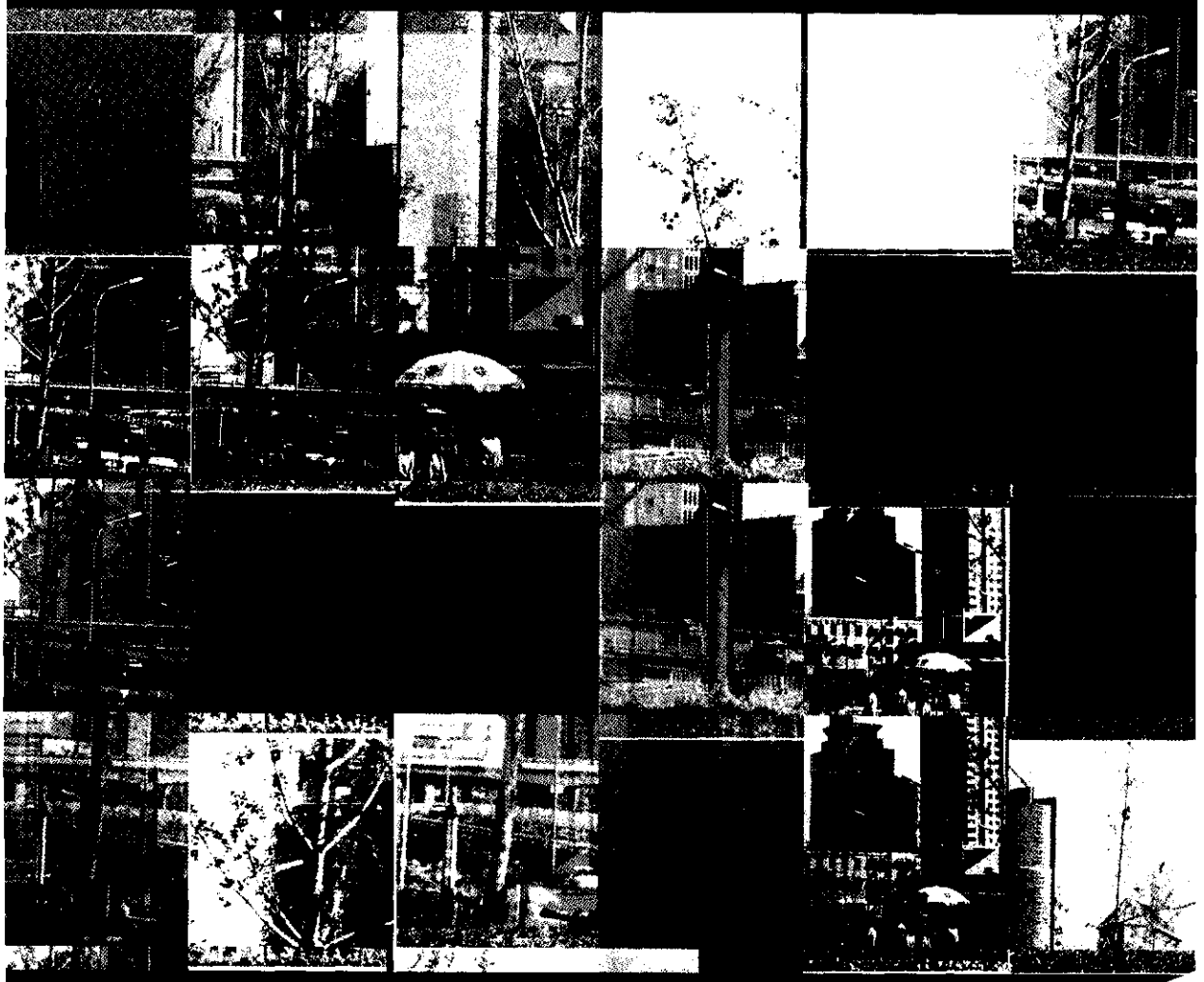
Transnational Buildings



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Transnational Buildings in Local Environments

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Transnational Buildings in Local Environments

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Preface and Acknowledgments

The office building is the most intriguing type of building in the contemporary world. It synthesises the current post-industrial era of late modernity; an era that has introduced a new, globally interconnected social system based on information technology. The office building displays the power of the modern corporation while centralising the command-and-control activities of the globalised economy. It is an internationally oriented commodity present in almost every nation; a visible symbol of local economic wealth, social, technological and economic progress, which rules – and yet transcends – the skyline of the contemporary global city. More than a local structure, the office building is now a transnational building, part of a broader socio-spatial matrix where key cities now meet. Probably few other building types depict so clearly what Castells calls a 'node and hub' of the network society, i.e. the crossroads between the highly dynamic world of global economic exchanges, governed by worldwide information-based flows, and local realities and (environmental) problems, governed by the dynamics of the place. My aim with this study is to explore how the transnational building may turn into a green building.

Several individuals and organisations provided generous financial and intellectual support without which this study would have not been completed. I would like in the first place to express my deep gratitude to Wageningen University's Environmental Policy Group as well as to Wageningen University and Research Centre (WUR) and Wageningen University Institute for Environment and Climate Re-

search (WIMEK) for enabling this research and its field studies financially. I am more than indebted to my promoters Professor Arthur Mol and Professor Gert Spaargaren for their time, encouragement, critiques, and inspiring exchanges that indeed built up the foundation for the material presented in this study. Professor Mol, thank you for inviting me to your Group to start the study; Professor Spaargaren, thank you for telling me when to end it. Looking now at the completed research, I honestly do not know where their ideas finish and where mine begin.

This research has also benefited enormously from the support of the Institute for Housing and Urban Development Studies in Rotterdam, particularly at its beginning. I am mostly grateful for Ir. Jaap de Vries for providing me the opportunity to collaborate in the setting up of a course on sustainable building at the Institute, as well as for helping me to overcome a number of obstacles along the way. Dr. Okke Braadbaart also played a central part in the materialisation of this study and I would like to express my deep gratitude for his encouragement to continue and conclude it. I also gained greatly from – and am most thankful for – the guidance and insightful comments provided by Professor Isa Baud during my stay at the Institute.

Many thanks are of course due to the persons interviewed for the research (listed in Appendix 1), who provided the information that forms the empirical body of this work. Many of these interviews were indeed inspiring to me. I would like to note Architect Roemer van Toorn, Professor Peter Schmid, Architect Max van Huut, and Dr. Juriaan van Meel (in the Netherlands); Architect Jorge Wilheim and Architect Renato Siqueira (in Brazil); and Architect Zhaohui Wu, Architect Cui Kai, and Ms Patricia Lamberts (in China) for their special attention in receiving me for interviews. Thanks are also due to Dr. Song Yehao for revising and providing helpful comments on my chapter on Beijing.

Since the start of this research I have been living in four countries, travelling between cities in different continents. A number of friends and colleagues have been really important in all these crossings, of whom I would like to mention a few: Zhang Lei, Peter Ho, Kris van Koppen, Susan Martens, Bas van Vliet, Corry Rothuizen, and Dick Legger (in Wageningen); Ronald Boon, Ester van Steekelenburg, Ed Frank, Marijk Huysman, and Mingshun Zhang (in Rotterdam); Fabio Zeppelinni, Ana Flora Murano, Anand Hemnani, Maria Alice Zerlotti, Maria Carolina Duva, Eliana Biscaia, Icaro Cunha, and Clarice Vaz (in São Paulo); Claude and Marianne Podeur (in Paris); the Ambassador Afonso and Lucy de Ouro Preto, Yu Ji, Yi Liu, Feng Yencheng, and Du Pengfei (in Beijing).

Finally, and it goes without saying, my family deserves most thanks for motivating me in this (long) project. I am most grateful to my father José Roberto, my mother Lucia, and especially to my sister Roberta, for their support and understanding for my absence, for their sharing with me difficulties and joys. I would like to dedicate this work to them and also to Michel for helping me, for his good ideas – and for so many good times.

Bangkok, January 2004.

Propositions

1. More than a local structure, the office building transcends the city's skyline interconnecting urban spaces via information flows.

   "This thesis"

2. Transnational buildings as nodal points between global flows and local infrastructures can trigger the ecological modernisation of the urban environment.

   "This thesis"

3. If "architecture is a technique determined by social problems" (Oscar Niemeyer, Brazilian architect) and "ecological problems are growing social problems" (Ecological Modernisation Theory) it follows that ecological problems shall more and more dictate the development of architecture.

4. *One bee makes no honey; one grain makes no rice soup. A single tree makes no forest; one string makes no music. (Chinese proverb)*
   Local environmental politics in combination with global environment management strategies may turn isolated green building examples into worldwide sustainable urban infrastructures.

5. By internationalising Ecological Modernisation Theory through scholarship programmes directed especially at developing country researchers, Dutch academics and policy makers are diffusing worldwide the Dutch pragmatism to tackle environmental problems.

6. Universities are also transnational spaces, hubs of globalisation where ideas evolve. Exchanges among transnational students and researchers should always be fostered worldwide – not only for the development of science today but also for achieving social justice among nations tomorrow.

These propositions belong to the dissertation "Transnational Buildings in Local Environments", defended by Luciana Melchert Saguas Presas on March 30th 2004 at 16:00 hours in the Auditorium of Wageningen University.

Contents

List of figures, tables, and charts

List of figures

List of tables

List of charts

Abbreviations

ACCA21	Administrative Centre for China's Agenda 21
AMvBs	The Netherlands Standard Rules for establishment types
ANEEL	Brazil National Electric Energy Agency
BREEAM	Building Research Establishment Environmental Assessment Method
CBD	Beijing Central Business District
CERES	Coalition for Environmentally Responsive Economies
CETESB	São Paulo State Agency for Environmental Protection
DAEE	São Paulo State Department of Water and Electric Energy
DSM	Demand Side Management
DWR	Dienst Waterbeheer en Riolering, Amsterdam's wastewater treatment company
EMPLASA	São Paulo Metropolitan Planning Company
EMS	Environmental Management Systems
EPA	United States Environmental Protection Agency
EPA	The Netherlands Energy Performance Advisory
EPN	The Netherlands Energy Performance Standard
EU	European Union
G3	Europe, Japan, and North America (or triad)
GATT	General Agreement on Tariffs and Trade
GWL	Amsterdam's water supply company

IMF	International Monetary Fund
IPT	São Paulo Institute for Technological Research
LTA	The Netherlands Long Term Agreement for energy consumption
ICC	International Chamber of Commerce
ISO	International Standardisation Organisation
IT	Information Technology
LEED	Leadership in Energy and Environmental Design
MAI	Multilateral Agreement on Investment
MEAs	Multilateral Environmental Agreements
MINEZ	The Netherlands Ministry of Economic Affairs
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
PACDEE	Brazil Annual Programme against Electric Energy Waste
PURA	São Paulo Programme for Rational Use of Water
SABESP	São Paulo State Company for Drinking Water Supply and Sewerage
SEHAB	São Paulo Department of Housing
SEPA	China State Environmental Protection Administration
SEMPLA	São Paulo Department of Planning
SZW	The Netherlands Ministry of Social Affairs and Employment
UN	United Nations
UNCHS	United Nations Centre for Human Settlements
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNCED	United Nations Conference on Environment and Development
VROM	The Netherlands Ministry of Housing, Spatial Planning and Environment
WTO	World Trade Organisation

1
Introduction

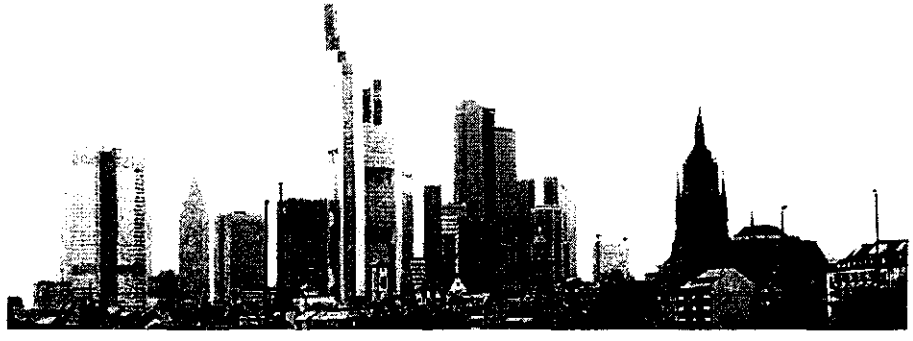

Figure 1.1
Commerzbank headquarters, Frankfurt.

IN 1997, THE TALLEST skyscraper of Europe was inaugurated in the centre of Frankfurt to serve as the headquarters of a major German bank. Beyond its technical innovations, this building also marked a major step in the urban policy field – it was the first skyscraper constructed to comply with ecological conditions. These conditions represented the outcome of a long decision-making process, involving the bank's directors, local politicians, and utility managers. After years of negotiations, they became the basis of a covenant signed by the bank and Frankfurt's urban planning department.

The first ideas for the Commerzbank headquarters (see Figure 1.1) had in fact come forward in the 1980s, when the directors decided to construct a large office complex in the city centre with the goal of relocating the staff, at that time scattered in different office units in Frankfurt. While several feasibility studies were carried out by then and various options considered, the project was time and again opposed to by strict municipal policies aiming to outlaw high-rise developments. Among other drawbacks, such a building would pose a burden to the local infrastructure and environment, worsen traffic congestion, and break ranks with the local architectural style.

A more flexible approach seeking to balance such interests would only be made possible some years later when, paradoxically, the German green party ascended to the local government. The proposed solution was to subject the construction permit to a series of criteria that would benefit the city, to be negotiated be-

tween the different parties. These criteria included a range of ecological factors, including prescriptions for a reduction of energy consumption.

These prescriptions, too, represented a major move in the energy policy field. Since the 1970s, German policies had mainly insisted on end-of-pipe strategies, such as targeting the energy use of air-conditioning and other energy-intensive equipments. With this project, urban planners aimed to go one step forward and introduce clean technology approaches, creating the first naturally lit and ventilated skyscraper in the world.

The architecture of the Commerzbank was developed thereby around an equilateral triangle surrounding a central atrium, with a cladding system based on a triple glazed layer, allowing natural ventilation in the tower, hence decreasing its cooling load. As a result, the building achieved a high level of energy efficiency, consuming around 60 percent less energy than a regular building constructed in a similar climate for the same purpose in the same era. In addition, it achieved a quite high degree of overall environmental performance by incorporating a water efficiency system, considerations for the use of materials and indoor micro-environmental quality, and minimum parking facilities to encourage the use of public transport.

And it also turned out to be a good investment, at least in terms of marketing, despite the high costs involved. The directors claim that with its new headquarters, the Commerzbank produced a global icon sealing the image of a solid and innovative multinational company seriously committed to its social and environmental responsibilities.

But to what extent would such environmental responsibilities also apply to the design and operation of the bank's offices elsewhere? While this building received much publicity highlighting the bank's environmental concerns, it appears that no further questions have been raised as to whether the Commerzbank fulfils the same environmental standards in its premises in other cities. If it does, is it then possible to conceptualise the environmental innovations deployed in a building in Frankfurt as the anchor for a transnational network of urban environmental management?

Transnational buildings in local environments

This turn of millennium is an era of pronounced transformations. Information technologies have revolutionised the means of production, changing labour relations, and allowing a dispersal of economic activities around the globe. This era is also marked by the liberalisation of financial markets and basic services and the multiplication of foreign direct investments and international trade activities worldwide. Companies, too, have internationalised their activities along global assembly lines, as their factories, deposits, and headquarters are now dispersed on different continents. And cities, conversely, have become sites where this new dynamics is re-centralised, serving as agglomeration centres for the co-ordination and management

of a complex web of activities of global economic institutions. Sociologists claim that with globalisation major cities as London, Paris, New York, and others have become 'nodes and hubs' at the crossroads of circuits of people, information, capital, and goods that traverse them (Castells, 1996; Smith, 2001).

As a result, the city has also been undergoing marked transformations in the era of globalisation. Certain 'transnational urban spaces' have emerged, which, while located within a national territory, provide a direct and continuous link between the local and the global. These include business districts, export-processing zones, offshore banking centres, and corporate headquarters connecting key cities and creating, in turn, a network of simultaneity in which local, translocal, and transnational ideas, images, technologies, and management practices navigate. Consequently, within cities a context of 'transnational urbanisation' is now developing, as these transterritorial connections of social practices – from above and from below – are now *fusing* in the urban space, to some extent homogenising, worldwide, its metabolism and shape. More and more we see that major cities are growing alike as well as undergoing the same kinds of transformations – to the extent that they are now composed and occupied largely by the same architects, investors, suppliers, developers, and global economic agents.

A number of authors have analysed these transformations by focusing on their different facets – e.g. the effects on spatial planning, local labour markets, local culture, etc. The urban environment, however, still remains a relatively untouched topic of research in these debates. Along the spatial and economic transformation that major cities have been undergoing with globalisation, multiple environmental stresses are also being added to the urban space – stresses for which office buildings bear a significant share of responsibility.

In the first place, the density of the urban tissue is increasing considerably due to the agglomeration of economic activities. This is prompting a sharp agglomeration as well as verticalisation of the urban space – turning it into a kind of 'dome' of environmental challenges that concentrates pollution, heat absorbing materials, reflective surfaces, and on the like. As a result, office buildings are more and more compelled to adopt 'environmentally sealed' designs to avoid external pollution, such as the 'glass box' concept (e.g. curtain wall). In doing so, they are also becoming more and more dependant on automated, resource intensive systems of acclimatisation and lighting to operate – translating into higher running costs and significant environmental loads. It follows that, irrespective of the location, the urban space is being trapped into a vicious circle of worsening exterior environment and a spiralling consumption of natural resources.

Dealing with the environmental externalities of the urban office stock is a multifaceted challenge. As the Commerzbank's case shows, it demands a scope of strategies spanning many scales, from the level of individual buildings to total urban planning, and encompassing policy, managerial, and technical solutions. It also involves social dynamics concerning a wide range of actors – regulatory, planning and environmental institutions, companies, investors, contractors, energy and water utilities, among others – with possible conflicting interests. Adding to this com-

plexity, this web of interests is further entangled in a globalising modernity as these actors are also part of global networks of stakeholders, such as multinational companies, international property investors, foreign contractors, and global utilities.

The aim of this study is to analyse how both cities and companies are managing environmental flows (e.g. energy and water) in urban office buildings, but to also go one step further. Beyond exploring how urban environmental reforms are developing in the era of globalisation – the diverging interests and concerns of local and global actors, their power relations, and decision-making processes in the continuum public-private – this study intends to explore the extent to which global companies such as the Commerzbank may constitute worldwide channels for the consolidation of new approaches, or new rationales, for enhancing the environmental performance of office buildings in different cities. Its main hypothesis is that, while migrating to different cities bringing into the urban space homogenising effects in terms of environmental disruption, the system of global companies may also bring in positive influences, which one way or another may trigger an environmental reform or an ecological *modernisation* of office buildings from city to city. Thus, while globalisation may intensify local environmental problems of major cities, it may also contribute to their reversal.

Central research question

The hypothesis that global companies may contribute to the ecological modernisation of office buildings brings the central question of this research to light. Since the 1970s onwards, environmental observers have diverged opinions on the role of transnational economic agents vis-à-vis the environment, as to whether they contribute to the globalisation of environmental problems or to the globalisation of environmental reforms. Many environmentalists have argued that gaps in national environmental standards draw the most polluting Organisation for Economic Co-operation and Development (OECD) industries to developing countries, creating pollution havens and propelling a 'race to the bottom' in environmental standards. Conversely, proponents of globalisation have claimed that global market forces may also diffuse best management practices and that multinational companies, in most cases from OECD countries, create pollution 'halos' in developing countries. Yet, while international environmental conventions, codes of conduct, and the like[1] have increasingly pressed multinational companies to homogenise their environmental standards on a global scale, this is not necessarily so with the environmental impacts of their physical premises: buildings, offices, facilities, and the like. Likewise, while environmental innovations are being more and more incorporated into the running of corporate offices at least as far as their home-countries are con-

[1] For instance, the International Chamber of Commerce Business Charter for Sustainable Development, Agenda 21, OECD guidelines, and the Coalition for Environmentally Responsive Economies (CERES) Principle, among others.

cerned, the extent to which this is happening on a global scale remains under-investigated.

Still, the urban space has traditionally been dealt with by locally embedded planning and regulatory processes, as well as serviced by local utility companies. We therefore may assume that approaches in urban/environmental policies adopted by different cities – a product of the different political systems, markets, and stakeholder relations, among others – may either facilitate, stimulate, or perhaps overrule the potential import of environmental innovations into the urban space through this transnational corporate network. In this context, evaluating the mechanisms through which multinational companies are putting in place in-house environmental management approaches in their different offices worldwide, requires an evaluation of the *interface* between the environmental management routines triggered by such companies and the diverse local environmental management routines embedded in the different cities where they operate. In this respect, the central question this study seeks to answer is: *How is the environmental restructuring of transnational buildings developing at the interface between corporate environmental strategies and urban environmental policies?*

To deal with this question, this study is carried out along three strands of specific objectives:

- Analyse the environmental profile of the premises of global companies and determine the major dynamics governing their in-house environmental management strategies both in the local (home-country) as well as global (foreign branches) contexts.
- Analyse and determine the major dynamics governing the urban planning and utilities management processes of major cities in the sense of enforcing, promoting, or perhaps inhibiting the environmental management of their office buildings.
- Explore, interpret, and understand the interface between local environmental management strategies (urban planning and utilities management level) and global environmental management strategies (corporate level) in the greening of urban office buildings.

In general, global companies have started to include in their day-by-day managerial decision-making a number of environmental considerations, particularly due to emerging environmental regulations, scientific studies regarding the impacts of production, and new environmental concepts and tools. Environmental management has already been institutionalised as a fundamental practice within their agendas (e.g. Wever, 1996; cf. also ABN AMRO, 2000b; IBM, 1999). This new *modus operandi* has also started to affect the way such companies relate to the environmental aspects of their offices, particularly in their home-country contexts (usually in the OECD, for instance the Commerzbank, AT&T, Duracell, ABN AMRO, Reuters, etc.). Common concerns include the handling of wastes and hazards, but also the overall energy and water efficiency standards of their offices, and their related emissions such as carbon dioxide (CO_2) from energy consumption (see, for

example, Bouman, 2000; Davies *et al.*, 1997; Gissen, 2003). As a result, many such companies have started to better monitor the use of resources in their offices and improve the technologies of resource intensive climate, lighting, and other systems.

At the local level, and recognising their environmental challenges, the overall urban planning strategies of major cities are also increasingly incorporating concerns for environmental protection and energy conservation. Policy-makers have started to pay more attention to the environmental performance of spatial areas, particularly of business settlements, and to propose solutions such as innovations in the building code, environmental labelling schemes, eco-taxation, urban (re)development, and so on (see, for example, Edwards, 1996; Rogers, 1997). Parallel to this, utility companies handling energy, water, and waste services – many of which have been privatised and are confronting conflicts between environmental management and their business logic – have also started to provide advice on conservation strategies, as one more service they offer to their corporate clients (see, for example, Chappells *et al.*, 2000; van Vliet, 2002).

Finally, at the local-global interface level, and as the Commerzbank's case shows, urban policies are serving as activators of corporate environmental strategies. Likewise, corporate environmental strategies are also triggering local environmental reforms. Yet, the ways through which local and global management practices will interface in different locations may prompt similar, different, or even *hybrid* policy arrangements in this era of transnational urbanisation (local + global, state + market; cf. Cohen, 1996; UNCHS, 1999). In other words: while companies (presumably) aim for consistent environmental management solutions for all facilities worldwide, different cities, concurrently, (presumably) also attempt to solve their environmental challenges by providing suitable incentives towards the environmental restructuring of the urban space. Therefore, environmental innovations that result from this interaction vary not only in their local and global steering mechanisms, but above all in the 'glocal' condensation of such mechanisms. That is, the globalisation of environmental innovations receives local flavouring, forming numerous glocal combinations of urban environmental reforms.

The organisation of the enquiry

This study takes as its point of departure the debate on globalisation, modernity, and the environmental transformation of the urban space (chapter 2). In this debate, parallels are drawn between globalisation and the rise of environmental externalities in transnational urban spaces.

Conversely, trends that are currently emerging in the environmental restructuring of transnational business settlements are discussed in chapter 3, taking into account their technical, societal, managerial, and political dimensions. These trends are subsequently reviewed along the most prominent debates highlighting the relationship between society, environmental disruption, and environmental reform. As shall be demonstrated in the fourth chapter, the ecological modernisation theory is

elected in this research to frame our empirical enquiry, as it combines a focus on the social context of technological change with a broader perspective on the relationship between the globalising modernity and environmental reform.

As described in chapter 5, this study adopts an intensive, explorative research strategy to investigate the interface between local and global actors in relation to urban environmental change. The explorative case study methodology allows us to analyse in detail and compare the different mechanisms in place in different cities. The research analyses 12 case studies focusing on the interception between the urban environmental policies of three cities – Amsterdam, São Paulo, and Beijing – and the corporate environmental strategies of four multinational companies – ING, ABN AMRO, Andersen[2], and IBM. Our methodological choices and selection of case studies are explained in this chapter as well.

Chapters 6 to 8 comprise the empirical part of the study, analysing the local and global societal interaction in the environmental management of office buildings in the cities of Amsterdam, São Paulo, and Beijing. Each of these chapters begins with an overall description of the 'locality' of the space, including its main characteristics, infrastructure and environmental profile, regulatory framework, and local environmental policies. Each chapter then moves on to explore the global environmental strategies that are possibly emerging, by analysing the premises of the four companies. In each of these chapters we develop a conclusion as to how the local and global management of environmental flows meets and interacts, and how this affects the environmental restructuring of the office stock of each of the three cities.

Chapter 9 reverts to the local-global, city-company, public-private interactions by exploring the actors at play and analysing the resulting environmental innovations. In this chapter, the study reaches its objective of explaining how the greening of transnational buildings is developing in our 12 cases. From this analysis, we describe and interpret the mechanisms through which environmental innovations are emerging, as well as indicate those that should be enhanced to activate the ecological modernisation of office buildings in the era of transnational urbanisation. Based on these conclusions, we also review the innovative theoretical propositions elaborated in this study, suggesting directions for future research.

[2] Although Andersen is now extinguished as a company, the research was carried out throughout 2001 and 2002, therefore practically all the information regarding this company was raised.

2

Globalisation and the Environmental Transformation of Major Cities

STARTING IN THE MID-1960s, large companies and financial institutions have internationalised and dispersed their production processes along 'global assembly lines'. Cities as London, New York, Paris, Bangkok, and others have thereby emerged as nodal points within an increasingly globalising geo-economy, where such dispersed production processes are reintegrated, materialised, and controlled. As a result, while these cities have started to play a key role in the dynamics of the globalising economy, these dynamics, in turn, have been reshaping not only their socio-economic order but also their *spatial forms*. From city to city, 'transnational spaces' are being created prompting a sharp verticalisation and densification of the urban space, with intensified environmental and infrastructure challenges.

Traditionally, cities have been analysed as closed spaces with local problems. Nowadays, however, the intersection of global and local social agency requires an understanding of numerous realities so to grasp the transformations of the urban space. The aim of this chapter is to highlight the implications of such new realities to major cities, focusing on their environmental dimensions. First, an introductory section outlines the most prominent debates about the relationship between globalisation and modern societies, exploring such topics as culture, economy, and politics, and also discussing some aspects of the environmental question. After this introduction, we analyse how globalisation is affecting the composition of the urban space as well as triggering environmental challenges.

Globalisation and modernity

The concept of globalisation started to appear in the social sciences vocabulary beginning in the 1980s. Within one decade it reached a firm position and became one of the key concepts for analysing and understanding the modern world. The main definition of globalisation in the *Oxford Dictionary of Sociology* describes it as a theory that examines the emergence of a global cultural system, which materialised as a consequence of a variety of social and cultural developments, including the consolidation of a global economic system. The concept of modernity, in turn, can be referred as a new mode of societal organisation that started in Europe in the seventeenth century and became influential more or less worldwide (e.g. Giddens, 1990). As can be noted, modernity and globalisation are concepts very closely interlinked and for this reason certain observers introduce the thesis of the 'myth of globalisation', refuting the notion of a globalised world order as something new. These observers claim that the current internationalised model of economic practice is not unprecedented, that truly transnational companies are fairly rare, that foreign direct investments remain concentrated on the richer regions of the world, and therefore that the world economy is also not global, so to speak, but remains concentrated on the region known as triad, comprising Europe, Japan, and North America, also referred to as the G3 (Hirst *et al.*, 1996). They also argue that the G3 exerts tremendous economic power putting pressure on financial markets and other fields of business, so that global markets are in fact not global, but following a logic determined by the triad.

In contrast, various other scholars share a consensus that certain pronounced transformations started around 30 to 40 years ago, with the emergence of an information society and the growing sense of global interconnectedness and consciousness. These theorists claim that such transformations have brought about a new phase in modernity, which can no longer be restricted to the mere internationalisation of business practices, but which have also reached other spheres of society and human life. Understanding these transformations, to them, has become an essential condition for understanding contemporary events, particularly since the early 1990s. Yet, although they agree with the magnitude of such transformations and with the emergence of a new world order, namely of globalisation, interpretations of these transformations vary according to different intellectual traditions, where two main theses have dominated.

According to one strand, globalisation can be understood as the corollary of the processes of interdependence and interconnectedness that started with capitalism around 400 years ago. In that era, Europe began to exert influence on the rest of the world, through colonialism and later on imperialism, and to transplant European cultural institutions on all continents. One of the strong defenders of this theory is Wallerstein (1990) – followed by Robertson, Gordon, Glyn and Sutcliffe, and Hirst and Thompson – stressing the *continuity* of the internationalisation of the world economy, parallel to the development of capitalism, with globalisation being, within this perspective, the aftermath of the process.

The second strand states that globalisation can be interpreted as a new phase in modernity, which indeed goes beyond the previous period of internationalisation. While most scholars of the discontinuity school do acknowledge that historically global interconnectedness and interdependence did exist, they disagree with the other group who claim globalisation to be a by-product of the capitalistic system. These theorists attribute this new phase to certain fundamental technological changes that have been occurring during the last 30 to 40 years, which are irreversibly reshaping the world's societal systems. Authors as Giddens, Castells, Dicken, Urry, and Held, emphasise the role of new information technologies that have provided new forms of mass communication, with potentials hugely extended by satellite transmission systems and fibre optic cabling. These new technologies, in addition to the advent of mass travel technologies, have brought about an acceleration and compression of units of space and time, and in turn an 'annihilation of space through time' (Giddens 1990). As a consequence, the relationship between the individual and the world has been drastically intensified as social interactions routinely span global reaches. At the same time, a network society has emerged operating on 'space of flows' (flows of capitals, knowledge, information, images, sounds, symbols, and so forth) and on 'timeless time', in simultaneity and immediateness (Castells, 1996). Giddens summarises the discontinuity theory by claiming globalisation to be a process that enabled a disembedding of social systems, i.e., the '"lifting out" of social relations from local contexts of interaction and their restructuring across indefinite spans of time-space' (1990, p. 21); a phenomenon unprecedented in history[3].

Moving the discussion beyond this continuity/discontinuity duality, sociologist Malcolm Waters (1995) also provides a distinction between 'old' and 'new' theories of globalisation. Old theories have developed since about 1975, regarding topics as modernisation and convergence (e.g. Parsonian functionalism), world capitalism (such as Wallerstein's world system theory), issues of international relations and the growing interdependence of countries, as well as McLuhan's global village concept. These theories attempt – arguably unsuccessfully – to identify and

[3] Theories of globalisation are not restricted to this continuity/discontinuity dichotomy, however. Authors as Scholte (1996) and Held *et al.* (1999) tried to distinguish other schools of thought in the globalisation debates. Beyond those that decry a globalisation hypothesis (what they call as conservatives or sceptics, respectively), these authors also agree with identifying what can be called the hyperglobalist thesis, advanced by critics mostly concerned with issues regarding power and politics, claiming that the nation-state is weakening vis-à-vis the growth of global business practices, particularly of transnational networks of trade, finance, and production. This group sees thereby globalisation as the current imperialistic trend of rich countries exploiting poorer ones, i.e., the americanisation or westernisation of the world. Unsurprisingly, on the other side of the spectrum Scholte also notices the emergence of a liberal group, constituted of neo-liberals and reformists, who are now celebrating globalisation and its fruits. (In fact, Scholte identifies three main schools of thought – namely the critics, the liberals, and the conservatives – while Held *et al.* identify the sceptics, the hyperglobalists, and the transformationalists, the latter comprising of those that analyse globalisation as a social phenomenon that has brought qualitative changes in cross-border transactions, such as Giddens and Castells with the notions of 'time-space compression' and 'space of flows', respectively.)

explain the prime causes triggering globalisation. New theories, conversely, seek pluralistic causality behind the social processes and transformations bringing about a globalised world order. Starting in the late 1980s, particularly with the work of Robertson, followed by Giddens, Castells, Urry, and others, these new theories are interesting in that they began to provide growing contributions to the debates and controversies revolving around the relationship between globalisation and modernity: reflecting on the dynamics of the 'glocal' (the intersection of global and local flows of capital, people, information, etc., and thus the heterogenising effects of globalisation); and also interlinking globalisation with the environment. What is interesting, too, in this new context is that a parallel body of scholarly research has started to emerge that explores the relationship between globalisation and urban transformation, also in view of such glocal constructions.

The coming sections of this chapter explore these new theories of globalisation. First we provide an abridged analysis of the social restructuring process following the advent of globalisation, reviewing the consequences of globalisation to the different social subsystems[4], namely the cultural, the economic, and the political, and also bringing some insights to the environmental issues of advanced modernity. This analysis, not exhaustive, attempts to provide an overview of the main concepts currently being debated, so to complement or provide a better understanding for the discussion that will follow. At that point we shall shift our focus to the urban dimension and explore the different theses and debates revolving around the transformation and restructuring of major cities in the era of globalisation, mostly through the work of key scholars such as Friedmann, Sassen, Castells, and Cohen. The chapter closes with a number of observations about the urban environment vis-à-vis the spatial transformation being forced onto major cities in the age of globalisation.

Social transformation and restructuring[5]

It is probably logic to start an analysis of the transformation and restructuring of society in view of the processes brought about by globalisation by exploring the cultural dimension, one of the main domains of modernity affected by globalisation. This is in addition a relevant debate for the study of urban spatial transformation, which we shall return to at another stage in this chapter. The emergence of a global cultural system indicates that a variety of social and cultural developments are creating a globalised culture, through the expansion of mass communication

[4] The social system theory was elaborated by Talcott Parsons, defining that any social system comprises of four subsystems, whose related functions serve to uphold the whole, which are: the cultural, the economic, the political, and the social.

[5] An important distinction should be clear: by social/urban transformation we mean that the system changes its objectives, becoming thereby a different system. In turn, when the system changes the institutionalised ways to achieve its systemic goals, there is a process of social/urban restructuring (see Castells, 1989).

systems, the rise of global consumers with similar standards of consumption, the rise of cosmopolitan citizens, the internationalisation of the sports industry, the development of global tourism, and so forth (Marshall, 1998). This suggests that globalisation has, at least on the surface, a homogenising effect on products and places, together with the capacity for introducing cultural evenness.

Exploring this homogenisation effect, urban planner Michael Cohen (1996) analyses the transformation of cities in the North and South in the age of globalisation. By looking at the growing similarity among major metropolises in North and South, such as New York, Shanghai, São Paulo, London, he raises an 'urban convergence' hypothesis. He claims that similar processes are transforming such metropolises spatially and institutionally, and bringing many types of problems with them, including environmental ones. Along the same theoretical line of reasoning, sociologist George Ritzer (2000) explores a thesis of the McDonaldisation of society, critiquing the growing homogenisation that comes from worldwide restaurant chains, shops, products, and so forth.

Other cultural theorists suggest, in contrast, that globalisation has both homogenising and heterogenising effects. Roland Robertson (1991, 1992), for instance, claims that it is not enough to interpret globalisation as the mere westernisation or the Americanisation (or even the McDonalidisation) of the world. He thereby explores the notion of 'world compression' – which takes place through the growth of interdependencies, such as those introduced by information technology, mass communication, mass travel, and so on. This in turn has intensified the notion of 'global consciousness', that is to say, the notion that the world is intrinsically interlinked and that events that take place in one corner of the planet inexorably affect another[6]. Consequently, in this increasingly compressed world, nationally constituted societies are also increasingly exposed to internal and external multiculturality, which is due not only to the hypermobility of people but also to the hypermobility of information, images, symbols, products, and so on. Mobility via the different media assaults societies on a global scale, such that the local is intrinsically affected by the global and vice-versa. Curiously, at the local level this exposure to globalisation produces both self-enforcing and transforming identities – i.e., people tend to seek their individuality and self-actualisation by diverging from global trends, while at the same time making use of such trends as long as they provide them some type of benefit. This leads in turn, according to Robertson, to both kinds of effects of globalisation in different local contexts: particularity and difference, on the one hand, and universalisation and homogenisation, on the other. The result is the 'interpenetration of the universalisation of particularism and the particularisation of universalism' (Robertson, 1991, p. 73).

Examples of these effects of homogenisation and diversity are numerous. Mol (2001), for instance, recalls the case of global cultural producers, such as CNN, which, although broadcasting essentially the same news, have to adapt their

[6] An example here could be the growing awareness that environmental problems that take place in the Amazon, for instance, will affect the environmental quality of other parts of the planet, or, another example, that deforestation in Malaysia will bring air pollution to Singapore.

programmes according to the specificity of each market. The same applies to other producers, particularly multinational companies, whose products need to receive local adjustments to suit local consumers' tastes. Good examples here are the case of McDonalds that, in spite of selling the same ranges of products in its branches all over the world, readapts these ranges (introducing new products, eliminating others) according to the local markets. Similarly, the automobile industry also has to take into consideration such homogenising effects as the same manufacturer producing the same car must adapt this car for different markets, changing exhaust types, driving wheels, lighting systems, and the like. In this context, trends of homogenisation, particularly in the economic sphere of production and consumption, are always challenged to diversify according to local particularities, rendering the McDonalidisation or evolutionary convergence theories somehow inappropriate for discussing, at the moment, the implications of globalisation to local structures.

Another major debate in line with this global/local interplay is the one proposed by Anthony Giddens (1990), who explores the interpenetration of the global and the local from a slightly different perspective[7]. Together with Ulrich Beck (1992, 1999) he interprets globalisation as a phenomenon that occurred because the main traits of a first phase of modernity – namely, mass production, mass communication, and mass consumption – triumphed, giving birth to certain interlinked processes of globalisation, individualisation, gender revolution, underemployment, and, not the least, environmental crisis. Therefore, *because of* globalisation, modernity has now entered a new phase, the one he calls 'reflexive modernisation'. The term 'reflexive' stands for the constant re-examining or re-evaluation of modern social practices resulting from the massive influx of information that individuals and institutions have to face and absorb everyday, as a result of globalisation and its effects. It also explains the fact that modern societies are increasingly challenged to confront the negative consequences of modernisation itself, such as violence, environmental problems, poverty, and so forth. Unlike Robertson, who limits himself to a discussion of cultural issues, Giddens analyses this interplay of global/local also in terms of its consequences for social relations. He concludes that, at the level of individuals, at the core of a globalised culture lie feelings of anxiety, fear, uncertainty, which produce in sum a general loss of parameters. This scenario of unclearness, he goes on to say, drives people towards a process of 'life politics' or the search for self-fulfilment through the exploration of their own individuality, a search which may manifest itself as divergent consumerist options, new political beliefs, new religions and deviant social practices. Finally, at the institutional level, Giddens suggests that reflexivity triggers a new *modus operandi* involving decision-making, technology and science, management issues, and the like – which confront institutions with the need to constantly incorporate new information and knowledge, re-examine their practices, and go forward with the flux.

[7] While both Giddens and Robertson focus on the local/global relations, Robertson emphasises the cultural dimension, while Giddens focuses on social relations. Robertson has therefore criticised Giddens for overlooking cultural issues, and also for seeing globalisation as a consequence of modernity, while latter author sees it as a condition that has facilitated modernity.

What the urban environmentalist can learn from these debates is that dealing with local environmental problems is far from simple, even when globalisation contributes to enforcing, worldwide, the idea that environmental problems are serious issues of modernity that deserve a prime position in the local institutional agendas. There is not one single logic of environmental reform that would suit all the different situations, problems, and locations. This brings the notion of 'glocal environmental regimes' to the fore, as the homogenising effects of international environmental standards, corporate codes of conduct, and the like will need to cope with differing developmental/technological levels, financial disparities, political priorities, different urban ecosystems and other particularities of each specific place.

Beyond its cultural implications, globalisation is most often connected to the dynamics of the world economy, which historically may have started with the Pax Britannica of the nineteenth century or even earlier with mercantilism, events that triggered the growth of international trade activities. In a way, sceptics of globalisation are right in linking the activities of the so-called globalised economy with a particular geographic concentration, that is to say, in the triad region (or the above-mentioned G3, composed of the three economic regions which historically were the most advanced ones in terms of economy and industrial development). Following this line of reasoning, globalisation still largely remains a westernisation process, a fact that can be corroborated by four indicators: The first one refers to the role of multinational companies in the globalised economy; of the 100 largest multinational companies of the world, only one – Petroleas de Venezuela SA – does not have main headquarters in countries located in the triad. What is thereby claimed is that the corporate power of the triad has in fact increased during the past decades with the advent of globalisation and its neo-liberal variants, e.g. deregulation, demonopolisation, and privatisation of local companies. The second indicator relates to the uneven distribution of foreign direct investments worldwide, as these usually originate in the triad and end in the triad, much more than in developing countries as commonly thought. In the 1980s, for instance, 75 percent of all foreign direct investment stock remained in the triad, although investments into both developed and developing countries have increased ever since. Similarly, the third and fourth indicators – the expansion of trade flows and the development in financial products and services – also follow the patterns of foreign direct investments in terms of concentrating on the triad. In 1990, for instance, 75 percent of global trade businesses took place in the triad and that in the 1990s the circulation of goods and financial capital also concentrated on this region (Mol, 2001).

On the other side of the spectrum, and as explored by Ankie Hoogvelt (2001), there are certain developments in the global economy, which clearly did not previously take place. In the first place, with globalisation the traditional classification of primary, secondary, and tertiary sectors (agriculture, industry, services) has dissipated, whereas activities are now distinguished as 'real-time' ones (for which the distance and location are not relevant), and as 'material' activities (for which the limitations posed by location and transportation are still imperative). In this

context, the economics of globalisation – and its consequences for the 'real economy' – can be deconstructed according to three strands. The first one evokes the emergence of a 'global market principle', which is distinct from the previous notion of a global marketplace as countries, which in the past used to specialise in a particular product, now compete for the exports of the same products; a fact that is increasing competition while also prompting a dominant standard of price, quality, and efficiency set forth according to global parameters. The emergence of such global market principle has in turn reordered the way economic activities are organised; i.e., it has produced a new global division of labour, as a consequence of the delocalisation of the production of goods and services. This has particularly taken place as for the so-called material activities, following the emergence of 'global assembly lines', which of course have been facilitated by the reduction in logistics costs, allowing factories to be installed anywhere in the world. In turn, and as the logics of moving factories has followed cost benefit ratios, certain areas of the planet have been undergoing de-industrialisation processes, while others are being industrialised. In the same way, while manufacturing employment declines in highly industrialised regions, it augments in industrialising ones, changing the relationship – but also sealing the interdependency – between core and peripheral regions. The last strand of consequences regards the perpetration of real-time activities via a process known as 'global financial deepening'. This means that with globalisation money capital has become totally volatile for investment opportunities that may arise in the planet, and therefore move from one location to the other within seconds. This also means that profits have been deterritorialised also affecting the real economy, as in these transactions, to the same proportion that some win, others lose, and these are usually the economically less privileged ones. As a consequence, Hoogvelt finally claims that globalisation has also entailed a process of weakening social solidarity worldwide, and, one may add, of increasing the gap between the rich and the poor, between private interests and public interests, in brief: between the capital and the state.

Consequently, and in view of such transformations in the economic sphere, major debates have been initiated as to the implications of globalisation for the nation-state. These have primarily discussed the notion of the decline of national sovereignty, as the national bureaucratic and decision-making structures are increasingly changing and readapting themselves to the new, globalised world order. As Held (1995) and McMichael (1996) have argued, the political role of individual states has been also significantly reduced due to the emergence of new international forms of political and economic authorities – including for instance the United Nations (UN), the European Union (EU), North American Free Trade Agreement (NAFTA), the World Trade Organisation (WTO), and multilateral institutions, such as the World Bank (WB) and the International Monetary Fund (IMF). National sovereignty is claimed to have declined insofar as these authorities have started to deploy new instruments of governance that have a global reach, such as international laws, international conventions, and universal agreements (e.g. for trade, security, and environment), among other issues. With such instruments, supranational

authorities have also attained an internal logic, in turn with their specific interests and dynamics, trapping all governments into their system, and to some extent also undermining the power of hegemonic states as the USA.

(Hyperglobalist) theorists as Hardt *et al.* (2001) go one step further in this analysis and argue that national sovereignty itself has not declined with globalisation, but has rather taken a new shape. For them, national sovereignty is now composed of an interconnection of both national and supranational powers that together exert a new type of authority, which in turn operates and articulates the logics of capitalism or capital accumulation. For these authors, the emergence of supranational authorities represents a major shift from traditional international law, defined by conventional contracts and treaties, to the constitution of new supranational world authorities, which may exert totalitarian powers. Therefore, while in this policy-oriented discourse on globalisation it is usually accepted that most decisions are still made by national governments, an undeniable context has emerged in which supranational conventions legitimately – and powerfully – overrule domestic conventions.

The role of the nation state is also claimed to have declined due to the emergence of sub-political regimes – such as non-state or non-governmental actors. This argument suggests that these are actors that have also become important stakeholders in national/international decision-making processes. The presence of NGOs implies a new process of negotiation that emerges among the different actors (for instance, interfering between businesses and authorities) so that the state becomes less and less able to dictate regulations on its own (and the market to act as it wishes) and has to mediate conflicting interests. This new approach further reshapes the traditional design of political instruments to control a country, as it implies the incorporation of the interests of these new actors, usually in negotiation processes. In this respect, and while NGOs contribute to the consolidation of life politics, or to the ability of individuals to express their individual opinions politically, they also break down the centralisation of power and responsibility within and among the nation-states.

Finally, concerning the rise of an imperative global business culture, a number of authors as Castells, Hoogvelt, as well as Hardt *et al.* have denounced and condemned the fact that the modern state has lost much of its sovereignty in view of the forces of global networks of wealth, power, and information. These authors claim that large companies – such as multinationals and major financial institutions – increasingly exert also a political power, in turn rendering the authority of nation-states more and more insignificant. Here the debate on transnational urban spaces and the role of the local government in managing them has become another focus of debate. Particularly Catalan urban sociologists as Jorge Borja and Manuel Castells do even admit that major cities are in fact turning into the major 'multinationals' of the 21st century, trying to increase their power to attract investments and technologies, and the multinational companies that may provide them. A question that emerges in this context (and to which we shall return later on in this chapter) regards the capacity of the local government in controlling such global flows once

they settle on the urban space prompting, among others, numerous spatial transformations at a certain environmental cost.

Before moving on to the urban dimension, the last aspect of the relationship between globalisation and modernity – and the most relevant one for this study at this point – regards the consequences of globalisation for the environment. Of course this debate will be carried out with much more detail later in this text and in the following chapters of this study but it seems that at this point it deserves an introduction. The environmental question has appeared only incidentally on the globalisation discourse. One of the first contributions in this regard is provided by Giddens, who analysed the current ecological crisis – as well as the growing importance of ecology in the social system, particularly vis-à-vis the economic sphere – within the globalisation theory. In elaborating on the consequences of modernity, Giddens presented in 1990 the thesis that with globalisation an intensification of worldwide social relations links distant localities in such a way that local events are reciprocally influenced by events that occur in other localities. In 1991 he introduced in this reflection the issue of ecological problems, arguing that these problems contribute to amplifying the notion of global interconnectedness or the notion that global systems are growing increasingly interdependent. According to him, while environmental problems or environmental degradation may travel far away from its agent of causation, they may also lead to local heterogenising consequences, as the effects of environmental problems are not distributed equally in the world.

Reflecting on environmental problems and their uneven distribution in the era of globalisation, an interesting distinction has been provided by Michael Redclift (2000), who primarily reproaches transnational actors for the transfer of environmental degradation out of their territories. Of course, the spreading of pollution itself may be caused by risk industries, such as nuclear plants, chemical industries, or environmental intensive activities, such as deforestation, which not only imply local problems of desertification, once in advanced stage, but also global warming issues. The first variant of his analysis regards the *diffusion of sources* of pollution, which defines the spread of polluting industries especially from North to South. This statement holds as truth the principle developed on 'pollution haven', as the South, by in general terms having more lax environmental regimes and regulations, and also by having interest in attracting foreign investments, to a certain extent allows multinational companies to operate in their territories with little attention being assigned to the environment. The problems that may follow can be very severe and may also go beyond the national territory. In this sense, Redclift takes this analysis further and elaborates on a second form of global environmental impact that occurs through the *diffusion of impacts*, namely through the mediums of water, soil, the atmosphere, such as the dispersal of hazardous wastes and the threat posed by radioactive leakage and fallout, for instance. Such impacts can be generalised as 'global concerns' affecting the so-called 'global commons', many of which are contained in the texts of international negotiations, such as global warming, ozone depletion, and acid deposition. These problems may be interpreted as the negative consequences of globalisation (of

consequences of globalisation (of production and consumption) itself, that arise through the processes of global trade, foreign direct investment, economic decision-making, management concepts, increase of transportation for distribution of goods, among others.

This concern for the global commons became, in turn, a transnational tendency along with the intensification of environmental consciousness around the world. With globalisation, it can be argued that while the global economic activity with its unequal distribution of goods and money favours the North, it conversely also turns the North dependent on the South, due to the unequal distribution of resources and environmental space that favours the latter. Thus, while certain scholars advocate the rise of pollution hells in particularly the third world, others stand for the rise of pollution havens with the relocations of industries that may have a positive environmental effect in the South, with multinational firms propagating, worldwide, their trends in environmental management and technological reform. These authors explain that the issue regarding discrepant environmental regimes would only be marginal in the decision-making of industrial delocalisation; moreover, the economic benefit that might arise would be rather irrelevant as compared to the whole cost of the investment.

In the discourse of globalisation and the environment, particularly referring to the question of pollution haven, a leading author has been environmental sociologist Arthur Mol (2001), who analyses ecology as an emerging rationality in the social system, which is slowly catching up with the (still) dominant economic one. According to Mol, as the interdependence of North and South in terms of natural resources and technology increasingly intensifies with globalisation, it follows that there is plenty of room for positive results to emerge out of the relationship between globalisation and the environment. A globalisation of environmental reforms can thereby materialise following the worldwide introduction and consolidation of environmental management systems, as well as the intensification of international standards such as the ISO 14000 series[8]. A promising field is the growth of corporate voluntary initiatives, such as the Business Charter for Sustainable Development under the International Chamber of Commerce, the Coalition for Environmentally Responsible Economics (CERES), Agenda 21, OECD guidelines, among others, once sustainable industrial development becomes a common search between North and South. Finally, global economic institutions such as the WTO, IMF, World Bank, OECD, among others, are somehow increasingly being compelled to be transparent regarding the environmental side-effects they should be accountable for, somehow changing global governance with regards to environmental issues. These institutions are slowly promoting the harmonisation of environmental policies in view of global trade practices and foreign direct investment issues, via for instance the Multilateral Agreement on Investment (MAI), promulgated by the OECD, and the Article XX and the various Multilateral Environmental Agreements (MEAs) promulgated by the GATT/WTO regime[9]

[8] Although much discussion has aroused on the effectiveness of such standards as well as on the question whether they are affecting industries at all.

(MEAs) promulgated by the GATT/WTO regime[9] (Mol, 2001). However, and as Scott Vaughan (2001) alerts, much polemics are arising against the worldwide homogenisation of environmental policies, reflecting the point that as ecosystems are evidently not equal across countries, simply homogenising environmental rules on a worldwide basis may create situations of conflict among different nations and organisations, let alone a decrease in the environmental quality. On the other hand, however, this does not exclude the possibility of homogenising environmental policy *rationales*, as the expected target or standard may be achieved through different ways.

Globalisation and urban space

Within the framework of the new, above-described theories of globalisation that came forward since the 1980s onwards, a body of scholarly research started to also explore the relationship between globalisation and urban space. Before looking at these studies, a word or two about the concept 'urban space' is in order here to explain why such studies started to emerge: Space, following Castells' reading, can be interpreted as the expression of society – or a material product that relates with other material products which together provide it with a form, a function, as well as a meaning (Castells, 1996). If we see it this way, we can assume that the urban space is the product of social relationships that take place within cities. It is therefore a product that is in itself emblematic of urban societal functions, meanings, and values.

According to urban sociologist Saskia Sassen, cities have traditionally been analysed as contiguous urban spaces, or as the 'ecology of urban forms and the distribution of population and institutional centres' studied in terms of local 'people, lifestyles, and urban problems' (Sassen, 1994, p. xiii). However, as herself and a number of other scholars agree, this approach has now become incomplete. To the extent that (urban) societies started to undergo fundamental transformations with the advent of globalisation, the implications of such transformations to the local economy, culture, politics, and so forth, as described above, have induced profound changes also in the urban dynamics at the local level, translating into a new con-

[9] The main possibilities of global environmental agreements with a homogenising intent are at the moment the Multilateral Agreement on Investment (MAI) and the Article XX and the Multilateral Environmental Agreements (MEAs). The MAI was introduced in 1995 by the OECD as a decision to homogenise general agreements on investment (not only regarding the environment) in view of the growth of foreign direct investments by OECD members. Due to the intense criticism it incited, negotiations have been suspended since April 1998, and the idea of creating a 'level playing field' for foreign direct investments remains unachieved. The Article XX was introduced by the General Agreement on Tariffs and Trade (GATT, which came into force in 1948), listing certain provisions for environmental regulations. The MEAs are trade provisions designed to exert control over world trade (under the auspices of the WTO, in turn founded in 1993, at the end of the Uruguay round of GATT, to serve as un umbrella organisation supporting the GATT and the international trade system).

struction of the locality (Castells, 1996, Sassen, 1994). This new construction is prompting the rise of *transnational spaces* within the urban territory – such as business districts, airports, export processing zones, offshore banking centres, corporate headquarters – which provide a direct and continuous link between the local and the global; a fact unprecedented in the urban history.

It is in this context that a group of urban theorists began to incorporate globalisation processes and dynamics in their discussions to understand the major processes governing urban change. And it is also in this context that a body of scholarly literature emerged pointing to different hypotheses why certain cities as New York, London, and Tokyo – but also São Paulo, Singapore, and Frankfurt – have converted into major sites where globalisation processes somehow materialise, and subsequently where the urban space is being reshaped in a rather similar way. There are three main lines of theory that have dominated this debate – the postmodern city (David Harvey), the global city (John Friedmann and Saskia Sassen), and the informational city (Manuel Castells) – whose claims, though diverging slightly, converge at the idea that globalisation has now become a dominant reference point for understanding urban change:

Harvey (1989), to begin with, has produced a comprehensive body of Marxist urban theory in the urban sociology literature, speculating about the impacts of economic globalisation on cities. For him, the major economic rules of global capitalism have subordinated culture to the economic sphere, triggering thereby a new 'urban experience'. Also following the claims of Anthony Giddens, he posits that the notions of space and time have undergone a 'compression' with globalisation, also affecting the urban socio-temporal perception, and causing thereby a certain degree of social and psychic malaise and a growing sense of uncertainty. He calls this experience 'the condition of postmodernity'. Harvey contends that such feelings of anxiety and malaise have prompted the pursuit of life politics (cf. above) or local oppositional moves, which he yet believes to be a dead-end solution, because they do not lead to the development of a global political stance to face major global institutions or challenge the rise of globalised problems.

Yet, it is probably John Friedmann that should be seen as the first most prominent writer on the relationship between world economy and cities[10]. In his short but rather influential article *The World City Hypothesis*, published in 1986[11], Friedmann calls the attention to seven interrelated hypotheses to explore (or start

[10] Although Friedmann credits Harvey as well as Castells for the research they had been carrying out since at least the early 1970s, linking larger developments of industrial capitalism to processes influencing and transforming the urban space. According to Friedmann, it was precisely these authors that revolutionised the sociological concept of the city as a contiguous ecological ensemble subjected to the dynamics of local population and space to the one in which the city started to be interpreted as a product of social forces also triggered by world capitalism and the relations of production. But it would be only by the late 1970s that the city would start to be associated to the globalising economic scene as such.

[11] A previous article by Friedmann, *World City Formation: An Agenda for Research and Action*, co-authored with Goetz Wolff, had been published in 1982, introducing the first ideas, which would be further elaborated in the 1986 publication.

exploring) this relationship between cities and globalisation. These are summarised as follow. First, the way that cities integrate with the world economy, and the functions it thereby develops, are imperative for the structural changes taking place within them. These functions correspond to the world division of labour, in which different localities perform different tasks, such as headquarter function, financial centre, and so on. Second, key cities, mostly but not exclusive in core countries, have become centres or 'basing points' for the articulation of the world economy. Exceptions are for instance São Paulo and Singapore, which nevertheless follow a complex spatial hierarchy constructed in this system. Third, the dynamics governing production sectors and employment of these cities start to directly reflect their global control functions as they start to absorb corporate headquarters, develop financial products, high level business services, and incorporate into the major international grid of global transport and communication (e.g. international airports and the frequency of international flight connections would be an indicator of that). Fourth, and in so doing, these cities start to become major recipients of international capital and therefore to thrive economically at rates strikingly disproportionate as compared to certain neighbouring cities that, say, thrived during the industrial age (e.g. London as compared to Liverpool). Fifth, these cities have thereby become also major recipient centres for both domestic and foreign migrants. Six, as a result, these cities are also subjected to social polarisation. And seven, this social polarisation is in turn followed by onerous social costs, many times beyond the state's fiscal capacity.

Saskia Sassen has contributed enormously to the world city hypothesis, by complementing and substantiating these hypotheses with massive loads of empirical evidence, which she first analysed as for the case of the three main world or global cities – New York, London, Tokyo (2001) – and subsequently as for the case of a number of other important metropolises – such as São Paulo, Hong Kong, Miami, Toronto, Sydney, and so forth (1994). Sassen's argument, following thereby Friedmann's line of reasoning, is that the globalised economy has been organised around main command-and-control centres, the 'global cities', which mainly serve to coordinate and manage the intertwined web of activities of networks of firms. She therefore speculates about a major contradiction that emerged with the advance of modern telecommunication systems. The idea that information technology would allow a massive decentralisation of economic activities – particularly of information processing services (operating 'real-time' activities) and provided by advanced services firms such as finance, property, auditing, insurance, legal, advertising, management, marketing, and so forth – with people working from any location in the globe connected to a mainstream network *did happen*, but in a completely unforeseen way. While such activities have been indeed dispersed around the globe, they have simultaneously also been re-centralised in specific locations: in major metropolises. '[I]nformation technologies have not eliminated the importance of massive concentrations of material resources but have, rather, reconfigured the interaction of capital fixity and hypermobility' (Sassen, 2001, p. 96) so that the activities of the globalised economy have indeed been spread all over the world,

but at the same time major cities have been given a new competitive edge, in view of the complex management and coordination that this dispersal requires.

To explain this duality of what she defines as 'spatially dispersed, yet globally integrated organisation of the economic activity' and its consequences to the metabolism of cities, Sassen also deploys other hypotheses, which she uses to organise a model for the global city research (2001, p. 3). To begin with, these assume that globalisation and digitisation are processes that have enabled the geo-economic dispersal of corporate undertaking, where the more dispersed these undertakings around the globe, the more complex and strategic are the related management and coordination activities. This of course takes place following mainstream developments in the globalised economy and its internationalisation processes, such as the liberalisation of financial markets and the growth of foreign direct investments and international transactions (particularly in services), where companies are now spatially organised in a kind of 'global assembly line'. This notion of global assembly is an important one in Sassen's analysis as she contends that it is precisely due to the emergence of such global assembly lines, with the assembly of products and goods in factories and deposits around the globe, that new forms of centralisation have become necessary to manage, plan, and control complex webs of activities.

Subsequently, as these management and coordination activities become extremely complex, companies also tend to increasingly outsource them to highly specialised firms (e.g. marketing, accounting, legal, auditing, and so on, which basically process information). These highly specialised firms, in turn, by producing highly complex products, need to operate in agglomeration economies, due to the need of face-to-face communication in the service sector. As a consequence, key cities have turned into major 'information industries', generating highly specialised products and operating in highly complex networks. In this context, Sassen explains how major metropolitan areas, beyond their traditional functions as trade and banking centres, now operate new functions as these have developed into the command centres of the globalised economy, in turn concentrating financial and advanced services firms, in turn becoming major sites of production, including the production of innovations, and subsequently becoming the major markets for these products.

As a result, Sassen posits that a context has emerged in which cross-border city-to-city transactions start to take place at unprecedented intensity. Accordingly, a kind of *transnational urban system* is constituted, as such global cities start being subjected to the transterritorial networks of economic activities and all the influences that may come along, and function as 'nodal points' where globalisation materialises. This means that an urban system may encompass several nation-states and, conversely, one nation-state may encompass several urban systems (2001, p. 171). In line with this, in addition, and in view of the directions of flows of investments from city to city, a context has also emerged in which a new, global *urban hierarchy* has been constituted in this transterritorial kind of urbanism, for which London, New York, and Tokyo may be attributed as the core sites of command-

and-control. An important question Sassen thereby raises is: what happens to the relationship between the global city, with its new transnational spaces subjected to transnational urban systems and hierarchies, and the national government, with its sovereign rules?

Her answer is that to the extent that national governments play a minimum role on the globalised economic activity, it seems that they also start playing a minimum role on such transnational spaces. To explain this, Sassen mentions that the national urban system grows somehow disarticulated from the global urban system (for instance the discrepancy between London and former industrial cities as Liverpool, or New York and Detroit, or even Tokyo and the former Toyota-city, Nagoya, as Toyota transferred its headquarters to Tokyo and moved its production lines to countries as Thailand, South Korea, and the United States). She also mentions that these cities constitute rather a system, in which they do not necessarily compete with each other; nevertheless in which growth that may arise in the system does also not necessarily revert as growth to the respective country.

If we look at it this way, such global cities may indeed be 'globally and locally embedded but nationally disembedded' (Smith, 2001, p. 56), but this does not mean that the global city is merely the product of the logics of global capitalism. In this regard, authors as Harvey and Castells, and particularly – and also more recently – Michael Peter Smith, although recognising the contributions that Sassen and Friedmann have made to the urban theory, have laid their critics to the rather unilateral view of the global city research in which globalisation and transnational practices materialise 'from above'; global cities being the *stasis* of such process. A number of indicators suggest that some practices are also triggered 'from below' in such global cities, which are largely overlooked in the global city discourse, developing along 'different forms and degrees of social and spatial inequality in these cities, and the local, national, and global determinants of these disparities', and expressing in local political particularities (Smith, 2001, p. 59). These are for instance transnational migration networks, grassroots social cohesion practices, grassroots politics, and so forth. According to Smith, these cities do not simply die politically.

In this sense, and in view of the numerous connections – from above and below – that now fuse in the urban space, Smith theorises about the emergence of a context he terms 'transnational urbanism'. As we shall explain later on in this study (cf. chapter 5), this metaphor suggests the conceptualisation of the city – and the urban space – as a crossroads of diverse networks of social relations that go beyond the local, transcending one or more nation-states. What differs Smith's theory from the global city research is the fact that the latter group emphasises the functionality of global capitalism 'from above', somehow overlooking transnational practices that shall also emanate 'from below' – 'which now cut across urban landscapes, producing disorderly, unexpected, and irretrievably contingent urban outcomes' (Smith, 2001, p. 12). In short, while the global city research revolves around the restructuring of global capitalism in major command-and-control centres, research into transnational urbanism is also concerned with the local social constructions that emerge with globalisation, and how these may be connected across localities so

to produce transnational social spaces[12]. Smith's claim is that the mainstream analysis of the global-local interplay advanced by scholars as Sassen and Friedmann – representing the 'global' as the site of dynamic flows and economic forces, while the local as the place of stasis or assimilation of such dynamics – is incomplete. For him, the local should also be seen as a 'dynamic source of alternative cosmopolitanism and contestation' (Smith, 2001, p. 167).

Castells has also criticised and complemented the work of Sassen by saying one should see that 'the global city is not a place, but a *process*. A process by which centres of production and consumption of advanced services, and their ancillary local societies, are connected in a global network, while simultaneously downplaying the linkages with their hinterlands, on the basis of information flows' (Castells, 1996, pp. 407-459, italics added). By elaborating a theory on the informational city, and concentrating on the construction of transnational spaces as 'nodes and hubs' of international flows in a network society, particularly of electronic circuitry, Castells emphasises that crucial to understanding the transformation of major cities is understanding how the flows connecting advanced services, production centres, and global markets operate – 'with different intensity and at different scale depending upon the relative importance of the activities located in each areas *vis-à-vis* the global network' (Ibid.) – and thus how these change over time.

Illustrative of this is his analysis of the largest information flows among American cities (data provided by the Federal Express Corporation, including volumes of letters, packages, and boxes), in which he concludes that there is indeed an urban hierarchy, where certain nodes dominate (in the USA these are New York, followed by Los Angeles), and where connections take place in selected national and international circuits, not randomly. However, he also points that this hierarchy is far from being stable or assured, but an ongoing process, where an accentuation of investment flows that certain major cities may experience at a certain point of time may imply economic slumps in others. In the early 1990s, for instance, when cities as Bangkok, Shanghai, Mexico DF, and Taipei exploded economically, Madrid, New York, London, and Paris underwent a decline, where the volumes of foreign direct investments reduced, also affecting the prices in property and even halting new constructions. Conversely, by the end of the decade when cities in emerging economies saw an economic downturn, the others saw an economic recovery (Ibid.). It can be concluded, in this context, that *because* major cities now function in a transnational hierarchical system, to a certain degree there exists competition among them. And to secure their position in the hierarchy, such cities will inevitably seek to attract increasingly more foreign direct investments, eventually also into the property sector.

[12] In distinguishing between the semantics of the terms transnationalism and globalisation, anthropologist Michael Kearney (1995, quoted in Smith, 2001, p. 3) argues that the latter is mostly concerned with social processes that are 'decentered from specific national territories', while transnationalism indicates transnational social relations as being 'anchored' in a place while also transcending to other places.

The internationalisation of the urban property market and spatial transformation

Up until now we have discussed the relationship between globalisation and cities in terms of the new functions they assume in view of international flows of capital and investments, leading to the construction of transnational spaces and the constitution of urban hierarchies. At this point we shall shift our analysis to the property industry, and explore how this dynamics of securing foreign direct investments is influencing the local property market, internationalising it, and eventually transforming the urban space. The property market is not only a sector that demonstrates the economic performance of major cities and possible fluctuations in the urban hierarchy, but a segment whose function is to supply such major cities with the required built space so as to support their economic activities. Its products do therefore become part of the investments companies place in these cities. If there is competition or not among global cities, or an urban hierarchy, will be foremost manifested in the volumes of local property developments and the directions of investments in property, whose ensemble not only reshapes the urban space but also transforms the urban environment.

Since the beginning of the 1980s, as the activities of the financial sector and other fields of business started to expand in major cities and concentrate high-income workers, so did the demand for top-segment office and residential space. Urban land prices in cities as London, New York, and Paris increased thereby sharply and rapidly. Throughout the 1990s, the price of commercial property continued to grow substantially, boosting massive construction projects including developments of speculative buildings. Sassen (2001), for instance, reports that cities as New York and Amsterdam saw an increase in property prices of approximately 50 percent during the period 1995-8, while Madrid had 80 percent, and Dublin of almost 100 correspondingly.

In turn, the growing participation of foreign firms as both investors and buyers of property in these cities was a key factor in the consolidation of an international property market which, while formed in 1980s, took off particularly in the 1990s. In the case of São Paulo, for instance, these firms have usually been American ones – but with a high participation of German and French firms – which have entered the local market by making joint ventures with local developers (World Architecture, 1997). In the case of Beijing, these firms have usually been Japanese ones, which have entered and still operate in the market in joint ventures with publicly owned local construction institutions. The entry of institutional investors into the financial market has also contributed to the expansion of the property industry throughout the world (Sassen, 2001). The financial industry, in this regard, has now become a key one in this field, not only occupying but also owning a large share of urban property[13].

[13] To corroborate this, Sassen points at a study published in the journal *Real Estate Finance*, in which the authors demonstrate that the ownership of such transnational spaces lies in the hands of private, usually foreign firms, particularly those of the financial sector. In 1997, for instance, the financial sector owned 27 percent of the property of London City (see Sassen, 2001, and Baum

In this context, prices of urban land in major cities have risen at unrelated proportions as compared to the overall national economic profile, also showing a huge disparity of land price between core and peripheral urban areas. As a consequence, the consolidation of transnational urban spaces has thereby sharpened within cities, also contributing to attract more and more international biddings to specific locations (e.g. high profile business districts). Castells (1996) goes further in this observation and shows how, besides accentuating the emergence of transnational spaces within urban areas, the sharp increase in inner city property prices has also contributed to further agglomerating the economic activity within the urban space. As he explains, investments in property imply fixed costs to a firm, therefore a move to suburban areas, where the cost of land is less costly, would imply a devaluation not only of its fixed assets but also of the corporate image of the firm. Several major property undertakings started thereby to emerge in core areas – either restoring old structures or producing new developments – and these areas, in turn, have become part of an international, high profile property market, including the participation of foreign investors, architects, designers, auditors, suppliers, and so forth. In Asia, for instance, some 1,800 skyscrapers were constructed in the 1990s; in Shanghai alone 138 towers were added to the skyline during this decade.

As a consequence, the urban space has been largely undergoing a homogenisation process, becoming more and more alike from city to city, particularly in such transnational spaces as the business districts. This similarity can be noticed in buildings individually, as they start applying similar designs, construction techniques, equipment, and so forth, a fact that is largely related to the intense participation of foreign contractors, designers, auditors, suppliers, and clients. And it can also be observed at the district level, as the density of the tissue of such major cities is extremely increased – densified and verticalised – insofar as these cities enter the network of 'transnational urbanisation' and increasingly absorb investments brought about by globalisation. Major cities and their transnational spaces have indeed become very large agglomerations of people, high-rise buildings, cars, pollution, and everything that follows. As Castells puts it, these cities concentrate both the best and the worst (1996).

Although the internationalisation of the property market plays a great role in homogenising urban spaces, to further understand the logics ruling the spatial transformation of major cities and thereby contributing to the growing similarity of particularly such transnational spaces it is necessary to also understand processes that are somehow triggered *at the locality*. For this purpose, and parallel to the internationalisation of the property industry, it is also important to look at the local managerial élites – which have a great influence on the local property market – to understand why certain aspects of the urban space are growing more and more alike, while others are diversifying with globalisation. These élites, and unlike local people, are cosmopolitan. Moreover, they are also the ones whose dominant interests

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and Lizieri, 1999, "Who owns the City? Office Ownership and Overseas Investment in the City of London", *Real Estate Finance*, 16(1), pp. 67-100).

govern society and, to a large extent, its spatial logic. Its cosmopolitanism, however, plays a dual role: on the one hand it supersedes any specificity of the local, lifting them to ahistorical, placeless spaces of the globalised order; on the other, it embeds them in new forms of social cohesion so as to escape such global cultural codes (Castells, 1996). In other words, while the urban élite seeks to be connected to the global world, it also seeks to maintain its specificity so as not to become an anonymous, somewhat obvious facet of globalisation.

Thus, their influences in terms of spatial manifestation are also dual, so to say. On the one hand, élites build their own world, distinct from the global, impersonal world. In terms of architecture, this includes differentiated residential and to some extent leisure places, such as spaces of culture and art, which largely vary from city to city. On the other, they also need to create a lifestyle that unifies or connects them *symbolically* with the élite around the globe, particularly where their work habits are concerned. And here the spatial manifestation supersedes the historical specificity of each place and develops this anonymous and obvious facet of globalisation. Illustrative can be the diverse business districts around the world and its support facilities – such as international hotels, airport lounges, sports installations, chain restaurants, shops, etc – which have all developed a similar shape, a similar culture, and a similar meaning.

Global architectures

What is interesting, and not coincidence, is the fact that the consolidation of these transnational urban spaces has taken place at the same time that postmodernism started to dominate as an architectural style, since the early 1980s onwards. As explained by Hardt *et al.* (2001), the passage from modernity to postmodernity took place insofar as European customs and values were supplanted by American ones; a culture that is all-inclusive, which is no longer dominated by an aristocratic élite, but by a business class in which everyone has, in principle, same chances. In architecture, postmodernism materialised as a movement in which buildings, particularly office buildings, started to divert from the pure, austere industrialist forms of modernism and the International Style, which had emerged in Europe with the Bauhaus, whose orthodox forms could only be understood or interpreted by aristocrats or intellectuals. The proposal of postmodernism was to generate instead forms to be understood and interpreted by everybody, and this would be achieved by incorporating ornaments such as allusions to historical motives and other local specificities (such as those deriving from vernacular traditions, for instance). Starting in 1978 with the headquarters of AT&T in New York, designed by Phillip Johnson, postmodernism came forward proposing a discrete ornament (a Chippendale top in the construction façade). But what happened was that it developed fantastic proportions in the following years, particularly under the practices of American architects as Michael Graves, Robert Venturi, and Charles Moore, and became a colourful, exaggerated, even dyslexic style. What is paradoxical is that, instead of accomplishing a worldwide heterogenisation of architecture, as architects of this movement

had primarily sought, the fallacy of postmodern architecture is that it became an end in itself. It became another style, where historical motives had to be reproduced in contexts deprived of any historicity, such as business districts, resulting in a confused ensemble, the reproduction of hybrids, at the crossroads of 'spaces of flows'. It thereby led to the homogenisation, from city to city, of a huge architectural cacophony in the age of globalisation, which, according to some authors, seals the end of history, where everything is mixed, where things have gone out of control (Castells, 1996).

This said, the influences and dynamics of globalisation that have been funnelled to the urban space throughout the 1980s and 1990s with the internationalisation of the property industry, together with the influences of the urban élite and of the postmodern movement, particularly in terms of corporate buildings, have been manifested in an architecture that symbolises the popularisation or democratisation of the urban space in view of the rise of a global business culture, the architecture of the globalised world. A global architecture that is furthermore characterised by transparency, through the extensive use of glass, which has become indeed a vehicle in contemporary commercial buildings to demonstrate in the integrity the companies that inhabit them. But what in fact happened was that, by replicating itself, the homogenisation of the urban architecture has also turned the global city into a large experimental laboratory, incessantly opening up new construction sites, where every building strives to be bigger, more colourful, more spectacular than the other. And this homogenisation, as we shall see below, has also entailed enormous environmental costs, which only recently started to be taken into account, not only associated with the sheer magnitude and agglomeration of these developments, but also regarding the (too often) inadequacy of their technologies.

Transnational spaces and local environments

This discussion on the homogenisation of transnational spaces brings us back to the debate on the homogenisation/differentiation of culture in the age of globalisation, and to the (contradictory) theories put forward by Cohen and Robertson, mentioned in the beginning of the text. Upon closer examination, and in line with Robertson's argument, perhaps the similarity noticed above is more visual than real. Without doubt, to a certain degree differentiation still exists in such transnational spaces. Real estate researcher Juriaan van Meel (2000), for instance, carried out a detailed study of the relationship between office design and national context and identified that, although from the outside office buildings may look very similar, in each country its layout will vary enormously in view of the different laws, market characteristics, cultural issues, labour relations, urban settings, and so forth. What is interesting to analyse, in this respect, as urbanist Nezar Alsayyad observes, is that 'in the era of globalisation, when culture is becoming increasingly placeless, urbanism will maintain some relevance because of its ability to explain the specificity of local cultures' (Alsayyad, 1996, p. 108).

In contrast, it is undeniable that to a large extent such transnational spaces are indeed undergoing a growing homogenisation, standardisation, or even McDonaldisation process. Transnational urban spaces such as business districts, shopping outlets, chain hotels, and so forth, are still 'global products' often designed by the same architects, and occupied by the same global economic agents. In this sense, and returning to Cohen's analysis in the beginning of the text, there is to an extent an urban convergence process indeed taking place, which is besetting large metropolises in the age of the global economy in plural ways. Looking at the major cities from this optic opens up a universe of critical urban problems that are emerging with globalisation, showing thereby 'the other side' of the global city research: the realm of rising urban environmental and infrastructural challenges.

To begin with, and following Cohen's analysis comparing the growing similarities of cities in both North and South, it is clear that in terms of infrastructure major cities underwent a slow economic growth in the late 1970s and early 1980s, attributable not to the advent of globalisation itself but to the worldwide economic recession following the oil crisis. This was immediately reflected in a slow growth of public investment in infrastructure – such as roads, water supply, wastewater treatment, solid waste collection, electricity supply, and telecommunications – sealing in turn a growing gap in urban infrastructure provision. As a result, even in richer countries as the USA, a debate was raised about a possible infrastructure crisis following electricity blackouts on the eastern coast, failed water and wastewater services provision in Chicago and Washington, and problems with road maintenance in other large cities. In the South, conversely, this has contributed to worsening the gap in urban environmental management translating nowadays in an estimated 170 million urban inhabitants without clean water supply and a proper urban sanitation infrastructure. In Latin America, for instance, a survey conducted in 1994 by the World Bank revealed that only two percent of all urban waste was treated before disposal, a figure that has been probably kept more or less stable. In addition, the problems related to urban transport in major capitals of the South are evident indicators of the deficient infrastructure performance of these cities. This leaves us little doubt that both types of cities have been increasingly facing a lack of financial resources – as well as a weak management capacity – to be invested in urban infrastructure ever since.

It was in this context that the concept 'urban environment' – and subsequently 'environmental management' – came forward around 20 years ago, also coinciding with the advent of globalisation as a key notion of modernity. This took place first in the North, and has now achieved a more or less worldwide reach. Since then, there have been many attempts to mitigate environmental damage, particularly in the North, several of which have been considered fairly successful. Yet, in most cases, and according to numerous studies, the overall urban environmental quality tends to deteriorate rapidly both in cities in developed and developing countries, demanding urgent attention. In the North this is taking place particularly due to the depletion of natural resources, urban pollution, and weakness of environmental governance. In the South, the difficulties encountered by the already pre-

carious environmental infrastructure and governance have been exacerbated by the rapid speed at which cities are growing, where two main environmental priorities are dominating. One of them is the pollution of water resources deriving from untreated wastewater. Needless to say that the growing urban population, overconstruction, infrastructure overload, and poor housing provision for the lowest-income are the main driving forces for this. The urban deficit in terms of adequate sanitation reaches a very high level in the South, for instance 80-90 percent in cities such as Karachi in Pakistan. The result is disastrous to both the environment and human health. The second main urban environmental challenge in these cities is vehicular atmospheric pollution that is taking over after polluting industries migrate to other areas. Mexico DF, for instance, has a population of around 20 million inhabitants and is also home to 4 million cars, which produce toxic atmospheric gases 6 times beyond the acceptable standards set by the World Health Organisation (Rogers, 1997). When vehicular pollution is too intense, industrial production is halted and the public is urged to stay indoors. In Bangkok, another example, over 100,000 masks have been handed out to traffic policemen in response to the hospitalisation of one of their members, who had severe lung complications from breathing stifling air[14]. Other critical problems include deficit in green areas, inefficiency in energy and water consumption, and heat island effect, among other things.

But parallel to such declining investments in urban infrastructure that have taken place since the early 1980s, the spatial transformation and homogenisation of major cities *due to* globalisation has also been playing a key role in adding to such rising environmental challenges. First of all the density of the urban tissue in such cities has been increased considerably due to the agglomeration of economic activities in core regions, where three main morphological trends are developing in parallel and leading to converging environmental problems: The first is a process of *verticalisation* and densification of core regions, resulting from the transformation of these cities into international business centres and national economic engines. The presence of foreign firms and high-income workers has contributed to sharp increases in urban commercial and residential property prices, particularly during the past decade. This has led to the proliferation of high-rise buildings and high-density land usage resulting in the formation of 'urban canyons', which puts at stake issues such as natural ventilation and lighting. Therefore, more indoor artificial lighting, refrigeration/heating and ventilation are frequently required to operate buildings in such cities, with higher energy consumption implications. High buildings also imply increased wind speed at pedestrian level due to the formation of such urban canyons, leading to reduced outdoor activity and increased use of indoor space. And the less friendly the outdoor environment, the more people rely on indoor comfort, resulting in more energy consumption (Santamouris, 2001; de Schiller, 2000).

Secondly, as urban land prices have risen significantly, these cities have also been undergoing a rapid process of *expansion* and suburbanisation – as peripheral

[14] Architect J. Wilheim (Secretary of Urban Planning of São Paulo), interview.

areas are more affordable, hence attractive, particularly for residential developments – entailing more energy use and pollution from transport for commuting. In this context, economic and real estate pressures too often prompt alterations in the local building and urban planning codes so as to facilitate construction permits. And in this process, environmental considerations usually fall short, leading to a type of 'spontaneous' urban growth trend. Many metropolises nowadays suffer from heat island effect as the expansion of urban areas implies a decrease in green areas, more vehicular pollution, as well as paving and other heat absorbing/reflecting materials – which in combination increase urban heat sharply. Temperatures may reach up to 10°C higher than those of adjacent non-urban areas, thereby severely increasing the need for air conditioning in buildings and aggregating energy consumption of these cities. Further, more complex and environmentally intensive systems of water supply and treatment are required to pump water over longer distances in expanding cities. Finally, difficult drainage solutions are required to cope with urban flooding problems, making their environmental and energy load tremendous (EA.UE, 1997).

The third trend is towards a general *discontextualisation* of buildings. As discussed above, the presence of foreign firms – active investors, buyers and users of real estate – has contributed to the internationalisation and homogenisation of the property sector. This, in addition to the worldwide, converging architectural preferences of the local managerial elites, has led too often to the reproduction of similar buildings within the global network of cities. As a result, the building stock of major cities is now seeing a process of homogenisation, hence of discontextualisation in many cases, as more and more it responds to international standards of design, construction techniques and building services, usually employing glass and hermetically isolated façades. Such 'environment rejecting' techniques are too often seen as the most appropriate solution to avoid the external polluted environment of major cities. However, being employed rather frequently, and many times not corresponding with the local climatic context, such techniques end up provoking further environmental problems as buildings require more and more energy to be cooled and lightened, and their glass façades contribute to increase urban heat. Irrespective of the location, the urban space is thereby being trapped into a vicious circle of worsening exterior environment and a spiralling consumption of energy.

Numerous studies have pointed at the environmental footprint of such transnational buildings, as they converge in themselves one of the major indexes of worldwide energy and water consumption, raw material employment and usage of land, making their impacts on both the local and global environment massive[15]. In chapter 3 we shall discuss these indexes separately, and in more detail. Statistics also suggest that poorly designed buildings consume altogether around half of the world's energy supply, potable water, and raw materials being thereby accountable for a large share of the world's climate change gases emissions, as well as for a

[15] See, for instance, Baker *et al.*, 2000; Hawkes, 1996; Jones, 1998; Littlefair *et al.*, 2000; Roodman *et al.*, 1995; Watson, 1993; Edwards, 1996; Anink *et al.*, 1996.

significant proportion of stratospheric ozone and potable water depletion. They are in addition also involved with deforestation problems and non-renewable resource depletion.

In this sense, though glamorous as they may look like, transnational urban spaces should also be seen as domes of environmental hazards. While traditionally urban environmental problems have been evaluated in terms of urban pollution, sanitation problems, deficits in energy and water supply, attention should be paid more closely to where the roots of many such problems rest. Indeed, although conveying a glossy image of global capitalism and local wealth, these spaces are in fact the crossroads between the highly dynamic world of global exchanges (on the one hand) and local, deteriorating urban environmental infrastructures, governed by the dynamics of place (on the other).

Conclusions

The essence of this chapter was to provide an overview of the main implications of globalisation to the urban space, and the related environmental transformation that cities are undergoing. We started by defining main concepts to grasp the relationship between globalisation and modernity – such as the implications to the domains of culture, economy, politics, also referring to the environmental question – so to provide an understanding of the new urban dynamics that emerged with globalisation, and finally of the implications that globalisation has for the urban space and for the urban environment.

In major cities, the urban space has undergone marked transformations with globalisation, leading to the rise of transnational spaces within urban areas. These are for instance business districts, shopping facilities, international hotels, and so on, which in addition now belong to an international property market. In this context, they have become global products often produced by same international designers, investors, construction companies, and so on, and often occupied by the same global economic agents, such as multinational companies and financial institutions. By providing a direct link between local and global social practices, these transnational spaces have eventually also contributed to the consolidation of a kind of transnational urbanisation, in view of the growing linkages, interdependencies, diffusion of diverse flows of information, and so forth that now occur from city-to-city, across the countries.

As a result, while still maintaining certain local characteristics, these transnational spaces have also been increasingly undergoing a homogenisation process. This is reflected not only in the new economic, societal, and institutional dynamics that take place in such spaces, but is also manifested in their spatial forms, environment, and infrastructure. For this reason, these transnational spaces are also being plagued with a set of critical (similar) problems, which somehow intensify to the extent that cities absorb investments and increasingly participate in the global economy. Among these problems there are environmental setbacks, resulting from

the massive spatial and environmental transformation once investments are funnelled to the urban space, and materialised in the form of high-rise, high-density office developments.

As we attempted to demonstrate in this chapter, we can assume that the building stock of the world's major cities portrays a typical example of 'diffusion of sources' of environmental pollution, standing at the crossroads between the wealth of global capitalism and local environmental and infrastructure problems. In addition, it also implies the 'diffusion of impacts', which not only affect the local environment, but the global sustainability of the planet, concomitant to the loads of energy and other resources that they require to operate. Nevertheless, and being a transnational space within the urban areas, we can also assume that the building stock of major cities does represent a great channel through which environmental management and reform practices may be distributed along a transnational urbanism system, in view of the city-to-city, transterritorial interactions, carried not only by international property investors and related professionals, but also by its global occupants such as corporate clients. Hence, to the extent that globalisation contributes to the environmental deterioration of major cities, as we explored in this chapter, it may, as we shall see in the following ones, also contribute to their environmental reform.

3

The Environmental Restructuring of Urban Office Buildings

ECOLOGICAL BUILDINGS AND NEIGHBOURHOODS started to be constructed in the 1970s as a response to the energy crisis and a growing sense of environmental awareness. While most of the achievements by then took place in housing design, notable works were also done in the field of office buildings. Since then the attention of architects, clients, and policy-makers has been increasingly drawn to the energy and environmental dimension of offices spaces, eventually prompting a whole new research agenda and literature on the subject.

A leading argument in this chapter is that in the transition from the approaches developed in the 1970s to those of nowadays a major shift has been taking place. While in the 1970s green designs were conceived in terms of local, contextual, low-technological solutions, usually applying the 'eco-community' discourse, now at the turn of the century the issue is no longer whether the buildings are low or high technology, but whether they achieve a better environmental performance in general. This way, while in the 1970s solutions tended to explore options of *self-sufficiency* – or disconnectivity from the mains grid – now sustainable office buildings are primarily exploring *environmental efficiency* approaches and being achieved in contexts of relatively strong connections to networks of existing infrastructure. Their greening turns into assets for the companies that inhabit them, for whom environmental concerns are high on the agenda but still intermingled within other logics, such as the survival in the marketplace.

In the pages that follow I shall provide an overview of the environmental restructuring of urban office buildings, with respect to technological aspects as well as actors (local, global) and policies carrying environmental innovations. The chapter starts with an historical description of the transition of the logic of ecological design, i.e., from sufficiency to efficiency approaches, showing how the deployment of environmental control[16] in office buildings evolved from *mechanic* to *passive* solutions, while at the same time discarding approaches of full disconnectivity to systems of infrastructure for achieving environmental efficiency. Following that I shall explain current innovations in design techniques of both individual office buildings as well as office districts/neighbourhoods, describing issues of energy, water, materials, and indoor environment, also paying attention to the social context and degree of connectivity to infrastructure systems. Thirdly, I change the focus from analysing techniques in their social contexts, and look at two other – related – dynamics in bringing about environmental change: that of politics (government policies) and that of management (policies prompted by companies, the main occupants of office spaces).

The chapter concludes with some observations about the changing character of the environmental restructuring of urban office buildings within the overall context of late modernity.

Historical overview

Although the history of office buildings and the issue of environmental control dates of course prior to that, it was in the early 20th century that a kind of 'administrative revolution' took place, resulting in the creation of large companies and large buildings. With the subsequent growth in the demand for office space in central districts, office buildings started to verticalise and predominate the landscape of major cities as London, Chicago, and New York. What is interesting to see in these buildings is that in certain aspects they had much in common with what is understood for as ecological building design today. That is, due to technological limitations of the time, such as lack of air conditioning for instance, environmental control would be achieved via passive means (e.g. passive cooling). In this sense, their interiors tended to explore the use of daylight through large windows, resulting in narrow floor plates to achieve lighting control. And, as today, natural ventilation was also somehow hindered due to urban air pollution and noise, as cities of the industrialisation period were not only filled with polluting factories but were also joined by railway transport systems with noisy and polluting coal-burning engines (Cook, 2000). It was therefore in this context that environmental control was de-

[16] By environmental control we mean the solutions developed to achieve *indoor comfort*, such as desirable levels of temperature and lighting, which can be attained via mechanical or passive methods. As we shall explain later on in this chapter, mechanical systems of acclimatisation and lighting have become the most energy intensive components of a building.

veloped in these buildings – i.e., within a conflict on the usefulness of windows to address daylight but to avoid the entry of pollution.

Dealing with this environmental conflict in cities of the early 20th century led to two types of solutions. On a macro level, urban designs encouraged the separation of city functions – such as residential, industrial, commercial, so as to control the spreading of pollution and provide a certain degree of urban hygiene – and the creation of traffic corridors to link them. On the level of individual buildings, massive investments were carried out to improve the technologies that had emerged during the previous century – such as the combination of steel and glass in the building envelope, and the introduction of mechanical appliances such as heating, sanitation, and subsequently artificial lighting. With the boost in these technologies, the construction of office buildings became increasingly rationalised, standardised, and eventually industrialised. An early type of air conditioning for buildings emerged[17], making use of a system of grilles, which deterred the influx of polluted urban air (Cook, 2000). As a result, office buildings grew increasingly 'sealed' from the outside, as environmental control would be achieved more and more through artificial means. A typical example of buildings of such period is the Larkin Administration Building, in the state of New York, designed by Frank Lloyd Wright and completed in 1904, which in turn was demolished in the 1950s (Banham, 1969; Cook, 2000).

While monofunctional urban development confirmed in the ensuing decades, so did this tendency of sealing the building from the outside insofar as refrigeration and fluorescent lighting systems were consolidated, allowing in turn larger and deeper floor plans. These systems were also coupled by further innovations in the envelope design, especially with the introduction of the curtain-wall, altogether marking a worldwide turning point in architecture and construction techniques. While coming as an aesthetical response to the eclectic, bourgeois style of buildings that was predominating the cityscape at the turn of the century (e.g. neoclassic, neo-gothic, and so on), these new technologies established new parameters within the modern movement in terms of a worldwide *homogenisation* – or even proletarisation[18] – of construction techniques. In addition to that, they also marked the worldwide *internationalisation* of architecture, by which one single building design could be applied in any city, be it in a cold, arid, tropical, or moderate climate. On the other hand, these new technologies also encompassed enormous hidden costs – in terms of energy efficiency, environmental damage, and human health – that would only much later on become evident (Banham, 1969; Baker *et al.*, 2000;

[17] Air conditioning was first introduced in the United States into the textile industry, in the 19th century, where the incoming water vapour reduced thread breakage and the effect of static electricity (Cook, 2000).

[18] Although the modern movement and the International Style were seen as a proletarisation of construction techniques, aiming at the provision of housing for everyone with industrialisation, it would become clear later on that the austerity of forms did not really communicate with the proletariat, being appreciated only by intellectual élites. It would be in this context that postmodernism would supplant modernism, as we explained in chapter 2.

Hawkes, 1996; Jones, 1998; Littlefair *et al.*, 2000; Roodman *et al.*, 1995; Watson, 1993; Wilson *et al.*, 1998).

Yet it would be incorrect to say that with the increasing worldwide rationalisation of office buildings no further passive environmental solutions were explored during the modern movement of architecture. Although several authors contend that modernism might have been somehow antithetical to local environmental considerations – particularly under the practices of large corporate architectural firms, such as those established by Walter Gropius, Mies van der Rohe, Marcel Breuer, Philip Johnson, Skidmore Owings and Merrill – some of these same architects also made their contributions in terms of reducing the energy and environmental load of mechanical systems in buildings. Walter Gropius and Marcel Breuer, for instance, analysed the local climate and sun angles as determinants in the design process, and the Lever House – designed by Skidmore Owings and Merril, and built in Chicago in 1952, one of the icon buildings on the occasion – used in its glass envelope a heat-absorbing tint to reduce undesired solar gains (Watson, 1993). Of course, more 'organic approaches' such as those of Alvar Aalto, Frank Lloyd Wright, and Eric Mendelsohn, have always, one way or another expressed more concerns for the environment in their architectural practices, although perhaps embedded in more complex architectural languages (Jones, 1998).

Since the late 1950s onwards some important publications emphasising passive environmental control in buildings started to emerge. A series of articles published in magazines as the *Bulletin of the American Institute of Architects*, for instance, presented the use of climate-responsive architecture, such as white reflective roofs for warm climates and earth-sheltering and solar orientation for cold ones (Watson, 1993). The first contemporary ideas regarding 'bioclimatic architecture' also emanate from this period, mainly developed by Victor and Aladar Olgyay as an integration between design, climate, and human comfort, where 'environmental control would be achieved through *working with, rather than against, climate*' (Hawkes, 1996, p. 13, italics added; Olgyay, 1963). Eventually, in 1969, the publication by Reyner Banham *The Architecture of the Well-tempered Environment* added an important contribution connecting the environmental crisis with the growing energy consumption of buildings while, on the other hand, also exploring the role of environmental technologies in the context of the modern movement or the International Style of architecture (Banham, 1969). Although the work of these authors paved the way for the development of more sustainable buildings, of course the energy crisis following the 1973 oil embargo played a major role particularly in questioning the use *and cost* of air conditioning in offices, as well as the efficiency of large and open floor plates.

The energy crisis of the 1970s affected above all Europe. Whereas the city-zoning concept had predominated until then, urban planners started to encourage urban compactness and mixed-use developments to save on car fuels. In offices, employers were suddenly concerned with the sharp rise in prices to heat and cool the workplaces and on top of that employees started to also express their complaints about such large and open office floors, in view of noise and lack of pri-

vacy. In this context, while the optimism regarding technology declined in Europe in the 1970s, employees became more and more influential within organisations – particularly in continental Europe – resulting in the tightening up of laws to guarantee their right to sit at the supervisory board of a company, which in turn secured, among other things, their right to daylight, natural ventilation, and an outside view[19] (van Meel, 2000).

This, of course, had a direct effect on the way office buildings were designed and maintained, and environmental control would be achieved. In contrast to open floors, preference was now given to cellular layouts or a combination of both (the 'combi-office'), and here architects started to experiment new solutions, such as the building of Centraal Beheer in Apeldoorn, the Netherlands, a large insurance company, designed by Herman Hertzberger and completed in 1972, where the 'human scale' and the feeling of a 'working community' were the key ideas. By contesting the deep floor to a large extent and by seeking human comfort, this building became an influential example during the 1970s in terms of improving the indoor environmental quality and reducing energy consumption. Other similar examples would also influence the way to address the environmental (and human) dimension of buildings by then. Among these, the NMB (now ING) building in Amsterdam, designed by Alberts and van Huut, and completed in the mid-1980s, proposed somewhat radical ecological measures trying to make an autonomous, 'self-standing' building. Although we shall return to this case with more detail in chapter 6, what should be stressed by now is that solutions such as those applied in the NMB remained relatively small in number. In line with alternative, eco-community ideals, the NMB project attempted to fully disconnect the building from the systems of infrastructure, particularly of those regarding energy supply. Its aim was to propose an alternative lifestyle, also in the context of working places, and a breakaway from unsustainable modernity. Nowadays, these approaches – once known as 'organic design solutions' – which in themselves present remarkable technological solutions, are nevertheless largely seen as naïve, as they do not manage to be applied on large scale in view of the overall framework of the business world – capitalism, commercial property development, globalisation – and remain as punctual, sporadic, even as exotic cases; in sum: models of a kind of utopia.

In Great Britain the context was both similar and different. On the one hand, the social, operational, and environmental grounds of large and open office spaces and monofunctional zoning systems also started to be questioned since the mid-1970s onwards (van Meel, 2000). But on the other, solutions did not necessarily try to radically break away with local infrastructures, and were more pragmatic in some ways. The engineering firm Arup Associates, for instance, completed in 1981 the Gateway Two building in Basingstoke, the first large office building to incorporate a central atrium, acting as a buffer for air temperature control between internal and external conditions. Although this was one of the first office buildings to be referred to as 'low-energy' in the world, it was still conceived to be connected to

[19] This took place in Italy (1975), Germany (1976), Sweden (1977), and in the Netherlands (1979).

the mains grid. And it turned to be a prime example in fact: the central atrium, some contend, has developed into an essential condition of contemporary bioclimatic office buildings. This design paradigm, which may be referred to as 'sustainable building', has actually become the most popular approach of ecological design[20]. These are buildings that try to minimise their environmental impacts by evoking topics as ethics, environmental sustainability, and reduction of ecological footprint. Another example is the headquarters for the National Farmers Union Mutual and Avon Insurance at Stratford-upon-Avon, designed by Robert Matthew, Johnson-Marshall and Partners and completed in 1984. In addition to the atrium, this building also employed several other bioclimatic features, e.g. cross-ventilation, external fixed solar control, generous floor to ceiling heights, good daylighting, high insulation, night-time ventilation, sensitive controls, and so forth (Jones, 1998).

Again, also differently from continental Europe, on a more social level, proposals to empower employees and their union representatives in Great Britain were practically unanimously opposed to (van Meel, 2000). Therefore, in a way, the more hierarchical British working tradition has hindered the development of egalitarian or more human physical spaces, such as those offering access to daylight, natural ventilation, and outside view to the majority of employees. This helps explain why environmental design in British offices developed different approaches as compared to continental Europe ever since. Cellular office layouts have been combined with – still – large, open, and deep floor plates. Therefore, the logics of addressing sustainability topics in the 1980s were, in the 1990s, also joined by concepts as flexibility and physical performance, with environmental efficiency to be achieved primarily in contexts of strong grid connection and combining passive with active technologies. Most British architects now use climatic buffer zones (such as atria), high performance materials, and smart appliances to achieve environmental control. And this has also enabled them to start *exporting* their environmental design logic to the world, also to continental Europe, particularly in terms of 'low-energy' office building solutions, with firms as Foster and Partners and Richard Rogers Partnership making the bridge between global solutions and the specifics of the local.

So here we are speaking of the paradigm of 'building as a smart asset' (cf. Guy and Osborn, 2001), in which deep ecological buildings are developed in strong grid connections; sharply in contrast to the solutions of the 1970s. Nowadays this has grown to be the most often evoked logic of green design above all in corporate architecture, and, it goes without saying, in major cities[21]. Renowned examples of

[20] Nowadays, however, the term sustainable building has become a kind of catchword to refer to all buildings that are designed in a more environmentally friendly way.

[21] According to Guy and Osborn (2001), five main 'competing logics of green design' may be identified, ranging from lower to higher technological approaches: The first and lowest technology of these preaches the creation of buildings to reinforce the notion of *self-sustained eco-community*, totally disconnected from the main infrastructure networks, and mostly expressed in terms of organic housing design for alternative lifestyles, seeking to break away from unsustainable moder-

this logic are the Commerzbank (Frankfurt, 1997), the RWE Tower (Essen, 1996), the Menara Meseniaga (IBM Tower, Kuala Lumpur, Malaysia, 1992), the Four Times Square (New York, 1999), and a rapidly growing number of others. These buildings are not only icons of the post air-conditioning generation of architecture, combining low and high technologies, but also icons of globalisation and, respectively, reflexive modernity[22]. Paradoxically, there is a number of energy companies that actually occupy such buildings, e.g. EdF in France, ENI in Italy, Tokyo Gas Co. in Japan, in addition to RWE in Germany, and numerous others. And interesting, too, is the fact that solutions have now started to address issues regarding water efficiency as well as environmental management at the district level, with projects such as the Shanghai Master Plan of Richard Rogers (unbuilt), the Gannet/USA Today Corporate Headquarters in the United States, the Berlin Postdamer Platz, and the Business and Advanced Technology Center in Malaysia, the latter currently in construction, revolutionising urbanism.

In the coming section we shall briefly explore the main techniques that are being deployed in such buildings – how they are conceived and embedded in systems of infrastructure – as well as give an account of the indoor quality and issues related to the urban environment and infrastructure.

Ecological building techniques

Since the late 1960s and early 1970s, we see that major transformations started to challenge the environmental dimension of buildings, particularly – but not only – with regards to systems of acclimatisation and lighting. These transformations resulted in a number of new solutions to achieve indoor environmental control and comfort, which are in certain countries more or less becoming commonplace nowadays. These are, for instance, the opening of façades to natural ventilation, the creation of atria and halls as climate buffer zones, the improvement in insulation

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nity (e.g., the Eco-Village Network, Findhorn in Scotland, and so on). This approach is followed by the *healthy building* paradigm, which evokes issues as sick building syndrome and psychological aspects of the indoor environment (such as the buildings of the German architect Joachim Eble, for instance). Subsequently, the sustainable architecture or *sustainable building* story line as such (or as Guy and Osborn call it: 'the building as ecological polluter') should be understood as the one in which buildings try to minimise their environmental impact or footprint by evoking ethics and sustainability topics, such as renewable materials, soft and appropriate technologies, use of local knowledge and resources, and so forth. (This is in fact the story line most popularly associated with the image of green building, although to date mostly advanced through demonstration projects, cf. for instance National Dubo Centrum, 2000). The fourth approach in turn refers to *neo-vernacular architecture*, seeking to recreate symbolic social values by shaping and contextualising modern looking buildings according to local traditional design criteria. Finally, the last of such logics is the one closest to ecological modernisation theory. Guy and Osborn call it as the 'smart asset' logic, which evokes topics as flexibility (particularly of the workspace), efficiency, cost-savings, intelligent technologies, and so forth.

[22] Reflexive modernity stands for the confrontation that modernity is facing with its own problems, cf. chapter 2.

and sun protection, and the introduction of renewable energy systems (Daniels, 1997). Also, a major shift occurred in the way such solutions have been conceptualised, as nowadays the environmental performance of urban office buildings is achieved in contexts of strong grid connection – somehow contradicting the initial attempts of the 1970s.

In this section we shall provide a closer understanding of how solutions are being conceptualised for the development of ecological office buildings and districts, in terms of technology, and related degrees of connectivity to infrastructure and embeddedness in local/global social dynamics. For this purpose we subdivide environmental themes into three main groups: 'real' environmental technologies (addressing issues of energy, water, and materials), indoor environment, and urban environment. For each group a short account is given of the *impacts* that such themes pose individually on the environment, followed by a description of the state-of-the-art of the main techniques which are being deployed to curb them: how these are put in use in view of main social – local and global – carriers, and how these are finally connected to networks of infrastructure.

Environmental technologies

Energy. As analysed by Jones (1998), modern buildings consume energy in five phases. The first is related to the manufacturing of materials, components, and systems, which is termed *embodied energy*. The second, which is associated with the energy consumed for the transportation of materials to the site, is known as *grey energy*. Third, the *induced energy* regards the energy expended in the construction itself. Fourth, the *operating energy*, the form of energy that has prompted most consideration, is the energy actually spent in the running of the building, as long as the building is occupied. Finally, a building also consumes energy in its final disposal or, eventually, in its recycling, which is the *disposal and recycling energy* phase. All things considered, the most energy intensive phase is the operational one which corresponds to the running of the building throughout its life cycle – usually estimated at 60 years or as long as the building stands and is occupied – and is therefore related primarily to the energy dispensed in the systems of acclimatisation and lighting. Nevertheless, energy consumed at the manufacturing of building products is also very high; in England, for instance, embodied energy of construction materials accounts for 10 percent of the nation's total industrial energy use (BRE, quoted in Smith *et al.*, 1998).

Ideally, reducing the energy consumption of an office building should address these five stages. However, attention is currently focused on the operational phase and strategies are thereby deployed in view of different, though interrelated, considerations, mostly in the design phase, combining both active and passive resources. First, and most important, a building should pay attention to *passive solar issues*, such as orientation and siting, glazing size and location, natural ventilation, as well as shading strategies, so as to work *with* – not isolated – from the surrounding environment. This implies for instance the placement of windows in strategic

locations so as to capture sunrays, but avoid glaring, and also to capture air but ensure the building's structural stability. Once these issues are determined, the building may then turn to *energy efficient materials*, which are for instance high-efficiency windows, insulation, bricks, concrete, masonry, as well as interior finishing products, which are basically higher quality, superior building materials. Thirdly, the building may adopt additional *high-performance technologies*, advanced in terms of (helping in) energy saving, such as energy saving appliances, advanced lighting controls and thermostats, activated blinds, strategic fans, efficient heating and cooling systems, solar water heating systems, as well as heat recovery systems, wind turbines, and photovoltaics, among other alternative energy solutions (Passive Solar Industries Council, 2003).

The combination of such strategies has resulted in interesting innovations, of which two cases deserve to be mentioned. The first one is the *wind tower*, which is basically a re-adaptation of a vernacular solution commonly applied in arid places (see for instance Jones, 1998; Baker *et al.*, 2000). In combination with modern technologies, these towers are powerful ventilation systems, which induce air circulation through the building, drawing warm air upwards and capturing fresh air in. An example is the Ionica Headquarters in Great Britain, where the architects also introduced, in addition to the towers, an interactive façade, a central atrium, as well as ventilated hollow-core slabs, which altogether allow the building to be air-conditioning free.

A second example combining these innovations is the *double skin* façade, which is claimed to reduce energy consumption and running costs by 65 percent, reducing therefore carbon emissions by about 50 percent (Battle, 2003). The double skin, for instance used in the Commerzbank in Frankfurt and the RWE in Essen, consists of a double envelope system with a cavity in-between (of around 50 centimetres, see Davies *et al.*, 1997). It can act as a thermal buffer zone in winter, reducing space-heating requirements, as a source of natural ventilation in mid-season, even in high-rises, as well as a solar control system in summer, as the skin may be sealed and blinds activated, reducing cooling loads. It is therefore most appropriate for temperate climatic regions.

As can be noted, the optimisation of energy use in buildings is a product of both local and global embedded solutions. To begin with, all passive measures are to be taken according to the local environmental conditions, thus following the logics of the place. Here the client and the design team do indeed play a crucial role in determining how these will look like, involving for instance the way how local, traditional design solutions may be used in modern buildings. Conversely, energy efficient materials as well as high-performance technologies are in fact global by nature. They are usually designed by multinational manufacturers (e.g. Lucent, Siemens, American Standard, etc.), and applied transnationally, following specifications by architects and contractors according to the requirements of the place. Therefore the two hybrid solutions described above – the wind tower and the double skin – are in fact somehow already 'glocal' combinations, synthesising the lo-

gics of the local, in their passive character, but above all developed according to trends determined by the global state-of-the-art of technological development.

Finally, in terms of connectivity, we see two main trends taking place. These solutions may either be applied in weak grid connections or in contexts of strong grid links. The later is of course usually the case, and this is explained due to two reasons. First, office buildings are generally located in contexts of strong grid infrastructure (urban areas), therefore they do not particularly need to 'turn their back' to systems already existent, although they may, indeed, use them less or more efficiently. Secondly, office buildings are still energy intensive structures, arguably requiring a backup system in case, for instance, the solar panels do not cope with the energy demand, the winds are not sufficient to run wind turbines, and so forth. Here a context emerges in which the roles regarding flow management between the building and the energy infrastructure are redefined, meaning that loops are partially closed at the same time that the existing infrastructure is partially used. Here perhaps utilities may play a role in providing services in energy saving strategies, as is already the case in most developed countries.

As for weak connections, conversely, one could say that these would take place more sporadically, where the client jointly with the architect propose a kind of demonstration project, by considering the building and the system of infrastructure as two independent systems. As yet, and to a certain degree, such demonstration projects are still somewhat unusual, even naïve solutions, particularly in contexts of strong grid infrastructures, as they propose a conflictual breakaway with logics – such as those of the government, local utilities, and global capitalists – that are still rather imperative (see Guy and Osborn, 2001; Jensen, 2001).

Water. The current system of decentralised water supply and wastewater disposal is one of the legacies of the nineteenth century, introduced in European cities and quickly adopted by the rest of the world. Although this system helped reduce cholera and the typhus epidemics of that period, at the same time it laid the groundwork for many of the environmental problems confronting us today. The destruction of natural landscapes, for instance, such as water ecosystems, wetlands and streams that serve as water reservoirs, in addition to the so-called city sinking effect (the lowering of the urban soil due to the decrease of the volume of underground aquifers) happens on a large scale due to the excessive level of water consumption in buildings (around one third of the world's potable water is estimated to be consumed in commercial buildings). The respective consequences are: rapid groundwater depletion, microclimatic change, species extinction, the killing of forests when the tree roots can no longer reach the groundwater, and the deterioration of built environment. Moreover, long distance water pipelines are needed for water provision in large cities, accounting for high maintenance costs and high-energy consumption to pump large volumes of water in and out of vast urban areas. A survey made in Germany, for instance, pointed out that Frankfurt gets its water from Vogelsberg (100 km away), Hanover from the Harz region (more than 100 km away), and Stuttgart from Lake Constance (approximately 200 km away, see

EA.UE, 1997). The treatment of wastewater, in turn, also entails high costs and energy-intensive systems to transport the emissions from their sources to the treatment plants. Several problems regarding urban sanitation, particularly in third world cities, derive from the incapacity of coping with such complex – and costly – system of infrastructure, which nevertheless has become the most commonly used model worldwide.

However, innovations are currently emerging apparently worldwide involving the reuse of water in buildings and, to some extent, the disconnection of water-related infrastructure systems. In terms of water consumption, an appropriate planning may include a wide range of water efficient fixtures – such as low-flow taps and low-flush toilets – to reduce the volumes of water used in an office building. In addition, rain or 'grey' water[23] may be used as second quality water to reduce the volumes of water expended in flushing toilets, in watering gardens, and so forth (Ibid). These are fairly promising water saving options, although current regulations, particularly in OECD countries, commonly put rainwater on a level with wastewater, overburdening the sewage treatment systems. In turn, sewage treatment can also be done in a more rationale way, usually involving a disconnection from mains grid, using nature-based systems for wastewater purification. Besides decreasing the overburden on conventional sewerage systems, these kinds of system also minimise the energy use for operating large, centralised sewage treatment plants.

A number of office buildings have started to incorporate water conservation and reuse strategies, whose appliances are many times provided by global manufacturers, e.g. American Standard. Examples that may be given are: Commerzbank in Frankfurt, Swiss Re in London, Menara Meseniaga in Kuala Lumpur, Malaysia, and Lloyd's of London, London (Gissen, 2003). In many cases, utilities are playing a major role in providing services in water saving strategies to help such buildings achieve desired reductions in consumption and emission, particularly due to the urgency of the problem of water scarcity.

Yet, and like energy infrastructure, the optimisation of water-related services in urban office buildings is also taking place in contexts of strong connection to existing infrastructure, although urban buildings may harvest water from underground aquifers and try to treat sewage in decentralised plans. Examples of disconnectivity to systems of water infrastructure, however, would perhaps be most common to cases of office parks located in peri-urban large sites supplied with large quantities of fresh water, which could be used to secure the building's demand of water, as well be able to serve as nature-based water treatment plants, for instance through ponds, or other in-site solutions.

Materials. To discuss the use of materials and the related environmental implications, we have to bear in mind that a distinction should be first made between environmental pollution from the use of materials, such as depletion of resources, and

[23] Water discharged particularly from sinks, which may be used as second quality water.

indoor pollution, related to the use of toxic materials inside buildings. In this section we describe issues related to environmental pollution.

Each year, an estimated three billion tonnes of raw materials (40-50 percent of the total flow in the global economy) are used in the manufacturing of building products and components worldwide (Roodman *et al.*, 1995; Anink et al, 1996; UNEP, 1996). Raw materials for the building industry must be extracted, processed, transported, added in the construction phase and finally disposed, and there are certainly many environmental impacts related to all these stages.

The pursuit of technological development since the industrial revolution and the gradual emphasis on generating a common international language in architecture, as we explained in chapter 2, particularly soon after the second world war, developed a building culture where the use of steel, glass, aluminium, and concrete dominated, starting in developed countries and then in the rest of the world. It is realised now that these materials present high embodied energy – as they are too energy-intensive to process, which frequently leads to pollution – and are increasingly depleted as finite resources, which puts a burden on architects worldwide to reclaim a more sensible approach towards their use. Furthermore, because they belong to an international style rationale they are also international in origin, which immediately increases their grey energy potentials, that is, the energy expended for their transportation. Paradoxically, many buildings nowadays referred to as ecological or low-energy have high grey and embodied energies.

Several buildings, however, are now attempting to minimise the use of materials with high embodied energy, such as aluminium, plastic, and cement, as much as possible, and particularly to avoid those with high grey energy. These buildings try to use materials closer to their natural states, such as timber and bricks and other renewable ones, also paying attention that their extraction is made in such a way so as ensure regeneration and avoid depletion. In addition, many attempts are being made to minimise waste and encourage the recycling of scraps resulting from construction debris, for instance, as well as of the whole building once it is decided to be disposed of. An example here is the Alterra office complex in Wageningen, the Netherlands, which has not only used renewable materials but has also been designed to be totally recycled once disposed. All its components are therefore cut in such a way that they may be reassembled in another building in the future (Koster, 1998). Other buildings that have adopted a similar approach are the National Audubon Society in New York, the Greenpeace USA Headquarters in Washington DC, and the HEW Customer Center in Hamburg (Gissen, 2003). These are buildings that are developing an intelligent economy of cycles, based on sustainable principles, trying to optimise the usefulness and durability of the materials applied by avoiding waste. Therefore, the flow of materials is being analysed in the sense that waste is prevented in different phases: from the extraction and processing of construction materials, to the construction or renovation of the buildings, and eventually to their final demolition.

On the question of selection of materials, a remark should be made regarding the way these materials are embedded in local and global infrastructures, which

is now leading to a paradoxical discussion. As described above, since at least the modern movement of architecture the possibility of using construction materials of 'global' origins – such as aluminium, glass, and steel – was enabled, also revolutionising and somehow homogenising the conception of façades. Nowadays, however, to the extent this possibility has been intensified with other 'global' materials, such prefabricated ones, it has also been challenged by the issue of grey energy expended in transportation, putting into question the international procurement of construction materials. And here office buildings designed for global cities, though seeking to achieve an image of globality also through the materials used in their façades and interiors, are increasingly challenged to adopt materials of local sources if they want to comply with ecological conditions, eventually requiring a formulation or conception of 'glocal' architectural identities in the envelope/interior design. In this case, the selection of construction materials shall be more and more embedded in the local infrastructure, though decisions regarding this selection will still remain among actors which may be many times 'global', such as clients, contractors, architects, at least insofar as regulations on this matter are not yet well defined. Here the participation of certain environmental NGOs has been significant, particularly concerning the use of non-renewable materials, such as timber from not managed sources in the Amazon and Malaysia.

Indoor environment

A perspective on the indoor environment is relevant here as it complements the above discussion on environmental technologies and pressing environmental concerns. Modern buildings are pathogenic in various ways. Generally speaking, as most people spend at least 80 percent of their lives indoors, predominantly in their homes and offices, it is of great importance that the indoor environment is favourable to the buildings' occupiers (EA.UE, 1997). Such pathogenicity of the indoor environment has been first detected after the 1973 oil crisis, when people started to suddenly insulate fully their houses so as to save energy, while at the same time putting at stake issues such as ventilation and air exchange. As cases of sicknesses resulting from indoor contamination sharply raised, several studies were in turn carried out, eventually detecting that there are many materials inside buildings which may be very harmful to the human health, many of which even carcinogenic.

These studies on sick building syndrome and indoor air pollution have revealed that the modern building industry, pressed to generate its products *en masse*, has developed a wide range of synthetic materials to be commercially accepted on a large scale, most of which harmful to human health. Wood, for instance, has been replaced by UPVC for windows, wool in carpets by synthetic fabrics, wooden furniture and fittings by plastic, and so on, and a series of electrical appliances have been introduced (Smith *et al.*, 1998). Of particular concern are the exposure to electromagnetic fields, volatile organic compounds, and nowadays the legionnaires' disease. The sick building syndrome has become so alarming that the United States Environmental Protection Agency (EPA) already considers it among the five great-

est threats to human health. Accordingly, the American Medical Association and the United States Army made a survey to investigate the consequences of poor indoor environments and estimated that inadequate indoor air quality costs USD 150 million workdays and about USD 15 billion in lost productivity each year in the United States (Ibid.). Therefore, improving the indoor environmental quality implies more productivity and less absenteeism levels, in addition to sparing companies of litigation risks, as a number of studies on the subject have demonstrated (see Roodman *et al.*, 1995; Wilson *et al.*, 1998; Heerwagen, 2000).

As a result, optimising the use of materials in buildings as we discussed above should also pay attention to the other side of the environmental equation, that is, the people who inhabit the building. Therefore, while preference should be given to endogenous and renewable materials to avoid environmental pollution, these very materials are those that should be most appropriate to human health, e.g. mud, natural rocks, ceramics, certain minerals, and natural floor coverings, among others (EA.UE, 1997). Illustrative is the Greenpeace USA Headquarters in Washington DC, which paid particular attention to indoor sustainable design in its renovation, selecting low volatile organic compound materials, in addition to other environmental and human health considerations (Gissen, 2003).

In terms of embeddedness to local/global infrastructure, and unlike the issue of grey energy of construction materials as described above, apparently worldwide major efforts are being made to control indoor pollution. The prohibition of asbestos cements and the control of the legionnaires' disease, for instance, is now more and more commonplace. But in any case, although the global diffusion of ecological building technologies does also concern the indoor environment, regulations on this are still strictly made on a local basis, whose differences may sometimes be an obstacle toward the import or local development of technologies regarding the improvement of the indoor environment. In this case, architects and clients will play a decisive role in defining the quality of the indoor, while local policy-makers will play a decisive role in promoting active policies to control indoor pollution.

Office buildings and the urban environment

Finally, we can explore the greening of office buildings from the perspective of the urban environment, which involves three main dimensions: the spatial structure of the place, the local transport infrastructures, and the major city's overall political/utility planning setting.

Starting with the first, the greening of urban office buildings involves the implementation of design and construction techniques to be integrated within the spatial structure or the place. To begin with, this means paying attention to the local climate, prevalent winds, urban fabric, and so on, in the sense that individual buildings will be able to fit well – individually as well as collectively – within the space and be less resource intensive by exploring natural daylight, passive cooling/heating, and so forth, according to the local requirements (cf. Girardet, 1997, 2001). Individual buildings may also contribute to enhance urban green areas, not

only on the surface, e.g. on the roofs and ground, but also vertically on the envelope. There are now interesting examples of buildings that have developed *vertical gardens*, which not only contribute to balancing energy use in their interiors, by minimising cooling loads for instance, but which do also help to reduce pollution and urban warming. A radical case in point here is the renovation proposal for the ENI headquarters in Rome which, though never built, proposed the renovation of an obsolete façade by adding a second layer to it, a dense vertical garden, which would at the same time solve the problem of rain infiltration and avoid overheating in summer. As is implicit here, there are basically two dynamics that would influence the greening of office buildings from this perspective. One of them concerns local building codes and master plans, which should elaborate policies to allow such optimisation of the land use so that buildings require fewer resources to operate, although still maintaining buildings connected to systems of infrastructure. The other regards the role of architects and (motivated) clients – regardless of their origins (local, global) –, which will play a decisive role for proposing innovations, by carefully studying the local spatial organisation and which how designs and construction techniques would be most appropriate.

The second perspective of the greening of urban office buildings is with regards to the local transport infrastructures. As discussed in chapter 2, inner city industrial pollution is largely making room for vehicular pollution with its consequences upon human health and the environment. In this regard, what is currently being proposed in order to mitigate the environmental problems related to transportation is a combination of land use and transportation policies, usually applying the systems of *compact mixed-use urban nodes*, which concentrate mixed-use developments (commercial and residential at the same time), minimising the transport needed to commute from one zone to another. This system, although contested for concentrating pollution, avoids the single-function development and the dominance of the car, favouring thus multi-functional buildings and clean transport systems like bicycles (see for instance Rogers, 1997). Empirical evidence demonstrates that the compact model is successful, not only in terms of relieving some of the urban environmental problems, but also in terms of enhancing the quality of life the city offers. An example that can be given is the master plan for the Postdamer Platz in Berlin, designed by the Italian Architect Renzo Piano, proposing the rehabilitation of a large area of urban wasteland into a mixed use development, including offices, retail, housing, entertainment facilities, and public amenities, also addressing public transport issues. In this case, broader (local) urban planning strategies would be decisive for implementing compact, mixed-use developments. However, clients and architects may also play a role in this regard and propose mixed land use and accessibility to public transport as part of their environmental planning strategies. Examples that may be given along this line are: Condé Nast and Reuters in New York, HEW in Hamburg, Deutsche Messe in Hanover, ABN AMRO in Amsterdam, Gap Inc. Offices in San Francisco, Helicon and Swiss Re in London, Commerzbank in Frankfurt, and the Greenpeace USA Headquarters in Washington DC, among many others.

Thirdly, the overall political setting of the city would be crucial in promoting active policies and programmes to improve the environmental performance of office buildings. These could involve not only the design of better master plans – such as the above mentioned Postdamer Platz – but also the promotion of other solutions such as urban cooling where applicable, through urban agriculture and expanding green areas to alleviate the heat island effect by improving natural shading, heat absorbing, and humidifying capacities. A study performed by the Lawrence Berkeley National Laboratory in Los Angeles, for instance, where trees and high albedo surfaces (higher reflectivity of solar energy) were theoretically added to about 15 percent of the city, indicates that peak summer temperatures have dropped by 10° C, and smog production decreased by 10 percent – equalling the removal of 3-5 million cars from the roads (see also Rosenfeld, 1999). Studies using high albedo roof coating materials in California and Florida found that cooling energy use was reduced by as much as 67 percent. These are solutions that will certainly be applied following the degree of environmental ambition of the government in power. And here, finally, utilities may also play a role in trying to optimise the use of resources in urban areas. Although their objective is of course of maximising profits by selling more and more basic services, they are also now facing the contradiction that the resources they sell (e.g. energy, water) are also becoming scarcer. In this sense, many utilities are now also favouring a more rationale environmental performance of urban settlements, promoting programmes of energy/water saving also with regards to office buildings.

Innovations in governmental policies

To this point, I have mainly discussed the general technical solutions that are being deployed to increase the environmental performance of office building stocks and the social context in which they are being adopted, with respect to connectivity to infrastructure and embeddedness to local/global societal dynamics. Now I will shift the focus from the techniques and discuss the general policy scenario influencing the way such buildings and districts are designed and operated. This discussion starts with an overview of the governmental actors and institutions (with a special focus on the transnational, national, and local urban policies promulgated in the European Union, also mentioning examples elsewhere when relevant), and on the section that follows, of market actors, focusing on corporations that occupy the office space.

Two main historical contexts have influenced the development of governmental policies with regard to the building industry: the energy/environmental crisis of the 1970s, and the problem of global warming together with the rise of a 'risk society' in the 1990s. In both scenarios, national development patterns based on resource intensive and on fossil fuel energy have been put into question; and, equally, and in both cases cities and their buildings have been identified as among prime targets to reduce the country's aggregate energy consumption and environ-

mental impact. In terms of policy development, both contexts have gradually prompted a number of innovations in different countries. Among these, Europe has become one of the most advanced regions, turning into a case worth to be looked at in more detail:

In retrospect, the development of such policies in the European Union started in the 1970s, when a concern over the effects of technological development, the growth in energy demand, and environmental disruption started to attract the attention of the middle classes (Edwards, 1996). These, in turn, pushed authorities to take a stand and ensure above all their energy security. Among the consequences, the building industry was challenged to quantify and qualify its level of environmental impact and energy consumption, and identify the extraction and use of resources. A new energy and environmental policy was developed leading to the grant of subsidies for the development of the first solar houses, as well as incentives for experiments with the first passive office buildings, such as the NMB described above. In the urban policy field, attention was given to small-scale development and compactness, to encourage sociability and discourage the use of cars. Albeit being viewed as too idealistic on that occasion, these new policy approaches have in fact boosted a new generation of buildings and urban designs that have given an important step toward improving the energy and environmental performance of the built environment.

In this regard, to the extent that the energy and environmental crisis of the 1970s was gradually solved, energy and environmental efficiency continued to be an issue within the building industry in Europe. A number of programmes was developed in housing, offices, and urban design, among others from the late 1970s until the early 1990s. Their problem, however, was that they were scattered and uncoordinated, thus unable to boost results. It would only be in the early 1990s that governments would start to take a serious stance regarding the building sector – particularly in face of the uncertain policy implications regarding global warming[24]– and try to synchronise policies. Although these policies to curb carbon emissions have now come to a standstill, the 1990s has indeed prompted many innovations in the energy and environmental policy field. Europe has again taken the lead in this respect[25], where some of the policies are transnational (applied across European countries), while others are more national in character, and others still developed at the urban planning scale. In the following paragraphs a description of such policies is provided, also exemplifying to a certain extent cases outside the European Union.

[24] Such as the United Nations Framework Convention on Climate Change and the proposals of the Kyoto Protocol. In 1992 a text for the United Nations Framework Convention on Climate Change (UNFCCC) was first adopted at the United Nations Headquarters in New York regarding the reduction of greenhouse gas emissions. By 1997, the Kyoto Protocol determined that developed countries should decrease the emissions of greenhouse gases (primarily CO_2) by 7 percent, based on 1990 figures, during the period 2008 to 2012; until 1999 a number of 84 had signed to it.

[25] In the United States, conversely, energy and environmental policies have somehow been counterbalanced by powerful economic forces, decreasing to a certain extent the value of environmental solutions, also affecting the ecological reform of the building sector.

In relation to transnational policies, various directives and research funding programmes have emerged related to the building sector in the European Union since the early 1990s. In the year of 1990, for instance, the European Commission's *Green Paper on the Urban Environment* was a turning point in environmental issues vis-à-vis the building industry, regarding primarily the establishment of a broad framework for effective action on a diverse range of environmental problems from energy to noise, global warming, and water pollution (Edwards, 1996). The Green Paper listed seven important areas of action or policy change to facilitate the transition necessary in European cities[26]. The next significant development was the publication by the European Commission in 1992 *Task Force Report on the Environment*, recognising the relevance of the urban quality of life and its important links involving health, environment, and amenity. Finally, the Maastricht Treaty, signed in February 1992, introduced the concept 'sustainable growth respecting the environment', proposing a wide range of implications for the future practice of the building industry, among which: (i) preserving, protecting, and improving the quality of the environment; (ii) protecting human health; (iii) prudent and rational utilisation of natural resources; (iv) promoting measures at international level to deal with global environmental problems. It is evident that many of these are related to the building industry. The Treaty also recognised that environmental action must be taken across national boundaries to avoid one Member State from gaining competitive advantage over another in the case of policy discrepancies. Thus the harmonisation of European environmental policies has been an imperative objective of the European Union and the practical effects of the Treaty, also concerning the building industry, are gradually emerging.

In this respect, two important policy principles have emerged in the European Union Treaty changing the relationship between clients and their professional advisers on the question of environmental pollution: the principles of 'polluter pays' and 'pollution should be dealt with at the source'. The former shifts the emphasis away from governments to the environmental contaminator thereby exposing clients and architects to the risk of litigation from third parties. The latter implies taking preventive measures to avoid remedial action later. In this sense, it is implicit in the principles of the European Community policy that it is now necessary to implement projects with minimal environmental and health impacts[27].

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[26] These included: (i) the abandonment of zoned land-use principles and adoption of policies encouraging mixed-use and denser development; (ii) a switch from investment in roads to support the public transport; (iii) the protection of urban cultural heritage; (iv) the protection and improvement of open spaces in towns to enhance visual pleasure, improve microclimate, and reduce air pollution in urban areas; (v) the improvement of wastewater treatment; (vi) the reduction of air pollution and more efficient use of energy; and (vii) the avoidance of waste generation at the source (Ibid.).

[27] In the European Union context, the general debate regarding environmental issues particularly global warming prevails under the 'precautionary principle' according to the European Community law, where Member States are increasingly required to take preventive actions concerning environmental damage, which should be rectified *at source* (see for instance Edwards, 1996).

Although these measures were launched in a transnational perspective, in the light of these principles, individual governments within the Community have introduced a number of policies so as to curb the energy consumption and environmental impacts of buildings and districts, including offices. Of these, some are voluntary measures while the other ones are more command-and-control. Among voluntary based approaches, a successful example is the one of *eco-labels*, which assess the environmental performance of buildings so as to grant them points. Their aim is to encourage the voluntary self-monitoring of the market, in the sense of enhancing the 'image' of the building (and the companies that inhabit them), promoting better marketability, such as commercial advantages through lower energy and water bills, in addition to achieving higher environmental sustainability to influence clients (Daniels, 1997). The most renowned of such schemes currently deployed is the Building Research Establishment Environmental Assessment Method (BREEAM), applied in Great Britain since 1991 first for office buildings, and subsequently for industrial facilities, supermarkets, and private houses. Concerning office buildings, the BREEAM uses a system of evaluation according to criteria grouped in three levels of environmental impact[28].

The BREEAM has been the first approach of its kind in the world, and comparable methods are nowadays being developed in other countries, such as France, Norway, Spain, United States, and Canada. In the United States a similar system has been launched – the Leadership in Energy and Environmental Design (LEED) – which is also a consensus-based national standard for encouraging high-performance and increasing the sustainability of buildings in a voluntary way. Developed by the United States Green Building Council, it provides a common 'green building' standard across the country to encourage integrated design practices, and promote environmental leadership and competition in the market through raising consumer awareness (LEED, 2003). Similarly to the BREEAM, LEED also provides a comprehensive framework for assessing the environmental impacts of buildings in different levels. And in addition to it, the United States government introduced in 1992 the Energy Star programme (through the Environmental Protection Agency under Clinton's administration), which is also a voluntary labelling scheme designed to promote energy-efficient products, so as to reduce carbon emissions. In office buildings for instance the Energy Star applies to office equipment, such as computers, monitors, and printers, which in fact has been the sector in which it achieved the greatest market entry. In 1998 the Energy Star merged with the Green Lights programme, which had been promoting energy efficient lighting in commercial buildings. By 1999, more than 100 buildings were awarded the Energy Star label in the United States (Brown *et al.*, 2000).

[28] The first of these is the 'global evaluation and resource utilisation' including potentials of CO_2 emissions, acid rain, ozone depletion, in addition to use of natural resources, recycled materials, renewable materials, and longevity. Secondly, the 'local evaluation' assesses issues regarding transportation, water management, noise, shading, and other local ecological features. Thirdly, the 'interior evaluation' corresponds to an assessment of the use of dangerous materials and systems of indoor comfort (Ibid.).

In contrast, more command-and-control approaches are also being experienced by governments with the introduction of minimum energy performance requirements in the building code, in other words, the use of energy standards. Here the Netherlands has taken the lead, followed by Canada, where these requirements are usually complemented by a series of regulations, such as the minimum performance and labelling of energy-consuming products, collection of statistics on monitoring, in addition to subsidy schemes (see Larsson, 1996; MINEZ, 1999). The energy performance of a building has therefore to be demonstrated in the documents for the application of a building permit.

In Europe, and elsewhere too, governments are also experimenting the deployment of economic instruments such as tax abatements, improved mortgage conditions, creation of investment funds, and other benefits to encourage developers or owners of ecological buildings as well as incentives to utility companies, whose market has now been deregulated at large. As for improvement in mortgage conditions, for instance, two illustrative examples can be given: one of them is the Bank of Montreal, which reduces its interest rates by one forth for green constructions; the other is the Swedish largest housing bank, the Hypoteksbanken, which announced to lend money only to ecological-oriented projects (although to the housing sector, see Roodman *et al.*, 1995). Though promising, however, these instruments are still quite incipient at the moment. Taxes can for instance be levied at different stages of the production and operation of buildings, spanning from materials to energy and water consumption. Concerning energy use, product charges – which can be laid upon the price of products which cause pollution, either through their manufacture or consumption – and tax differentiation can be applied on electricity generated by fossil fuels so as to create incentives for the introduction of more sustainable technologies. In this context, investment and research and development (R&D) subsidies on new, more sustainable technologies in different areas of the construction industry are currently been experienced (particularly in northwestern European countries) in order to encourage innovation and development of environmentally friendly technologies (Edwards, 1996).

Finally, at the urban level, local governments in various countries are now making use of covenants, concerning both buildings and urban designs, which are among the most reasonable solutions to encourage actors to take environmentally friendly actions. Covenants are usually developed according to a pre-established framework (which may be introduced at national level), developed by the government in collaboration with the market, specifying numerous measures to be taken voluntarily so as to decrease the environmental impact of buildings or districts. Such framework is thus a way of homogenising the adoption of sustainable measures in a country, in other words, of providing a common understanding on the issue of sustainability among different stakeholders. In the Netherlands, for instance, a series of National Packages for both ecological building and urban design was signed by stakeholders in the mid-1990s serving to clarify, both to the building industry and to public authorities, what exactly a ecological building practice implies (VROM, 1996, 2001, cf. chapter 6). Although not mandatory, local governments

may influence the decisions of developers, for instance, by facilitating projects that comply with certain criteria put forward in the Package. Denmark is another country that has also adopted a similar covenant applicable to the building industry[29].

As a last word, several governments are also influencing the environmental performance of buildings and districts by requiring the application of an Environmental Assessment during the planning and design phase of projects. Usually, these are prescriptions also done at the urban planning sphere. The Environmental Assessment is usually applicable for projects above a predetermined area, including mostly biophysical criteria[30], for which a large amount of information is needed, spanning from the visual aspects of the design, to effects on health and safety, pollution, and land take and its agricultural capacity (Edwards, 1996).

Innovations in corporate policies

Corporate innovations in environmental policy are of course manifesting in different segments of companies within the building industry nowadays – spanning from product manufacturers, development, to construction, and facility management companies, among others. Above, for instance, we incidentally mentioned a few companies such as Siemens, American Standard, Lucent, which are now globalising environmental technologies for (office) buildings. In this section we shall however provide a general discussion on environmental innovations promulgated by companies that *occupy* office spaces and how.

During the past decade, environmental management in companies has become more and more commonplace. In this context, Van Koppen identified that corporate environmental management is in fact emerging according to three scenarios. The first one is called the *crisis-oriented stage*, where firms are compelled to control their environmental impact dimensions to comply with existing laws and regulations. In this case, the firm usually finds solutions among end-of-pipe technologies and their internal motivation is strictly restricted to the compliance with the law. Secondly, the *process-oriented stage* is characterised as an attempt to achieve eco-efficiency where firms, knowing in advance about the legal implications of their activities, try to control their environmental performance in a cost-

[29] Dr O. Nielsen, Danish Ministry of Housing, communication.

[30] The Directive 85/337 the European Community, for instance, defines two project categories: Annex 1 projects (mostly including industrial facilities, for which a formal Environmental Assessment is required) and Annex 2 projects (which may include office buildings or districts, for which the assessment is require as long as Member States so consider). Since the definition of works under Annex 2 is quite vaguely expressed, different European countries have adopted varying standards (Edwards, 1996). In 1997, however, after discussions on a possible harmonisation of screening procedures, Directive 97/11 extended the categories of developments subject to formal Environmental Assessments. These include: major out-of-town developments (like shopping complexes, theme parks, office parks, and leisure centres), golf courses, multiple cinemas, stadia, major holiday villages or hotel projects and certain infrastructure projects (such as yacht marina, industrial estates, etc), ski developments and smaller categories of power station.

effective way, usually making use of preventive programmes. The third stage regards the *chain-oriented process* in which environmental management systems, including the whole chain of production, takes place: from materials extraction, to manufacturing, use and, finally, to the end disposal. Firms which undergo such a stage try to fulfil a kind of green identity, via among others concepts as 'win-win', PPP (people planet profit), and many times make use of this to achieve a marketing differentiation. To date, most of the firms fall into the process-oriented stage, although the number of firms trying to go beyond efficiency issues is growing[31].

Regarding the companies under the second and third stages, four main innovations have been introduced in recent years influencing issues regarding environmental management, also affecting the way these firms deal with the environmental dimension of their offices. Although it is not the intention of this study to provide a thorough description of these innovations, a summary is yet in order here. The first of these is the endorsement to *international voluntary business programmes*. These business programmes – such as International Chamber of Commerce Business Charter for Sustainable Development, Agenda 21, OECD Guidelines, Coalition for Environmentally Responsive Economies (CERES) Principle, UNEP codes of conduct, and the like – are a framework of corporate environmental policies with a particular interest in regulating the international dimension of the environmental performance of companies such as in the case of foreign direct investments. By endorsing to these principles, companies are claimed to benefit by improving their image, public relations, and reputation, gaining more credibility with the market (see Adams, 1999).

The second of these innovations are the ISOs (issued by the International Standardisation Organisation) and the Environmental Management Systems (EMS). The ISO 14000 series is a way of homogenising environmental standards in a cross-country way, but which has rather been a kind of missed opportunity, as it did not achieve the expected market penetration among different industrial sectors (Mol, 2001). However, in the European Union case for instance, the European Committee of Standardisation has adopted the 'ISO 14001 Environmental Management Systems' as the main European Standard (Edwards, 1996). With it, the Committee requires organisations to publish an independently validated statement of their environmental policy so as to bring their environmental factors to the general public[32].

Thirdly, and parallel to the ISO, the EMS are another environmental management tool. The differences between both are in fact very little, although the ISO 14000 series provides the *certification* of environmental performance, which is universally applicable, while the EMS provide an analysis of production processes so as to detect environmental implications and increase the environmental perform-

[31] Dr. K. van Koppen, interview.

[32] Such statement has to include commitments to the prevention of pollution, continual improvement in environmental performance, and a record of compliance with relevant environmental legislation (Edwards, 1996). The latter is of course the minimum standard any organisation needs to achieve.

ance of production or operation. Thus, the identification of environmental aspects of an organisation's activities, products, or services is the basis upon which the EMS will be built. In turn, environmental objectives and targets are required to form the basis upon which progress towards improving environmental performance will be measured. These must be consistent with the broad environmental policy of the company, including the commitment with the prevention of pollution.

Finally, and in order to ensure that the EMS or ISO certifications are consistent over time, companies are increasingly undertaking Environmental Audits of their own environmental performance. These are periodical assessments usually done by external experts so as to determine the performance of the EMS undertaken by a company, in the sense of providing a feedback loop for the managerial board as well as suggestions for corrections[33]. Companies are gradually using Environmental Audits as a management tool in order to gain a competitive advantage due to a number of reasons, including in particular the ever-stricter environmental legislations and the liability implications, the rising energy, materials, and waste disposal costs, the competitive pressure (as other companies start pursuing environmental objectives), and a growing public awareness. The result of the audits may be incorporated in the company's annual report.

In line with these instruments, companies do increasingly recognise that besides 'branding' their products with an environmental certificate, endorse to international sustainable business programmes, and the like, it is equally important to provide an appropriate 'branding' of their workplaces. Raymond (2001), for instance, analysed how companies are using a sensitive approach in the architectural style to reinforce the principles of the corporate culture and strengthen their image, which, for instance, can be of a progressive, trustworthy, conservative, or caring enterprise. The corporate architecture, in addition, also demonstrates whether the company fosters communication, teamwork or individualisation, hierarchies, among other important issues, also influencing the profile of employees it will attract. In this sense, while most companies start applying such new instruments of environmental management for their products, some of them do also start moving to a more chain-oriented approach (the third corporate stage described), and include their premises in their environmental programmes.

Illustrative here can be the case of several energy companies that have started to explore a new approach to the (re-)design, construction, and operation of their premises in the sense of furthering environmental considerations. Electricité de France (EdF), for instance, which since the 1970s has generated and distributed energy based on nuclear sources, specified in the brief for the commission of its new headquarters in Bordeaux that the complex should be energy efficient. To-

[33] An environmental audit involves the evaluation of the operational practices so as to determine whether these can be made more efficient in terms of resources use and waste production, or altered to minimise risk of pollution. It examines the way in which the company deals with the waste it produces and seeks more efficient waste management options that may be employed. It analyses the material and energy resources the company uses to see whether more environmentally sound alternatives can be applied. Moreover, it develops contingency plans for environmental accidents.

gether with the six main electricity utility companies of the world (Edison, Enel, Hydro Quebec, Kansai, Ontario Power, RWE, and Tepco) EdF is part of the E7 Group, which plays an active role in global electricity issues and is also committed to promote sustainable development, considering environmental management as a high corporate priority. For this purpose, the group has developed a joint policy framework for implementing related initiatives in both domestic and international markets, as well as for providing information and expertise on the efficient generation and use of electricity. Also, as part of their environmental policy commitment, these companies have individually engaged in furthering innovation in their corporate offices, in the sense of providing benchmarks to be followed by the market. Besides EdF, another renowned example of ecological building prompted by an energy company within the E7 Group is the RWE AG Headquarters in Essen, completed in 1996, which became a landmark for the entire Ruhr Valley region with its 30-storey cylindrical tower of 32 meters of diameter, the 5th German highest building, and one of the first of such scale to provide natural ventilation.

Energy companies, and utilities in general, are a particular case in point. In the era of deregulation of the public services market, such companies are now at a crossroads between stricter environmental regulations and campaigns targeting the reduction of consumption of, for instance, energy and water, and their business objectives of selling more and more the services they cater for. It is in this context that some of the business rules of utilities have changed in recent years, as these companies start also selling 'efficiency' besides electricity and water. In the United States, for instance, the National Association of Regulatory Utility Commissioners worked on a task force to change the (electricity) utility profit rules to reward investments in Demand Side Management (DMS[34]) and, beyond premium rate of return on efficiency investments, utilities would start to engage in 'shared savings' systems. That is, for every dollar saved from the customer, the utility was allowed a small rate of participation in the saving, allowing its stockholders to earn an extra USD 0.15, while the customer remained with the saving of USD 0.85 (Rosenfeld, 1999). In this case, 'teaching' the market – including companies – how to be more efficient in energy consumption has become a sound economic solution. In the United States, since 1990 the Shared Savings idea together with DMS programmes grew at about USD 3 billion every year, with some slumps since 1996 (Ibid.). Hence why environmental innovations in office building start to be an appealing trend also for those who sell 'environmentally intensive' products.

In addition to the utilities, if we also look at the briefings of the most significant examples of ecological buildings in the world owned/maintained by regular companies, we see that in most cases it is the companies themselves that indeed trigger the greening process of their buildings. The NMB (or ING) headquarters in Amsterdam commissioned in the late 1970s an 'innovative architecture', with environmental considerations. IBM in Kuala Lumpur, Malaysia, required an architec-

[34] According to Chappells *et al.* (2000), DMS studies have the objective of 'reducing the need for products or services by better managing their storage and supply' (p. 30).

ture to reflect the 'progressive character of the company', yet sensitive to the environment, while EdF in Bordeaux a cellular office space to achieve energy efficiency, and RWE in Essen natural ventilation to reduce energy consumption and increase indoor comfort. The ENI in Rome requested a renovation project to demonstrate 'ecological equilibrium' of the company (Melchert, 2001b). This indeed points at a trend in which companies head towards a more chain-oriented environmental policy, as mentioned above, so as to attain a green identity, also with the architecture of their offices.

Similarly, and considering the way that companies deal with the operations of their offices, we see that examples are numerous of companies that are extending the environmental management routines (including audit schemes and public reporting) of their activities to also encompass issues as water and energy use in their offices, environmentally efficient systems of waste disposal, and so forth. Examples that may be given here, besides the companies just mentioned above, are: The Gap Inc., Duracell, Herman Miller SQA, Nike, Schlumberger, Ford, among many others. These are companies that are certainly not only seeking to improve their environmental image with more sensitive architectures, as one may perhaps claim, but which are also revolutionising the way to carry out corporate environmental programmes, at least as far as their home-country contexts are concerned.

Conclusions

In this chapter I tried to sketch the main scenario in which environmental concerns are being internalised within the construction and operation of urban office buildings and districts. I first provided an historical overview on the changing approach to deal with the environmental aspects of office buildings and districts. A particular concern in this overview was given to systems of acclimatisation and lighting, which historically have been dealt as the most environmentally intensive components of office buildings. After the historical description, I provided an outline of the main techniques and related societal dynamics that are currently being applied to curb the environmental impacts of office buildings and districts, which were analysed in terms of systems of environmental technology, indoor environment, and urban environment, respectively. Finally, I also explored the main policy innovations that governments and corporate actors start developing to deal with the ecological footprint of office buildings and districts.

From the information gathered in this chapter, it seems that a main transformation has been occurring since the early 1970s, when the first important considerations for the energy and environmental dimension of buildings and urban areas took place. In the 1970s, by the time the first energy crisis hit the West, environmental themes were to a large extent rather marginal within the construction and operation of (office) buildings and districts. While to a certain extent research on this theme had already been carried out for decades by then, practical examples were still scarce and likewise not institutionalised within governmental – neither

corporate – policies. In addition, solutions tended to approach de-modernisation designs, disconnecting from systems of infrastructure, by many viewed as too idealistic by then.

However, and somewhat surprisingly, to the extent that the energy and environmental crisis was gradually solved, environmental innovations that were introduced during the 1970s increasingly grew in importance since then, leading to the development and maturation of many programmes targeting different sectors within the building industry. These programmes gained a particular impulsion since the early 1990s, when the West was reached by the second energy crisis with the issue of global warming and a matured public concern for ecological issues. Since then, examples of sustainable office buildings and districts started to boost rapidly, at the same time that governments started to increasingly institutionalise environmental issues within their urban policies, and companies, similarly, started to increasingly more apply environmental programmes to their activities, eventually also encompassing the dimension of their offices. Thus, while in the 1970s environmental issues were to a large extent only marginal within the construction and operation of office buildings and districts, these issues started to gain a core importance in the 1990s. Likewise, de-modernisation solutions of the 1970s questioning the overall technological optimism of the modern movement of architecture have now made room for a new 'enchantment' of technologies, in a way forward in modernity. Finally, during the last decade the environmental reform of office buildings and districts has been further strengthened by other policy and managerial innovations that have been deployed with an increasing intensity, such as rating systems, 'shared profits', improved mortgage conditions, corporate environmental management programmes, and so forth.

In the light of these developments, it seems no longer possible to surmise that the environmental reform of office buildings and districts is a mere wishful thinking today, as it was in the 1970s. It is now recognised at large, among governmental, technical, corporate, as well as societal circles, that improving the environmental performance of buildings and districts is an achievable, pragmatic, and necessary move towards ensuring the sustenance base of the planet in terms of natural resources – a move in which solutions for the greening are embedded in contexts of strong grid connectivity as well as enmeshed in a dynamic local-global societal interaction.

4

Ecological Modernisation Theory and Transnational Buildings

WHILE IN THE PRECEDING chapter I described the main trends in the environmental restructuring of urban office buildings, the focus of the present one is to put these trends into a theoretical perspective which shall help us to evaluate the empirical events of this study. As shall be demonstrated, the ecological modernisation theory is elected to for this purpose as it combines a focus on environmental technologies and related policies with a broader perspective on the relationship between the globalising modernity and environmental reform.

Ecological modernisation theory emerged as a distinct school of thought in environmental sociology in the early 1980s, primarily in north-west Europe, and has now grown into a leading worldwide model of environmental reform. The concept 'ecological modernisation' denotes a paradigm converging economic growth with environmental protection. At its core lies the idea that 'all ways out of the ecological crisis seem only possible by going further into modernity', in that environmental problems of modernity are to be solved in a further, ecologically radical modernisation process, by refining polluting industrial processes into cleaner ones. The theory presents thereby a series of propositions – ranging from technological, to political, societal, and economic issues – to end the 'industrialism versus environmentalism' conflict of modernity. It suggests that it is indeed *viable* to combine further industrial growth with environmental objectives, without changing the institutions and societal dynamics of modernity in their fundamental traits.

Several studies on different industrial clusters have taken ecological modernisation theory to ground their analyses and propose policy directions, e.g. the chemical industry (Mol, 1995), domestic consumption (Spaargaren, 1997), utility services (Chappells *et al.*, 2000, van Vliet 2002), to mention a few. While some of these have emphasised the role of science and technology (cf. Huber, 1985, 1991, 2000), others have focused on the importance of economic and market dynamics in bringing about ecological reform (cf. Mol, 1995), while others on the changing relations between state and market (cf. Jänicke, 1993). Further, another body of research has been centred on the changing discursive practices within environmental politics (cf. Hajer, 1995). And finally, since the mid-1990s onwards, research into ecological modernisation theory has also started to pay attention to geographical areas beyond north-west Europe, most notably in other industrialised and newly industrialised countries, such as the United States, Japan, Lithuania, China, and Vietnam (cf. Rinkevicius, 2000; Frijns *et al.*, 2000). Central to all these studies is the notion that environmental and economic objectives *can* be met within the existing political and economic spheres of the societal system of the contemporary world.

In order to better grasp the framework of ecological modernisation theory and how it can be fit in a study of transnational office buildings, we start with a general introduction of the historical development of environmental sociology to review how ecological modernisation theory emerged and evolved within it. Then we go on to discuss some of the major characteristics of ecological modernisation theory, and analyse how these may be connected to our discussion on globalisation and urban environmental change. The chapter finalises with the introduction of a theoretical model, i.e., a set of hypotheses, which shall help us to analyse the empirical research in the context of our central research questions.

From limits to growth to ecological modernisation

The first debates on the relationship between society and environment took place in the beginning of the 20th century, focusing primarily on issues regarding the degradation of natural resources and built environments (Dunlap, 2000). These debates, however, though resulting in the institutionalisation of the first nature reserves, national parks, and the like, did not significantly contribute towards building a theoretical perspective in sociology, as they failed in questioning the underlying causes – economic, social, or political processes – leading to environmental conflicts. As certain environmentalists suggest, a more concrete upsurge of environmental concerns would only take place in the 1960s and 1970s, when notions of radical change or limits to growth revolutionalised discussions on the transformations of the social order required for our subsistence on earth. This period is frequently designated as the first wave of environmental concern, a period which also coincided with the first attempts to promote industrial pollution control.

Environmental sociology was introduced as a specialism in social sciences during this first wave of environmental concern[35], as discussions about the relationship between social dynamics and environmental deterioration/reform started to gain increasing ground. Rachel Carson's volume *Silent Spring* published in 1962, in this regard, was unarguably one of the first and most influential of the period. These early discussions about the environmental question were also largely influenced by a series of events, altogether culminating in 1972. First, the Apollo 8 expedition to the Moon in 1968, for instance, strengthened the notion of a 'spaceship earth', or the awareness raising of a common 'shelter' that needs to be safeguarded. Second, the first (United Nations) conference on the environment, held in Stockholm in 1972, initiated a process of institutionalisation of environmental concerns. Finally, two other important publications – the report to the Club of Rome *Limits to Growth* and a special edition of the journal *The Ecologist*, *'A Blueprint for Survival'* – both issued in 1972, consolidated the notion that a fundamental change was imperative: While *Limits to Growth* drew attention to the existence of an 'environmental problématique' and a future environmental predicament, *A Blueprint for Survival* not only alerted that 'radical change is both necessary and inevitable...'[36], but also proposed a model for an alternative, ecocentric society. A society that would consist of numerous small-scale units of settlements, where people would live close to and subsist from nature, where technology would be adapted to a proper scale, and where the political system would be autonomous thus self-governing (A Blueprint for Survival, 1972; cf. Spaargaren, 2000).

As expected, the notion of ecocentrism and radical change incited a major polemic during this first wave of environmental concern. On the one hand, traditional capitalists and the right wing of the time believed that the rising ecological questions were largely overestimated in that environmental problems were to be solved according to Adam Smith's invisible hand or market equilibrium theory. Conversely, a more leftist approach argued that a radical anti-growth political culture was necessary to curb environmental problems, somewhat reviving the zero-growth theory of John Stuart Mill (cf. Huber, 1991). This leftist line in time bifurcated into two streams of thought, which, though related, gave rise to two distinct schools in environmental sociology: the neo-Marxists (on the one side) and the counter-productivity scholars (on the other). While the former blamed capitalism per se, counter-productivity theorists – also known as de-modernisation, de-industrialisation, or eco-anarchists – blamed both the capitalistic and industrial clusters of modernity for causing environmental problems (Mol, 1995). Hence, an early body of literature on environmental sociology was originally formed on the

[35] In one of the inaugural articles demonstrating an intertwinement of social theory and environmental issues, Catton and Dunlap proposed in 1978 the 'new theoretical perspectives in sociology', defining a new field of study focusing the 'interaction between the environment and society' (cf. Dunlap, 2000).

[36] '...because the present increases in human numbers and per capita consumption, by disrupting ecosystems and depleting resources, are undermining the very foundation of survival' (A Blueprint for Survival, 1972, p. 15).

grounds of a somehow dialectic debate on the institutional traits of modernity – capitalism and industrialism – in the identification of prime agents bringing about environmental disruption. Before analysing the major outcomes of the first wave of environmental concern, let us have a pause and explore these slightly differing approaches.

According to neo-Marxists as Allan Schnaiberg, James O'Connor, David Goldblatt, Peter Dicken, Ted Benton, and David Pepper, it was the *treadmill of production* – i.e., the capitalistic character of the organisation of production – to be held responsible for bringing about the continuous disruption of the sustenance base. For them, such disruption is primarily initiated by a small number of powerful companies, which, by propelling the process of capital accumulation, make use of nature as a production force, causing in turn environmental harm, and trapping capitalistic societies into a kind of treadmill of economic production and environmental disruption. In this sense, the key to understanding – and reverting – the environmental crisis of modernity lies in deflecting from the capitalistic mode of production, which is essentially detained by such companies.

This school, though still subsisting as one of the dominant academic traditions in environmental sociology (particularly in the USA), was in turn largely criticised for its unilateral perspective about capitalism causing environmental problems. A more radical school of thought thereby emerged, advocating that both capitalism and industrialism should be considered on the question of environmental threats. Advanced particularly by the group of counter-productivity theorists – e.g. Barry Commoner (USA), Ivan Illich (France), André Gorz (France), Rudolf Bahro (Germany), Otto Ulrich (Germany), Wolfgang Sachs (Germany), and Hans Achterhuis (the Netherlands) – this group developed a line of reasoning based on the concept of 'net-balancing' or *Total-bilanzierung*. Still writing in the light of Marxist thought, these theorists were nevertheless somehow critical to Marxism in its disregard to the *character* of the forces of production (such as technological options), as Marx's accounts were exclusively focusing the *social relations* of production (Spaargaren, 2000). Therefore they postulated that in order to have a correct measurement of the productivity of a technology or a certain sector of industry, all *real* costs involved with production processes, including environmental harm, should be taken into account.

This net-balancing approach tackled in particular technological systems known as 'slum-technologies' or 'dead-end technologies' – e.g. nuclear energy and the chemical industry – meaning, in practical terms, that the welfare brought about by such industrial segments in the short term reaches a socio-critical point in the long term, in which the gains start to run counter against the emerging (environmental) consequences. As a solution this line proposed not only changing the realm of the *relations of production* (i.e., capitalism) but also the one of the *forces of production*, i.e., dismantling of (such) industrial systems, mostly encouraged by grassroots initiatives, such as those belonging to the 'new social movements', e.g. NGOs. In its turn, the counter-productivity school was also criticised, but mostly for leading to conflictual relationships between state and industry. And in this con-

text another group of environmentalists would eventually come to the fore with a more positive appraisal of the logics of industrialism, the ecological modernisation theorists.

As some scholars contend, the limits to growth debate – as this first wave of environmental concern became known for – despite its importance for introducing a definite discussion on the relationship between nature and society, and for inaugurating disciplines such as environmental sociology and environmental economics as sub-disciplines within sociological and economic studies, cannot be considered to have led to successful results, at least not in economic or political terms. Mol (1995), for instance, describes that during this period the first government departments for the environment and environmental legislation and planning were instituted in most industrial societies, followed by an increase in the number and membership of non-governmental environmental organisations. But as an ecological reform carrier, he argues, this first important debate on environmentalism was not effective in 'affect[ing] the basic institutions that were held responsible for environmental disruption' (Mol, 1995, p. 2), i.e., capitalism and/or industrialism, in their fundamental traits. Options of environmental reform created mostly divergences in opinions rather than solutions to tackle the problems – the envisaged environmentally sound society proposed during this period was many times viewed as too idealistic or even unconceivable within the logics of modernity.

A new wave of environmental concern occurred when the environmental movement lost this impracticality trait, by the mid-1980s, when attention was drawn to the *structural design fault* of industrialism, whereby the concept 'sustainable development' started to gain increasing ground, giving the environmental question an overall more positive appraisal[37] (Mol, 1995; Spaargaren, 2000). According to Adams (1990), two main publications laid the ground for most environmentalist thinking on the sustainable development field[38]: *World Conservation*

[37] Paradoxically, however, as Dunlap (2000) observes, this new wave of environmental concern was yet triggered by three major environmental catastrophes – Three-Mile Island (1979), Bophal (1984), and Chernobyl (1986). These catastrophes, while provoking a shift in the focus of environmental concerns from issues regarding scarcity to the impacts of certain technological options on humans, finally put into question the *structural design fault* of industrialism, that is, the inadequacy of certain technologies (cf. also Giddens, 1990, pp. 151-2). In time, as debates eventually reconnected the relationship between human health to the issue of environmental scarcity, leaving the question of the relationship between capitalism and environmental problems somehow untouched, the notion of a 'burdening of the sustenance base' (Mol, 1995, p. 2) started to advance in environmental sociology debates. Societal attention was now focused on the mismatch between the 'capacities of the natural systems of the earth and humanity's ability to fit its activities into this framework' (Kirkby *et al.*, 1995, p. 7). These questions finally paved the way in the 1980s for the emergence of the concept 'sustainable development', which came as a proposal to deviate from the conflictual environmental sociology and policy models of the 1970s. The environmental question was to be solved insofar as this three-sided mismatch of industrialism, scarcity, and human health was adjusted.

[38] However, he claims, the concept sustainable development had already been brought into focus at the Stockholm Conference on Human Environment of 1972 – where the clash of interests between

Strategy (IUCN, 1980) and *Our Common Future* (Brundtland, 1987). Although with a strong focus on the dual crisis of third world countries – namely the crises of development coupled by environmental constraints (e.g. desertification, deforestation, and so forth) – the sustainable development debate basically brought to the fore two notions: first, and as an overriding priority, the call for the upgrading of the living conditions of particularly the fourth world. Second, the 'belief...that equity, growth and environmental maintenance are simultaneously possible with each nation achieving its full economic potential and at the same time enhancing its resource base' (Kirkby *et al.*, 1995, p. 7).

In this regard, and no longer so much questioning the economic fault of modernity (i.e., of capitalism) vis-à-vis the environmental crisis, there was now a new environmental politics discourse, whereby a sustainable level of production was encouraged: supporting growth but at the same time reorienting technology, managing risks, and merging environment and economics in decision-making processes (Brundtland, 1987). As a result, and again in contrast to the 1970s' debate on limits, the 1980s celebrated an expansion of capitalist development, as 'the concepts of economy and ecology were no longer regarded as antithetical' (Spaargaren, 2000, p. 45). This not only meant that the third world could develop within the planet's carrying capacity, but also that industrialised countries should adjust the structural design faults of their industrial systems according to sustainability parameters.

It was within this new policy outlook that a third group of environmental sociology theorists emerged, originally in Germany, recognising such '*structural* character of the environmental problématique' leading to the burdening of the sustenance base, yet assuming that exiting political, economic, and social institutions can internalise environmental care (Hajer, 1995, p. 25, italics added; Mol, 1995; Spaargaren, 2000). These theorists started out by observing that environmental protection could be achieved in frameworks of economic growth, leading to the assumption that material flows could be 'decoupled' – i.e., dissociated – from economic flows[39] (Mol, 2000a). As a result, and challenging the notion of deindustrialisation and limits to growth, these scientists started to explore new directions or options for understanding the dynamics of environmental deterioration and reform in view of the main social practices and institutions of modernity in a scenario of further growth – i.e., of modernisation. Their central object of reflection has since then been the changing social practices and institutional transformations bringing about the environmental reform of modern societies. According to ecological modernisation theorists, the institutionalisation of environmental care into all spheres of society is a viable condition for the further development and subsistence of mankind, even under conditions of capitalism.

The theory of ecological modernisation originally ripened against the backdrop of two dominant, though slightly different, debates, put forward by two of the

environmental conservation and development was pointed out – and subsequently employed by a number of authors, receiving various interpretations, e.g. Riddell, Sachs, Eckholm, and Glaeser.

[39] In other words, that economic flows and environmental resource flows develop *independently*.

major German social scientists in the mid-1980s. Although, by now, several authors have contributed to the theory's development, eventually leading to a refining of its original propositions, a few topics still remain imperative for understanding both the core of this school of thought and also how it diverts from or converges with other theories. In the section that follows I briefly review the most distinct characteristics of ecological modernisation, starting with the issue of emancipation of ecology and then moving on to the question of the changing relationship between state and market, and the concept of social change (the two main debates originally put forth by the theory), the theory's descriptive and normative connotations, as well as the issue of substance (i.e., environmental) flows and the role of science and technology. Following this review I will finally explore the theory under the present conditions of globalisation and its applicability in this study.

Premises of ecological modernisation theory

A central theme of ecological modernisation theory is the notion that ecology has been growing as an *independent rationale* or criterion within modern industrial societies. Unlike other important movements that have emerged since at least the 1960s onwards (e.g. feminism, peace, nuclear disarmament, etc.), it is unarguably the environmental movement that has been mostly ascending and growing in importance within the modern societal system – to the extent that departments and ministries for the environment have been established (1970s), green parties instituted (1980s), and several market-based mechanisms have started to incorporate 'ecology' as a distinct product criterion, e.g. through eco-labels, environmental auditing, green financing, and through concepts like environmental performance (Mol, 1995; Spaargaren, 2000). According to ecological modernisation theory, the institutionalisation of environmental care is a process that cannot be only reduced to an economic or political reasoning, insofar as ecology is becoming a distinct rationality of modernity.

Against this backdrop, ecological modernisation theory developed two somehow complementary debates. One of these was presented by Martin Jänicke (1985, 1986, 1993), bringing into focus a discussion on the *failures of the modern state*. According to him, the classical environmental policy making paradigm – centralised, inflexible, developing 'curative' policies of command-and-control – has to a large extent been incapable of dealing with or controlling the environmental crisis of modernity, in view of monitoring billions of natural resources and related emissions that are used in and produced by the world economy. Likewise, the bureaucratic state has also failed in not being able to promote substantial advances in technological innovations, neither incentives for companies to adopt more environmentally sound strategies. Jänicke elaborated thereby on a *political modernisation* discourse, in which environmental policy making is set about by horizontal cooperation and consensus among actors, on the basis of dialogical decision-making and covenants, and in which the state somehow 'retreats' in the implementation of

environmental care and transfers certain responsibilities on this matter to de-central level actors, such as the market. Without of course loosing grasp of certain tasks that remain indispensable for the state in bringing about environmental reform, this proposal is not a simple 'laissez faire' policy, but rather a changing paradigm in which the state becomes an 'enabling state', in the sense that it creates appropriate conditions for the market to carry out environmental management and reform[40]. In addition, he also notes that in this process the environmental policy discourse shifts not only from command-and-control to more negotiated approaches, but also from 'curative' or 'demodernisation' solutions to 'preventive' and 'technologically progressive' ones.

The other debate was prompted by Joseph Huber (1985, 1991, 2000), identifying that such new environmental reform discourse was not only restricted to the government-industry relationship but that it also concerned the societal sphere, in view of the role of civil society in pushing for ecological reform, such as consumer pressure and environmental NGOs. He thereby elaborated a *theory of social change* – or a radical programme of ecological reform – in which 'economy' and 'ecology' became intertwined concepts. The essence of Huber's thinking is that ecological modernisation is a way to overcome environmental problems by making use of the same institutions of modernity – such as political and economic ones – in a project of 'modernising modernity', by re-institutionalising environmental concerns (or by 'economising ecology' and 'ecologising economy', above all in the sense that ecology starts making an impact on the business world rationale).

In turn, these two streams within the theory have resulted into two (or three)[41] main bodies of literature (cf. Spaargaren, 2000; Mol, 1995). The first one deals with ecological modernisation as a *descriptive* or *substantive theory*, which analyses the (historical) changing political concepts and societal developments to deal with environmental problems by applying theoretical premises as a vehicle for describing society. The main observation made here is that environmental issues have been moving from the periphery to the core of societal concern, affecting the policy making practice of politicians, managers, financiers, consumers, and so forth, also converging at the idea that the state is becoming less and less bureaucratic and hierarchical at dealing with environmental problems, delegating environmental care responsibilities to the market. The second highlights ecological modernisation as a *normative* or *formal theory*, which prescribes alternatives to deal with environmental problems. Here again the main observation is that ecology is moving from peripheral to core debates of modernity, eventually developing its own rationality. To explain this, adherents of ecological modernisation present a set of some five interlinked hypotheses which are being tested since at least the mid-1990s:

[40] Such as for instance by introducing eco-labelling schemes and other mechanisms to instigate a market dynamics towards environmental reform (cf. also Blowers, 1997, on the issue of the enabling state).

[41] In reality, Mol (1995) identifies three main bodies of literature, the third one referring to programmes of political parties.

The first hypothesis corresponds to the criticism that traditional judicial-administrative structures based on the 'react-and-cure' formula dominant in the 1970s have received, whereas a second-generation 'anticipate-and-prevent' regulatory framework or corporate policy has started to gain increasing credibility. Related, the second hypothesis stresses that science and technology have started to play a new role vis-à-vis ecological-informed transformations of modernity, not only discarding the 'react-and-cure' (end-of-pipe) formula, but also manifesting important new concepts as 'multiple stress' or 'critical load' – emphasising integrative ecological responses to industrial processes and the levels of pollution that nature can endure. Thirdly, and while the state somehow retreats in view of environmental care issues (cf. above political modernisation)[42], market actors – such as producers, R&D institutions, business associations, recyclers, also concerning end users – start to play a pivotal role as ecological reform carriers, moving away from the concept that environmental protection implies increased production costs towards the concept 'pollution prevention pays'. Fourthly, decision-making processes regarding the management of public assets (such as nature) have also been joined by external actors, such as environmental NGOs, which do not only further push for environmental protection but have also started to develop environmental reform proposals. Finally, the fifth hypothesis can be defined as the changing environmental discourse paradigm, moving away from the 'ecology versus economy' discourse introduced in the 1970s towards a more consensual approach, in reference to and intrinsically interlinked with the above mentioned four other hypotheses, whereby concepts as win-win, people-planet-profit, and pollution prevention pays, among others, have emerged[43].

As can be noted, a common denominator to these hypotheses is the issue of managing environmental flows – such as the use of energy, water, materials, and the related emissions at the end of the production line. The theory's essence is therefore to provide an understanding of how environmental flows may be managed in a more ecologically rationale way, in view of developments that take place interdependently within socio-economic and political-cultural transformations resulting in technological change. According to the theory, the contemporary environmental crisis is above all a *social crisis* of the structural design fault of modernity, leading to the burdening of the sustenance base, which needs therefore to be reconstructed in the sense that production as well as consumption processes start to minimise the extraction of resources, particularly non-renewable ones, be more efficient in the industrialisation process, and minimal in terms of emissions.

And in order to achieve this, three main projects have been advanced by the theory. First, the shift or substitution from curative (Entsorgung) to preventive (Vorsorgung) technologies, in a paradigm of further industrialisation with clean production processes, opposed to end-of-pipe strategies and de-industrialisation so-

[42] More recent definitions on the role of the state divert to some extent from this retreat idea and are also somehow more sceptical regarding the role of the market as an ecological reform carrier (cf. below).

[43] For these hypotheses see Mol (1995) and Hajer (1995).

lutions. Second, the partial de-industrialisation or dematerialisation of certain technical systems or economic sectors that are fundamentally maladjusted still remains imperative in this new context, such as certain segments of the chemical industry, nuclear energy, and so on. Third, the close monitoring and subsequent monetarisation of nature; in other words the better control of resource streams and the attachment of an economic value to them, through for instance the introduction of economic concepts, mechanisms, and principles aiming at environmental protection[44].

In its essence, ecological modernisation theory suggests that these projects are leading to an ecologically radical kind of industrial revolution in which environmental externalities are being internalised in a way forward into modernity, in an ecological *modernisation* process. According to the theory, de-industrialisation solutions do certainly exist, but are somehow developed on a smaller scale as compared to further modernisation approaches.

To finalise, the theory also highlights that to the same extent that ecology is growing as a new criterion of processes of production and consumption, it is also growing into an independent criterion of *modernity* itself, as the environmental question is now also being raised in sociology at large. Illustrative of this achievement are the works by key scholars as Anthony Giddens and David Harvey, which are now formulating concepts in which the ecological crisis becomes pivotal for understanding the current, 'reflexive' phase of modernity in which we stand.

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[44] In view of these claims, ecological modernisation has been often connected to the idea of being a mere technocratic or technological fix approach. In addition, the assumption that large-scale technologies, which cause environmental harm, may be reverted into instruments of environmental reform has likewise incited much critique, particularly by neo-Marxist schools. For these schools, by tackling environmental problems via 'new and more intelligent technologies', ecological modernisation may also result in negative social effects – due to the increased costs these technologies may imply in the short-term – and benefit economies of scale, such as large corporations. And these corporations, in turn, cannot be reverted into instruments of ecological reform, as they are in fact the main agents causing environmental disruption. In short, according to these scholars 'ecologising economy' and ' economising ecology' by delegating certain environmental reform tasks to the market is all in all incapable for resulting in more than window dressing environmental reforms or technological fixes.
Ecological modernisation theorists have counter-argued these criticisms and explained that at the heart of the theory is an attempt to bridge the gap between technological change and environmental social sciences, by looking at how such environmental flows are being *managed* by society in a large-scale. In general, technological developments are already being designed according to ecological criteria, and environmental problems of modernity cannot be tackled without considering that technologies – and large corporations – are indeed intrinsic aspects of modernity or, ultimately, that modernity and industrialism are an *inseparable project*. Therefore the phrase: 'all possible ways out of the environmental crisis cannot but be ways further in modernity'; as modernity is far from being in its end and industries, which shall continue to subsist, will need to be refined in an ecologically rational direction. In any case, ecological modernisation theorists posit that political modernisation may *perhaps* not suit conditions of pure free markets, e.g. out of the north-west Europe region. Although this is an issue that in its turn puts into question the theory's generalisibility scope, it should be also clear that pure free markets do in fact also not exist, and that, to varying extents, all market economies are somehow state-and-society regulated, relatively like in the context of north-west Europe.

The globalisation of ecological modernisation theory

Since the early 1990s onwards, new environmental issues like global warming, ozone depletion, desertification, and destruction of rain forests have strengthened the idea that environmental problems are not only fairly interlinked among themselves but do also resound on a more global level. It is within this context that a 'second environmental crisis' emerged in contrast to the 'first environmental crisis' of the 1970s and 1980s, usually defined by environmental sociologists as the phase of 'global environmental change'. While the first environmental crisis tried to tackle environmental problems at the local level, the second crisis introduced 'new' debates on the urgency of environmental problems and the need for international or even global coalitions to deal with them (cf. Spaargaren, 2000). These new challenges have eventually also affected the framework of ecological modernisation theory, particularly for putting into question the role of science and technology as environmental reform carriers, and also for stressing the need for transnational environmental policy agreements – an element that the mainstream elaborations of the theory do not address.

One of the leading theorists of the second environmental crisis is probably Ulrich Beck with the concept of *Risikogesellschaft* (risk society, cf. Beck, 1992, 1999), through which he points to the emergence of a society where fear and anxiety dominate, where environmental problems have gone out of control. Also tackling modernity and its industrialist dimension, he suggests that the production of 'wealth' is accompanied by the production of 'risks', with incalculable side effects. Such risks are in turn contributing to bring modernity to a new phase, one in which it becomes reflexive, where society is confronted with hazards and insecurities 'induced and introduced by modernisation itself' (Beck, 1992, p. 21). Terming this new phase 'reflexive modernity', Beck explains that unlike in 'simple' modernity, the global consequences of such new risks – such as radioactivity, toxins, genetic engineering – belong to a different age, as they induce irreversible and generally invisible harms, thus in principle only existing as long as they are scientifically proven. In addition, and somehow paradoxically, according to Beck risks of reflexive modernity act in a kind of boomerang effect, sooner or later affecting the same agents who produced them, thereby breaking up or democratising[45], or at least to a certain extent, patterns of social class or developmental status.

It is within such framework that, besides the role of science and technology and the urgency for transnational policy agreements, the role of multinational companies in the diffusion of environmental 'bads' or 'goods' has also been increasingly put into question. In general, environmental sociologists argue that it is precisely the economic dynamics of global capitalism that holds the largest share of

[45] The idea of democratisation of the distribution of risks has been contested by particularly dependencia and neo-Marxist theorists, who claim the poor to always suffer more (Mol, 2001). Along this assumption, Beck later on explained that 'globality of risk does not, of course, mean a global equality of risk' as the first law of environmental risk is that 'pollution follows the poor', being the sanitation deficit in the third world a major indicator in this regard (cf. Beck, 2001, p. 5).

responsibility for triggering and worsening environmental problems. Yet, while there is evidence that multinationals are making efforts to deal with their environmental externalities – or at least as far as their home countries are concerned – environmental sociologists *do not* yet share a consensus regarding their environmental conduct on a worldwide level.

In this regard, scholars as Bradford Gentry (1999), Lyuba Zarsky (1999), Jan Adams (1999), in addition to Arthur Mol (2001) have in general a positive appraisal of the environmental performance of economic agents in the era of globalisation. Defending the thesis that globalisation mechanisms may encourage the distribution of 'goods' (such as better technologies, improvement in living standards, etc.) to different localities, they suggest that it may thereby trigger a 'race to the top' in terms of environmental management particularly where developing countries are concerned. Others scholars including Beck (and following Shiva, 1993, and particularly dependencia theorists) are more sceptical, claiming that the foreign direct investment-environment linkages are far from evident. In the face of this dichotomy, a question to be raised, also defying the principles of ecological modernisation theory, is: in the era of global environmental change, to what extent do global market actors indeed play a role in diffusing global environmental reforms?

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The ecological modernisation theory has been (and still largely is) elaborated in the context of north-western European countries, tackling the local dimensions of environmental problems, such as through the improvement of environmental flows within industrial sectors. Many of the elements put forward by global change theorists – such as the environmental dimensions of globalisation processes or the global dimensions of environmental problems – do not appear in the classic elaborations of ecological modernisation theory. Also, the theory does not have a strong focus on the risks in everyday life but rather on institutional adaptations to cope with ecological problems. In a way, ecological modernisation theory is much more concerned with issues regarding *institutional reflexivity*, than with the reflexivity of risks and threats to everyday lives (Hogenboom *et al.*, 1999).

In some respects, however, the arguments put forth by Ulrich Beck do not necessarily contradict those of ecological modernisation scholars, in the sense that both schools combine the idea of continuing with modernisation processes trying to encompass their side effects. But when it comes to issues regarding the institutionalisation of doubt or the globalisation of uncertainties, risk society theory seems to be much closer to the principles of the counter-productivity school, as it implies the disenchantment of science or the inability of technology to solve environmental problems, unlike ecological modernisation theory[46].

[46] As expected, the criticisms it has thereby attributed to ecological modernisation are fairly in line with those laid by counter-productivists, see Mol, 1995, p. 44. Conversely, ecological modernisation has claimed that risk society, in spite of being a prominent and influential political appeal,

All in all, and in line with the discourse on global environmental change, discussions have already started to emerge as for the suitability of ecological modernisation for explaining or predicting ecological reform in non-EU areas, most notably in developing countries or in the so-called double-risk societies[47] (e.g. Rinkevicius, 2000; Frijns *et al.*, 2000). Although the theory has received rather critical remarks in this regard, also stemming from ecological modernisation scholars themselves, its applicability to other countries is still intriguing adherents as well as sceptics of ecological modernisation theory.

In its current conceptualisation, the theory presupposes some socio-political, economic, and cultural conditions, as well as institutional characteristics that become decisive to its application. Frijns *et al.* for instance mention (i) a democratic and open political system; (ii) widespread environmental consciousness; (iii) well organised environmental NGOs and business organisations to defend public interests in negotiations; (iv) tradition in negotiated policy making; (v) an advanced technological development in a highly industrialised society; (vi) a detailed and reliable system of environmental monitoring; and, finally (vii) 'a state-regulated market economy that dominates production and consumption processes, covering all the edges of society and strongly integrated in the global market' (Frijns *et al.*, 2000)[48].

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somehow fails in providing a concrete framework for the development of environmental policy proposals.

[47] Societies not only facing risks of late modernity but also development constraints (e.g. poverty, monetary deficits, institutional shortcomings, and so forth).

[48] It is evident that institutional conditions of north-western Europe diverge in many aspects from those in developing countries. The third world itself is also quite plural, consisting of newly industrialised countries, 'underdeveloped' countries, and transitional economies. In this regard, the theory does certainly not correspond to the conditions of underdeveloped economies (e.g. sub-Saharan Africa), where there is no welfare state with articulated and institutionalised environmental tasks, hardly any advanced technological development or state regulated market economy connected to the globalised world market and, above all, very weak institutionalised environmental consciousness (Mol, 1995). But with respect to transitional economies and newly industrialising countries, however, the theory seems to be more adequate as a number of them has a relatively strong welfare state, an (emerging) market economy, relatively high level of (environmental) technology, a transitional process of democracy and public participation, although a quite a poor level of environmental awareness and relatively powerless (relevant) environmental organisations (Ibid.).

Here again the theory has been contested by particularly dependencia theorists and neo-Marxists for being viable, in the first place, only due to the 'net withdrawal of natural resources from and a net addition of pollution to developing countries by the industrialised nations' (Mol, 1999). For such theorists, in addition, the general 'imposition' of a western model of environmental reform is unsuitable to non-OECD countries, due to their different local socio-economic and cultural conditions. Although part of these arguments may be true, other arguments, in contrast, would suggest that ecological modernisation, as a western ecological reform model, may be indeed suitable for non-OECD countries, as modernity is mainly a western or triad project (which has already been globalised), in which the dominant models of development – and consequent ecological restructuring concepts – do emerge, though not exclusively, in the west.

A major argument here is that an ecological restructuring of developing countries according to western models is already in progress due to globalisation mechanisms themselves. These include for instance the numerous international development programmes promoted by multilateral organisations as the World Bank, IMF, UNCED, etc., as well as activities and programmes diffused by diverse international NGOs and multinational companies – which are in a way encouraging developing countries to 'leapfrog' the first technological generation of polluting industries and directly adopt better, ecologically sound approaches. For adherents of ecological modernisation theory, it is therefore not incorrect to say that the rising economic interdependence, political interaction and collaboration, global diffusion of 'western' technologies, and the emergence of global consumers may well push for somewhat *converging* tendencies, which also apply to environmental reform issues. In this case, the globalisation of the ecological modernisation theory seems to be pertinent, although researchers still suggest that its applicability to areas outside north-west Europe shall probably require some adaptations.

Ecological modernisation theory and transnational office buildings

As mentioned in the beginning of this chapter, ecological modernisation theory has been used in studies of different industrial sectors and policy contexts. Two main questions are thus in order in this section: How and to what extent may ecological modernisation theory contribute to an explorative study of the greening of transnational office buildings; and, conversely, how can an explorative study of the greening of transnational office buildings contribute to substantiate the theory of ecological modernisation.

Starting with the former, and being a theory of social change, ecological modernisation theory primarily helps us to analyse and understand the *social context of technological change* – that is, the interdependency between technological change, socio-economic, and political-cultural transformations. It predicts that environmental reforms are most likely to occur in frameworks of 'modernising modernity' – refining production and consumption processes towards clean technologies, ecologising economy, and economising ecology – hence without altering fundamentally the main institutions that make up modern, capitalist societies (cf. above).

In line with this, we may use the ecological modernisation theory to assess and compare the role/interaction of different actors involved in the organisation of production and operation of offices and related districts for bringing about environmental reform. When reflecting on the ecological restructuring of transnational office buildings we are therefore dealing with a dynamics of actors belonging to a public-private continuum, and of both local and global origins: e.g. multinational companies, local policymakers and urban planning authorities, energy and water utility managers, as well as architects, contractors, suppliers, investors, and representatives of credit institutions, among others, that may be either local or interna-

tional. Questions we should thus ask to analyse the theory's adequacy for explaining environmental change in our case include the following: How are environmental criteria emerging in the design and operation of office buildings in different cities? Are technologies of office buildings in different cities moving towards cleaner ones? If so, are the local governments of different cities introducing 'enabling' policies to instigate a dynamics of radical environmental change, thereby moving away from purely command-and-control and curative instruments? And in turn are global market actors as multinational companies – which occupy a significant share of the urban office stock – playing a key role in implementing, worldwide, urban environmental change?

Reverting to what was said in chapter 3, according to Guy and Osborn (2001), the logics of green design closest to ecological modernisation theory is the one that can be referred to as 'smart asset', in which topics as flexibility, efficiency, cost-savings, and intelligent technologies are evoked. This is the main logic of green design of the world of commercial property development, thus of the development of ecological office buildings in large cities, such as the Commerzbank in Frankfurt, Four Times Square in New York, Swiss Re in London, etc. The ecological reform of buildings is therefore carried out in contexts of (i) strong grid connectivity, (ii) where environmental concerns are high on the agenda but still enmeshed within the logics of business survival, and (iii) of strong local/global interaction. Therefore, and in view of all the actors that are related in the production and operation of office buildings in such contexts (and beyond the decisions made alone by architects/clients), environmental reforms in such contexts will tend to develop environmental solutions that: (i) do not disconnect from mains grids, (ii) are both a means to reduce expenses and an asset to brand the overall economic and societal performance of the companies that inhabit them with an environmental image, and (iii) make use of both locally embedded techniques (such as passive solar design) and of global technologies, such as those related to saving equipment (energy, water devices) and efficient materials (cladding, windows, and so forth)[49].

[49] Illustrative of this is the example of the headquarters and demonstration project Groundwork Trust' Eco Centre, in the United Kingdom (Guy and Osborn, 2001). In this building, the original proposal of the architect and the client was of fully disconnecting the structure from the networks of infrastructure, proposing thus a self-standing solution, an example of 'environmental sufficiency'. This solution, however, was abandoned insofar as the architect and client found out that the logics of constructing an urban building did not necessarily mean that the building would have to turn its back to the 'usual infrastructure of grid electricity, mains drainage and gas' (Guy and Osborn, 2001, p. 95). Yet, although still connected to the external sewerage system, gas supply, electricity, and water supply, the building proposed instead an approach of 'environmental efficiency'. It generates its own energy through a wind tower, provides hot water through a system of solar panels, is air conditioning free and minimal in both energy and water consumption, and it has also been conceived so as to use environmentally sound materials. But as Guy and Osborn explain, the connectivity to the infrastructure grid was maintained to serve as back up in the case where the wind turbines, for instance, do not cope with the building's energy requirements. And above all it was also maintained in view of avoiding conflicts between the ambition of the architect/client and the reality of commercial, technical, and planning considerations. In this example, the roles on flow management between the building and the infrastructure networks were redefined – meaning

Analysing transnational buildings

As Spaargaren explains, ecological modernisation 'focuses on the ways in which substance-flows-management can and 'should' be organised in modern societies in a more appropriate way' (2003, p. 4). Solving thus the structural fault of modernity in the light of ecological modernisation theory may imply three forms of environmental innovations – (i) dematerialisation, (ii) monitoring and monetarisation of resource use, and (iii) substitution of unsustainable resources with renewables (Ibid., cf. above, see also van Vliet, 2002) – whose relevance will vary depending on the context that is being studied.

In analysing office buildings all three forms of environmental innovations seem to be relevant, insofar as office buildings incorporate technological options in their production, and yet become an *industrial agent* in their operation, metabolising environmental flows such as water, energy, materials, exhausts, and wastes in their running. In this sense, and to begin with, dematerialisation implies for instance the shift from the provision/consumption of products to the provision/consumption of services, with lower environmental impacts. Thus instead of buying air conditioning, buying cool air; this means that the air conditioning machine may be replaced by another means to achieve cool air, through for instance, natural ventilation. Monitoring, in turn, comprises a continuous assessment of the environmental flows, including resource use (energy, water) and waste streams (wastewater), which may take place in the operation cycle of offices. This corresponds to turning the invisible aspects of the operation of offices into visible or quantifiable ones. Monitoring is usually accompanied by the monetarisation of resource use and wastes, giving thus the environmental externalities a price (through eco-taxations, for instance). Finally, substitution regards the replacement of technologies that are unsustainable by sustainable, clean ones, or, similarly, of non-renewable resources by renewable ones. This is for instance the case of renewable energy sources (such as wind turbines or solar panels) to replace fossil fuels, although here a gradual substitution is more likely to occur in view of the arguments we discussed above.

In line with the above, and to analyse how these environmental innovations materialise amid the dynamics of the actors of a specific industrial sector, Mol (1995, pp. 62-92) proposes a system to distinct among three main analytical spheres or networks[50] in which such transformation processes take place: the policy, economic, and societal spheres. This system – defined as the triad-network – offers 'the advantage of combining both the structural properties of institutions and

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that loops of resources were only partially closed, but still supporting the existing infrastructure networks – summarising thus the idea that understanding technological change it is above all necessary to understand the interaction of related actors. Although, on the surface, this example may look like a demodernisation solution, it represents nevertheless a clear ecological modernisation process.

[50] Networks, in this respect, can be understood as social systems in which actors operate in more or less permanent institutional interactions.

the interactions between actors constructing a network' (Mol, 1995, p. 63). The policy network, in this regard, concentrates on the government-industry interactions based on the political-administrative perspective, in which transformations can be detected regarding the way laws, regulations, standards, and other instruments are formulated, passed, and enforced. Secondly, through the economic network[51], which concentrates on economic interactions via market mechanisms throughout the production-consumption processes, it is possible to see whether innovations stem from the market (including supply and demand forces) towards ecological reform and eventually towards its self-regulation in terms of environmental control. Finally, within the social network – in its turn concentrating on social-cultural relations between economic sector and civil society – one can observe whether social movements exist calling for an ecological reformation process.

The relevance of these networks of course also depends on the context in which they are applied. In the case of production and operation of transnational office buildings, where connections to local grids and global/local social interaction are strong, the policy and economic networks seem to be most relevant. The societal network, which mainly relates to civil society movements such as environmental NGOs, is of somehow a lesser importance, at least up to the present date, as apparently there is limited consumer pressure demanding an ecological reform of office buildings[52].

Thus, with respect to policy networks, office buildings are traditionally produced at the crossroads of policies and regulatory instruments (such as those determined by master plans and building codes), and by their enforcement and monitoring methods. The way they operate will also depend of the way they are served by systems of infrastructure provision as utilities (such as regarding energy, water, and wastewater). These connections do basically take place within government-industry/local-global linkages, determined a priori by local planning agencies, (although the efficiency of these becomes rather ambiguous in a context of transnational spaces). Therefore, in the present study we are in the first place interested in seeing *how*, if anything, environmental innovations may emanate from within this network. How do interactions between global actors and local ones in this public-private continuum take place; what is the role of the local government in bringing about the environmental reform of transnational spaces? By answering these questions we shall also revert to the debate of Sassen and Smith as for the role of the local government in managing transnational spaces, cf. chapter 2.

As for economic networks, in turn, transnational office buildings can be seen as commodities which will be produced and operated in an international market, determined thus by both local and global stakeholders. Here a strong interaction exists between suppliers (including suppliers of energy and water, of construction materials such as product manufacturers, of design, such as architects, of money such as financiers, and so forth) and consumers (such as companies and building

[51] The economic network is sometimes also referred to as industrial network.

[52] Although society may exert pressure on companies to improve their environmental performance, eventually affecting the environmental dimension of office buildings.

owners, i.e., those that will use the office space) – both with varying origins (local, global) and diverging interests – regarding the way offices will be conceived and operated and environmental innovations will emanate. In this study, our second concern is thus to assess the role of global and local economic actors in bringing about environmental reform: how decisions are steered in each context, and how they may be channelled, if anything, from place to place. Here the role of multinational companies remains of crucial importance, also for answering (part of) the central question of this research on the ways through which they promote environmental innovations in non-OECD countries and may constitute a transnational network of urban environmental management.

Hypotheses on the ecological modernisation of transnational buildings

Ecological modernisation theory has been developed in the context of north-west Europe and in relation to industrial production and consumption processes primarily. So in order to be useful for assessing ecological reforms in different economic and policy contexts – and answer our central research question – we should be aware of the problems which can arise when dealing with a transnational perspective and the office building sector mainly. Some of the elements of the theory are useful without much adaptations/reformulations, while others are to be complemented with additional theoretical notions.

Assuming that ecological modernisation may be indeed of relevance for areas outside the context of north-west European, in this research I utilise the theory in its *descriptive dimension* and will assess how its core assumptions vary, if anything, from place to place. With the objective of better understanding both how the environmental reform of office buildings develops in different places as well as how the theory applies in different economic and policy contexts, this investigation will be carried out in two levels. First, the triad-network is partly applied[53] to help in the assessment of how ecological reforms may be under way in different cities in view of the interaction between local/global and public/private actors. Second, and based on this information, the main tenets of ecological modernisation are assessed and compared among different societies. For this purpose, a series of hypotheses on the environmental management and reform of transnational spaces in the light of ecological modernisation theory is herewith suggested, which shall help us to evaluate the empirical events this study proposes to examine:

1. Besides economic criteria, ecological criteria are now also applied in the design and operation of office buildings, favouring in general a more efficient – rather than self-sufficient – use of resources. Buildings are therefore still connected to existing systems of infrastructure yet better monitoring and partially dematerialising the use of environmental flows, as well as substituting inadequate technologies.

[53] I emphasise 'partly applied' as in general I shall not analyse the societal sphere, neither all organisations pertaining to the economic and policy spheres.

2. Governmental policies in major cities are moving towards consensus-based policymaking approaches for the environmental management of transnational spaces, launching conditions (enabling policies) for the market to carry out environmental reforms. These approaches in addition are also favouring a shift from curative strategies to preventive ones. The role of the state in governing both environmental reforms as well as transnational spaces in general is therefore proactive.
3. Economic actors and market mechanisms are thereby playing a key role in diffusing ecological criteria in office buildings. While in the earlier periods of environmental reform, policy-makers had a crucial role to play in the agendising and formulation of the (hierarchical) policies, nowadays market actors are becoming key vehicles for implementing environmental reforms.
4. Global market actors as multinational companies may thereby turn into vehicles for triggering worldwide environmental reforms, homogenising a rationale of environmental management applicable to (transnational) office buildings.

In a way, while the theory of ecological modernisation lays a foundation for understanding empirical transformations leading to the environmental restructuring of transnational stocks of offices and districts, by approaching these hypotheses, on the other hand, we may also contribute to the theory's development. This research may thus be constructive for two possible reasons: First of all, there are few relevant studies that have analysed the greening of buildings or offices according to the ecological modernisation theory. However, as the environmental impact of office buildings is a subject of particular importance, environmental innovations are increasingly taking shape. This is therefore a fruitful field of research for assessing the validity of the principles of ecological modernisation. A second reason, in turn, is related to the fact that, in the context of globalisation and global environmental change, the role of ecological modernisation theory in analysing and prescribing environmental reform in different state-economy contexts still remains to be further tested. Therefore, widening the understanding of how ecological modernisation occurs/applies in different economic and policy contexts is crucial for substantiating the theory's basis in view of its global reach.

In order to test these hypotheses I shall first provide an overview of empirical events taking place in three major cities under different state-economy combinations at the interface local-global, public-private (Amsterdam, São Paulo, and Beijing, respectively chapters 6, 7, and 8). Yet, to facilitate an understanding of how an ecological modernisation process may be triggered from place to place, in the next chapter I shall provide an analysis of the dynamics towards the greening of transnational office buildings. This chapter will thus serve as an intermezzo to introduce a conceptual model and construct an analytical framework for assessing and interpreting the ecological reform of transnational spaces, as well as to define the empirical design of the research. The conclusions on the empirical events in relation to ecological modernisation theory shall be analysed in chapter 9.

5

Analysing the Greening of Transnational Office Buildings

TO THIS POINT, I have provided an overview of the environmental transformations urban office stocks are undergoing in the era of globalisation, both in terms of disruption (chapter 2) and reform (chapter 3). While in the previous chapter I integrated this elaboration into a theoretical framework and a set of hypotheses to help us to evaluate the empirical research, still some clarifications need to be presented. So far, I have not yet specified how an empirical research into environmental reforms may be operationalised as to the case of transnational office buildings.

The aim of this chapter is thus to define the empirical design of this study, forming a bridge between our theoretical elaboration on the ecological modernisation of transnational buildings and the empirical research. Starting with a summary of the theories highlighting the social dynamics that are in place in transnational urban spaces, the chapter presents two other components that shall combine with the hypotheses previously stated, and guide the empirical research in the chapters to come. The first one consists of a conceptual model. This model serves to provide adequate analytical notions for carrying out empirical research into the environmental reform of transnational office buildings, clarifying therefore the variables and bounds this research proposes to focus and unfold. The second component is a research methodology, including appropriate techniques for assessing how decisions regarding environmental management practices by both multinational enterprises and local organisations are made, and thus how environmental reforms are

materialising in transnational spaces in view of the main social carriers. An explorative case study methodology has been elected for this objective, whose unit of analysis comprises the interface between local and global social agency in the greening of transnational office buildings.

The interplay of local-global actors in transnational urban spaces

Traditionally, urban theory has primarily focused on local cultural, social, spatial, economic, and political processes. However, during the past two decades or so, various urban theorists have started to include a global perspective in the study of the local, claiming that it is now necessary to consider a wider societal matrix to understand urban change. These authors, however, while acknowledging the role of global capitalism as a major author of urban change, have diverged opinions as to the role of the local in transforming the urban. Global city theorists as Friedmann and Sassen, on the one hand, tend to depict the local as a place of assimilation of global flows and economic forces. Other theorists as Castells and Harvey, in contrast, while recognising the role of the global in shaping the local, give an accent to the *local responses* that emerge in global cities as well. In so doing they define the local as a 'political space', in view of its ability to prompt social movements of reaction and resistance[54].

Taking this argument further, Castells presented a theory distinguishing 'spaces' of social action transforming the city at large. According to it, in the era of information technologies the urban is no longer delimited to physical contiguity as it was in the past. Rather, it is constructed around two spaces: the 'space of flows' and the 'space of place(s)'. The former concerns the dense exchanges of capital, information, technology, images, etc., stemming from the global, which have become the 'expression of processes *dominating* our economic, political, and symbolic life'. The latter regards the urban experience as a local experience, with people living within the physical contiguity of the place, with their historical diversities, identities, and forms of societal interaction – and are in their majority *un*connected to the space of flows (Castells, 1996, pp. 407-459).

Castells' theory of the space of flows and space of places – or globalisation and localisation – has also been discussed in terms of 'glocalisation', where the different effects of globalisation on the different nodes of what he calls the network society are analysed from a more cultural view (cf. chapter 2, Robertson, 1991, 1992). More recently, his theory has received a new impetus particularly through the work of urban sociologist Michael Peter Smith (2001), bringing to the fore a discussion on transnationalisms 'from below' that are now reifying *parallel to*

[54] Harvey and Castells, though sharing many concepts, diverge opinions about the power such movements may exert. For Harvey, economic globalisation is triggering disorganised social actions, unable to develop a co-ordinated, transnational political force capable of facing the drawbacks of a globalising modernity; a dead-end. Castells, conversely, deems that localisms are indeed a viable form of resisting the global capitalist hegemony.

those 'from above'. By focusing on local social constructions emerging in response to globalisation, this author examines how such constructions may be connected across localities also producing transnational social spaces. Illustrative of this are, for instance, the practices advanced by migrant groups – e.g. transnational political coalitions and grassroots activisms – facilitated by the possibilities of communication, travel, and other forms of 'local-to-local' exchanges that have emerged with globalisation. Other examples could be local forms of policymaking (principles, instruments, and standards) to deal with the similar challenges that are besetting urban areas, such as environmental and infrastructure issues, which are now spread across localities by advanced means of information exchanges, the activities of NGOs, and so on (e.g. the adoption of strategic planning, environmental impact assessment procedures, etc.). He thereby suggests that the city should be understood as a crossroads of local, national, and transnational social relations: nodes of numerous connections – from above and from below – sustained either by socio-economic opportunities or by means of advanced communication and travel. These numerous connections – which go into the making of what he terms 'transnational urbanism' – are according to him 'mutually constitutive' (p. 168). They *merge* in the urban space, insofar as they enter the local arenas of policymaking with '*their corresponding fields of difference*' (p. 5, italics added). Smith proposes his approach of emphasising the effect of the local on the transnational to be fruitful for allowing a separation and comparison of the differences and communalities in global, national, and local social actions – ranging from the cultural, economic, and political spheres – in producing and/or transforming the urban space.

* * *

How are urban environmental reforms developing in the era of 'transnational urbanism'? In what ways are multinational companies triggering environmental innovations in their premises in different cities? In what ways do local planning processes contribute to the greening of transnational buildings?

In this research of environmental reforms taking place in the urban space, and referring to the work of Castells and Smith, I shall give an emphasis to two different 'spaces' of social action in advancing environmental innovations into the urban space. The first space regards the global 'space' of social action, the 'space of flows', that is, the practices of multinational companies promoting environmental innovations in their offices in different cities. In this research we shall call this space of social action as 'global management of environmental flows'. The other, in contrast, regards the local space of social action, or the 'space of place' according to Castells, which I shall designate as 'local management of environmental flows', regarding the environmental innovations applicable to office buildings promoted by local agencies of environmental management and policy of different cities. To carry out such analysis I shall assess how both spaces of social practices *interact* in different urban nodes, so to see which actors, conditions, and mechanisms are triggering environmental reforms. From this analysis I shall then judge

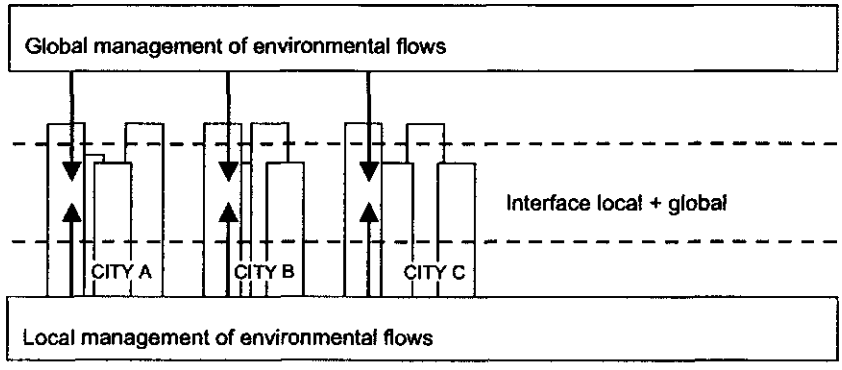

Figure 5.1
Conceptual model.

the dynamics through which multinational companies may be forming transnational networks of environmental management, and, conversely, the dynamics through which local planning processes may be adding to an ecological modernisation logic in the making of environmental reforms (cf. chapter 4).

The essence of this articulation is summarised in the conceptual model below (see Figure 5.1). This model illustrates the main dependent (explained) and independent (explanatory) variables of the research. As the central research question of this study revolves around the ways through which local and global actors are interacting in the promotion of environmental innovations in the office stocks of different cities, the 'promotion of environmental innovations in urban offices' is the main *explained* or *dependent variable*. In line with this objective, the model illustrates the two 'bins' of social practices that are to be explored. On the one hand, the 'global management of environmental flows', which in this research corresponds to the strategies of multinational companies regarding their offices in different cities. On the other, the 'local management of environmental flows', corresponding to the local environmental strategies applicable to office buildings promoted by the planning and environmental departments, utilities, facility managers, architects, engineers, etc., also concerning national policy networks where relevant.

In turn, from these two 'bins' of social practices, three main clusters of *explanatory* or *independent variables* are assumed to be crucial for determining the explained variable above defined. The first one regards the *characteristics and dynamics governing the global management of environmental flows*. This implies analysing the strategies pursued by multinational companies worldwide for their offices (in general) and with regards to environmental management practices (in particular), such as how decisions regarding the premises in different cities are made, which criteria are taken into account, the priority of environmental criteria, which innovative environmental techniques are put into use, how management or technological approaches are exported/imported, managerial level at which initia-

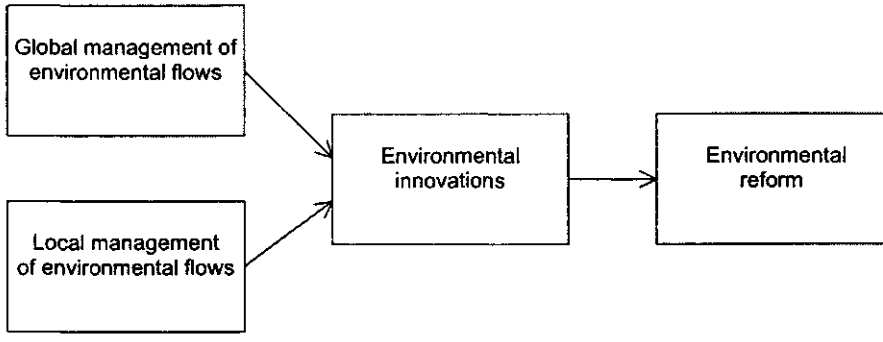

Figure 5.2
The environmental reform of transnational buildings.

tives are taken (local or global), the finance of environmental technologies, the company's motivations, and so on.

The second cluster regards the *characteristics and dynamics governing the local management of environmental flows*, concerning two main issues. The first regards the profile of the utility infrastructures, such as energy, water, and waste networks and their experts, in view of the strategies and programmes of resource saving these advance applicable to office buildings. The second issue regards the local environmental policy structure, also in view of the environmental programmes, strategies, and instruments that are applicable to office buildings[55].

The third cluster of explanatory variable is related to the characteristics and dynamics of the *connections between both spaces of environmental management* at the interface between company strategies and city strategies in a specific location, aiming to explain how both groups of actors are interacting and interfering in the environmental reforms of different nodes of the network society. This implies analysing how the space of flows and its regimes meets the space of place, e.g. whether and how the specific policies of multinational companies fit within the local circumstances and dynamics, and whether and how the space of place facilitates or hinders the implementation of the regime of the space of flows.

We assume that this interception local-global is what will eventually determine the dynamics of environmental change (see Figure 5.2), allowing us to explore and compare the practices of different multinational companies on the same city (e.g. companyA-city with companyB-cityA), the practices of the same multinational company on different cities of the network society (e.g. companyA-cityA with companyA-cityB), as well as the similarities/divergences on the dynamics of the local-global interface spanning across the cities.

[55] Assuming that environmental technologies in major cities are in line with the global state-of-the art (cf. chapter 3), we do not consider the profile of the local building industry, as well as the capacity of the local experts, as a relevant independent variable in this research.

A qualitative, explorative case study research

The conceptual model above can be seen as a starting point for defining the research, introducing the key factors, constructs and variables, and the presumed relationships among them, to be analysed. Yet, a research methodology needs to be chosen for carrying out such analysis. The aim of this section is thus to define and justify a research methodology that corresponds to the main objectives of this study.

To begin with, a choice has to be made between two research approaches: namely extensive and intensive. The former concerns the identification of communal denominators, i.e., properties and patterns, in a large number of cases, usually applying descriptive statistics and other numeric correlations. The latter, conversely, is more concerned with causal factors and processes in a more limited number of cases, using mainly qualitative manners of evaluation (Miles, 1983; Miles *et al.*, 1994; cf. also Mol, 1995). Of course, the selection of either approach is above all related to the *types of questions* that one seeks to answer with the study. Regarding our study, this puts us before two research alternatives. On the one hand, our research can be extensive, quantitative, conducted on a large-scale, trying to identify among a large number of cases communal patterns of events to demonstrate that multinational companies and/or local planning processes promote (or not) environmental innovations in office buildings of different cities. In that case we would come up with reductionistic results, conduct logistic regressions and suggest generalisations of the findings. This strategy would especially be helpful if our research would focus on 'how much', 'to what extent' sort of questions. However, our intention is rather to conduct a process-, decision-, and theory-oriented research, in which explanatory factors and theoretical constructs are more relevant. That is, we seek to understand *how and why* events take place in specific locations – i.e., the causal relations between facts and effects – and how these events match or confirm the theoretical concepts postulated at the end of the previous chapter. In this case, the methodological literature leaves little doubt that a qualitative, hence intensive, research approach is more suitable.

As argued by Miles *et al.* (1994), there are various qualitative research strategies. Among these, an explorative multiple case design has been selected for this research, as we seek to investigate, and compare whenever appropriate, how urban environmental reforms are consolidating at the crossroads between multinational companies and local planning processes and possibly reproducing in different locations (in view of the postulates of ecological modernisation theory). In this regard, Yin (1984) makes it clear that multiple case designs are in fact similar to single case designs in that they are 'an empirical enquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used' (Yin, 1984, p. 23). However, their difference lies on the fact that with multiple cases, the researcher is more concerned with a deeper understanding 'of processes and outcomes of [different] cases, the chance to test (not just develop)

hypotheses, and a good picture of locally grounded causality' (Miles et al., 1994, p. 26), where each case serves 'a specific purpose within the overall scope of inquiry' (Yin, 1984, p. 48).

In this research, as we are concerned with understanding the dynamics and decisions (or sets of decisions – why they are made, how they are implemented, and with what results) and how these may vary in different locations in view of the local-global interface, it seems that an explorative multiple case design on a limited number of multinational companies and cities (that is, on their local-global interaction) is appropriate to meet our objectives. In this light, this research is defined as an *explorative case study research* – qualitative in nature – in which our unit of analysis comprises the interception 'city-company' in articulating the greening of transnational office buildings. By carrying out such explorative methodology we shall better understand not only the main mechanisms of environmental change that may be in place in different urban nodes of the network society. We shall also be able to assess the role of companies in propagating environmental management practices worldwide, as well as the local – policy and economic – conditions that may facilitate the environmental reform of transnational spaces in different cities.

Selection of case studies

To carry out such methodology we need in turn to select a limited number of cities, and the related multinational companies settled in such cities, and define a time frame. As argued by Mol, evaluating ecological modernisation processes requires a study of contemporary events. In addition, it also requires analysing 'frontrunners', so as to increase the possibility of analysing a 'rather recent and embryonic process of ecological restructuring in its full extent' and indicate coherent trends for the future (Mol, 1995, p. 89). Starting with the multinationals, selecting environmental frontrunning companies which are 'anchored' in one specific city is the first task for defining the empirical research into contemporary events. In other words, we need to find a number of multinational companies that occupy environmentally sound buildings in one specific city. In view of different possible options – including ABN AMRO (Amsterdam), ING (Amsterdam), Andersen (Amsterdam), IBM (Amsterdam and Kuala Lumpur, Malaysia), Ford (Detroit), Nike (Hilversum, the Netherlands), Commerzbank (Frankfurt), and Agip (Rome), among others – a choice was made for starting this investigation with the buildings of ABN AMRO, ING, IBM, and Andersen in Amsterdam, which are worldwide renowned examples of 'sustainable buildings' in related literature, constituting altogether a significant yet manageable number of cases to carry out intensive research[56]. The selection of Amsterdam in turn is also notable due to the fact that this city is located in a place

[56] In fact, in order to meet our criteria of selecting frontrunning companies, and beyond these examples selected, our sample could have included only the cases of Nissan (which is actually located next to IBM) and Nike (which is nevertheless located in a municipality fairly far from Amsterdam, in Hilversum).

	AMSTERDAM	SÃO PAULO	BEIJING
Political system	Representative democracy	Representative democracy	One-party state
Market	Relatively state-regulated market economy	Market economy	State-controlled market economy
Institutional capacity[57] for urban environmental planning issues	High	Medium	Medium-high
Institutional autonomy for environmental planning issues	Medium-high	Medium-high	Medium-high
Level of environmental monitoring	High	Medium-high	Medium-high
Level of environmental technology	High	Medium-high	Medium-high
Capacity of participatory decision-making	High	Intermediary	Low-intermediary

Table 5.1
Characteristics of selected cities (based on Frijns et al., 2000).

well developed in terms of environmental management capacity, where environmental innovations are thereby expected.

Consecutively, the second challenge is to select the other cities which – while concentrating offices of the selected companies above – may provide, together with Amsterdam, different state-economy combinations (that is, cities of different economic and political backgrounds) for exploring and comparing how 'ecological modernisations' develop under different local settings. In this regard, a sample of three cities seems to be of a manageable size, in which Amsterdam is then to be complemented with other two cities. In order to explore and compare how 'ecological modernisations' develop in significantly different state-economy cities at the local-global interface, it seems that the additional two cities should in the first place be located *outside* OECD countries. In addition, these two cities should differ among themselves in their economic and policy backgrounds. A final condition is that, in order to explore the development of ecological modernisation theory, these cities should not be located in underdeveloped countries (cf. chapter 4).

[57] Number, and related number of personnel, of public environmental institutions at the urban level.

In view of these conditions, and jointly with Amsterdam, Beijing and São Paulo seem to provide a diverse framework to analyse the ecological modernisation transnational spaces at the interface between the global and local management of environmental flows. Besides the institutional differences, the cities also have physical and environmental variations. Although these variations may prompt different solutions in terms of techniques (particularly as far as passive solutions are concerned, cf. chapter 3), in this research we are mainly interested in exploring the *societal processes* that lead or hinder the adoption of environmental techniques.

In this sense, the technologies that are applied in view of the different environmental priorities are considered to be subsequent to the rationale of politics, policies, and management that are required to achieve environmental change, with whom we are mostly concerned[58]. Table 5.1 summarises the different state-economy combinations and other relevant characteristics of these three cities, justifying our selection.

Operationalising the dependent variable: research boundaries

A boundary that should be finally established regards the actual environmental flows that will be taken into account for this study. As described in chapter 3, there are numerous options or items to be analysed when assessing the environmental reform of offices: energy and water consumption in different phases, materials, indoor environment, and so forth. Yet, for reasons of time management, not all environmental flows can be taken into account in this research. First, a selection has to be made with regards to the *phase* that we should be concerned in analysing environmental change. As explained in chapter 3, buildings use up resources and emit wastes during many phases (spanning from their design, construction, operation to final demolition). However, and in line with many prominent contributions in the field (see, for instance, Baker *et al.*, 2000; Hawkes, 1996; Jones, 1998; Littlefair *et al.*, 2000; Roodman *et al.*, 1995; Watson, 1993; among others; cf chapter 2), there is no doubt that the operational phase of a building is the most resource intensive one as it corresponds to the phase during which the building is being actually operated, consuming numerous resources and emitting numerous wastes, year after year.

[58] Another remark to be made here regards whether the issue of ownership or temporary tenure has an influence on the incorporation of environmental concerns in the company's office. As will be demonstrated, not all the offices analysed in this study are property of the companies selected, particularly those in Beijing. However, according to empirical cases (e.g. Nike in the Netherlands, which is a tenant of its office space, cf. Bouman, 2000), companies, even in the condition of tenant, may very well 'push' for the ecological upgrading of the building as this condition does not leave out the possibility of the company to opt among different buildings in view of their environmental status, e.g. regarding several indoor technologies, appliances and equipment, e.g. lighting and sanitation systems, equipment (computers, machines), layout (of desks, etc), indoor shading devices and so on. In addition this does not leave out the possibility that companies have to apply environmental management systems, monitoring procedures, and the like, in the running of their (rented) premises.

Focusing thus on the operational phase of the building, the second selection concerns the precise environmental flows that shall be taken on board. Buildings may be burdensome to the local environment and infrastructure during the operational phase through several ways: e.g. by using energy, water, through flows of materials (e.g. office supply materials.) into and wastes out of the building, through transport-related issues, through the impacts of the indoor environment on people, and so forth. Due to time constraints, we need to make a choice as to the items that should be most relevantly explored in our study of transnational buildings and environmental flows. Again in reference to the above contributions, it is clear that issues regarding energy and water are by far the most pressing ones, as they not only have consequences on the local infrastructure but also on the state of the global environment, through for instance greenhouse-gas emissions. Roughly, 60 percent of the use of energy and water in a building takes during the operational phase. In view of this magnitude, we propose to restrict the research to the consumption of energy and water in offices in the *operational phase* of the office building. As this corresponds to the 'running' phase of the office, the consumption of energy and water can be seen as physical resource streams being constantly metabolised in the space. Their environmental performance, however, is determined partly during the design stage (such as major equipments, technological options, etc., selected during the design phase) and partly during the operational stage itself (such as concerning monitoring systems and other saving strategies).

In terms of energy consumption, this corresponds to exploring the 'operational energy' (cf. chapter 3), which is mainly attributed to systems of acclimatisation (such as spatial heating and air conditioning) and lighting. Such systems do also represent the highest fraction of operating costs of a firm; reducing thus their load implies significant reductions in operating costs (see Jones, 1998; Conlon, 1999). Office equipment, which is too often – though incorrectly – considered to be an energy burdensome fraction in the office operation, has nevertheless a much lighter share in the office aggregate energy consumption (see Jones, 1998). However, it should be noted that office equipment such as computers, printers, and copy machines do emit tremendous loads of heat to the indoor environment, demanding thus more intensive systems of acclimatisation.

Water consumption is another important issue to be considered, as water is becoming a scarce resource worldwide, and office buildings also use a significant amount of water in their running, with the related emissions (wastewater). The costs and energy consumption to operate the pumping of water to and from treatment stations aside, water consumption is also related to several environmental impacts, such as the destruction of ecosystems at the point of harvest and the 'city sinking' effect. Therefore decreasing the amounts of water used in and emitted from buildings is an important factor to reduce the load of the urban environment and infrastructure.

The selection of energy and water consumption in the operational phase seems thus to provide a significant sample in which environmental innovations are to be expected, and whose application shall give an illustrative picture of the main

trends of the environmental management and reform of urban office buildings. In this sense, as the environmental strategies of both multinational companies and local agencies do comprise a broad range of environmental flows – including energy, water, and waste streams – had we selected another environmental flow of the operational phase of the offices, such as waste streams, we would probably arrive at the same kinds of results (as for the case of energy and water) regarding the dynamics of environmental change. However, should the research be concerned with the issue of embodied energy in materials, for instance (see chapter 3), we would probably arrive at different results due to the stage at which most decisions concerning the selection of construction materials are made (which is during the design process, in which the participation of multinational companies is more restricted, except for cases of direct involvement at the design phase), requiring thus another research approach.

Research methods

As will become clear in the coming three chapters, the focus of the empirical research was given to empirical events taking place in the 1990s, although relevant historical issues are also taken into account. Both primary and secondary sources of information were gathered in this research. Primary sources comprised mostly of interviews and site visit to the offices of each company in the three cities. In each of the three cities, personal interviews were held with professionals at each company, such as directors, environmental managers, facility managers, and so on, as well as with professionals at city planning agencies, property firms, in addition to energy and water utilities in the three cities (cf. Appendix 1). These interviews, applying semi-structured checklists constitute the central source of information of this research. First, they allowed us to assess the precise principles, programmes, strategies, policies, and instruments applicable to office buildings that are being deployed in the three cities, steered amid the utility infrastructures and local environmental policy structure. Secondly, they also provided valuable information as for the environmental management routine of the selected companies with respect to their offices in the different cities: e.g. types of programmes that are being carried out (focusing on energy and water conservation), what they cover, how they are initiated, which management level (global or local headquarters) decisions are made, how these are delegated to foreign branches, how actors connect with local networks in the carrying out of environmental management issues, which critical factors are contributing or hindering, and so on. In addition to these, interviews were also held with other key stakeholders – such as architects and developers (cf. Appendix 1) – directly or indirectly responsible for the design or running of the offices of such companies. These actors also provided significant inputs regarding the decision-making processes of such companies with respect to the selection of certain technical operative systems in their offices vis-à-vis energy and water use, such as type of bulbs, glazing, sanitary devices, cooling/heating systems.

This information above was in turn complemented by secondary sources of data. To begin with, these consisted of general documents on each city, such as World Bank and UN documents, reports of diverse ministries, city-planning departments, and publications in specialised academic journals, among others. Secondly, they comprised the general literature on corporate environmental management, in addition to the various corporate annual and environmental reports and related scientific studies of the selected companies. In view of the limited amount of published materials with regards to the environmental management of urban office buildings in the three cities, these secondary sources do only contribute marginally to determining the related programmes, strategies, policies, and instruments deployed. However, they are useful for providing a general overview of the characteristics of the place, including geographical, political, socio-economic, and cultural aspects as well as the environmental and infrastructure profile of the place, main environmental management strategies (applicable to the building industry in general), building code, also extending to literature on systems of infrastructure provision such as energy and water utilities. Finally, they are also helpful in providing a general picture of the companies themselves, also with respect to their internal policies of environmental protection, the management level at which decisions concerning environmental care are made and, where relevant, how these are transferred/delegated from headquarters to foreign branches. These secondary sources were eventually supplemented by official documents produced by property firms – such as Jones Lang LaSalle and CB Richard Ellis, among others – including information on the property market, office buildings typology, occupancy, cost, and so on. These documents mainly describe the context in which the urban office stock is composed and operated, such as the legal framework and market upon which urban office buildings are possibly becoming greener.

* * *

All interviews, averaging 20 for each city, were held in 2001 and 2002. Two field visits were paid to the offices of the selected companies in the three cities during this period. The data collected were mainly qualitative; no extensive quantitative research has been conducted. In addition to the interviews and secondary sources of information, and as far as possible, conferences, lectures, and meetings on topics related to the research were attended during this period, in the three cities and elsewhere.

The empirical part of this research includes three chapters: Amsterdam, São Paulo, and Beijing. After an overall description of the characteristics of the place (thus the main features of the cities' office stocks, infrastructure and environmental problems, main regulations, market), we describe how environmental management is being implemented in the space of flows and in the space of places, the former by analysing the premises of our four companies – ING Group, Andersen, ABN AMRO, and IBM. The chapter on Amsterdam serves as the basis for understanding the supposed benchmark to be followed in the other cities as well as to demonstrate

the organisational structures of the companies at OECD level, also with respect to environmental management and its delegations procedures. In each of these chapters we elaborate a conclusion on how local and global actors are interfacing and triggering the implementation of environmental management and how an environmental restructuring of transnational office buildings is thereby developing.

Analysing in turn the nature of such events also with respect to the principles of ecological modernisation theory (hence our research hypotheses) takes place in the conclusive chapter of the research (chapter 9). In this chapter, general conclusions from the findings of this research are also presented, reviewing the theoretical articulations proposed in this study and elaborating directions for further enquiries.

6
Amsterdam

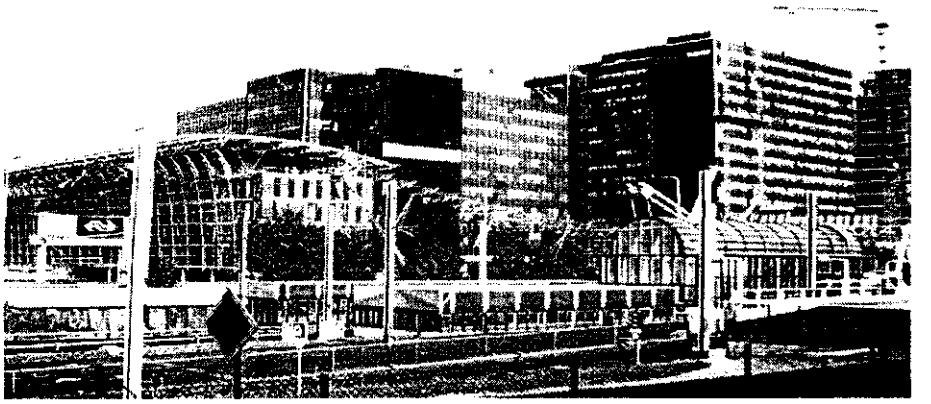

Figure 6.1
Amsterdam South.

THROUGHOUT THE 1980s AND 1990s Amsterdam consolidated its position as an international business capital, attracting an increasing number of corporate headquarters. During these decades also, environmental topics have grown into a key theme of both corporate and governmental agendas, in the Netherlands and elsewhere, owing to a number of factors – conventions regarding global warming, stricter regulations and higher fees for the consumption of energy and water, pressure by civil society, and so on. As a result, and as its stock of office buildings grew, environmental management practices stemming from global and local actors have started to intermingle in Amsterdam: first, local environmental policy agencies, which have traditionally played a prime role in the city's development, have started to prompt a number of new strategies to manage its environmental and infrastructure challenges, sharpened with the growth of its international business activities. And second, several multinational companies, which have migrated to the city, have also started to advance environmental strategies for their offices, all in all boosting the ecological reshuffle of Amsterdam's office buildings.

The environmental restructuring of Amsterdam's office buildings is the core subject of this chapter. In the first section we start with an introduction of the characteristics of the place, describing the main composition and operation of the city's office stock, the general regulatory framework ruling over it, as well as the rising local infrastructure and environmental challenges. Subsequently we move to the heart of our debate and provide an analysis of the environmental management prac-

tices of both local and global actors, describing the adopted approaches and the interplay of social action in furthering technological change in four office buildings. In the conclusions we elaborate a synthesis of how the environmental reform of Amsterdam's office buildings is developing in view of the influences and interactions of such two spaces of social agency.

Characteristics of the place

Amsterdam developed since about 1000 AD on the banks of the IJ River, although it was the river Amstel – dammed and canalised around 1270 – that gave the town its name. Most of the topographical contours and natural boundaries of the Amsterdam of today were delineated during this period, when two harbours were created, an outer and an inner one, and a series of dikes was raised to contain the banks on which buildings and circulation routes for land traffic were constructed (Kemme, 1996; Kahn et al., 1999).

Historically, further adaptations to the natural geography were advanced as the city expanded, including the construction of new dikes to improve safety and the drainage of lakes towards the north of the IJ and towards the south adjoining the city. And as the population grew, various urban planning concepts were deployed to control and accommodate Amsterdam's spatial needs. Although now criticised for inconsistency – as these concepts varied from urban expansion and functional separation approaches to city compactness and mixture of uses – environmental preservation has always remained a constant, probably in view of Amsterdam's susceptible topographical constitution (Liefferink, 1997; Ibelings, 1995, 1999; TU Delft, 2002; Fainstein, 2000).

Amsterdam has undergone three distinctive economic periods. First it developed as a trading town, at the crossroads of local and regional networks of traders, an economic activity that largely benefited from its favourable geographical location and from the exemption that it was granted from paying tolls on Dutch waterways (Kemme, 1996). Subsequently, Amsterdam grew into an industrial centre, towards the mid-1800s, a period during which Bremen and London had surpassed its trading importance (Ibid.). Nowadays, it has grown to become an internationally oriented business city, enjoying a sharp rate of economic growth, being many times referred to as the 'gateway' to Europe. With Schiphol airport (the fourth European airport) and Westpoort (currently the fifth largest harbour in Europe), Amsterdam has during the past decade attracted an increasing number of headquarterss, of both multinational companies and national firms. While these companies are altogether strengthening Amsterdam's importance vis-à-vis the globalised economy, as we shall demonstrate in this chapter they are also contributing to transform its physical space and, not least, its environmental quality (Kahn et al., 1999; Heinemeijer et al., 2000; Rienstra et al., 1999).

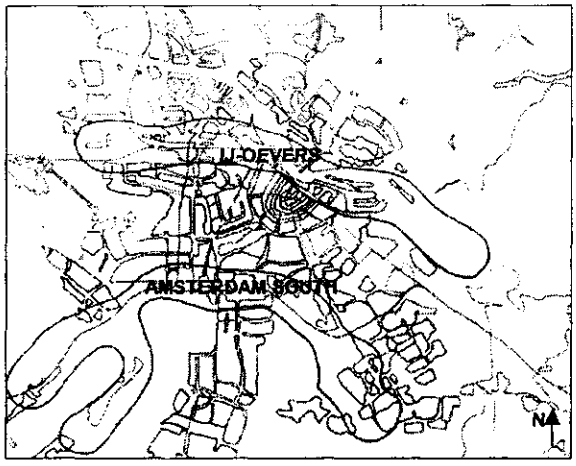

Figure 6.2
Distribution Amsterdam's office stock.

Amsterdam's office stock

Amsterdam's office stock is distributed along two main business centres (Kloos, 1995). One of them is situated in the waterfront and dockside development along the banks of the IJ River, mostly around the Central Station, in an area known as the IJ-oevers. The other is located in the city's southern suburbs – known as Amsterdam South – an area that has been developing over the last 15 years predominantly along the A10 highway, connecting Schiphol Airport to the city centre (see Figure 6.2).

Amsterdam South is considered to be the fastest growing business centre in the Netherlands as well as the largest office-building site of Europe (Kemme, 1996), in which the financial and service sectors predominate. Its growth is largely related to the proximity to Schiphol Airport, the country's main international airport, in which one of the first landmark buildings or 'image signifiers' of the global economy – the World Trade Centre (WTC) building – was constructed (Koster *et al.*, 1997). This building, completed in 1985 and located right in front of the airport's main entrance/exit, yields a strong symbol for those arriving to Amsterdam by plane; a fact that certainly helps the city secure the city's importance as an international business centre – yet, unlike other Dutch large cities, preserving its historic cityscape.

Nevertheless, Amsterdam is not the only headquarters location in the Netherlands. As a result, and in spite of accommodating a large number of corporate headquarters of both Dutch and foreign firms, Amsterdam's total office stock area is rather small to make any impression in the international property market (Koster *et al.*, 1997). This fact sometimes puts into question Amsterdam's status as a global city, although the city is many times referred to as the 'gateway' to the unified Europe. Instead of Amsterdam, it is usually the Dutch Randstad[59] that is designated

[59] The Dutch Randstad can be understood as a polycentric urban system consisting of the four Dutch largest cities – Amsterdam, Rotterdam, The Hague, and Utrecht – together with a number of smaller cities in the western part of the Netherlands linked by an extensive green heart. Its physical constitution is rather peculiar for it has no centre and is rather a pluricentric urban conglomerate consisting of a ring of cities in a diameter of almost 80 kilometres, whose core is a large green area. It also has no hierarchy and is thereby frequently designated as an 'inverted metropolis' or a 'ville sans agglomération' (Taverne, 1994).

in academic literature as the 'Dutch global city' which, despite not being a jurisdiction, ranks the third most important metropolis in Europe after London and Paris, and ahead of Frankfurt and other German cities (Rienstra *et al.*, 1999). Amsterdam's economic role within the Randstad is nevertheless crucial, and the city is commonly regarded as the country's cultural, finance and service capital, being thereby formally addressed as a secondary global city[60] in related literature (Nijman, 2000; Koster *et al.*, 1997; Rienstra *et al.*, 1999).

Occupancy and support structure

According to Amsterdam Economic Development Department (2002), the greater Amsterdam area currently includes offices of approximately 1,800 foreign companies – counting the European headquarters of around 250 foreign companies as well as major Dutch corporate headquarters.

A particularity of Amsterdam is the fact that the city is currently turning into one of the main European financial centres, employing almost 45,000 people in the financial market (Ibid.). The southern axis along the A10 highway is becoming the country's 'financial mile', as many say, with headquarters such as of ABN AMRO Holding and ING Group[61] (World Architecture, 1998). Amsterdam also has more than 70 foreign banks with offices in the city, the oldest stock exchange in the world (currently ranking 5th in Europe and 8th in the world), in addition to highly specialised training institutions (e.g. Amsterdam Institute of Finance and two universities), which altogether strengthen the city's importance vis-à-vis the global economy. Other major sectors present in Amsterdam are publishing and accounting (Amsterdam Economic Development Department, 2002).

In terms of area, and as mentioned previously, the city's present office stock is rather small as compared to other international capitals. In 1990 Amsterdam totalled one fifth of London's office space, and one seventh of Paris' (Rienstra *et al.*, 1999). This is partly explained as Amsterdam is not a dominant national market for office space, like London is in England or Paris in France, and neither does it ac-

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In political terms, the Randstad results from a strategic institutionalisation taking place in the Fourth Report on Spatial Planning (1988) so as to enable the Netherlands to hold a strong urban system to compete with other large capitals for businesses, meeting therefore the new challenges set by the globalised economy. Other similar urban systems can be found in Germany (Ruhr), in Japan (Kansai) and in Italy (Po Valley). Its total population is of about five million inhabitants, of which 1.45 million live in the municipality of Amsterdam – the largest among the four, with 730,000 inhabitants only in the inner city. Yet, even though the Dutch economy – and subsequently head office locations – is fairly scattered throughout its area, in general terms one can say that The Hague remains the seat of the Dutch government being at the same time a leading international bureaucratic centre, while Utrecht is a city mostly oriented towards education, Rotterdam mainly a trading capital, as a major world seaport, and Amsterdam the country's financial centre.

[60] According to Sassen (1994), in 1990 Amsterdam ranked 7th most important European global city due to the number of top head offices location entries (banking, industrial, and commercial firms), after London, Paris, Frankfurt, Hamburg, Brussels, and Copenhagen.

[61] However, the three other major Dutch financial institutions – Rabobank, VSN and General Bank – are headquartered either in Utrecht or in Rotterdam.

commodate large state-owned companies[62]. The inability to concentrate a large office stock area and subsequently a high number of corporate offices (and therefore of not being a proper global city) partly justifies why rent levels in Amsterdam are also rather low as compared to other world capitals. Yet, according to a new master plan for the South Axis region, Amsterdam's total office area is bound to see some expansion as objectives have been established to finalise a total 650,000 square metres of office space in the coming years, where transport infrastructure will be eventually redirected underground (Amsterdam Physical Planning Department, 2002; World Architecture, 1998).

Another fact that can be remarked is that the city's office stock is dominated by owner-occupiers (in fact, at the moment around 50 percent of the whole Dutch office stock is owner-occupied). This implies that buildings rather than pursuing pure marketability from the investors' point of view (such as construction efficiency, capitalisation over land values, and gross-to-net ratios) usually adopt a corporate identity through the architecture. As a consequence, organisations are also more eager to experiment new building types and innovations in office concepts, including environmental innovations (van Meel, 2000). Still, trends indicate that this high rate of ownership is probably going to change in the coming years as organisations start to prefer renting their office spaces instead of owning them, leading developers to boost a commercial office development market[63].

In terms of structure to support international businesses, Amsterdam offers a fairly wide range of conveniences. First of all, it houses four mainports in the heart of Western Europe: Schiphol Airport (the fourth largest in cargo and passenger traffic in Europe, transporting 31 million passengers a year, and providing connections to 220 destinations in 90 countries), Amsterdam Sea Ports (5th in Western Europe, 6th in Europe, handling 55 million tonnes of cargo each year), Amsterdam Teleport (the city is considered Europe's IT and multimedia capital, offering the state-of-the-art in telecommunications), and The Amsterdam Science and Technology Centre. Amsterdam is the 5th International Congress destination in the world (Economic Development Department Amsterdam, 2002). As a consequence, it offers value-added logistics and supply chain management in addition to duty-free

[62] This fact in turn has a historical background, as the country's administrative geography and economic policy have been laid based on physical *heterogeneity* rather than cohesion (Taverne, 1994). Nowadays, as several Dutch large companies among which those of the financial sector and transnational companies emanate not only from Amsterdam but also from other Dutch cities, the Dutch economy is fairly scattered throughout the country, particularly in the Randstad area. There are of course some exceptions, such as Philips, which recently relocated its headquarters from Eindhoven to Amsterdam.

[63] This is due to the fact that companies have started to realise that property ownership implies high fixed costs, which could be allocated otherwise. As an example, KPN telecom, the Dutch leading telecom company, has recently decided to sell all its properties in order to invest in further information technology. By outsourcing office space, companies also become somehow more impartial regarding their liabilities with property issues, in addition to being freer to allocate, or dislocate, their investments where and how they wish (Dr. J.J. van Meel, researcher, real estate department, Technological University Delft, the Netherlands, interview).

warehousing. Amsterdam is also a city of vast capital resources, with a highly educated workforce (46 percent of population holding a College/University degree), offering in addition a good tax climate for foreign companies (Ibid.).

Buildings' typology

As some authors suggest (e.g. van Meel, 2000; Kloos, 1995), looking at first sight, the office architecture pursued in Amsterdam seems to have a strong international orientation. This is due to the fact that a large number of foreign architects, particularly British and American, practice in the Netherlands either for international clients or for Dutch commissioners. Nevertheless, as they contend, it can also be argued that despite the apparent international orientation, the office architecture pursued in Amsterdam in still very Dutch.

In the first place, the greater Amsterdam is not particularly dominated by high-rise office buildings as compared to other business cities. A survey conducted by the property company Jones Lang Wootton revealed that Amsterdam has in fact one of the smallest concentration of high-rise buildings of any capital city, less than a third of the square meters of Singapore or Kuala Lumpur (Koster *et al.*, 1997). This is partly due to its status as a historical city, in which a specific urban setting (narrow streets, absence of a straight street pattern, sensitive soil) has somehow hindered the development of tall structures[64].

Secondly, although the façades of the buildings give the impression of being fairly similar to American or English ones, their floor plans are in general quite different. While deep floor layouts dominate the latter, Dutch buildings usually present shallow ones[65]. The Rembrandt Tower, for instance, one of the tallest buildings of Amsterdam (135m) has a floor depth of only 9 meters. This of course affects several internal components, such as lighting, ventilation, isolation, and so forth.

Another characteristic that can be easily remarked is the fact that open plan offices are also rather rare. On the contrary, cellular office spaces predominate in the office layout. This is probably also related to the egalitarian society that is so much fostered in the Netherlands. An office module of 1.8 m x 5.4 m is the standard; the number of modules an employee occupies is directly proportional to his hierarchy on the firm (van Meel, 2000). This is also facilitated by the highly developed industrialised construction techniques in the Netherlands, in which products' dimensions (e.g. slabs, ceilings, HVAC units) are highly standardised. However,

[64] Still the first 'miniature skyscraper' of Amsterdam came to be in the city centre (the Utrecht office building, 1905), beginning Amsterdam's high-rise tradition, a tradition that mostly consists of unrealised plans and in which the term semi-skyscraper has become more suitable (Kloos, 1995). In this respect, although favouring high-rise buildings, several objections were clearly expressed against their construction in the city centre, particularly by the architect H.P. Berlage, who proposed such building typology for the outskirts of the city instead, through his celebrated Plan Zuid of 1917.

[65] For this matter van Meel (2000, pp. 129-147) provides a detailed description.

current trends indicate that this situation may change as cellular office spaces somehow hinder communication among employees, where the need for working in teams may lead to more flexible layouts (Ibid.).

A last remark refers to trends in desk sharing and teleworking systems, introduced in the Netherlands some years ago, which have also tremendous implications for the office space layout. Among European countries, the Netherlands has the highest rates of teleworking, around 9 percent of the working population (European Commission, 1999). This will in its turn have implications on the occupancy rate and subsequently on operational issues, among which on the offices' energy and water consumption levels.

Local infrastructure and environmental profile

Amsterdam is not considered to be a polluted city. Most public complaints usually concern noise and odour nuisances, the former particularly around Schiphol airport and the latter usually related to traffic emissions. Apparently there are no major air quality problems, neither infrastructure weaknesses (such as related to energy and water supply, and waste/wastewater collection and treatment), except for the emissions of CO_2 for which the city is accountable for. Finally, as Amsterdam is growing to become a major information technology oriented city, where information and communication technology companies are extremely heavy energy consumers, energy supply is starting to see some constraints[66].

There are 338,000 people working in 49,000 business establishments in Amsterdam, consuming water, energy, and other natural resources, as well as generating waste[67] and wastewater (Milieudienst Amsterdam, 1998). In terms of energy supply, the country's total primary energy demand, in 1996, was as follows: natural gas (51%), oil (32%), coal (13%), nuclear (1%), and others (including renewable energy sources, 3%) (CBS, 1997). Therefore one can say that most of the energy consumed in office buildings derives from fossil fuels (which includes natural gas), with consequent climate change emissions implications. In fact, the country is estimated to emit about 50 million tons of CO_2 per year (Ibid.).

Statistics demonstrated that Amsterdam's office stock consumed in 1996 about 550 million cubic meters of natural gas and 2,000 million kWh of electricity, both revealing an increase as compared to previous figures (Milieudienst Amsterdam, 1998). This accounts with a total of some 6 million tons of carbon dioxide emissions per year. Amsterdam's office stock also generates about 160 tons/year of

[66] According to Ir. E. Timár (Amsterdam department for the environment, Milieudienst Amsterdam), the general infrastructure in the city of Amsterdam is rather good, exception made to energy supply which, due to the increasing presence of information and communication technology companies, has started to present some shortcomings during the past few years (interview).

[67] Although this study does not focus on issues concerning the office stock's waste, estimates indicate that Amsterdam's offices generate in total around 300,000 tons per year, excluding construction and demolition waste, approximately one third of which correspond to waste paper (Milieudienst Amsterdam, 1998).

freon gases (CFC, HCFC, HFC, halon gases), with the related implications to the stratospheric ozone depletion (Ibid.). The two major energy distributors in Amsterdam are Nuon and Essent, although there is a number of smaller companies also operating on market competition.

With respect to water infrastructure, the water company supplying the greater Amsterdam is still publicly owned: Gemeentewaterleidingen Amsterdam (GWL). Its responsibility is to cater for water supply services. Amsterdam's drinking water originates from surface water resources (Gemeentewaterleidingen Amsterdam, 2000). Surveys conducted by Amsterdam's department for the environment demonstrate that the city's office stock consumes about 16 million cubic meters of water per year, and has a total number of 15,752 water meters installed (Milieudienst Amsterdam, 1998). Wastewater collection and treatment services is dealt with by Dienst Waterbeheer en Riolering (DWR).

General regulatory framework

The Dutch building industry – thus Amsterdam's office buildings – operates under the Dutch building code, which is specified by the Ministry of Housing, Spatial Planning and Environment (VROM). Although local municipalities cannot add extra clauses to the code, as these might lead to unfair competition among the building industry's professionals, they can influence it slightly so as to suit local specificities[68]. Building permits, in this regard, are issued and checked locally, particularly by the local housing and environmental departments. In addition to the building code, the VROM also puts forward a set of standard rules (AMvBs, see VROM, 1998a) applicable for different building types (e.g. restaurants, shops, offices, and so forth), which, albeit nationally issued, leave a great margin to be locally interpreted.

Apart from these prescriptions set by the VROM, the Ministry of Social Affairs and Employment (SZW) has established national rules concerning health and safety issues for the interior of the workplace. These rules, known as Arbeidsomstandigheden (or simply Arbo) regulations, determine a range of aspects concerning the indoor environment, particularly the dimensions of workplaces and the access of workers to daylight. With regards to dimensions it specifies that a workstation should comprise of at least 7 square metres (gross) – a fact that somehow describes the reasons behind the large office areas so common in the country as compared to England or North America where these dimensions are set half as small by law (van Meel, 2000). As for daylighting, they stipulate that workstations that are being used for more than two hours per day need to have access to natural lighting. Although there are no standard rules specifying the distance from the workstation to the window, the regulations state that the window surface has to total at least 1/20th of the total floor area of the office space.

[68] Ir. E. Timár, interview.

As for the municipality itself, there are basically two main sets of regulations, which render the city's office stock particularly distinctive. One of them rules over Amsterdam's land use system, by which land is let on the basis of long-term leases (Kahn *et al.* 1999), through which speculation can be controlled. Property developers, whether profit oriented or not, have to participate in government's biddings, and as a result cannot press for speculative building production despite the fact that constructed space demand is far higher than the supply (Fainstein, 2000). This municipal land tenure system is used rather seldom, not only in the Netherlands but also throughout the world.

The other set of regulations concerns the office buildings' height, where the municipality of Amsterdam allows a maximum constructed height of about 90 meters in sub-centres provided it is in the vicinity of a public transport intersection[69] (Kloos, 1995). Plans for high-rise buildings in Amsterdam are treated separately by the city council, however, which in turn gives a good opportunity for participatory decision-making processes during development negotiations. In Amsterdam South a particular attention has to be paid to air traffic due to its proximity to Schiphol airport. The restrictions concerning height have a drawback, however, which is the fact that the region's limited vertical space imposes a constant search for vacant space on the city's outskirts (Kahn *et al.*, 1999).

Local management of environmental flows

Up to this point I have described the general profile of Amsterdam's office stock. In order to understand how environmental management is being introduced, this section reviews how environmental principles, policies, strategies, and instruments are being advanced within the city's main policy networks, including different levels of governmental bodies, utility companies, and relevant agencies, and to some extent how these networks interact in implementing them, focusing in particular on energy- and water-related issues. We first give a short overview of Amsterdam's urban management system, then we move on to analyse how environmental management issues are initiated and implemented, so to finally describe the particular role of the main local policy stakeholders. Conclusions regarding the implementation of environmental management, as well as the ecological restructuring of the city's office stock, will be exposed in the last section of this chapter.

* * *

Amsterdam is governed by three major departments – housing, urban planning and land-lease – in addition to others of somehow minor importance: environment, infrastructure and traffic, welfare, and economic affairs. Environmental themes, in-

[69] This is also related to the aim of decreasing motorway traffic congestion, particularly in the southern region.

cluding those related to the office stock, are basically dealt with by the Department for the Environment, the Milieudienst Amsterdam.

Within the municipality the division of tasks is quite decentralised as Amsterdam is divided into 14 sub-districts each with its own administration, operating with quite a high degree of autonomy. Each of the sub-districts has to perform certain tasks such as local spatial planning, maintenance of public areas, and environmental upgrading and preservation. The Zuidas region (a district located in Amsterdam South), however, due to its economic importance and rapid development with not only local but also regional implications, is still largely controlled by the central municipal government[70]. The municipal government is in turn responsible for the provision of drinking water and the operation of rail, road, and public transport infrastructure for the whole city.

Where environmental management is concerned, Amsterdam's office stock is primarily influenced by the Dutch building code, which contains several specifications or requirements, e.g. safety rules, structural issues and other technical requirements, but says little about environmental topics[71]. In fact, such topics are identified in certain regulations restricting the use of materials that radiate toxic gases – for instance radon and asbestos – and others related to construction and demolition waste, which are required to be separated into three fractions so as to ease their handling and recycling. As for water use or water performance in offices, the building act apparently does not contain any specific regulation[72]. The same applies for wastewater in office buildings, or the use of rainwater/grey water[73]. It does, however, include an important component, which is the energy performance standard (EPN), a standard that determines the quantity of energy that a building is allowed to use based on the calculated energy consumed by the building by a reference consumption figure (Dutch National Team, 1998).

The EPN was introduced in 1995, under an energy policy framework established by the Ministry of Economic Affairs (MINEZ) in conjunction with Novem, the Dutch energy and environmental agency (Dutch National Team, 1998; MINEZ, 1999). It was originally outlined in the Energy Report, a document issued by the MINEZ containing long-term energy strategies. The EPN is in this sense a standard regarding *new* industrial and office buildings (not housing), compelling them to comply with a required performance. This performance decreases over the years; in 1995, for instance, it was set at 1000 MJ/m^2/year, whereas now it is 850 MJ/m^2/year and by 2004 it is aimed to be 600 MJ/m^2/year, a reduction that the gov-

[70] The geopolitical importance of the Zuidas region, as observed by Ir. E. Timár, leads to a somehow contradiction with the overall decentralist administration of Amsterdam (interview).

[71] Ir. E. Timár and Dr. J.J. van Meel, interviews.

[72] According to Ir. R. van Veldhoven (Amsterdam's water supply company, Gemeentewaterleidingen Amsterdam) the act specifies water use particularly for heavy consumers, such as car washing facilities, but contains very little regarding the use of water in offices (communication).

[73] Concerning grey water, the Amsterdam City Council in conjunction with the Amsterdam Water Supply company is launching a programme to supply grey water (not drinkable but suitable for washing machines and toilets) to a new housing development in Ijburg district (Gemeentewaterleidingen Amsterdam, 2000).

ernment believes to be easily achievable[74]. Nowadays the EPN is instituted in the building code, which is under the VROM[75], and controlled locally in the proceedings of building permits issuing.

On the same occasion of the introduction of the EPN, the MINEZ launched another programme so as to control the energy efficiency of *existing* industrial and office buildings, known as 'long-term agreement' (LTA), requiring such buildings to reduce their energy consumption by 25 percent, based on the 1995 levels within a period of 10 years. It is implicit that this programme entails a great deal of negotiations during the implementation phase. Finally, in order to achieve such targets, the MINEZ also initiated an Energy Performance Advisory system (EPA), which determines the energy consumption of existing buildings by means of a scan, to which recommendations for improvements can be added.

Apart from the building code (and the aforementioned standard rules or the AMvBs, to which we shall shortly get back), it is important to also recall the Arbeidsomstandigheden (Arbo) regulations, which are somehow decisive for some aspects of the indoor environment, such as interior dimensions and issues regarding daylighting. As for the latter, although the Arbo regulations do not impinge standard rules specifying the distance from the workstation to the window, the guidelines suggest that 'lack of daylighting and lack of an outside view can result in dissatisfied employees' (van Meel, 2000, p. 144). This may very well explain the reason why Dutch floors are rather shallow, a fact that is embedded in the Dutch 'consensus' culture in which the issue of egalitarianism is highly praised (outside view not only as a privilege of directors but a right of everyone). In this respect, about 80 percent of Dutch office buildings have openable windows and possibilities for individual climate control, aspects that are crucial in the overall office's energy balance.

Department for the environment

Apart from the rules put forward by the building code and Arbo regulations, upon which Amsterdam is not entitled to add clauses, the municipality is able to influence the environmental performance of office buildings via its department for the environment, which makes use of two main sets of instruments – covenants and environmental permits, the former allowing a scope for adding requirements – in addition to the application of standard rules and enforcement procedures, although the deployment of such instruments in daily environmental management routines is apparently limited.

[74] Ir. A.H. Bouman (Netherlands Agency for Energy and Environment, Novem), interview.

[75] While the *energy policy* remains under the MINEZ, the implementation of the EPN has been conferred to the VROM. The VROM, in its turn, maintains an *environmental policy* that includes both a climate change and a sustainable building programme, the latter recognised, in Dutch, as Duurzam Bouwen.

Covenants are a traditional Dutch way of environmental policymaking, by which negotiations play an important role. This is particularly clear in the city of Amsterdam, where the land use system is based on municipal land tenure, by which companies that wish to build in the city have to somehow create long-term partnerships with the government; the government, in turn, may decide on which partners to work with. This induces companies and authorities to reach agreements, also with respect to environmental control. The covenants, in this context, are usually elaborated based on the ALARA principle, a principle by which environmental impacts may be reduced to 'as low as reasonably achievable'. It thereby introduces the idea that, as zero impact is practically unachievable, efforts should be made to reduce the impact only where it is either intolerable, or where the cost of its reduction is reasonable. For the construction of office buildings, this means applying all available means to mitigate the environmental impacts and to improve the building's performance (not only regarding energy) as long as they do not entail exorbitant additional costs, which would hamper the economic feasibility of the investment[76].

In general, the environmental component of covenants is to be worked out within the department for the environment, although through consultation with other governmental bodies, including the VROM and the MINEZ. Although most such covenants are elaborated according to the ALARA principle, they may also be based on the National Packages for Sustainable Building (VROM, 1996, various years), an initiative of the MINEZ and the VROM, gradually institutionalised since 1996. The packages are themselves also covenants, in turn signed by different stakeholders from different branches of the building industry, including authorities. They contain vast specifications promoting environmentally friendly solutions, from the building to the urban design, at the same time demonstrating attitudes expected to be implemented voluntarily by the market (see VROM, 1999a, 1999b, 1999c, 2000). Parallel to the packages, VROM has started an environmental policy including a climate programme (for CO_2 reductions) and a new sustainable building programme, by which it tries to shift the emphasis on 'environmental efficiency of buildings' to also renovation and maintenance of the existing building stock, including demolition and recycling, issues that can also be raised in the covenant and decision-making processes in Amsterdam.

Secondly, the department for the environment may also influence on the environmental performance of office buildings by compelling some projects to undergo environmental audits, by which environmental permits may be granted. These audits are usually requested for large-scale projects, such as buildings using heavy machinery; office buildings usually do not fall into such category. The department may in addition add some extra clauses (the so-called 'expanded scope of

[76] Information under this section, particularly regarding the influence the Department for Environment exerts in the greening of Amsterdam's office stock, was to a large extent provided by Ir. E. Timár, interview. Concerning the ALARA principle, he suggests that since it requires reductions to be as low as reasonably *achievable*, it leaves enough room for negotiations among interested parties.

the environmental permit' – Verruimde Reikwijdte van de wet Milieubeheer), by which extra environmental demands can be made also based on the ALARA principle. However, if the requirements are regarded as too strict, contractors may contest them in court.

Thirdly, the department may also make use of the standard rules (AMvBs) to influence the environmental performance of office buildings, as they can be locally interpreted (VROM, 1998a). Requirements may also be elaborated based on the ALARA principle.

Finally, the department for the environment has a team of inspectors, around 120 experts altogether, who attempt to check buildings periodically, particularly concerning their machinery. However, when it comes to the environmental performance of office buildings, these inspections are said to fail since priority has to be given to companies that usually cause public annoyance, such as bars and nightclubs.

Energy network

At the national level, the main governmental body responsible for the elaboration of energy policies is the MINEZ. At the local level, the main actors responsible for energy issues, including energy preservation, are the utilities. In between them, there is the Novem, the Dutch national agency for energy and the environment, which plays a quite important role in supervising and managing the realisation of energy and environmental programmes in view of the tensions that usually arise among conflicting interested parties, such as the government, the market, and society. In this sense, Novem brings together government policy and market developments so as to bridge the gap between theoretical knowledge and its practical application (Novem, various years) and provides a support as for the upgrading the energy performance of buildings nation-wide, with several examples in Amsterdam (e.g. Novem, 1991, 1999; European Commission Thermie Project, 1998a, 1998b).

In addition to assisting the government in implementing energy and environmental programmes, Novem also executes subsidy schemes for energy audits for buildings, provides for an adequate exchange of knowledge bringing in foreign expertise, and supports the government in designing policies by providing consultancy services. In this respect, it facilitated the development of the energy performance standard (EPN) and its implementation, in conjunction with the MINEZ (Dutch National Team, 1998; Novem, 2000a, MINEZ, 1999). Several buildings in Amsterdam have undergone energy audits so as to achieve energy reductions below those set by the EPN and consequent improvements under subsidies granted by Novem (see Novem, 1999, 2000a, 2000b, 2000c, 2000d).

As mentioned above, major policies regarding energy efficiency are determined by the MINEZ, the organisation responsible for deploying instruments tackling the different stakeholders involved in the energy sector. Energy companies, in this regard, which are now operating in a liberalised market, are required to implement schemes of 'energy premium', as stated in the MINEZ' Energy Report. These

schemes are grants allowed by the government (approximately EUR 180 million/year) to be invested in energy-efficient appliances and in facilities that conserve energy (Ibid.). The energy companies, in their turn, have stated their principles regarding energy conservation in a so-called 'green paper', published in 1999. Due to the fact that it is difficult to reach agreements between users and commercial energy providers, or even to manage costs, energy companies can provide consumers with energy saving services, something that is consistent with their profile as market parties. All these issues are discussed in the Energy Report, defining the position of the energy distribution companies and the implementation of statutory duties by the various parties in the liberalised energy market.

Since January 2002, electricity consumers are no longer captive but able to choose among the energy company to be supplied from (Ibid.; see also van Vliet, 2002). In this context, there is a number of energy companies serving the city of Amsterdam and competing for the kilowatt-hour cost; the most prominent of these are Nuon and Essent. The deregulation of the gas sector, in turn, is taking longer and expected to be fully materialised by 2004.

These companies offer comprehensive energy saving services, spanning from energy efficiency advisory, which screens the energy performance of the building, for instance, and proposes tools that can be used so as to lower energy bill costs, and the related subsidies schemes (cf. e.g. Nuon, 2002). Usually they are to be approached by the companies themselves as for the delivery of such services, although they develop marketing for such services on the web and through leaflets that are to be handed in to potential clients.

In addition, they also offer green electricity – deriving from renewable sources – which are slightly more costly than conventional electricity, the additional money to be reverted into projects for the generation of alternative energy sources (Ibid.). There are also some incentives for long-term contracts to be made, by which energy supplying companies install PV cells on site, each panel at the moment generates 80 kwh/m^2/year.

With the European unification and a free European market, the energy market tends to be more and more deregulated, where companies will increasingly be able to offer their services both nationally and internationally, dismantling monopolies. Several companies will thereby use the same grid for distributing energy, requiring in turn rather comprehensive monitoring systems. Such competition is expected to compel energy providers to pay more attention to quality, price and service, as well as to environmental issues (MINEZ, 1999).

Water services network

The (publicly owned) water company serving Amsterdam is the Gemeentewaterleidingen Amsterdam (GWL), which is in fact the oldest water company of the Netherlands. Its total water production capacity is 101 million m^3 of drinking water, from two plants – Production West at Vogelenzang (near Haarlem) and Produc-

tion East at Weesperkarspel (in Amsterdam East) –, both undergoing environmental management schemes (Gemeentewaterleidingen Amsterdam, 2000).

Since the building code does not impose strict rules regarding water consumption and wastewater emissions in office buildings, the company promotes some environmental initiatives basically due to the fact that water is gradually becoming a scarce resource, its prices are increasing, so that water reserves have to be preserved. These initiatives consist of continuous publicity the company makes to encourage the population to save water in buildings, R&D programmes (among which some concerning nature conservation) in addition to water saving services conducted upon request (usually made by hotels), by which the company sells monitoring systems, water saving devices, and performs risk assessments concerning the legionnaires' disease[77], the latter according to a temporary law passed by the VROM. Interactions, in this regard, between the water distribution company and other governmental bodies responsible for environmental management issues – such as the department for the environment, the VROM, or the water board – mostly concern water quality, and, at least so far, not so much water efficiency. The same applies to the water treatment company.

As aforementioned, wastewater emissions in Amsterdam are dealt with by Dienst Waterbeheer en Riolering (DWR). Water treatment in the city of Amsterdam applies a pipe system which differs rainwater from grey/brown water, the former not undergoing any treatment and being disposed on surface water resources, e.g. the canals. As for the decentralisation of wastewater treatment services in order to reduce the volumes of piped water to the main treatments plants, the city does not make use of it still, as far as office buildings are concerned and exception made to industrial facilities. However, a new policy is being studied at the moment for the development of a decentralised treatment facility to serve the Ijburg area, where a number of office buildings will be completed in the coming years[78].

Global management of environmental flows

Ecological modernisation theory postulates that market actors play a crucial role as environmental change carriers. One of its central themes is that ecology is becoming an independent rationale of modernity, a claim that is evidenced by a number of new ecological criteria that have recently started to emerge: e.g. eco-labels, environmental auditing, green financing, concepts like environmental performance, and so forth (cf. chapters 3 and 4). For the theory, while the state still remains imperative for launching adequate environmental management tools for the market to adopt, the main argument is that the dynamics of environmental change mostly takes place within the market itself, which eventually shifts to a self-regulatory

[77] Ir. R. van Veldhoven, telephone communication. A temporary law passed by VROM in early 2002 compels buildings or housing complexes (larger than ten households) to undergo a risk analysis, so that most attention is currently given to this issue.

[78] Drs. P. Teunissen (Amsterdam's water company, DWR), telephone communication.

paradigm. Based on this claim, one of the hypotheses put forward in this study is that global economic agents, as multinational companies, may be thereby playing a crucial role in the implementation of (local) environmental reforms.

In the light of this hypothesis, and while the preceding section described the main policies and instruments applicable to office buildings deployed by local utilities and environmental agencies, this one shall investigate how programmes and strategies of energy and water conservation in office buildings are happening – being initiated or metabolised – within a market of global economic actors such as multinational companies and financial firms. More specifically, we shall see how environmental flows are being managed by four multinational companies in the city of Amsterdam, namely ING, Andersen, ABN AMRO, and IBM, by describing how environmental management practices they are decided upon and operated, as well as fit with the local management of environmental flows described above.

ING Group

ING-Groep N.B. is a multinational financial institution of Dutch origin, operating in 65 countries in the fields of banking, insurance, and asset management. Instituted under this name since 1992, ING Group is a result of a succession of mergers and acquisitions with a long historical background (ING Group, 2000a). It currently holds several branches, known as ING brands, e.g. ING Real Estate, ING Barings, ING Bank, Nationale-Nederlanden, all part of the Group's equities, and therefore under the Group's liability. ING Group is currently the second largest financial institution in the Netherlands.

ING maintains several landmark buildings both in the country and abroad – among which the headquarters of ING Bank and ING Group, both located in Amsterdam – in addition to important buildings located in other Dutch cities, such as the Nationale-Nederlanden headquarters in Rotterdam, the tallest skyscraper in the Netherlands (150 metres high). ING's buildings tell much of the Group's history and evolution in management styles in view of a changing society that the bank has been working for. Despite more recent accomplishments – among which the new ING Group headquarters currently under construction along the A10 road in Amsterdam – it is probably the ING Bank headquarters (completed in 1987, formerly known as NMB Bank, see Figure 6.3) in Amsterdam Southeast that can be considered to be the Group's most remarkable building, a building complex that has indeed marked a period of environmental policymaking, trying to achieve passive architectural solutions and an environmentally self-sufficient structure, being still nowadays extensively cited in literature particularly due to its outstanding energy saving features and related cost-savings (e.g. Vale *et al.*, 1991; Wilson *et al.*, 1998). As environmental management in this building was mostly defined at the design phase, we shall provide a description of how decisions prior to the construction were made and environmental management issues incorporated below.

The complex was built during the period 1984-87 to headquarter the NMB Postbank (Nederlandse Middenstands Bank) which was in turn the result of a

Figure 6.3
ING Bank headquarters, Amsterdam.

merger between the Post Bank, a government owned banking institution, and the Nationale-Nederlanden, an insurance company by then[79]. As its name indicates[80], the NMB was a bank created for the Dutch middle class, which, unlike the ING Bank of today, was a Dutch oriented institution. Its board of directors constituted in part of members keen on the anthroposophical philosophy of Rudolf Steiner, who commissioned a building to be above all very human, aiming not only to improve the staff's well-being but also to provide the image of a 'people friendly', a not intimidating bank[81].

To begin with, the site acquisition took place after an offer made by the municipality of Amsterdam by which a large area would be sold rather inexpensively, provided the bank would construct a shopping mall in addition to the office complex. This area was located near the Bijlmermeer housing complex, in the city's south-eastern suburbs, a place that was becoming derelict facing numerous social problems, but which provided for good public transport access. As for the bank, the returns on the investment made with the mall would somehow finance the construction of the headquarters, which would require a large office area to accommodate 1,200 people, totalling 50,000 square metres. The idea was to construct ten mid-rise towers (of approximately eight storeys each) interconnected by a large internal street – instead of a high-rise one in case the bank decided to sell or lease one or some of the buildings in the future if the total number of employees should be downsized, something that in fact never happened.

The commission was given to the Amsterdam architects Alberts & van Huut, specialists of the so-called 'organic architecture' style inspired by anthroposophical concepts by which the building provides a 'third skin' for people (after skin and clothing), so that the architecture attempts to represent as much as possible the natural environment. The design was carried out in a participatory way, in which several round tables took place, including the architects, members of the bank, the engineers, the landscape architects and some technicians, where all stakeholders had equal decision-making powers as well as right to give their opinions. In

[79] NMB's name was converted into ING since 1992.
[80] In which Middenstands is the Dutch word for shopkeepers and retailers' class.
[81] The following pieces of information were provided by Drs. P.M. Kroon (head public affairs, ING Group), Ir. M. van Huut (chief architect, Architectenbureau Alberts & Van Huut bv) and Ir. M. Ballieux (architect, Architectenbureau Alberts & Van Huut bv), interviews.

so doing, solutions found by one of the stakeholders would not become obstacles of another stakeholder; it was a means by which all of them were fully informed of decisions that were in the course of being made. Public authorities, such as urban and environmental planners or utility managers, did not participate in such meetings, though.

Perhaps owing to this, several obstacles had to be overcome throughout the design phase, some of which not allowing the full materialisation of the aimed environmental ambitions. In the first place, the building was projected to be totally energy independent and to be even able to supply energy to the surrounding houses. The energy company, that at the time was still government owned, not consenting to this, claimed that the building would thereby become its competitor, which could eventually lead to large-scale consequences in case other buildings/companies started to pursue the same aims. The building is therefore 80 percent energy independent, something that is achieved via a series of passive architecture measures that were gradually explored throughout the design phase.

One of the first measures regarded the wind impact on the envelope. Given that the building complex would occupy one or two whole blocks, an attempt had to be made so as to mitigate the so-called 'cyclone effect' – by which the wind speed is significantly increased next to large vertical surfaces – hindering the isolation system and subsequently impinging higher levels of indoor acclimatisation. In order to achieve such reduction, the design team proposed the façades not be parallel to the street configuration, but rather curvilinear including irregular shapes to decrease the wind impact (cf. Figure 6.3). This solution, in turn, caused serious disagreements with the local authorities, who emphasised an objection to issue the building permits, despite the potential environmental improvements. According to the architects, the permit was only issued as one of the members of the bank's board persuaded a highly positioned city councillor on the occasion[82].

The second, related, important decision concerning the façade design addressed the need to lower noise impacts from the road. In order to achieve such reduction, the façade should not be vertical but rather slant in relation to the street. This would imply in turn not standardised slabs, something that would significantly increase the building costs. The design team however, managed to meet a solution by which the slabs would be identical despite the external visual difference that gives an effect of indoor and outdoor variation. It was due to this that internal atria were created, on top of which natural lighting elements and cavities for exhaust air were introduced.

Once the external shape was defined, the team started to explore other features such as materials, water elements, and greenery. As for materials, the complex explores a high thermal insulation system, which includes an external brick skin[83] based on a precast concrete inner wall, with a sheath of insulation in-

[82] Ir. M. van Huut and Ir. M. Ballieux, interviews.

[83] The brick skin underwent a whole refurbishment as since the walls are slant, they were starting to develop algae growth due to problems of infiltration, particularly next to the windows. This was solved by introducing a kind of glue in the cement that holds the masonry together.

between, where all windows are double-glazed. Heating and artificial lighting energy is downsized through simple passive solar measures, such as sunlight in addition to internal gains, e.g. heat emanating from artificial lighting, equipments, and from people themselves, a system that is coupled by hydraulic radiators connected to a 100 cubic metre hot water storage tank in the basement. The water in this tank is heated by a cogeneration equipment located in the complex and by heat recovery from the elevator motors and computer rooms. There is also a mechanical ventilation system, including a heat exchanger device, which captures the heat of the outgoing exhaust to heat the incoming air. The complex was not projected to have an air-conditioning system[84], but rather to use the thermal storage capacity of the building's fabric, a mechanical ventilation device, and natural ventilation through operable windows for passive cooling.

Furthermore, the spaces dedicated to circulation inside the building complex, the so-called 'internal streets', are filled with diverse artworks, which serve not only to give visual amenity, but in many cases to also improve the indoor microenvironment. The same applies to certain coloured metals added in the top of the towers' atria reflecting light on the sculptures located on the ground floor, which in turn give light to the surrounding walls. The complex is also equipped with three outdoor gardens and extensive internal landscaping, all irrigated by second quality water, which is stored in an underground tank. As the water elements are constantly in move, there are no risks for the development of legionnaires' disease.

Finally, by the time the design phase was practically over, another group of opponents to the complex expressed their concerns. This were the investors, directly or indirectly connected to the construction, arguing that the image the building would convey through the organic architectural style would not be of a reliable, solid, and serious company. They also claimed that, in two years' time, after the euphoria was over, the board would regret having built it that way. This prediction, however, turned out to be wrong. During the ensuing years the building is claimed to have attracted approximately 120,000 visitors per year, more than any Dutch museum on the occasion despite not having the doors opened to the public; still nowadays it receives some 40,000 visitors annually, which have to have a special permission so as to be allowed in. Public opinion, therefore, has been favourable, helping the bank to secure its image vis-à-vis the market.

In addition, the building complex also proved to be extremely cost efficient. Despite giving the impression of being rather costly, the complex was in fact cheap to construct on the occasion (NLG 50 million[85], 1987 prices), due to the economies of scale provided by the repetition of elements – that visually speaking do not seem to be repetitive – and to the downsizing of building services' equipments (cooling, heating, lighting and so forth). On the occasion, and as compared to the previous headquarters occupied by the bank, this complex consumed proportionately 12

[84] At a point of time the number of employees was increased by 60 percent requiring the installation of A/C in some areas. Nowadays it is occupied by around 1500 – 1600 people.
[85] Approximately EUR 23 million.

times less energy (only 0.4 GJ/m^2 annually). As compared to an adjacent bank constructed in the same period in a nearby site (actually an ABN AMRO building), the NMB was claimed to be 5 times more economical in terms of energy use per square meter, having even the construction costs slightly inferior. In this respect, the extra construction costs attributed to the complex' energy saving systems was estimated to be around USD 700,000, a cost that was recovered in just three months' time, as the annual energy savings in electricity bills amount to USD 2.6 million (Vale *et al.*, 1991; Wilson *et al.*, 1998). The building was also claimed to have the lowest energy costs among Dutch office buildings on the occasion, where absenteeism levels among bank employees, in addition, dropped significantly (by 15 percent), due to the better working environment the building provides, leading to an overall improved productivity.

Winning several prizes (Ibid.), the building has however been largely contested, and subsequently analysed and evaluated, bringing to the fore other stakeholders, such as researchers, advisors, appraisers. A case worth mentioning here is the involvement of Novem, the Dutch Agency for Energy and Environment, which has not only participated as an advisor and evaluator in the building's early design process (Novem, 1991) but has also taken care so that refurbishments or possible staff increase would allow the building to remain within the ceiling put forward by the EPN[86]. However, no further significant environmental innovations have been pursued in the building's operational phase, expect for the installation of an energy motoring system.

This said, it is important to bear in mind that while the building's greening process was originally initiated by the NMB-Postbank board of directors – of course largely supported by the expertise of the design team and influenced by other stakeholders – current decisions regarding its operation (including environmental implications), are made by the ING Group of today. The building is run by ING's internal facility managers, who take care of the general maintenance services. These managers, in this sense, have direct contacts with the local energy and water utilities, through the payment of bills. However, more complex issues such as energy audits or other environmental themes involving local policy networks are decided and coordinated at a higher administrative level, i.e., by the Group's Executive Board.

In this respect, the Group's Executive Board is responsible for issues regarding the (worldwide) properties of ING and their environmental features, deciding upon the launching of programmes, which in their turn are to be implemented by the executive committees, the latter including ING Europe, ING Americas, ING Asia/Pacific, and ING Asset Management (see Chart 6.1). The Executive Board is therefore the bank's main division dealing with the operational issues of the buildings, among which for establishing financial as well as environmental policies, and for making final decisions, including those regarding the Group's properties. It con-

[86] In one of such studies, for instance, Novem detected that the number of staff could increase as long as all computers would be changed into flat screen ones, so that the EPN would be met (Novem, 1999).

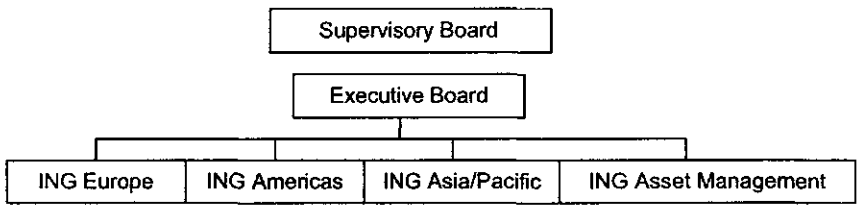

Chart 6.1
Management structure ING (based on ING, 2000b, p. 8).

consists of six members – having as CEO Mr E. Kist (see ING 2000a, 2000b) – who are controlled 'from a certain distance' by a Supervisory Board. It is difficult, however, to establish with precision where the role of one ends and of the other starts, although in general terms overall – local and global – corporate strategies, policies, communication matters, and environmental affairs are to be initiated and decided upon by the Executive Board, which is located in Amsterdam[87].

In 1995, the Executive Board introduced an environmental report, including a corporate environmental policy regarding the Group's performance *in the Netherlands*. Such policy consists of internal guidelines – concerning particularly waste and energy use processes (including its commitment with the Dutch long-term agreement – LTA – for the reduction of energy consumption, see above) – and external ones, by which the Group is committed to developing products that contribute to a better environment. In the same year the bank also endorsed to the International Chamber of Commerce Business Principles (Charter for Sustainable Development), mostly due to the process of internationalisation that the bank was undergoing by then, for which such a charter would ease its credibility as a global institution. In 1999, the Executive Board approved the ING Business Principles offering its employees a 'framework for high ethical standards of code' (ING, 2000b).

More recently, the Executive Board has established objectives to homogenise, not only in the Netherlands but also worldwide, the environmental aspects of the Group's properties. So far, such process has started to be implemented in the Netherlands alone, where central energy-monitoring systems have been installed in the majority of the Group's Dutch offices and an internal energy awareness campaign has been launched, claiming to have led to a significant reduction of energy consumption. It seems correct to suggest that much of what the bank has accomplished so far in terms of energy management stems partly from the privatisation of the Dutch energy market (which demands a rather detailed energy monitoring system within the offices), and partly from the Group's commitment with the Dutch government, by which all banking and insurance sector companies have to decrease their energy consumption by 25 percent, based on 1995 levels until the year 2005 (part of the LTA – long-term agreement, for which Novem is assisting the bank to achieve reductions).

[87] Drs. P.M. Kroon, interview.

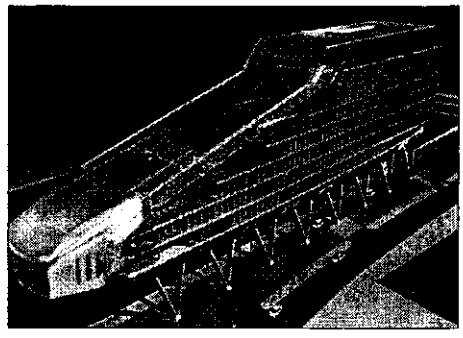

Figure 6.4
ING Group new headquarters, Amsterdam.

A last word should be mentioned regarding the Group's new headquarters building, which is being completed in the Zuidas and becoming the eye-catcher of the A10 highway (see Figure 6.4). With a total gross floor area of 19,500 square metres, and a commission given to the Dutch architects Meyer and van Schooten, this building is a horizontal structure expressing some (new) characteristics of the Group, among which: transparency, decentralisation, flatness. As opposed to the NMB-Postbank building, this one is much high-tech, designed however to be energy efficient as well. When completed, it will fully explore daylighting and windows will be openable via a double skin system (cf. chapter 3). In addition, working areas will be equipped with an air conditioning system which will be operated by using whenever possible water from an aquifer as well as heat pumps (hot and cold storage in the soil) to reduce energy consumption for both cooling and heating needs. In a way, such decisions have been originally instigated by the Dutch government (through its active policies of energy efficiency, such as the energy standard) and further developed by the Executive Board, which is in addition also trying to convey with the architecture the image of an energy caring organisation. And successfully. Even before completed, the building has already become another ING landmark, but this time symbolising the transparency of the company in the globalised economy, much in opposition to the Dutch oriented, somehow introverted one of the 1980s.

Andersen

Arthur Andersen, the American accountancy company established in 1913 and headquartered in Chicago, was present in 85 countries, where it employed around 85,000 people. Andersen offered services in, among others, business consulting, corporate finance, human capital, as well as in legal procedures, outsourcing, and taxation. By 2001, Andersen was still auditing 2,300 firms worldwide. Nowadays, the company has been taken over by other accountancy firms; in the Netherlands it has been taken over by Deloitte Touche Tohmatsu.

Andersen had been in the Netherlands since 1961, where it employed around 1,600 people and maintained three headquarterss: Rotterdam, Eindhoven, and Amsterdam. The latter was in fact situated in a site bordering the municipality of Amsterdam so that the building was considered to belong to the Amsterdam South business district, despite being under the jurisdiction of another municipality (Amstelveen, see Figure 6.5). This building complex is another worldwide landmark in

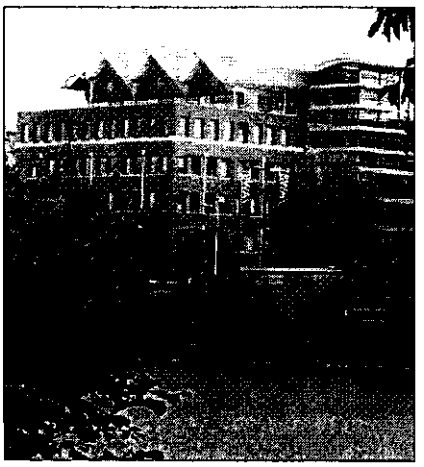

Figure 6.5
Andersen headquarters, Amsterdam.

environmental design. Completed in 1996, it is the outcome of a project that was not initiated by the company itself, but by a group of developers and consultants. Its owner is the German investment bank Trinkaus & Burkhardt GmbH, with whom Andersen had a long-term lease contract (supposed to expired in 2009).

Decision regarding this building started in 1994, when the president of the Multi Vastgoed bv[88], a multinational development company of Dutch origin, Mr H. van Veggel, was approached during a seminar on office markets and the demand for 'people friendly' buildings at the Technological University Delft (Delft, the Netherlands) by Ir. J. Bergs, an environmental consultant from DHV AIB, who proposed a joint development for an environmental and human friendly pilot building, to be incorporated for a commercial client. In was in this context that the search for both a client and a site for the implementation of the idea started, a process that lasted roughly one year.

The preliminary design process initiated during this period, before the client or the site were defined. Similarly to the ING Bank headquarters, the design of the building was also done in a participatory way, via a system called 'holistic participation method'. This methodology, created by the DHV consultant, fosters stakeholders to raise and overcome difficulties in the implementation of environmental projects, by assigning each of them to approach the ideas from another person's point of view: where the financier, for instance, plays the role of the architect, the client of the builder and so forth. This methodology was introduced during a three-day workshop in Eindhoven – organised by the consultant and chaired by Professor Peter Schmid, a worldwide pioneer in the sustainable building field – also involving lectures regarding sustainable building techniques and group discussions. It was attended by a group of main stakeholders, among which the developers (Multi Vastgoed), the architects T+T Design (from Gouda, a branch of Multi Vastgoed), the DHV consultants, a feng shui expert (Professor Cheng), financiers, constructors, and a fictitious client. The main opponents during the design phase were the builders, who refused to participate in the workshop and posed several objections throughout the design process. However, ideas regarding the project were clear after the workshop, as well as the envisaged environmental ambitions of the building

[88] Multi Vastgoed operates abroad under the name of Multi Development Corporation. Information regarding this section has been provided by Ir. B.A.G. de Bont (architect, T+T Design, a division of Multi Vastgoed) and to a minor extent by Drs. M. Vink (head facility management, Andersen Netherlands), interviews.

and how these would be implemented. As in the ING, public authorities did not participate in this exercise.

Andersen joined the project in 1995. On the occasion, the company was looking for a building to relocate its staff, which was scattered in four office storeys in other buildings in the city, and to explore thereby its own corporate identity via a new architecture. Its main requirement was that the building should have a total of 7,500 square metres of office area, where the floor templates should be cellular (standardised in 3.60 x 4.50 meter rooms for two staff members the smallest rooms) so as to provide privacy for the confidential work the company carried out. In addition to that, the building should offer parking facilities, a storage place in the basement, a restaurant, and an auditorium. The only architectural regulations regarded the use of indoor colours and communication logotypes, which were in fact worldwide standards of the company. The staff would select the location where the building would be constructed; the last prerequisite was a bus station to be located nearby the building, something that the municipality of Amstelveen is claimed not to have delivered.

Nothing was expected regarding the building's energy or water consumption from the company's side. When approached by the developers, Andersen had originally no interests whatsoever in occupying a building that would address sustainability issues. The developers allege that it took a long time to have the company fully convinced of the project. (One of the directors reacted, for instance, when informed that no air conditioning would be installed, saying that in this case he would prefer to work in his car.) This opposition changed, however, with time, and Andersen eventually turned out to be enthusiastic about most of the ideas.

The municipality of Amstelveen did not impinge specific environmental regulations beyond those set forth at the national level, such as the energy performance standard (that was just emerging on the occasion). It did neither have well defined sustainability policies that would interfere the way the building would be designed. It was, however, much favourable of having an environmentally friendly landmark building in its territory, thus willing to facilitate the legal procedures. The developers proposed in fact a whole master plan designed according to ecological criteria for the site, to be occupied by different companies, which was never realised due to economic impediments coupled by the difficulty to convince clients about the benefits. Apparently the energy and water utilities did also not interfere in the building's design.

The building complex has undergone several evaluation processes. The first one was during the initiation phase, when issues such as location selection, energy, materials, water, and green elements were analysed, as well as indoor environmental quality (including an electromagnetic radiation of the site). According to this initial evaluation, the developers proposed three environmental concepts: the 'basic', the 'plus', and the 'eco' package. Obviously the third was the most ambitious and expensive one, and it was the elected option for the pilot project. Nevertheless, pressures that arose from schedule and budget constraints during the construction phase are claimed to have led to some changes that were somehow not

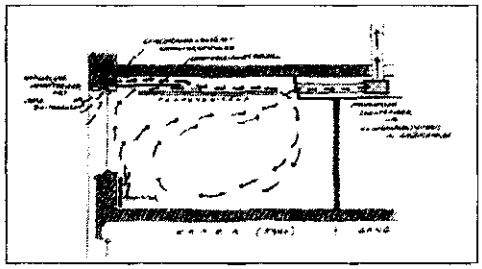

Figure 6.6
Andersen headquarters night cooling system.

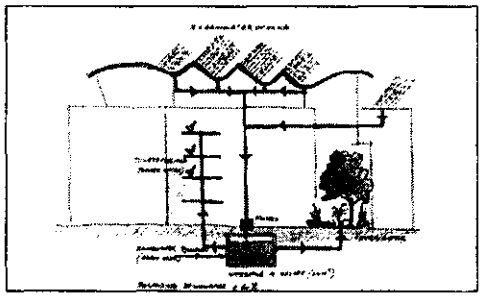

Figure 6.7
Andersen headquarters water management system.

really ideal from an environmental point of view (van Hal *et al.*, 2000). In this sense, although the environmental ambitions, as put forward in the 'eco' package, were not fully implemented, the complex was estimated to consume on the occasion 30 percent less than the EPN standards required. In addition, according to evaluation conducted in 1996 when the building was inaugurated, it had the best performance in energy use (energy efficiency) among European office buildings (evaluation is still being carried out by DHV consultants).

In terms of architecture and construction techniques, the complex consists of three buildings interconnected by conservatories. It explores thermal mass during summer so as to operate without air conditioning in addition to night ventilation through small openings in the glazing (see Figure 6.6). During winter, heat is supplied via a warm water radiation. It also has solar cells in the roofs – in total 270 square metres, being able to supply 15 percent of the whole energy demand of the building complex – and a system of sunscreens in the conservatory and stairwells. This was another pilot project supported by Novem, in which the combination of self-generation capacity and use of mains grid of electricity was explored. In terms of lighting, daylight is explored to a maximum degree complemented by low energy lighting fixtures with individual controlling systems. The complex also has a quite effective water management system, using rainwater to flush toilets, roof planting and semi open paving (see Figure 6.7). The greatest possible use is made of natural materials, such as brick and timber. The structure applies concrete due to an LCA analysis, which indicated the high environmental impact implications should the complex have a steel structure.

According to the chief architect, Ir. B.A.G. de Bont, the complex' construction costs were about 10 percent higher than a conventional structure; the German investor, however, was on the occasion granted with subsidies from the Dutch government for the implementation of environmental features. Yet, its rent fees are considered to be average according to the region's standards.

Andersen, in its turn, did not add to the building's environmental change, neither during the design nor in the operational phase. To begin with, there were no incentives coming from the world headquarters (Chicago) indicating environmental

rules or principles, or anything like, to be followed, neither did a corporate environmental report as such ever exist[89]. In this respect, the Dutch division admitted that employees tried to keep up with high levels of good housekeeping but there were no written commitments or written policies for that. Regarding the building, the Dutch facility management head, Drs. M. Vink, suggested that Andersen used the building because it liked it, not because of its environmental characteristics. Finally, regarding the building's operation, neither monitoring systems (for energy or water) have been installed, nor a sustainable waste management system has been introduced. There are some complaints regarding overheating in summer, yet no air conditioning equipment has been installed.

To finalise, the story of this building clearly indicates that environmental initiatives were originated, decided upon, and implemented by the local economic network mainly, amid developers, financiers, and architects. The role of the state was mainly limited to facilitating the issuing of the building permits as well as to providing financial incentives. The involvement of the global company did not add in this respect, leading one to conclude that Andersen largely occupied such building by chance. However, the company also seemed to be consistent with its overall poor environmental conduct and apparently did not use the building as a pretext to promote itself as an environmentally caring institution.

ABN AMRO

ABN AMRO Holding N.V. is currently the main financial services institution in the Netherlands and one of the largest in the world serving retail, wholesale, and private and asset management clients through an extensive global network. Founded in 1991, after the merger between the Algemene Bank Nederland (ABN) and the Amsterdam-Rotterdam Bank (AMRO), the ABN AMRO presently owns approximately USD 500 billion in assets and employs more than 100,000 professional staff in around 76 countries (ABN AMRO, 2000a).

ABN AMRO maintains regional headquarterss in Singapore, Chicago, São Paulo, London, and New York. In the city of Amsterdam the bank owns two main buildings – one in Amsterdam-Zuidoost (completed in the mid-eighties, nearby the ING Bank headquarters) and the other on the Zuidas, in front of the Amsterdam Zuid-WTC metro station[90], the bank's world headquarters (see Figure 6.8). Appointed by the American Institute of Architects among the ten best green construction projects in 2001, this building has been receiving a lot of attention since its opening in 1999. The objective of this building is to offer not only a pleasant working environment for more than 3,000 staff members (10 percent of Netherlands total) but also to reflect the bank's environmental ambitions, which have significantly changed since the merger in 1991 (ABN AMRO, 2000b, 2000c). In this regard, it is considered as a large-scale demonstration project of how a contemporary environ-

[89] For this reason we do not present an organisational chart of Andersen.

[90] ABN AMRO's total office stock in the Netherlands consists of approximately 700 buildings, whereas ING has a stock of about 400 buildings.

mental – though modern looking – building should be like, probably representing the highest achievement of the bank's environmental and sustainable building goals. As environmental innovations have been introduced in the design and operational phases we shall provide an account of both.

In the first place, the bank considers that its relationship as a financial institution with the environment is twofold. First, as an organisation maintaining around 3,600 offices worldwide, it consumes a tremendous amount of raw materials, energy, and water, and generates significant loads of waste and wastewater. It also contributes to urban atmospheric pollution issues due to its staff commuting and to the transportation of its required goods. Secondly, by acting as a financial intermediary, the bank has a strong power in steering choices towards specific directions, given that the economic activities conducted by the bank's clients may pose a burden on the environment. In this context, ABN AMRO formulated its environmental policy after signing to the Charter of the International Chamber of Commerce in 1992, with a core objective to integrate environmental considerations into all business decisions so as to contribute to the sustainable development of society (ABN AMRO, 2000b).

Approved in 1995, the environmental policy paved the way for the implementation of the first environmental management system, which mainly focused on in-house environmental management – such as waste management, goods purchasing, transport, energy and environmentally sound offices – and financial products and services. As a result, it is the objective of ABN AMRO since this period to reuse 75 percent of its waste and to seek to include an environmental section in all contracts with suppliers (Ibid.).

Concerning the Dutch premises[91], the bank introduced in 1997 an 'energy project'. This was done so as to comply with the Dutch government's long term agreement, previously indicated in this chapter, by which energy consumption of existing offices have to decrease by 25 percent until 2005. This project has been implemented in 3 steps. First, and in accordance with – but not only because of – the required adaptation to the energy market liberalisation, a detailed monitoring system was introduced. Based on data logging devices located next to the energy meters, this system counts pulses of energy, electricity and gas use every 15 minutes. The data is accessible by any staff member through the Intranet so that abnormalities can be more easily identified. Secondly, an energy management system was implemented, controlling energy use for instance when the office is closed or occupants are absent. Thirdly, the energy project fosters an overall reduction of energy consumption, focusing on both new and existing offices. For that the bank has a fund of EUR 2 million per year, to be spent within the Netherlands in addition to other normal activities, e.g. maintenance. The only condition is that these projects, as well as environmental projects in general, have to amortise within 5 years, which

[91] Information for this section has been provided by Drs. A.J. de Miranda (health and safety department, ABN AMRO Holding), interview.

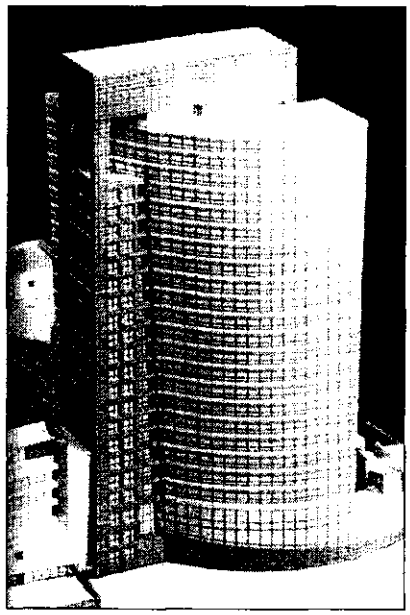

Figure 6.8
ABN AMRO headquarters, Amsterdam.

is an exception to the bank's policy of investing on projects whose payback time lasts at the most 2 years.

The bank has also developed a sustainable housing policy applicable to all its *Dutch* premises, including among others systems of smart lighting control, efficient heating and cooling, waste management, efficient glazing and where applicable heat exchange. The bank has been carrying out some pilot projects so as to gain experience in the sustainable building field, beyond compliance with the standard requirements dictated by the Dutch legislation. As such, energy consumption and opportunities for natural cooling are taken into account when evaluating air conditioning equipment. Natural lighting is encouraged in the premises whenever possible and suppliers are required to meet the terms of some additional norms.

The construction of the new headquarters in Amsterdam Zuid consisted, in this context, of a main pilot project for sustainable construction and management (see Figure 6.7). With a required floor area of 90,000 square metres to accommodate 3,000 staff members, its challenge was to realise a design that would produce a healthy and comfortable internal environment while maintaining a high level of energy conservation. It should, in addition, express the character and identity of one of the world's leading banks, which is to say, of a 'powerful, reliable, experienced, professional, dynamic and international' financial institution (Pei Cobb Freed and Partners, 2001). The commission was given to the architect Henry Cobb, from the design firm Pei Cobb Freed and Partners based in New York.

At an early stage in the project, the bank and the municipality of Amsterdam (Department of Physical Planning) signed a covenant defining some methods of cooperation (ABN AMRO, 2000c). This agreement concerned, among other things, an optimal integration of the building with the surrounding environment. This resulted, for instance, in the incorporation of a public square in front of the building, which was designed by municipal landscape architects in consultation with the Americans counterparts. Another covenant was also signed with public transport authorities, by which the building would be able to provide only 750 car parking spaces only (for the 3,000 staff members), so as to encourage the use of public transport. In return, the municipality has committed to work so as to improve the public transport links. The bank claims to encourage thereby the use of bicycle for commuter traffic and for this purpose it provides appropriate facilities on the prem-

ises for parking. No agreements were made with the energy and water companies, yet the building consumes green energy supplied by Nuon. An environmental audit was conducted regarding issues like energy use, waste disposal, water conservation, and encouragement of use of public transport.

In terms of environmental features, the building provides in the first place a system of 'climate façades' – constructed with a ventilated glazed panel system – which extract the staled air from the offices via a cavity between the internal and external glass layers, so that less energy is needed for cooling. The façades, in addition to providing protection against traffic noise from the A10 highway, also have a sun protection function. The sun radiation is directly offset via these cavities with intermediate sunblinds. In winter, the situation is reversed, as the high thermal insulation prevents from heat losses so that there are no heating devices necessary along the façade (European Commission Thermie Project, 1998a). The building does not apply natural ventilation as a cooling strategy, but windows may be opened in offices. (In reality, these windows had originally been designed to be fixed. A group of employees' representatives, however, demanded them to be openable as they regard it as an important feature for their well being, cf. van Meel, 2000). With respect to well being, the air inside offices is constantly renovated and moisturised. Moreover, cooling, heating, lighting, and sunshading can be individually controlled in offices.

Another important feature is the system of 'climate ceiling', which operates the cooling and parts of the heating systems of the building (European Commission Thermie Project, 1998a). These are made of perforated aluminium panels with separate connecting pipes for warm and chilled water, which are in turn supplied to the offices as required. The cooling is based on the coldness of an underground aquifer, which is much more efficient than a conventional system[92], coupled with night ventilation in summer. As for heating, the complex tries to use waste heat to heat the underground garage, which by itself also helps the rest of the building being less cold. The building is connected to the district-heating network, which in turn covers the basic demands. Additional requirements are generated by a system of boilers.

In terms of lighting, use is made of a high efficiency direct/indirect fixtures with metal reflectors and high-frequency electronic ballasts. Daylight is also explored to reduce the energy load, benefiting from several atriums and a generous use of glass. The lighting system is smart and louvers are automatically shut when human presence is not detected to avoid overheating.

However, despite the environmental features implemented and the related achievements (for instance the building tries to consume 10 percent less energy than the EPN), the building also presents several drawbacks mostly due to its high technology, which makes it also more vulnerable. There were several complaints regarding overheating as the heating and cooling system through a liquid medium

[92] By the Dutch law, the water used from the aquifer has to be subsequently replenished (Netherlands National Team, 2000).

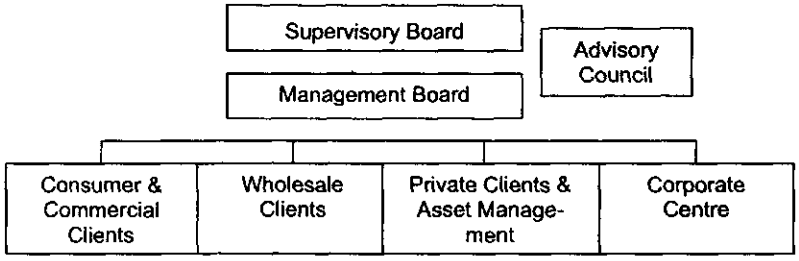

Chart 6.2
Management structure ABN AMRO (based on ABN AMRO, 2001, pp. 119-120).

might get clogged from time to time. In addition, an extensive use is made of granite originated from the United States, implying not only high costs but also in an unreasonable use of energy for transportation ('grey energy', cf. chapter 3). As for water conservation, for instance, the building does not have any special device except for water saving taps, which are quite normal for the standards of this building. ABN AMRO, however, intends to make water one of its main projects in the future[93].

Finally, and with respect to its office stock in the Netherlands, the bank has been facing difficulties to achieve the required reduction regarding the implementation of the EPN, which is currently 850 MJ/m^2/year, since it has introduced the desk-sharing scheme in its premises making the offices always fully occupied. Of course, the greater the number of people, the higher the consumption of energy, but in so doing the bank also saves on property land. With regards to the energy performance standard, which is expressed in terms of energy consumption against area (not taking into account number of persons, see Dutch National Team, 1998), there is a process going on at the moment to see how this issue can be renegotiated and if the number of users should also be entrenched in the standard. The Dutch government, on the other hand, has the conviction that energy consumption in office buildings can be reduced much more, down to or even below 500 MJ/m^2/year, of course without considering the new working routines.

Environmental decisions at ABN AMRO, e.g. the bank's environmental policy, are primarily initiated by the Health and Safety Department – which operates under the Consumer and Commercial Clients business unit – and confirmed by the Management Board, which is chaired by Mr R.W.J. Groenink (see Chart 6.2). Decisions regarding the bank's properties, in contrast, are initiated by the Housing and Real Estate Department – which also operates under the Consumer and Commercial Clients business unit. The Housing and Real Estate Department is also responsible for developing proposals concerning sustainability issues of the *Dutch* premises, such as technologies, monitoring systems, and so forth.

The environmental decisions regarding the bank's world headquarters in Amsterdam were, in this respect, primarily proposed by this department and ap-

[93] Drs. A.J. de Miranda, interview.

proved by the Management Board. However, despite this initial drive towards the building's greening, environmental innovations were of course deployed against the backdrop of other (local) practices of environmental management, such as the EPN and the covenants signed with the municipality of Amsterdam and with the public transport authorities, so one cannot say that ABN AMRO was the main environmental carrier in the story. When it comes to the foreign premises, for instance, where the local management of environmental flows is most likely weaker, the bank expects the local branches themselves to come up with such environmental management proposals, which in addition, if incurring great expenditures, should be approved by the world headquarters in the Netherlands. In addition, as mentioned before, the amortisation period of 5 years for environmental projects does not apply to foreign branches, which instead have to meet a payback of 2 years only[94]. Such financial decisions are made by the Management Board in the Netherlands, which for instance decides over – global and local – amortisation periods of investments in certain technologies, following the proposals made by the Housing and Safety Department (Netherlands) or by the foreign branches.

Within this framework, environmental investments of ABN AMRO have much to do with the following formula: maximum environmental gain = maximum environmental impact reduction with a minimum payback time. Some of the environmental investments are made to comply with legislation, others to ensure a clean record, and many to make sure financial savings can be achieved. In this respect, the bank spends almost EUR 20 million annually in energy bills for its Dutch premises, which are now constantly being monitored. In terms of savings, the world headquarters building alone, by having 20 meters installed and a detailed monitoring system, saves about EUR 1 – 2 million per year (the building's total cost was approximately EUR 280 million). Water technologies, for instance, have not been installed in the building as water is still a rather inexpensive resource, as far as the Netherlands is concerned, and investments in water saving devices are claimed not to meet the amortisation period as mentioned above (5 years for environmental projects).

IBM

IBM, the IT multinational of American origin, employs around 316,000 people in 100 countries. Its total market share is estimated worldwide at 30-40 percent. Its global annual revenue is around USD 88.4 billion.

In the Netherlands, IBM has no production facilities but maintains four main headquarters buildings in addition to four smaller ones. In the city of Amsterdam, the company has an office complex recently refurbished in the Zuidas (see Figure 6.9) and is currently finishing the construction of a new one in the same district, a building designed by the American architect William McDonough, an environ-

[94] Drs. A.J. de Miranda, interview.

Figure 6.9
IBM headquarters, Amsterdam.

mental design expert, and incorporated by the same company involved with the Andersen building, the Multi Development Corporation.

The design concept of this building originated again from the architectural firm T+T Design, a branch of Multi Development Corporation, the same initiators of the Andersen building. The investor is Westland Utrecht Hypotheekbank (EUR 73 million). The building complex, which is expected to be delivered in mid 2003, will have a total area of 34,000 square metres, spread in a series of different buildings, which vary in height, where the highest will have thirteen storeys (50 metres high), and offer 224 underground parking spaces. IBM will eventually lease the building on a long-term contract.

Decisions regarding this build-ing have been made jointly by the developers and IBM, mainly pursuing two main features. First, an idea of 'urban environment' offering a con-trast to the isolated office towers that have been sprawling along the high-way A10, dominating the landscape. Second, the building is focused on creating a healthy, pleasant, and especially a flexible work environment by offering access to daylight and natural ventilation. In order to approach these features, a series of narrow office buildings encircle an exterior courtyard, allowing an access to abundant fresh air and daylight, and providing a contextualisation with the surrounding housing. This composition, in addition, allows people to be easily connected to the outside through a courtyard in the lower levels and through a series of terraces, balconies and winter gardens for upper floors, regardless their location in the building.

In terms of environmental management, however, the building cannot be considered to be extraordinary despite complying with the Dutch government's regulations. Unlike the Andersen building, for instance, this one does not use PV cells[95], passive cooling elements, sustainable water management, and so forth. The selection of materials, however, has been made on the basis of durability, energy performance, maintenance and environmental friendliness. An orange-red brick was selected for the cladding, alternated with grey stone with a ceramic layer. It is important to note that in the case of IT companies, computer floors not only consume lots of energy due to their equipment but also require high cooling loads (due to the heat generated by computers), usually being the main energy users of the building. These rooms have to be cooled all year round; a fact that also applies to dealing rooms of banks. The building's curtain wall, in this sense, uses a recently

[95] Decisions regarding the installation or not of energy saving equipment have been made on the basis of cost-benefit estimates, Drs. R. Cleophas (real estate and site operations department, IBM Netherlands), interview.

developed coating, so that the building is significantly protected against heat gain minimising cooling loads while external visibility and access to daylight is ensured. The building also exploits the use of internal landscape architecture, water elements, and greenery to provide a 'people friendly' atmosphere. In addition, it also offers proper access to bicycle routes, frequent bus service and a train/metro station 850 meters away.

IBM has a longstanding global environmental management policy, which also applies to its facilities. Some of the strategies – for instance concerning work safety and health, as well as environmental, energy, and natural resources conservation – started to be formalised already in the 1970s, and have been evolving ever since. In this respect, IBM's buildings are in general terms *stakeholder* oriented, in the sense that the company seeks by offering a comfortable and high standard office environment conveying an appropriate image to get the best out of its personnel as well as to sensitise clients looking for its advise and consultancy. Floors are usually open, flexible, and the 'e-place' (desk-sharing) work culture is encouraged.

In terms of environmental policy, IBM's current approach sets forth, among other things, the following objectives, which will also be decisive for several features regarding energy and water management in its buildings: (i) to meet or exceed local standards and regulations concerning the environment; (ii) to continuously improve its environmental management system and performance, and periodically issue progress reports to the general public; and (iii) to conduct rigorous audits and self-assessment of IBM's compliance with its policy (IBM, 1999). IBM also has a system of in-house environmental management covering, for instance, waste, water, and energy management. These apply to buildings both leased or owned by the company worldwide.

Regarding the first objective, the general rule is to comply with the most stringent standard, either the local one or the one set by the company. In this sense, and in terms of energy and water efficiency, the buildings in Amsterdam do comply with the local norms – for instance the EPN, the Arbo rules, legionnaires' disease management, and other local prescriptions. As for the LTA (long-term agreement) with the Dutch government to reduce energy consumption by 25 percent until 2005, nothing has been done so far but the company expects to meet these requirements within 2 years' time. Since IBM encourages the 'e-place' concept, a similar constraint as found at ABN AMRO regarding the status of the performance standard is taking place at this company as well. Although its policy fosters best techniques to be cost effective, IBM does not buy green energy, unlike ABN AMRO, despite the possibility of having tax abatements.[96] In terms of energy monitoring, the buildings have installed a comprehensive energy monitoring system since 2002, based on Erbys data logging devices, similarly to ING and ABN AMRO.

Concerning the second objective, the company strives to achieve reductions in energy and water consumption in the order of 4 percent and 1 percent per year respectively in all its worldwide offices and facilities. In terms of energy, this fig-

[96] IBM energy supplier is NUON, from whom the company buys conventional energy.

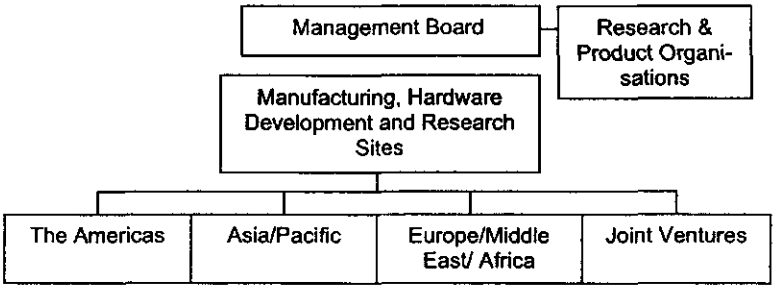

Chart 6.3
Management structure IBM (based on IBM, 1999, p. 33).

ure is easily achieved particularly by downsizing server areas – which as mentioned above, are heavy energy consumers – in addition to installing new techniques, e.g. smaller computers requiring decreased cooling loads, as well as by promoting behavioural campaigns to save water and energy. As the Dutch environmental policy framework is fairly advanced, the company's global policies usually are below the Dutch standards regarding environmental management.

The third objective is accomplished, as far as the premises are concerned, by regularly conducted audits regarding waste, water, and energy, which lead to the issuing of constant reports, usually provided by the Real Estate & Site Operations Department, which the Environment/Health and Safety Division belongs to. In the case of unusual, detailed investigations, external consultants are outsourced. Special teams commanded by the United States headquarters periodically check the result of these audits in the local headquarterss. Therefore, staff involved in the above mentioned departments strive to keep up with the local and global requirements.

Such global environmental policy is established at world headquarters level (USA) and is (largely) controlled by the regional administrations. The Netherlands, in this case reports to the EMEA (Europe, Middle East and Africa) region, which in turn is subdivided into more local administrative bodies, being the North and Nordics region the one to which the Netherlands belongs (see Chart 6.3).

The pursuit of this global environmental policy is claimed to be done so as to ensure IBM's leadership in relation to other companies of the sector, a clean record for its corporate image, as well as cost-benefit issues in a rather pragmatic way. This policy is coordinated via Intranet, so that it is homogenised in worldwide terms; local branches do not have any decision-making power regarding its formulation. Since the policy requires local branches to deliver data and facts annually in the format of an intranet report, the Senior Management is ultimately responsible for environmental matters. However, decision-making processes regarding the company's properties are quite independent country-wise, whereby external consultants are frequently hired to offer strategic advisory services on property-related affairs. But when in comes to budget approvals to major projects, IBM-Netherlands needs to have the consent of the European North-Nordic region, headquartered in London, and ultimately of the main headquarters in the USA.

Conclusions

While Amsterdam's office stock has seen a large expansion since the beginning of the 1990s, as the city turned into one of the main headquarters locations in north-west Europe, it has also been subjected to a growing number of environmental management practices. At the national level various covenants have been issued and standards introduced, particularly since the energy sector liberalisation onwards, and following international pressures regarding CO_2 emissions, bringing into focus a new need to address environmental issues in office buildings. The municipality of Amsterdam, in its turn, largely – but not exclusively – due to its land tenure system, has also been establishing covenants with or requiring environmental audits from companies, developers, or other parties interested in building in the city, so as to attempt to control the environmental performance of its stock of office buildings.

Where companies are concerned, these new environmental management practices are in general terms smoothly assimilated. As a matter of fact, and exception made to Andersen, all companies of our sample are even dominant actors in the steering of environmental innovations in their buildings. ING Bank, for instance, not only initiated the environmental ambitions of its headquarters in the mid-1980s but also *pushed* for their materialisation – in view of the impediments posed at the time by the energy company and the urban planning department. Although the approach of Amsterdam's planning authorities has changed ever since, this building is still a good account of the city's office stock early ecological restructuring process.

More recent developments have now taken a different route, moving away from 'self-sufficiency' goals (such as proposed by the ING Bank building) to solutions approaching more environmental 'efficiency' (cf. chapter 3). ING, for instance, is now seeking sustainability goals by applying advanced monitoring systems, dematerialisation and substitution of certain technical systems, as well as high performance technologies and materials, as the new headquarters of ING Group illustrates. The same applies to ABN AMRO with the development of a high-rise pilot project addressing mostly energy conservation, and IBM which, following global standards, seeks to achieve annual reductions in the energy and water consumption of its premises worldwide mostly in the operational phase of the buildings. Other examples that corroborate this trend are the European headquarters of Nike in the great Amsterdam area which, despite not being a property of the company, was also largely 'greened' after the company expressed its wish for an environmentally efficient building (Bouman, 2000). One should also mention the new European headquarters of Nissan which was designed to have its parts totally reused after dismantling, implying thus environmental conservation at the demolition and recycling phase.

The environmental restructuring of Amsterdam's office stock seems thereby to be proceeding in view of two (converging) tendencies: One of them regards the local management of environmental flows, which has been providing enabling con-

ditions for the market to pursue environmental innovations, such as the covenants (based on the National Packages for Sustainable Building) and the energy performance standard with its related subsidies schemes in energy advisory services. The other regards the global management of environmental flows stemming from the multinational companies, which in their majority attempt to go *beyond* the prescriptions set forth by the government being, indeed, major environmental reform triggers in the city of Amsterdam. The result of such interactions is leading to rather synergistic solutions, which may be described in terms of dematerialisation of the use of resources, through for instance natural ventilation instead of air conditioning (ING and Andersen), substitution of technologies (such as use of green energy), monitoring (particularly of energy and through the energy performance standard), as well as monetarisation (through tax abatements for the use of green electricity provided by energy suppliers).

The two spaces of social action are therefore mutually enforcing, clearly not competing with each other, to the extent that they are pursuing basically the same discourse of environmental policy: promoting more efficiency, and not self-sufficiency. A more detailed evaluation of these features of Amsterdam's ecological reform shall be presented in the conclusive chapter of this study (chapter 9).

7
São Paulo

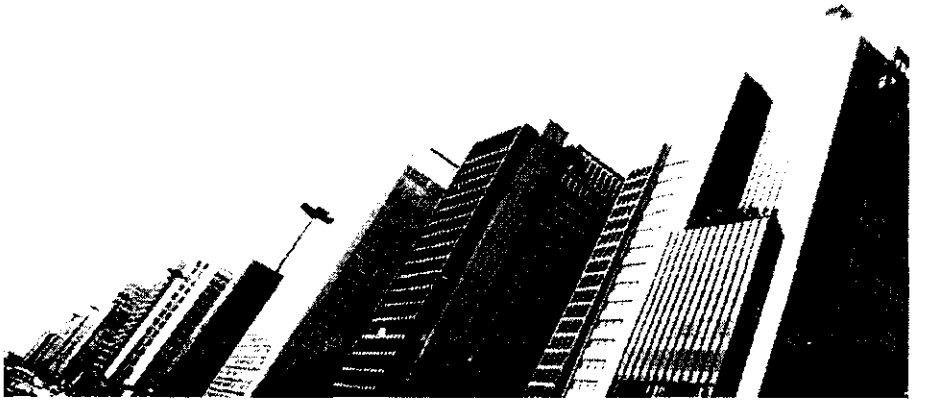

Figure 7.1
Avenida Paulista.

SÃO PAULO IS THE economic engine of Brazil. Since the mid-1900s onwards, it has also grown to be the leading business capital of the Southern Hemisphere, expanding and transforming sharply its physical setting and urban environment. A paradoxical city, São Paulo's size and economic importance are contradicted by a general absence of official urban or environmental planning. As a result, disorderly changes in the urban space – and their environmental side effects – have made of São Paulo a cacophonic cityscape, or, as many say, a 'bomb primed to go off'. The assimilation of corporate headquarters contributing to the city's verticalisation and expansion has thereby taken place at the interface between a rush for meeting a competitive edge vis-à-vis other cities for the establishment of businesses and, on the other hand, a large discard for the environment.

As I shall suggest in this chapter, however, the ecological restructuring of São Paulo's office stock is in its *status nascendi*, an embryonic process. Although the office property market grew to be highly speculative in the city seeking short-term profits (commonly at environmental costs), some developers have recently started to introduce the concept 'green building', indicating that a more efficient use of resources is bound to be triggered. My argument starts with an overview of the main characteristics of the place, describing the geographical distribution of the office districts, some characteristics of the property market, occupancy, buildings' typology, environmental profile, and general regulatory framework. Subsequently, I shall shift the discussion to analyse the two 'spaces' of environmental manage-

ment, focusing on the (emerging) strategies first advanced by local utilities and environmental management agencies, and secondly by the four corporate case studies of this research: ING, Andersen, ABN AMRO, and IBM, respectively. Although these two social spaces seem to provide little evidence that an ecological reform of São Paulo's office stock is arising, this chapter concludes with some general observations, and other evidences, that point at an emerging ecological restructuring process, discussing thus the conditions and actors that are favouring it.

Characteristics of the place

São Paulo was founded by Jesuit priests in 1554 on a hill nearby the confluence of the Tietê and the Tamaduateí rivers. This location would afterwards reap benefits from the proximity to the Serra do Mar and the harbour of Santos, and develop into an intermediary point for transportation routes between the coast and inland plains. Remaining among the poorest rural centres of the colonial period, and mostly colonised by adventurous settlers coming from the south of Portugal, São Paulo's early origins provided few clues of what the town would look like in the ensuing centuries.

Its growth took place at a slow pace until the end of the nineteenth century, a period during which coffee plantations started to soar over the state of São Paulo (of which São Paulo city is the capital) conferring on the city a new role, that of the world's main coffee export centre. São Paulo has since then bloomed at an extraordinary rate, attracting in turn investments in industrial sectors and urban infrastructure, in addition to a strong migratory influx. A population of no more than 30,000 inhabitants of late 19th century surpassed one million in the 1940s (Emplasa, 2000), quickly altering the city's topographic constitution with the development of residential and industrial complexes, the canalisation of rivers and streams, and the creation of dams for energy provision. In the process, a type of gap in environmental preservation started to widen, as public services – such as waste collection, sewerage disposal, street cleaning, paving, and urban drainage – too often failed to cope with the city's growth (Rincón, 2000).

Nowadays, São Paulo has become a high-rise city, facing a strong urban decentralisation trend and high levels of pollution, with a total metropolitan area of more than 8,000 square kilometres inhabited by around 20 million people (Emplasa, 2000). With an intense economic dynamism supported by governmental incentives to further attract industries and the services sector, the Great São Paulo[97] has become not only Brazil's 'command centre' – generating about half of Brazil's gross national product – but also the economic and financial capital of Mercosul, in addition to Latin America's main industrial and service pole (Emplasa, 2000; Seade, 2002). The city represents thereby the link between the national and international economies, concentrating headquarterss of numerous national and multina-

[97] Great São Paulo is the term used to designate the city jointly with its conurbed municipalities.

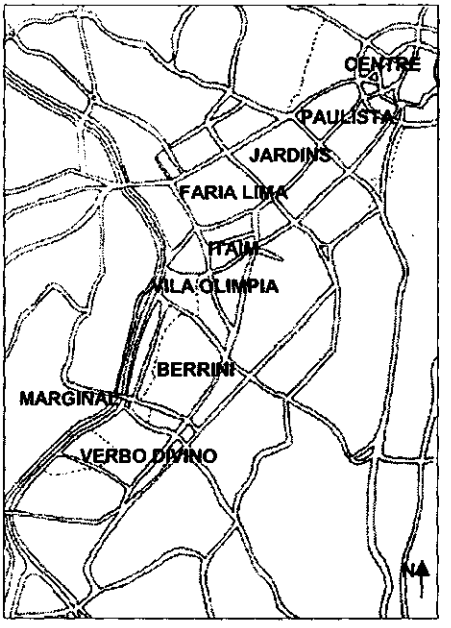

Figure 7.2
Distribution São Paulo's office stock.

tional corporations, decision-making institutions, banks, as well as telecommunication and service firms. São Paulo's GDP and income distribution are comparable to those of Italy

São Paulo's office stock

São Paulo's office stock has historically developed in the old city centre, particularly since the construction of the Martinelli building in 1929, the city's first skyscraper, which in fact triggered the city's verticalisation process. For decades the old centre remained the city's financial nucleous, growing from the capital accumulated by the coffee industry and boosting São Paulo's industrialisation and modernisation. As its area became packed with high-rise buildings by the late 1950s and early 1960s, new developments started to move south, first to the Paulista Avenue, located at the highest topographical point of the city, then to the Jardins region (Emplasa, 2000).

Still in the 1960s, service activities (e.g. information technology, advertising, and consultancy) started to develop along the Faria Lima Avenue, an avenue at the southern edge of the Jardins. As this region also became saturated with high-rise buildings by the late 1970s, other service sector nuclei were founded further towards the south – first in the Berrini region, including the Centro Empresarial complex and the Berrini Avenue, where the World Trade Centre building would be constructed in the mid-1990s, and later on in the Marginal Pinheiros (also referred to as Nações Unidas) and Verbo Divino regions, the latter being the latest vertical occupation of the city largely profiting from Brazil's economic stabilisation since the mid-1990s (Emplasa, 2000).

Nowadays, São Paulo's office stock totals 4,152 square kilometres (CB Richard Ellis, 2002b) and is concentrated on two main regions – a 'centralised' one, including the old centre and the Paulista, Jardins, and Faria Lima regions, and a 'decentralised' and expanding one, comprising of the Marginal axis which links the old centre to the Verbo Divino region (see Figure 7.2). The old city centre, in this context, although still concentrating around 40 percent of financial activities of the city and remaining an eminent financial pole, has been losing its importance due to a strong deterioration process, where an obsolete office stock, unsafe and difficult to be accessed, has been further beset by a poor environmental quality. The Paulista Avenue, in contrast, has during the past few decades assumed the role of

the city's (as well as of the country's) most influential economic centre due to the high concentration of high-rise buildings mainly maintained by banks. But it is especially the southern business districts along the Marginal axis that have been gaining attention during the past years due to the speed at which they expand, which in turn requires massive adaptations in the urban infrastructure, particularly concerning the road network.

São Paulo is characterised as a highly speculative property market, where new developments too often push for an extremely dense land use as well as an indiscriminate demolition of existing buildings long before the end of their useful lives, where overall preservation issues usually fall short. This fact, in addition to a vulnerable economic context, continuously exposes São Paulo's office property market to economic fluctuations. Overrated after 1994, the market has significantly devalued since 1998 due to the economic downturn propitiated by the Asian crisis, coupled by a surplus in office space. Recently it has started to present a vacancy of around 10 percent, proving an increase of vacancy as compared to the 1990s, with a (decreasing) prime rental basis of USD 390 m^2/year (CB Richard Ellis, 2002b).

Occupancy and support structure

Unlike the predominantly industrial and nationally oriented centre it had been for decades, São Paulo has been increasingly involved in the globalised world economy and is heading towards becoming predominantly a services capital – a shift currently considered to be irreversible (Emplasa, 2000; Seade, 2002). Starting in the mid-1980s, and with a growing specialisation and digitisation of the urban economy contrasting a downturn in industrial activities, such changes in the economic profile have led to a sharp increase in the number of service sector establishments (see Table 7.1), furthering in turn the construction of more office buildings.

Table 7.1 shows that a shift in the establishment distribution has intensified particularly since 1994, the year that brought about Brazil's economic stabilisation with the introduction of the Plano Real and the dollarisation of the national currency. While favouring the overall commercial activities – also positively reflecting on other sectors of the urban economy – the economic stabilisation coincided with the period during which the municipality of São Paulo's was administered by the progressive party, which profited from the economic upturn to attract large fluxes of investments (from both national and international origins) into the city's services sector, as well as in its property market, boosting a large number of new office building developments (Emplasa, 2000). And it was precisely in this context that São Paulo managed to secure its role as an emerging global city, the most prominent of the Southern Cone, offering a wide range of services related to hyper mobility of information: i.e., planning, advertising, marketing, legal, insurance, financial, and consultancy, among others.

SECTORS	1986	1990	1994	1997
	(in percentage)			
Industrial/manufacturing	17.9	18.1	**16.2**	14.6
Commercial	32.7	33.2	**35.1**	36.2
Services	**35.5**	**35.6**	**38.9**	**44.7**
Others	13.9	13.1	**9.8**	4.5
Total	100	100	**100**	100

Table 7.1
Evolution of establishments' distribution in São Paulo, 1986 – 1997.
(Source: Ministry of Labour, 2000).

As a consequence, São Paulo's office stock is now home to the main national and foreign business groups, counting with 38 percent of head offices from the 100 largest private enterprises of national capital as well as 63 percent of international business groups with head offices in Brazil. Great national and international market research agencies, established for decades in Brazil, are currently based in São Paulo – including Nielsen, Ibope, Marplan, and Gallup – and the twenty largest advertising agencies in the country have their head offices in São Paulo. São Paulo also headquarters large international IT companies, the world's most important auditing firms, in addition to the country's largest publishing companies, including the eight largest national magazine publishers, two of the five largest newspapers, and seven of the ten largest book publishers (Seade, 2002).

Financially, the city is not only Mercosul's largest consumers' market – concentrating 10.5 percent of South America's shopping malls and responsible for over one third of Brazil's acquisition power (thereby having a consumption potential larger than Rio de Janeiro's state, or approximately Paraná and Rio Grande do Sul's states added together) – but also Brazil's economic core, where sixteen out of twenty of the biggest multiple, commercial, and savings banks in the country are headquartered, four of them being among the largest national business groups (Seade, 2002). São Paulo has also South America's largest stock exchange – Bovespa – and the world's fourth largest future and commodities exchange – BM&F. Of the ten largest credit card companies, seven are headquartered in the city, as well as six among the ten largest brokers, and six of the ten largest insurance companies (Ibid.).

In terms of local structure to support businesses, São Paulo maintains sophisticated and diversified health, education, culture, leisure, and tourism service networks, comparable to those found in the world's major metropolises. It also has the highest number of executives and specialised labour available in the country as well as hospitals, best hotel chains, and restaurants. Dominating nationally in the number of business trade shows, exhibitions, and international scientific congresses, São Paulo is also the largest business tourism centre in South America, as well as Latin America's most important technological centre, where several of the most important Brazilian universities and research institutes are located.

Geographically, the city also benefits from being a mandatory route for any connection between the North, Northeast, Centre-west, and Southern states and

other cities of the Mercosul. It has thereby two of the three main airports of Brazil in terms of number of passengers. It is also a distribution logistics centre, located nearby the Tietê-Paraná waterway system (one of the largest of Brazil), the Santos port – Latin America's main exportation terminal and largest containers port – further benefiting from a high quality road and telecommunications network, exceptional for Brazilian standards.

Buildings' typology

São Paulo is a highly speculative developer-oriented market, in which a wide range of local developers and a growing number of foreign ones participate[98]. Yet, much of the commercial developments are still carried out by local developers, often using local architects, which largely reproduce examples carried out in the USA responding to a market influenced by the North American culture. In this sense, much value is given to the façade design and large open layouts, seeking the maximisation of space use. Architectural approaches are thereby many times fostered from the outside to the inside, where the 'glass box' concept is highly praised, and where environmental performance issues are only marginally considered. In addition, being a car-oriented city, buildings offer an impressive rate of parking facilities (one parking space for every 30 square metres of rentable area) so as to respond to the commercial demand. In fact, a high rate of parking space is one of the most relevant prerequisites for the building to be labelled as grade A (top segment) in the city, so that commercially developed buildings which do not comply with this feature inevitably face market constraints[99].

The participation of foreign design firms has recently been increasing largely justified by the so-called 'Brazil cost': the cost of an onerous legal structure, coupled by high interest rates, and heavily levied employees (World Architecture, 1997) – putting local architects at a disadvantage and further propitiating the 'americanisation' of the local architecture. In this regard, American architectural firms such as RKTL and SOM do not only largely practice but have started to even set up representative offices in the city due to the large number of commissions they have been receiving. These foreign firms generally claim that local developers, having become much more sophisticated with globalisation, no longer need to hire Brazilian architects to reproduce American buildings (Ibid.). They also allege that local architects do have a certain 'arrogant disdain for clients' (Ibid.) which prevents them from responding to market needs; a critic in reality directed at tradi-

[98] Tishman Speyer Properties (USA) was, in this regard, the first to establish offices in the city in a joint venture with a local construction company – Método – followed by Turner, Hines, AIG Lincoln (USA), Hochtief (Germany), and Dumez (France). Other important joint ventures have been recently taking place leading to new corporations, like Brazil Realty – a merger between IRSA of Argentina (in which George Soros has a 28 percent stake) and Cyrella, currently one of the biggest developers of the city – and Grupo Multiplan, another major local developer that is now joint with Goldman Sachs (World Architecture, 1997).

[99] Arch. A. Oliveira and Arch. M. Miranda (researchers, Jones Lang LaSalle – São Paulo), interview.

tional local architects, such as Paulo Mendes da Rocha, in the pursuit of solutions like large concrete slabs (e.g. the Museum of Modern Art building), solutions by and large fostered during previous decades. But to build in the city they are legally required to work in cooperation with local architectural firms (as decreed in the Brazilian legislation), as these are equipped with necessary expertise to *tropicalise* their proposals, i.e., embed their proposals into the local network of suppliers, contractors, approval processes, and so on[100].

And all of this has been eradicating the local architecture, while leading to chaotic ensemble, where the imposition of global influences on the urban space make of São Paulo a prime example. An imposition that in turn reaffirms São Paulo's condition as a developing country's global city, as the social divide between capitalists inside the buildings and a large third world crowd outside has made itself outstanding. Some claim that Brazilian architects need to 'modernise' and move on from the architectural ideology pursued in the past and perhaps thereby develop a new local language or architectural approach to better suit the local context. An example (perhaps not the most suitable one) of this could be the architect Ruy Othake who, by implementing extravagant though highly criticised projects, manages to secure its clientele.

Others suggest that foreign designers, clients, and developers need to work closer with their local counterparts so as to better translate their ideas and interests into the Brazilian context, bringing in, in this case, a more balanced influence: a large international expertise and technological knowledge coupled with a large local working force and vast natural resources. And this combination has in fact already been taking place. Particularly after the introduction of the Plano Real, a period during which the presence of foreign builders and related stakeholders has considerably intensified in the city, overall ideas of building efficiency have been to some extent boosted and translated into better layouts, modularisation systems, façade designs, cladding and windows quality, as well as in some instances into an improved environmental performance of buildings[101].

Local infrastructure and environmental profile

As any large city in a developing country, São Paulo has a tremendous car fleet and therefore suffers from high levels of urban atmospheric pollution. Back in 1995, the fleet already consisted of 5.16 million vehicles – 3.3 million gasohol fueled light-duty vehicles, 1.5 million ethanol fueled light-duty vehicles, and 360,000 diesel-fueled heavy-duty vehicles – a number that has grown approximately at 5 percent annually (World Bank, 1997). This fleet is responsible for 96 percent of CO emissions, 90 percent of HC, 97 percent of NOx, 86 percent of SO_2, and 42 percent of particulate matter, making urban atmospheric pollution the city's main environmental priority, particularly during the winter, when these gases are trapped in the

[100] Arch. A. Oliveira, interview.
[101] Arch. A. Oliveira and Arch. M. Miranda, interview.

atmosphere due to thermal inversion, reaching highly toxic concentration levels (Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1998). Indirectly, the fleet also brings about economic losses of more than USD 6 million daily (World Bank, 1991) due to the city's extremely intense traffic congestions. These congestions are, in turn, giving rise to a large alternative helicopter fleet (currently estimated the second largest after Tokyo) also promoting another distinctive infrastructure feature of the city: the large number of helipads.

Ecologically, São Paulo's metropolitan area is surrounded by a green belt with a broad hydrological network, including the rivers Tietê, Tamanduateí, and Pinheiros, and the reservoirs Guarapiranga (27,2 square kilometres) and Billings (37,9 square kilometres). Although constituting one of the city's most important ecosystems, serving at the same time for energy generation purposes, this hydrological network has been seriously affected by untreated urban sewerage and industrial wastewater emissions (World Bank, 1991). Nowadays, the water that used to be pristine suffers from severe eutrophication (algae bloom following a high increase in nutrient concentration in water), making water scarcity a recurrent environmental problem, affecting a significant share of the population with related diseases and periodic rationing. The water company serving São Paulo city, also responsible for wastewater treatment, is the government-owned Sabesp, while the water regulator is Cetesb (the state company for environmental sanitation).

In terms of energy, the city is predominantly supplied by hydropower sources with an additional oil-fired thermoelectric plant, which is occasionally used to provide peaking or emergency power for water pumping. Until 1998, the sole energy distributor in the city was the state-owned company Eletropaulo. Nowadays, after its privatisation, São Paulo city is still supplied by Eletropaulo, but the company is now owned by the American AES Corporation[102], while the oil-fired plant is currently maintained by CPFL, Companhia Piratininga de Força e Luz (held by Brazilian capitals)[103]. Such network of hydropower supply is deemed to have caused a regional environmental impact, as the reversal of rivers towards the reservoirs has contributed to their pollution and degradation.

There are limited assessments regarding the office stock's environmental footprint or concerning the volumes of energy, waste, and water directly consumed by São Paulo's office buildings. But according to assessments of the city's overall environmental profile (e.g. World Bank, 1991; Emplasa, 2000; Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1997, 1998) some trends can be remarked. First of all, São Paulo has increased urban runoff levels and serious flooding problems due to a diminished absorptive capacity of the soil and impermeability of the clay – following the high level of impermeabilisation of the city with the excessive use of asphalt, concrete, and constructions, among others, and decreased green areas – particularly during the summer when heavy rains occur. There are 400 areas identified within the city as being at risk from flooding, where

[102] Ir. J.H. Boaratti (sales department, Cia. Bandeirante de Energia), interview.

[103] In addition to the local sources, both companies also buy energy from Itaipú and Furnas, which are two power generators located outside São Paulo State.

around 75,000 people are periodically affected[104]. Secondly, the temperature differential between the centre and the periphery is 5°C, proving the existence of heat island effect (Emplasa, 2000), a phenomenon related to the excessive use of low albedo (reflective capacity) surfaces in addition to the decline in green areas.

São Paulo also presents excessive levels of noise pollution, having over 80 percent of its population continuously exposed to it; a significant part of which deriving from the construction and demolition of buildings. Visual pollution stemming from the number of construction sites has also become another serious environmental problem of the city, and the areas surrounding construction sites also present an increased presence of ambient dust and street rubble levels (World Bank, 1991).

Finally, forestland has significantly decreased in São Paulo between 1930 and 1990. São Paulo has also low indexes of green land per capita, having back in 1991 only 4.5 square metres per inhabitant, a figure that has probably decreased ever since (World Bank, 1991). Nowadays only about 2 percent of the city's surface is assigned for agricultural purposes.

In addition, and as a global city, São Paulo is continuously undergoing a verticalisation process coupled by an urban expansion trend, where more and more high-rise towers are being constructed as the city further grows. This in turn presses on the existing infrastructure, such as the road network, water and energy distribution and sewerage, also affecting the urban microclimate. São Paulo, in this regard, constantly undergoes water-rationing programmes and, in 2001, the city had to follow a strict energy saving campaign. An urban warming process is also detected in São Paulo, which, as in a vicious cycle, puts another burden on the existing urban infrastructure resulting, for instance, from an important increase of the cooling demand of buildings.

General regulatory framework

São Paulo counts with three main local governmental bodies responsible for urban planning and regulation, which accordingly rule over the city's office stock. First, two municipal secretaries – Secretaria do Planejamento (SEMPLA) and Secretaria da Habitação (SEHAB), decide over the issuing of laws and norms (in turn to be approved by the municipal chamber), and of building permits for commercial buildings above 250 square metres of area, as well as factories, hospitals, and schools. The issuing of building permits for residential buildings and commercial buildings below 250 square metres of area is done by the regional administrations of São Paulo (the city has around 20 in total).

Secondly, the Metropolitan Planning Company of the Great São Paulo (Emplasa), an entity created in 1975 linked to the State Secretary of Metropolitan Transports, articulates policies in the three metropolitan regions of the state of São

[104] This problem has become so serious in São Paulo that the local government has instituted a 'Urban Drainage Management Plan', with a budget of BR 5 billion (1998 prices) to be spent over the next 30 years (Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1998).

Paulo (São Paulo, Santos, and Campinas), which altogether constitute the 'megalopolis' of São Paulo. Its objectives are to assist public and private entities in the decision-making processes by generating statistical and cartographical data, to provide technical assistance to the metropolitan municipalities, and to serve the general population. It also develops projects of land use and occupation, urbanisation and urban revitalisation, master plans and socio-economic studies. In sum, while Emplasa is mostly linked with macro urban land use issues, e.g. zoning regulation, SEHAB mostly deals with issuing and enforcement of building codes, at a more micro level.

While São Paulo is traditionally characterised by the lack of official urban planning, the city currently holds however a complex set of instruments for the regulation and enforcement of urban construction activities – ruling extensively over physical standards of buildings (through the Código de Obras do Município de São Paulo – the building code of São Paulo – having a last revision in 1992) and land use issues (mostly through the Lei de Zoneamento Urbana do Município de São Paulo, São Paulo's urban zoning legislation, first introduced in the city in 1972, and intended to be modernised in the coming years) – their effectiveness is actually quite ambiguous. In fact, using urbanist Raquel Rolnik's words, there seems to be a 'contraposition between the space composed within a meticulous urban legislative framework [in São Paulo] and the other, three times bigger, eternally situated in a zone between the legal and the illegal'[105]. Construction activities in São Paulo, partly owing to such comprehensiveness in legislative terms, partly to corruption itself, are too often, but not absolutely, extrapolated (Rolnik, 1997).

Further to this contraposition, another trend that can be remarked in São Paulo is the 'institutionalisation of law infringement', a practice that takes place following the local power structure, where economic interests too often prevail the urban legislative framework. In certain cases, municipal bodies issue new laws to allow alterations in the city's existing construction and urban planning regulations. As an example, the recently passed Lei de Operação Urbana (Law of Urban Operation), allows changes in the zoning code – e.g. the verticalisation of new areas. Such changes are offered to developers at certain fees during the application for an 'irregular' building permit[106]. A fact that further favours the speculative trait of the city's property market.

Local management of environmental flows

To the same extent that São Paulo's urban planning and construction codes are comprehensive and complex to be followed, finding environmental management practices promoted by local public institutions for the greening of São Paulo's office stock is also a meticulous task. Environmental policy in the city is determined

[105] Translation from Raquel Rolnik (1997), *A Cidade e a Lei. Legislação, Política Urbana e Territórios na Cidade de São Paulo*, São Paulo: Fapesp, Studio Nobel (pp. 181).
[106] Arch. R. Siqueira (architect, Ricardo Julião Arquitetura e Urbanismo), interview.

by a wide range of actors – including the federal government, state authorities, municipal government agencies, private sector enterprises, non-governmental organisations, the communication media, and informal sector enterprises – and is characterised by a problematic coordination, ill enforcement, and frequent infractions, resulting largely from such extensive, rather complicated, legislative culture that exists in the country.

At the national level, the main institutional body dealing with environmental issues is the Ministry for the Environment. At the state level, the main agencies are Cetesb (the state agency for environmental protection), Sabesp (the state company for drinking water supply and sewerage), and DAEE (the state department of water and electric energy). At the local level, the main institutions are the department for the environment (Secretaria Municipal do Verde e Meio Ambiente) and the metropolitan council with representatives of the state and the mayors of the municipalities that altogether constitute São Paulo metropolitan area (38 in total, including São Paulo city). In addition, there are also the Emplasa, which conducts studies and has certain responsibilities in implementing environmental rules at the urban development level, the secretaries of planning and housing, which are responsible for issuing norms that may also have an environmental character geared to the building level, as well as the energy and water utilities Eletropaulo (acquired by AES Corporation after its privatisation) and Sabesp, which are responsible for the implementation of rules set up at higher governmental levels.

While policy guidelines, basic laws (such as for instance concerning minimum emission, ambient standards, licensing requirements for new projects, in addition to overall policies regarding energy and water efficiency), as well as budgetary decisions are generally controlled by the federal government (World Bank, 1991), pollution control, water supply, sewerage, and power supply are under the state government (with certain exceptions, such as with firms operating in the private utility market that follow federal regulations). The role of the municipality itself is focused on solid waste management issues, noise pollution control, streets, parks and recreation, education, health care, intra-city public transport, and cultural preservation (Ibid.). The instruments available for urban environmental management, in this context, include legislation and regulation (e.g. licensing), economic and fiscal measures (e.g. fines, pricing over resources, user charges), planning and direct investment (e.g. on water, pollution control, sewage, and so forth), in addition to a set of environmental standards and zoning legislations (Ibid.). The efficiency and effectiveness of such instruments, however, is too often regarded as limited owing to the fact that, as environmental protection and general environmental services are provided at different levels, intersectoral and inter-governmental coordination for environmental management is considered to be problematic in Brazilian cities. In many instances environmental responsibilities (including the deployment of policies, instruments and their enforcement procedures) are transferred from one governmental agency to another, resulting in the end in a poor environmental regime.

In terms of local management of environmental flows of construction practices, São Paulo's office stock is primarily influenced by the municipal legislative

framework, comprising of a building code and a zoning law with, however, limited environmental content. The latter, for instance, includes environmental protection norms for certain areas of the city, e.g. environmentally or culturally sensitive neighbourhoods, which nevertheless frequently tend to be broken in view of economic pressures. The former, the building code, includes some norms with an environmental character – particularly concerning (mandatory) levels of natural ventilation, lighting, water capacity, ratio of green area, and so forth – which are nevertheless considered not to go beyond what can be reasonable in terms of environmental comfort, and thereby do not really promote an environmental upgrading of buildings[107].

Ironically, instead of a greening process, an opposite trend can be noticed in the city of São Paulo. Further to the above-mentioned Lei de Operação Urbana, which by itself intensifies the environmental pressure of the city, the city's overall property market focuses too much on the marketability and construction efficiency from the investor's viewpoint (e.g. capitalisation over land values, gross-to-net ratios, occupation efficiency, and so on), so that little can be achieved in terms of bioclimatic approaches, which demand certain 'losses' of space, through for instance buffer zones, uneven shapes, or use of vegetation. In this regard, and in order to attain an optimal occupation proportion, office spaces tend to be rather deep, requiring thus more and more the use of artificial lighting and acclimatisation[108].

Moreover, traditional local bioclimatic solutions such as the brise soleil (sun shading devices) and the use of concrete for the purpose of thermal mass, much celebrated during the 1960s' and 1970s' architecture, are nowadays considered to be nonmarketable. This is due to the fact that these devices are claimed to be about three times as much costly to acquire or demand a too arduous work to be maintained as compared to curtain wall[109]. And curtain wall, in turn, is ironically enough many times used as an environmentally friendly material[110].

Finally, there are restricted governmental incentives towards the implementation of energy or water efficient (office) buildings[111]. In terms of energy efficiency, some proposals have been made during the past few years for the construction of self-sufficient buildings via co-generation equipments. But with no governmental subsidies of any kind, however, some of them proved to be economically unfeasible, such as for instance the Villa Lobos shopping mall, while others have managed to be carried out, e.g. the Plaza Iguatemi building, completed in 2002, in fact the most expensive office space currently available in the city[112]. The same

[107] Arch. R. Dini (architect, Julio Neves Escritório Técnico), interview.
[108] Arch. G.C. Gasperini (architect, Aflalo e Gasperini Arquitetura) interview.
[109] Arch. R. Siqueira, interview.
[110] Arch. R. Dini and Arch. G.C. Gasperini, interviews. These architects claim that as the technology evolves, curtain wall is indeed becoming the best solution for external cladding even in tropical climates as São Paulo, as they allow good luminance levels (the quality of which can be contested, though) but prevent the penetration of solar rays, which would in turn heat up the indoor space.
[111] Arch. R. Dini, interview.
[112] Arch. A. Oliveira and M. Miranda, interview.

limitation of public incentives seems to apply for water issues. Buildings that use for instance underground water resources – and thereby contribute to reducing the overburden of the mains grid – still have to pay the water company a fee for the use. The decentralisation of wastewater treatment, in this respect, also receives few, though growing incentives; but sometimes the contrary can also be remarked, as biotechnologies, for instance, in wastewater treatment systems are apparently forbidden[113].

There are, however, certain environmental management programmes fostered by other local networks, which one way or another promote the outset of an ecological restructuring process of São Paulo's office stock. These are described as follows.

Department for the environment

Although São Paulo's department for the environment (Secretaria Municipal do Verde e do Meio Ambiente) does not have any programmes directly linked to energy and water efficiency or to the ecological restructuring or upgrading of office buildings, it plays an important role in the city's overall preservation of green areas, indirectly affecting the activities of the building industry, eventually also influencing the way buildings use energy and water.

As previously mentioned, São Paulo has a tremendous green deficit, as only 10 percent of the municipal land is green (Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1998). This deficit aggravates other environmental problems of the city, such as atmospheric pollution, visual and noise pollution, soil protection, regulation of water cycle, heat island effect, as well as leisure. And these environmental problems, in turn, are further worsened by the fact that green areas in São Paulo are concentrated on certain regions and not distributed over the city's surface (Ibid.). Great part of this deficit is indirectly generated by the property market speculation, which encourages the advance of urban land occupation within the city. It is in addition promoted by clandestine property speculation, mostly nearby watershed areas on the city's fringe, areas intended to be protected through the watershed protection law (Lei de Proteção dos Mananciais).

The municipality, in turn, through the department for the environment, has been seeking to promote a better management of both public and private green land, the latter through the reinforcement of existing laws – e.g. those of the zoning legislation – or concession to fiscal benefits, and the former by maintaining quotas for the implantation of green areas. The department for the environment has also expanded the access of urban farmers to better technologies and trade structures, created a 'green incentive', benefiting sponsors of environmental education, research, documentation, and preservation actions (Ibid.). It has also developed a report on Local Agenda 21, including a series of environmental ambitions, tackling the issues of hydraulic resources, solid waste, hazardous waste, pollution (air,

[113] Ir. C. Alonso (engineer, Cetesb), communication.

noise, and visual), and green areas, among others (Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1997).

Environmental impact assessments, in this context, are mandatory to constructions on sites within protected areas, stipulated by the zoning law, and do mostly concern general environmental preservation (such as trees, natural topography, contamination of aquifers, and so on), but do not extend to water and energy efficiency in buildings. The projects, in this respect, which aim to be located in environmentally sensitive areas, have first of all to comply with formalities of the department for the environment, before applying to a building permit at the SEHAB.

Energy network

Eletropaulo-Eletricidade de São Paulo S.A., São Paulo's energy distributor, is a company with an international origin dating back to 1899, when it was first established as the São Paulo Tramway, Light and Power Co. in Toronto, Canada, with an official authorisation to operate in Brazil. After expansions in its concession areas, Eletropaulo-Eletricidade (by then renamed as Light-Serviços de Eletricidade S.A.) was acquired by the Brazilian government in 1979 and broken down into four other companies in 1998, the year that brought about the liberalisation of Brazil's energy sector. One of these was Eletropaulo, whose responsibility has been to distribute energy to 24 municipalities in the state of São Paulo, including the municipality of São Paulo, serving in total approximately 4.6 million consuming units or 14 million people, with a total consumption nearing 35,000 Gwh of energy, and being therefore considered to be the largest electric energy utility of Latin America (Eletropaulo, 2002). In April 1998, Lightgás – a subsidiary of the Light Group constituted by the American companies Houston Industries Energy, Inc. (currently named Reliant Energy) and AES Corporation, as well as by the French Electricité de France (EdF) and the Brazilian Companhia Siderúrgica Nacional – acquired Eletropaulo through auction. In 2001, with the selling of the shares of Reliant to CSN, Eletropaulo started to be controlled only by AES, and Light by EdF, the latter operating in Rio de Janeiro.

Part of the concession contract signed in 1998 determined that one percent of the company's net annual income is to be spent in energy conservation projects. For Eletropaulo, this represents around BR 50 million (approximately USD 21 million, 2001 prices), a volume that is distributed into two kinds of projects[114]. The first one corresponds to projects of the kind 'research and development', constituting of different programmes such as the expansion of transmission lines' capacity

[114] This project has been apparently successfully implemented. It was a resolution of ANEEL – the national electric energy agency, created during the privatisation of Brazil's energy sector to control the activities and operations of firms in order to ensure national interests vis-à-vis private ones – applying to all concessionaires and agents of the energy sector. ANEEL also determined how this budget should be spent – i.e., including R&D programmes as well as programmes related to the prevention against energy waste – and is responsible for the monitoring, Dr. R.X. Lima and Ir. J.H. Boaratti, interviews.

and development of electric energy plants to be run on solid waste, among others. The second is termed PACDEE (Programa Annual de Combate ao Desperdício de Energia Elétrica – annual programme against electric energy waste) involving, among others, projects to improve the efficiency of public lighting, of the energy supply chain, and projects related to the distribution of low energy lamps to low income households. The selection of programmes is to be decided by the general public and eventually approved nationally. Besides these projects geared towards energy efficiency issues, Eletropaulo has also started an environmental management system to ensure a continuous improvement of its operations[115].

However, there are at the moment limited specific programmes of energy efficiency directed to office buildings, despite the critical energy rationing programme instituted during 2001[116], and neither energy advisory services in this respect are being offered so far. Despite the overall privatisation process, consumers are still somehow captive in the sense that they still rely on one single company within the municipality of São Paulo, to whom they directly pay their related bills, sometimes intermediated by facility managers.

Yet, Eletropaulo initiated several informative campaigns to alert consumers of how energy can be saved, also including the office building sector, indicating that energy waste in offices may reach up to 15 percent of the total consumption, leading to increased bills, infrastructure overload and compromising the efficiency of office equipments[117]. It also called attention to the fact that, in average, air-conditioning takes around 48 percent of the total energy consumption of the office space in São Paulo, while lighting accounts with 24 percent, pumps and elevators with 13 percent, and office equipment with 15 percent (Eletropaulo, 2002). But these informative campaigns have so far not yielded substantial results from the consumers' side.

Accordingly, the energy rationing of 2001 did not result in radical behaviour changes or significant, large-scale technological improvements. But it did, however, initiate a awareness raising process of the overall population as early indications demonstrated that a voluntary reduction was having a surprising impact in the elimination of waste, through for instance the replacement of incandescent bulbs by energy saving ones (ABN AMRO, 2002). And it did also lead to an opposite direction, as many companies, office building complexes, and other large facilities started to achieve the required reduction by switching on an on-site generation equipment, usually powered by diesel (clearly nothing like a co-generation plant), which not only consumes energy excessively but also contributes to urban pollution. As apparently no monitoring was done during the period in terms of avoiding

[115] Dr. R.X. Lima (marketing department, Eletropaulo AES), interview.

[116] The rationing programme was instituted after a severe drought during the years of 2000 and 2001, the worst in 40 years, which decreased the water capacity of the hydroelectric system. In the city of São Paulo, it compelled consumers to decrease their energy consumption in the order of 20 percent per consuming unit (e.g. household), as compared to the average consumption figure achieved during the period May-June of 2000, during the period June-December 2001.

[117] Dr. R.X. Lima, interview.

such behaviour, nowadays new office buildings dedicate a significant space in the machinery rooms for the possibility of a future energy generator[118].

Water services network

In São Paulo, the main agencies related to water regulation, distribution, and treatment are administered at state level, through the companies Cetesb (the state agency for environmental protection) and Sabesp (the state company for drinking water supply and sewerage treatment, which is in fact on the largest sanitation companies of the world in terms of consumers served). While the former is responsible for the regulation, enforcement, and monitoring of the raw water supply and treatment cycle, the latter deals with the distribution and treatment of commercial water, operating eight water production systems within the metropolitan area of São Paulo. Both companies are government-owned. Consumers, in this respect, and as within the energy network, are considered to be captive, also paying the related bills directly to the Sabesp (sometimes intermediated by facility managers), and receiving their services in exchange.

In terms of infrastructure, and being located at the top of a hydrographical basin, the Alto Tietê, São Paulo has over 80 percent of its water sources coming from two watershed complexes, Guarapiranga and Cantareira (Emplasa, 1990), the latter being located at a further distance and exploited since the 1970s onwards (Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1998). Currently, there is an insignificant use of groundwater resources within the municipality, although some industries and large commercial and residential buildings are beginning to explore underground aquifers to supply their water necessities.

One of the main problems related to water supply the city faces is the contamination of water resources by particularly illegal domestic sewage, which renders the overall water quality unreliable. While water supply reaches nearly all the population, wastewater treatment in São Paulo has always been problematic[119]. Back in the early 1990s, for instance, only 70 percent of the residents were connected to the sewer system, and only around 40 percent of the collected sewage would receive any treatment (Sabesp, 1990). The city counted with only two biological secondary plants in addition to a mechanical primary one and five smaller wastewater treatment plants by then to process a volume of 621,000 m^3 per day.

But with the contamination of water sources and limited availability of underground resources, drinking water has to be brought from river basins increasingly further from the metropolitan area, such as for instance the Piracicaba river basin through the Cantareira system, and treatment costs at the Guarapiranga reservoir have significantly increased (Philippi, 1990). Water scarcity has thereby be-

[118] Arch. A. Oliveira, interview.

[119] This problem is claimed to result from both an administrative inefficiency as well as a lack of funds. There are several political interferences in the management of sanitation firms in Brazil and nowadays there is a discussion taking place regarding the ownership of their services, whether they are services to be provided by the state, the basins, or by the municipalities themselves.

come a problem of periodical significance, particularly in dry seasons, when the water levels at the reservoirs are lower. According to the Secretary of Hydro Resources and Works (Secretaria de Recursos Hídricos e Obras), the hydraulic capacity of the Alto Tietê basin, which includes São Paulo metropolitan area, is of 201 m^3/capita/year, a figure corresponding to one tenth of the indicated value set by the United Nations for all direct and indirect uses. In addition, there are still several problems related to waste, such as irrigation without technical criteria and the inadequate use of industrial, domestic, or public water, causing losses over the supply chain and frequent interruptions in the supply (Sabesp, 2002).

In terms of programmes related to environmental management, and while Cetesb has been seeking to better monitor the illegal occupation of areas nearby water springs so as to avoid such contamination (Secretaria do Verde e do Meio Ambiente do Município de São Paulo, 1998), Sabesp has been investing in the expansion of the collection and treatment systems, although both companies work in close cooperation. Sabesp is also promoting the partial removal of pollutants through on-site installation in certain buildings, industries, and public facilities. At the treatment stations, attempts are made to separate pollutants from the water before they are returned to the environment, where the treatment is conducted in two cycles, a solid and a liquid one. Nowadays there are five stations in São Paulo metropolitan area, treating nearly 91 percent of all wastewater volume (Sabesp, 2002).

As for water supply, Sabesp has also been developing programmes geared at the optimisation of the system. The first one is related to water loss reduction (given that 22.5 percent of the volume of water is lost through leaks and 21.5 percent through illegal consumption) through which it intends to control water losses throughout the supply chain. The second, the water reutilisation programme, currently involves only the industrial sector through the encouragement of on-site secondary water quality treatment and reutilisation.

The third programme, concerning among others office buildings, is the rational use of water (referred to as PURA – Programa de Uso Racional de Água[120]). It has been initiated in collaboration with the IPT (Institute for Technological Research of the University of São Paulo), where a series of pilot-projects and action plans have been implemented in certain hospitals, public schools, industrial kitchens, and commercial and residential buildings. Although somehow still in its outset, the objectives of this programme are to maximise the supply of water in São Paulo in view of the existing capacity, reducing thereby investments in the expansion of the capturing capacity of the water sources, the volume of water to be treated, and the city's aggregate energy consumption. These objectives are to be achieved primarily through the elaboration of laws, regulations, and norms towards the rational utilisation of water in buildings, including, among others, the technological development of sanitary devices (and eventually their standardisation in the building code), the implementation of modern monitoring techniques, as well as the intro-

[120] Dr. N.M. Simões (director, Sabesp), communication.

duction of educational programmes in the curriculum of public schools (Sabesp, 2002).

Global management of environmental flows

Since its outset in the mid-20th century, São Paulo's office stock has always had an internationally orientation. For this reason, several multinational companies are long established in the city, being in their majority owners of their office spaces. More recently, however, the increase in interest rates in the country during the past decade has prompted companies to shift their investments from realty into other funds, a fact that has induced them to be tenants, rather than owners, of their offices. In this case, the spaces are commonly property of investors, including foreign ones, whose participation in the city is growing substantially.

As the following accounts shall demonstrate, similarly to the local management of environmental flows, the multinational companies analysed in this research seem to add little to São Paulo's environmental reform. Moreover, and coupled by the trend of outsourcing facility management services to external providers, such companies usually have limited contact with local urban and environmental planning agencies as well as utilities of energy and water. As owners, their involvement in the design phase of the building during which environmental innovations such as substitution of inadequate technologies and dematerialisation may emanate, usually took place long time ago, at a time when related policies were also more limited. As occupiers or tenants, their contact with local organisations is usually restricted to the utilities, to whom energy and water bills are paid for. Therefore, it seems that to the same extent that local environmental management in São Paulo is in general rather incipient, the global management of environmental flows according to our selected companies is also just beginning. For this reason, and as only limited global and local practices of environmental management can be detected, the following descriptions shall provide an overview of how environmental innovations *are not* materialising in view of this
local-global interplay.

ING Group

ING first opened its branch in Brazil in São Paulo, in 1985, where it started to operate in the field of investments for corporate clients under the name of ING-Barings. On that occasion the bank consisted of 20 employees, renting one office floor of a building located on Paulista Avenue. By 1991, it already had 100 staff members. Nowadays there are around 180 people working for ING in São Paulo, in addition to a restricted number of employees working at a small representative office in Rio de Janeiro. ING's head office in São Paulo consists of three office floors (totalling 3,750 square metres) located at the HSBC Tower, a building previously named L'Arche building, located on Faria Lima Avenue.

Figure 7.3
ING headquarters, São Paulo.

ING's process to relocate its staff from the Paulista Avenue into this building started in 1991, totally decided upon by local managers and intermediated by the property firm CB Richard Ellis. By that time, the bank pursued three main criteria in terms of property selection. First of all, large slabs were necessary to accommodate the staff in the maximum of three office floors. Secondly, the building should offer the state-of-the-art in terms of technology and infrastructure, e.g. optic cables, separated telephone centres, elevated floor for cabling, central air conditioning system, security, and so forth. The third criterion was that the building should be well located and transmit a strong image of modernity[121]. Nothing was demanded in terms of environmental efficiency, neither stemming from local managers nor from global ones. ING moved into the L'Arche building in 1995.

The L'Arche building (see Figure 7.3), in its turn, a building whose architecture has been much criticised, was originally commissioned by the CCF Group, an investment bank of French origin[122]. CCF aimed to gather its staff in one single facility, which should comply with the following criteria: large slabs, best installations for employees, updated equipment, and an underground parking facility[123]. In this sense, this building was initiated with fairly high technological ambitions, where decisions were mostly made through online meetings (for the first time in Brazil)[124]. Being a French bank, the architectural design should also resemble its country of origin one way or another. The commission given to Arch. Julio Neves, the building was designed following the proportions of the French monument La Défense, using a large doorway portico and extensive curtain wall[125]. As can be noted, environmental criteria were not pursued at this stage.

Another aspect that should be remarked is that the L'Arche building was designed prior to the expansion of Faria Lima Avenue, at a time when the surrounding neighbourhood was occupied by small houses and shops, and at a time when

[121] S. de Biasi (chief operating officer Latin America, ING-Barings Brazil) and M. Cozim (premises manager, ING-Barings Brazil), interview. As can be noted, no environmental criteria were considered by then.

[122] In fact, ING was approached by the CCF prior to the construction to join the investment, though declining, S. de Biasi and M. Cozim, interview.

[123] According to S. de Biasi and M. Cozim, no environmental criteria were raised by CCF.

[124] S. de Biasi and M. Cozim, interview.

[125] Arch. R. Dini (director, chief architect, Julio Neves Escritório Técnico S.A), interview.

the zoning legislation prohibited the construction of office buildings in this area. Nevertheless, and apparently due to the close connection between the mayor at the time and the architect, approvals were consented, turning this building into one of the most speculative and marketable undertakings in São Paulo of the decade, the first to inaugurate on Faria Lima Avenue's expansion[126]. Nowadays, after the CCF has worldwide been taken over by Hong Kong Shanghai Banking Corporation (HSBC), the building has been renamed into HSBC Tower.

As for ING's decision-making process regarding this building, it is important to bear in mind the fact that the bank was on the occasion still NMB, thus a small and young bank internationally speaking. On the occasion, foreign branches had total freedom to select their premises, as well as the related architectural and technological features, also including environmental issues. Nowadays, the bank's system has become more centralised at the global level, i.e., in the Netherlands. The Brazilian branch, in this respect, reports to ING Real Estate in New York, which is the head office of the Americas, which in its turn reports to ING in the Netherlands. According to ING's premises manager, no environmental issues are checked through such contacts, though.

In this context, ING's head office in Brazil implements only a limited environmental management framework so far, which is mostly related to the recycling of waste, e.g. paper (intermediated by an external company that collects scrap paper in São Paulo for recycling) and bottles. Local managers claim it to be difficult to implement the same environmental ambitions as compared to the Dutch premises, when it comes to property options in São Paulo – e.g. those concerning energy, water, and overall environmental efficiency – as the bank *rents* its properties in the city[127]. No specifications are required from the global headquarters; local managers apparently have neither particular motivations (nor receive subsidies) in this regard. In addition, ING also has little contact with local utilities, except for the fact that it pays energy bills directly to Eletropaulo, (while water bills are intermediated by a facility manager – Cushman Wakefield Samco – which does the facility management for the whole building). Again, contacts related to the environmental and urban planning agencies are practically inexistent, first because the company did not get involved in the design phase, during which contacts regarding approvals are established, and secondly as these contacts during operational phase are rather limited, except for cases of large refurbishments (which was not the case).

In turn, as nothing was really thought of in terms of energy and water efficiency throughout the design process, the building falls short in terms of passive environmental control and high performance technologies or materials, although it

[126] While the commission was given in 1991, the approval for the avenue's expansion took place only in 1995. The building's original design is claimed to have gone for the approval process at SEHAB with a 'fake' side entrance, towards a narrow side street, whereby the main one with the portico was hidden.

[127] S. de Biasi and M. Cozim, interview. The reason why the bank rents out properties in Brazil is due to the fact that interest rates in the country are high, thereby investments in properties are not financially favourable.

has water saving devices and a smart air conditioning system, in turn decided upon during the construction phase as part of the building's specifications (standard to all floors)[128]. During the energy rationing programme of 2001, ING's policy was to switch off certain lamps in the three office floors, to install a smart lighting system in lavatories (decision made by the local premises manager), and to initiate a behavioural campaign among staff, e.g. by promoting the switching off of computers during lunch hours. ING also used energy from a diesel-powered generator three hours daily to supply energy for one of the floors. Being a polluting equipment, producing a considerable amount of noise and odours, special filters were also installed so as to curb the generator's environmental impact. In this respect, the bank did not receive any orders from Amsterdam in terms of how to proceed with the energy rationing. Decisions were all made locally, and the use of such equipment was also *not* monitored by local environmental planning agencies. Exception made to the smart lighting system installed in the lavatories, the other energy saving strategies were discontinued after the end of the rationing programme.

Andersen

Andersen established its activities in Brazil in the 1930s, first in the harbour of Santos and subsequently in São Paulo in the 1940s. By the end of the 1990s it merged with Coopers and Lybrand in the country. In 2002, it was taken over by the consultancy firm Deloitte Touche Tohmatsu. The account this section describes corresponds to Andersen's policies prior to 2002.

Besides São Paulo, Andersen had a quite vast network of branches in Brazil, including Belo Horizonte, Curitiba, Rio de Janeiro, Porto Alegre, and Salvador. It offered services *inter alia* in the fields of fiscal and financial auditing, as well as business consulting. By the 1970s, Andersen's branch in São Paulo was located on Rebouças Avenue, at the Unibanco building, being a rather small office by then. Since the 1980s onwards, Andersen started to maintain two main buildings in the city. One of them – totalling 2,500 square metres of office space – was located at the Centro Empresarial, where the company's administration, treasury, accountability, and human resources departments were located, and where around 300 employees used to work. The other, considered to be the Brazilian head office of Andersen, was situated in the Verbo Divino business district, totalling 4,500 square metres of office space, and accommodating around 800 staff members, including 51 out of the 75 senior associate members in Brazil.

As a matter of fact, Andersen's head office in São Paulo (see Figure 7.4) was rather commonplace in terms of architecture or building technologies. The construction, completed in 1986, was in reality commissioned by Fundação Previdenciária IBM (one of IBM's foundations), an institution which owned the building and rented it out to the consulting company ever since. The property company CB

[128] Arch. R. Dini, interview. This air conditioning system switches on automatically when human presence is detected.

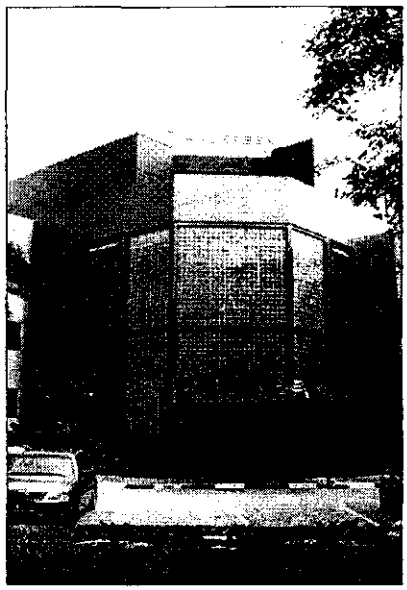

Figure 7.4
Andersen headquarters, São Paulo.

Richard Ellis acted as an intermediary between Andersen and the Foundation. With no real architect, the building was designed by the builders themselves, constructed by the firm Hochtief, and supervised by Ir. Sergio Viera da Silva, the technical advisor[129]. The building was also constructed in the least expensive manner, providing only essential infrastructure such as a basic telecommuni-cation system, an air conditioning equipment operating on water condensation, two water cisterns, and fluorescent lighting on a circuit of 220 W. It had neither a stabiliser for the IT department nor an energy generation equipment. Despite the aim of decreasing all construction and operational costs as much as possible, nothing was considered regarding energy or water efficiency issues, besides the regular standards set forth in the municipal building code[130].

In 1998, the building went through a refurbishment process, which mostly redefined its indoor structure, e.g. layout, furnishing, elements of decoration, and so forth. Again, in terms of energy and water efficiency nothing was considered or mentioned besides the standards of the building code, although an energy generator powered by diesel (Mercedes engine) was installed in addition to two no-break stabilisers by then[131]. During the energy-rationing programme of 2001, Andersen's policy to reduce energy consumption was to use the energy generator from two to four hours daily, to be coupled by the switching off of certain lamps. All decisions regarding the energy rationing were reached locally between the facility manager and main local associates of the company.

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[129] Ir. C. Monea (head facility management, Andersen Brazil) and Ir. W.O. Machado (facility management assistant, Andersen Brazil), interview.

[130] Ir. C. Monea and Ir. W.O. Machado, interview. The air conditioning system, still in use by 2001, was claimed to be extremely energy intensive, consuming 80,000 kWh per month functioning 8 hours per day.

[131] Ir. C. Monea and Ir. W.O. Machado, interview. The construction company was the Re-light. According to the facility managers, the aim was again to conduct the refurbishment in a low-cost way in the short term, to the detriment of the building's maintenance efficiency and cost in the long term. This was due to the fact that Fundação Previdenciária IBM, the building's owner, did not intend to further invest in the building, so that major technologies, that were not replaced in the course of the years, became increasingly obsolete. Andersen altered the building's internal layout on a yearly basis, however.

In this respect, and in terms of decision-making, major changes regarding Andersen's head offices in Brazil were to be approved by the company's global headquarters, located in Chicago, through the property department, while minor ones could be decided over locally. Budgetary issues, nevertheless, needed the approval by the global headquarters. But in its turn, the global headquarters apparently dictated little as far as Brazilian premises were concerned. No specifications about the architecture, facility management, or anything alike (such as energy or water efficiency) of São Paulo's offices were given from Chicago, except for those relating to space use or occupation – e.g. size of rooms according to employee hierarchy – clearly indicating an overall aim to optimise the occupation efficiency, thereby saving costs on property space and, subsequently on issues regarding energy and water expenditures. In this sense, partly owing to this and partly to a lack of local initiatives, nothing could be detected concerning the installation of energy or water efficiency equipment, despite the willingness of local facility managers to improve the energy and water performance of the building – issues that were discarded time after time by the local management board in view of other priorities[132]. Voluntarily, however, local facilities managers fulfilled an environmental management regime that mostly involved the recycling of waste and indoor air quality control. These initiatives were clearly locally raised, as Andersen did not have an environmental policy whatsoever.

Interactions with local environmental, urban planning, and utilities officials were in this sense limited. Andersen paid its energy and water bills directly to the related companies, Eletropaulo and Sabesp, and as these did not have specific programmes regarding office buildings, no environmental innovations could be established through this interception. However, no contacts whatsoever were ever held between the company and the department for the environment or urban planning agencies, as Andersen was not directly involved with the design phase of the building and the related procedures for construction approvals, during which such contacts mostly take place. In addition, the use of the energy generator was also not checked or monitored by the responsible environmental agency (CETESB). In this sense, as local environmental management programmes launched by São Paulo's public agencies are fairly limited as far as office buildings are concerned, and as Andersen itself, as a multinational company, did not contribute towards improving the building's energy and water performance, this building does not present any environmental innovation.

Yet, before the company's dissipation, the headquarters in Chicago had apparently put forward an intension to standardise the premises Andersen maintained worldwide in terms of architecture and building technology[133]. Such standardisation would take place through Chicago's property department, coordinated property manager P. Randal, and would start to be implemented starting in 2002 in a process to last about three years. The overall aim would be to homogenise office layout,

[132] Ir. C. Monea and Ir. W.O. Machado, interview.

[133] J.D. do Prado (senior associate member, Andersen Brazil), telephone communication.

visual communication, and so on, but also efficiency issues, such as those related to the applied technologies (e.g. lighting, water-related devices, air conditioning and heating systems, where applicable). The main drives would be economic ones, according to senior associate member J.D. do Prado, with however an environmental preservation inspiration.

ABN AMRO

ABN AMRO consolidated its presence in Brazil with the acquisition in 1998 of Banco Real, a bank of Brazilian origin operating in the country for more than 80 years. Although ABN AMRO had already been in Brazil for some years by then, its activities in the Brazilian market underwent substantial modifications after the acquisition. Initially, the bank started to operate in several segments and through a network of companies – including ABN AMRO Bank, Banco Real, Bandepe, and Real Seguros –, an administrative system that was in turn restructured in January 2001. Since this date onwards, ABN AMRO's management started to operate on a globally defined basis, including three main business lines of services: wholesale clients, consumer and commercial clients, and private clients and asset management (ABN AMRO 2000a, 2001). Despite this global homogenisation, however, and following local market influences, ABN AMRO has in fact become a 'hybrid' in Brazil. It explores the image, visual marketing appeals, as well as the name of the former Banco Real when it comes to private, retail clients – e.g. through the bank's retail shops and related marketing campaigns – while appealing to the international experience of the Dutch institution regarding wholesale clients and large-scale investments[134].

Before the acquisition, ABN AMRO held a representative office in São Paulo, which was located in the Verbo Divino region, in which around 200 employees worked. As the acquisition involved all of Banco Real's assets, ABN AMRO became consecutively owner, in terms of property, of not only around 3,900 retail shops in the country but also of the former Banco Real headquarters on Paulista Avenue (see Figure 7.5), a building where around 4,000 staff members nowadays work. This building, in this respect, had been commissioned by Banco Real in the 1980s, constructed by JHS Construção e Planejamento Ltda., and designed by architect Ivan Castaldi. Following Banco Real's visual marketing approaches, the building's architecture makes use of a series of slim arches clad by curtain wall, employing sober materials and colours as beige and brown (such design features are in fact Banco Real's visual symbol, trying to convey an image of seriousness and tradition). Energy or water efficiency do not exceed the standards put forward by the local building code at that occasion.

After the acquisition, ABN AMRO's new Brazilian headquarters in São Paulo went through a refurbishment process. Following prescriptions of Dutch managers from the world headquarters in Amsterdam, this refurbishment took place

[134] A. Campiglia (associate director, ABN AMRO Brazil), interview.

Figure 7.5
ABN AMRO headquarters, São Paulo.

mostly at decoration level, including the replacement of furniture, carpeting, and internal cladding, for other materials that would yield an image closer to the one the bank pursues in the Netherlands. It also improved the air conditioning equipment, as well as the building's security and fire protection systems. As can be noted, nothing was considered in terms of improving the building's energy or water efficiency, environmental performance, or anything alike, and no specifications in this regard were neither requested by Dutch managers from the Netherlands nor raised by those based in Brazil[135]. Respectively, nothing was demanded from the local policy or economic networks (e.g. energy or water utilities, planning department) to improve the building's efficiency.

In fact, environmental management carried out in São Paulo's premises – including the headquarters – do not go much beyond a somehow commonplace environmental management routine, which mostly covers basic environmental topics, such as waste recycling and basic indoor air quality issues. This is probably due to the fact that there are no interests emerging from world headquarters to pursue such ambitions abroad[136], but also partly due to the fact that local managers are apparently also not much concerned with such question in Brazil. The building is administrated by the facility management firm Cushman Wakefield Samco, which, besides carrying out environmental management issues, is also the intermediary between the bank and energy and water utilities for the payment of bills.

During the energy rationing programme of 2001, ABN AMRO also did not go beyond conventional measurements to improve the energy performance of its premises in São Paulo, and only initiated a campaign through which unnecessary lamps were switched off, elevators were more efficiently used (two of them were kept in disuse), and air conditioning systems were kept at 25°C during the summer months despite external conditions. (Unlike the other two companies above described, ING and Andersen, ABN AMRO did not use a generator powered by fossil fuels to beat the required energy saving standard). The head office also had the lighting system switched off during the night (it used to be continuously lit), which by itself allowed the bank to achieve the mandatory reduction of 20 percent as

[135] A. Campiglia, interview.
[136] Note the inconsistency with ABN AMRO's global office building in Amsterdam; Drs. A.J. de Miranda (health and safety department, ABN AMRO Holding N.V.), interview.

stipulated by law. Here no specifications or orders were given by the Dutch headquarters. The campaign discontinued after the end of the rationing.

Nevertheless, and according to local director A. Campiglia, decisions concerning ABN AMRO's Brazilian branch, including environment-related ones, are, in principle, exclusively made by Dutch managers from the Amsterdam's head office. Exceptions are made to minor refurbishments or small-scale projects. Budgetary issues are also to be approved by the Dutch head office. However, if Brazilian branches should wish to improve their environmental performance, the initiatives are to be raised by *local managers*, and the budget to be approved by the Dutch ones. One of the criteria for such approval is that, in terms of energy management, investments should amortise within two years. Contradicting the bank's policy in the Netherlands which states that energy-related internal projects can amortise within 5 years (cf. chapter 6), ABN AMRO clearly serves as an example of the environmental discrepancies that a multinational company may have[137].

IBM

IBM established a representative office in Brazil in the early 1900s, operating first under the name Computing Tabulating Recording Company and subsequently under IBM since the 1920s onwards. By the 1930s IBM inaugurated one factory in the state of Rio de Janeiro – Benfica, in fact the first production unit IBM ever opened in South America – followed by another one in the state of São Paulo in the ensuing decades, namely Sumaré.

Nowadays, IBM is constituted of two main groups in Brazil – Personal System Group and IBM Global Services – through which it offers practically the full line of products of the multinational company. It develops, in addition, products for the banking sector in the country, such as those related to information and communication technologies.

In terms of property, and besides the two above-mentioned production units (Benfica and Sumaré), IBM also owns several retail shops in the country's main cities and three main buildings, in Rio de Janeiro, Hortolândia, and São Paulo, the latter being the company's headquarters in Brazil (see Figure 7.6). This building, located on the 23 de Maio Avenue, was designed in the 1970s by the architectural firm Croce, Aflalo e Gasperini. It is considered to be one of São Paulo's main architectural landmarks, totalling 26,400 square metres and accommodating around 2,000 employees, about 42 percent of IBM total staff in the country (IBM, 2000).

At its early stage, decisions regarding the construction of IBM's headquarters in Brazil were partly made by the construction company of the occasion, and partly by the American IBM staff A. Smith, the project director, who accompanied the whole construction process of IBM's Brazilian headquarters[138]. In this regard,

[137] Drs. A.J. de Miranda, interview.

[138] Arch. G. C. Gasperini (chief architect, Aflalo e Gasperini Arquitetos S/C Ltda.), interview. In fact, the initial construction company went bankrupt in the course of the construction process so that the building was completed by another construction firm.

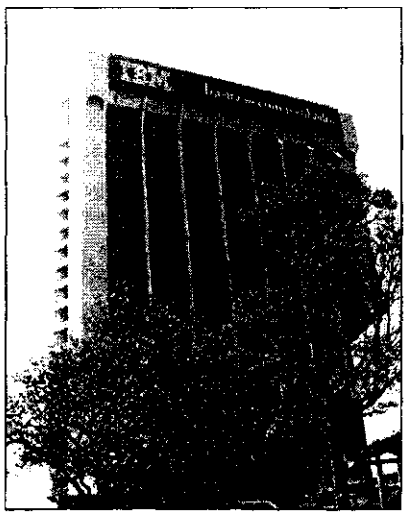

Figure 7.6
IBM headquarters, São Paulo.

while the construction company decided about location issues, the American IBM staff indicated prerequisites for the building's design, among which a large base to be used for specific services and equipment placing on the ground level.

According to architect G.C. Gasperini, what was particularly discussed during the design phase between the IBM staff and local contractors (urban planning and environmental agencies, as well as utilities did not participate in such decisions) regarded mostly the placing of circulation elements, such as elevators and staircases, as well as issues concerning the air conditioning system, which was later on opted for a single system located on the ground floor with peripheral shafts and ducts instead of several systems serving the floors. Options regarding the building envelope were also extensively discussed and the selection was eventually made for the predominant use of fixed windows (glasses with a refraction coefficient of 30-33 percent). No suspended floors were applied on the occasion, as this technique was not yet available. For the cladding, simple concrete was extensively used, whose quality would later on prove to be rather low; a fact that is claimed to have resulted from the shift of construction companies in the building course. In this regard, several other finishing problems were also detected over the years. The envelope, for instance, presented serious problems of infiltration, especially on the ground floor base. As a consequence, the building underwent two important refurbishments and is until now constantly being upgraded.

Issues of energy and water efficiency, as understood for today, were not considered during the design and construction phases, although options favoured the selection of best performance equipment available on the occasion. Feasibility studies were also carried out for the installation of an underground natural ventilation system, which was in the end not implemented[139]. Eventually, a full acclimatisation system was opted from, requiring the building envelope to be hermetically sealed with the exception of a few openable windows placed strategically for the external cladding's maintenance. As a result, the building is intensive not only in terms of air conditioning use but also in terms of artificial lighting, given that floor plans are rather deep[140]. All decisions were reached between the IBM staff and local contractors; contacts with local planning agencies were only held for the ap-

[139] Arch. G.C. Gasperini, interview.
[140] Arch. G.C. Gasperini, interview.

proval procedures. In this regard, no specific environmental issues were required by planning or environmental agencies, also not stemming from the energy and water utilities on the occasion.

IBM headquarters consumes monthly 8,000 cubic metres of water from underground resources – enough to supply 500 houses – and 850 MW of electricity, correspondent to the supply of a 17,000-inhabitant town (Infra, 2001). Concepts of energy and water efficiency are apparently emerging in the building, however, although still largely linked to the catching up with the obsolete technology of the 1970s building. In 1996, IBM initiated studies which led to the implementation of energy and water saving programmes including the updating of technologies – e.g. lighting, IT equipment, sanitary devices, and air conditioning – towards their rationalisation, as well as occupancy densification. In this respect, for instance, retrofitted fluorescent lamps were applied to enhance the lighting potential per light unit, using the same energy load. In terms of water use, taps with controlled flow have been applied as well as digital sensors to certain sanitary devices[141]. All of this has been initiated and coordinated by the local facility manager – Ir. M. Mantovani – as well as monitored by IBM's department for Real Estate & Site Operations located in the USA, although paid for with local budgets.

During the 2001 energy rationing, IBM complied with the 20 percent consumption reduction by switching off certain lamps as well as the external lighting (luminoso), and by decreasing the functioning hours of building, of its cafeteria, as well as of its air conditioning system (the latter normally operated 24 hours daily). Unlike ING or Andersen, however, and like ABN AMRO, IBM did not switch on the building's energy generation equipment[142]. After the rationing programme, some of these strategies continued to be applied, e.g. the reduction in the opening hours of the cafeteria, the reduction of the opening hours of the building and the external lighting are only be turned on from 19:30 until 21:00 (whereas prior to the energy rationing it used to be on throughout the night).

An interesting point remarked by the building's facility management department was that since the beginning of the energy-rationing programme, the concern for water efficiency was also reinforced. Water consumption started to be monitored daily since the beginning of the energy rationing programme, leading to the detection and repair of several abnormalities, e.g. leaks throughout the water supply system. This led in turn to a decrease in water consumption of about 25 percent[143]. Water consumption in the building is ever since being monitored on a daily basis.

In terms of decision-making processes, worldwide standardisation of technological features, and so forth, IBM has a global environmental policy that applies for all its worldwide premises. According to local facility managers, nothing is really standardised in terms of energy and water technology or efficiency per se, although the company stipulates technologies to be opted from the most restrictive

[141] Ir. M. Rosemberg (facility management department, IBM Brazil), interview.
[142] Ir. M. Rosemberg, interview.
[143] Ir. M. Rosemberg, interview.

policy, either the company's internal one drafted in the global environmental policy guidelines, or the local ones, i.e., the local legislative framework [144]. The company also determines in the global environmental policy that all IBM's properties need to reduce their consumption of energy and water in the order of four and one percent per annum respectively. Although little attention is assigned as for *how* local facility managers will achieve such targets, they are checked monthly by IBM's department of Real Estate & Site Operations, located in the USA, which allocates no special budgets for thus purpose, though. In this regard, the driving force for saving energy and water is claimed to be economic, that is, to save on money to be spent in energy and water bills, rather than ecologic, i.e., to protect the environment[145].

Besides these programmes, IBM's facility management department has a subdivision dealing with the environment. This subdivision takes care of the monitoring of indoor air quality, by checking the air conditioning system every 6 months (which is in fact mandatory according to the Brazilian legislation), as well as the water quality, by controlling the water quality of the underground aquifer. It also implies waste control and recycling as well as the control of light chemical products, e.g. those referring to the cleaning of the building. The facility management department is therefore the intermediary between the global company and local planning and environmental agencies, and utilities. Direct contacts, however, are only held with utilities mainly, as the department is also responsible for the payment of energy and water bills, although no specific energy or water saving innovations are introduced in view of this interaction.

Finally, although IBM's headquarters in São Paulo has nowadays a fairly high degree of autonomy to maintain the building, limited to this framework however, budgetary issues are strictly controlled by the global headquarters in the USA[146]. Local environmental innovations taking place in São Paulo, limited as they may be, can be considered to be located somewhere between local ambitions and concerns set forth at a transnational level.

Conclusions

The aim of this chapter was to assess how the environmental restructuring of São Paulo's office stock is taking place at the interface between management practices advanced by local agencies and utilities and global companies. First we outlined the main characteristics of the place and then described the spaces of environmental management, the local and the global.

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[144] Ir. M. Rosemberg, interview. Due to the restrictive character of IBM's global environmental policy, some regional differentiations are commonly detected. In fact, only carpeting and furnishing are done by the same companies worldwide (Miliken and Global Mobilinea, respectively).
[145] Ir. M. Rosemberg, interview.
[146] Ir. M. Rosemberg, interview.

As the case studies demonstrate, ING, ABN AMRO, Andersen, and IBM seem to carry limited environmental innovations in their offices. No particular dematerialisation or substitution of unsustainable technologies neither advanced monitoring systems (exception to some extent made to IBM) could be detected. This may primarily be explained as, in their majority, these companies do not have direct involvement with decisions made during the design phase (reducing possibilities for the dematerialisation or substitution of technologies). Secondly, there are no specifications set at global headquarter level – exception made to IBM – concerning the environmental performance of the offices in São Paulo in their operational phase, so that possible refurbishing mostly regard decoration features, not dematerialisation or substitution of technologies, neither the introduction of advanced monitoring systems. Thirdly, the companies investigated in this research seem to have little contact with local organisations that may potentially influence on their environmental performance – such as the environmental department and the utilities. In this sense, most environmental management systems pursued by the companies of this research are initiated locally, voluntarily, and are self-financed, and have therefore a rather limited content. Their main discourse is thereby based on 'common sense', exception made to IBM which fulfils a global environmental management regime extending to the energy and water performance of its premises, in its turn following an economic – rather than ecologic – motivation.

Conversely, environmental management practices promoted by local organisations such as urban planning and environmental departments, energy and water utilities, seem to be slowly emerging in São Paulo. The water company introduced a programme aiming to demonstrate how water use in diverse kinds of facilities may be used more rationally, while the energy company, after being privatised, has a R&D budget to be allocated in energy efficiency projects, which may be applicable to office buildings. In this sense, although no monetarisation of resource use could be detected so far, these programmes seem to suggest only an 'intention' of dematerialisation or substitution of technologies, probably initiated for better managing (limited) resources in view of a growing number of consumers. However, at the moment there seems to be a mismatch between such intentions and the environmental dimension of the offices of multinationals, as the former are rather incipient, not to say insignificant, to influence the latter. The environmental department, for instance, still carries out environmental management according to the Local Agenda 21 paradigm, that is, in principle encouraging better management of green areas, solid waste, pollution, and so forth, but in reality achieving rather little. Its main instrument to influence the environmental aspect of office buildings is the requirement of environmental impact assessments for buildings to be constructed in environmentally sensitive areas; other command and control instruments as the local building code and master plans do not go beyond 'reasonable' standards concerning energy and water efficiency. Apparently there are no covenants regarding environmental topics being applied in the city. In most cases the department for the environment *does not* interfere in the daily building practices in São Paulo.

On the other hand, however, local agencies are also not hindering the implementation of environmental innovations: Bank Boston, for instance, has recently completed the construction of its headquarters in the city following the American green building LEED principles, which puts forward a series of environmentally sound recommendations (cf. chapter 3). Decisions have been made at the bank's global headquarters level; locally, the bank is now promoting itself through the media as an institution caring for the well being of the city. Apparently approvals for the construction, also regarding the electrical and hydraulic projects, were easily obtained, despite their innovative environmental dimensions. Another example is the Rochaverá office building – initiated and being constructed by the developers Tishman Speyer Properties, working jointly with the local construction company Método. This building is bringing in the technology utilised by the developers in the Sony Centre and the Messe Turm, located in Berlin and Frankfurt respectively. Although designed by local architects[147], the Rochaverá is applying in São Paulo the German legislative framework for key environmental issues – i.e., relating to natural ventilation, lighting, high performance technologies, and so forth – without facing impediments from local planning and environmental agencies or utilities. When completed in 2004, it will add 60,000 square metres of green office space to the city[148].

To conclude, these two examples seem to provide evidence that certain sideway entry points for instigating the ecological reform of São Paulo's office stock *do exist*. In the coming years, these two buildings will most probably serve as a benchmark of environmental management – in terms of technology as well as legislation – for other buildings and local planning agencies to follow and adopt. If this proves to be indeed the case, environmental innovations will have been introduced in São Paulo's office stock mostly through foreign companies and investors, that is: by global economic networks. These networks would in turn have also 'taught' local planning agencies how to deal with environmental externalities of large buildings, proving that globalisation and urban environmental reforms may be two interrelated movements.

[147] This building has been designed by Aflalo e Gasperini, the same designers of IBM in the 1970s.
[148] Arch. A. Oliveira and Arch. M. Miranda, interview.

8
Beijing

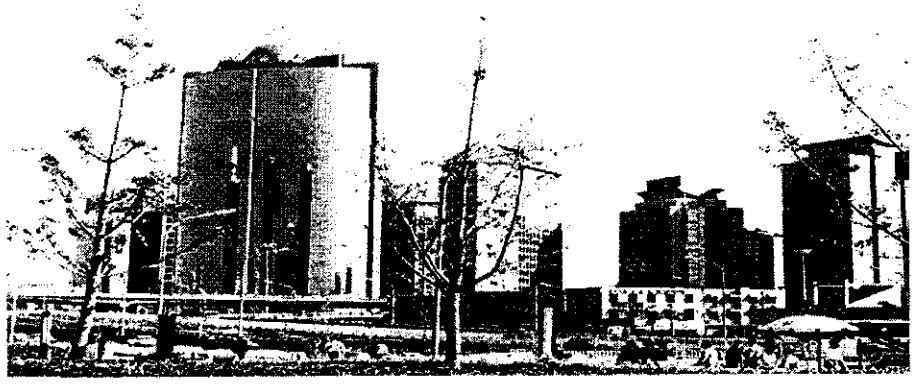

Figure 8.1
Chaoyang district.

IN 1986, DENG XIAOPING instituted the China's Land Administration Act commodifying – and internationalising – the right of land use in urban China. As a result, profit-oriented property development companies have been created in Beijing with a mandate to develop commercial estates, rapidly converting the closed communist capital into a metropolis of the globalised economy. If, on the one hand, this process has contributed to enhance the property market, on the other it has also rendered Beijing susceptible to market speculations, resulting not only in physical growth but also in pressures on the urban environment. While ranked among the most liveable cities of the world in the pre-communist era, nowadays Beijing is among the top 10 most polluted, suffering from decreasing green areas, heat island effect, vehicular atmospheric pollution, water scarcity, and, not least, energy inefficiency.

The aim of this chapter is to analyse the environmental management of Beijing's office stock, by looking at programmes and strategies advanced by local utilities and environmental policy agencies, as well as by global companies. While the modernisation rush after the launching of economic opening policies has greatly added to the rise of environmental challenges, it has, as shall be demonstrated, also contributed to the modernisation of building industry and the introduction of environmental management practices. To some extent, Beijing can be considered to enjoy a privileged stance due to its strong governance, for which environmental protection is among the highest priorities.

Characteristics of the place

Beijing's historical antecedents date back to around 3000 years ago, but most of its political importance was established in the 13th century, when the Mongol dynasty established its political base there. Since then, Beijing has developed according to Chinese ancient urban planning standards along a north-south axis, consisting of an external city (with aristocratic settlements), an imperial city (enclosing the most important state bureaus as well as noble settlements), and the imperial palace. It remained the northern capital of the Chinese empire since the 15th century onwards.

Since 1949, Beijing attempted to gain a new image, whereby urban planning and architectural styles were directly influenced by early Soviet models. Large efforts were made to give traces of imperial power or symbolism of places and monuments a new function – to serve the communist regime (Jianfei Zhu, 1999). The overall focus was on fostering intensive industrialisation – rather than urbanisation – replacing consumption by production, resulting nevertheless in environmental pollution.

The open-door policies and reform initiated by Deng Xiaoping since the late 1970s and early 1980s – with the introduction of market mechanisms and the opening of the country to foreign investment – brought about a new phase to the city's urban setting, reorganising its economic system. These policies included alterations in the urban land use, finance, and investment structure, which started to include more flexible policies of loaning, capital pooling, attracting foreign investments among others into the urban property sector. The property industry grew thereby rapidly, soon becoming the city's leading economic sector (Dianchun Jiang *et al.*, 1998). The result was an ever-accelerating proliferation of local urban developments and realty investments. A modernisation rush without precedents in history.

As a result, international business enterprises and foreign residents started to bloom in the city, also drawn by Beijing's position as China's capital enjoying a better urban status as compared to other Chinese cities[149]. Beijing has thereby emerged as a global city which, though in political competition with Shanghai, is no longer only characterised as China's political and cultural centre (carrying out the administrative work for nearly 1.2 billion people, but also as the country's expanding international financial, educational, and services capital (Gu and Kesteloot, 2001; Hu Zhaoliang, 1991).

Responding to the subsequent increase in the demand for office space, starting particularly in the late 1980s and early 1990s, Beijing has been taken up by massive urban renewal and old inner city redevelopment projects, where real estate investments in the city averagely amount to about half of total investments made in

[149] Generally speaking, capital cities are usually the most prominent, or at least the second most prominent cities in socialist countries, easily obtaining labour, financial and material support, as well as better infrastructure services. In a comparison, for instance, Beijing is twice as large as Shanghai and half as much as Tianjin, in terms of built-up area. But both the number of telephone connections and the area of paved streets per capita in Beijing are about twice of those found in the other two cities (Hu Zhaoliang, 1991).

the city nowadays (Dianchun Jiang *et al*, 1998). Another expansion in the property market has been recently triggered after the city received the International Olympic Committee vote in September 2001 to host the 2008 Olympic Games. Hundreds of large construction sites have been opened to bring the 3000 year-old city to a new level of development, implying too often the demolition of traditional settlements and the relocation of their inhabitants[150]. A remarkable USD 22 billion budget is planned to be spent in further urban development and reconstruction projects in the coming years – including 127 large urban infrastructure works, among which the extension of the road, subway, and railway flows (Meyer, 2002). Despite the obvious environmental pressures, however, which we will get back to further on in this chapter, the municipality of Beijing has also stated its intention to convert the city into an ecological one, promoting itself internationally under the logo 'Beijing 2008: Green Olympics'. From the above budget, USD 12 billion alone are to be spent in projects to clean up the city (Rosario, 2001). But with so many construction sites, it seems that it will take long before Beijing can indeed enjoy a better environment.

Beijing's office stock

Historically, Beijing lacked a central business district. Most of the administrative, financial, and business buildings were scattered in areas outside the 2nd Ring Road, which delimits the old city (Gu and Kesteloot, 2001). Since the economic opening, the pressure for having a more concentrated office, commercial, and service zones so as to develop the city into a strong international metropolis led to the modernisation of the historical inner city area and the establishment of business districts[151].

A large part of Beijing's office stock is therefore rather newly constituted, starting to expand mostly since China's economic opening. This expansion was brought about through a series of municipal development plans, proposing the rehabilitation of the three pre-1949 main central business districts (Wang-fujing, Qianmen, and Xidan) into new commercial centres, as well as instituting five primary and 30 secondary additional commercial and retail centres including office towers, hotels, and other commercial services, scattered regularly throughout the city. In addition, three interrelated development zones were created in the city with distinct functions: the Haidian Special Zone (designated for research and develop-

[150] Estimates suggest that about half Beijing's population (or 6.5 million people) will be relocated in the years prior to the Olympic Games (Meyer, 2002). According to the fifth census, Beijing's population comprises of 8 million registered permanent residents and 5 million floating population.

[151] Despite criticisms, municipal authorities claim that, unlike Shanghai, such concentration of service activities could not take place in a development zone as 'Pudong', as Beijing lacks an appropriate site within municipal boundaries for it (Fan Yaobang, 1994). In addition, residential neighbourhoods from the Ming and Qing dynasties (*hutongs*) occupying the old inner city area were usually left in a derelict state, requiring costly and fundamental rehabilitation. Their demolition was (and still is) thus many times considered the most cost effective solution for the creation of commercial and business areas (Gu and Kesteloot, 2001).

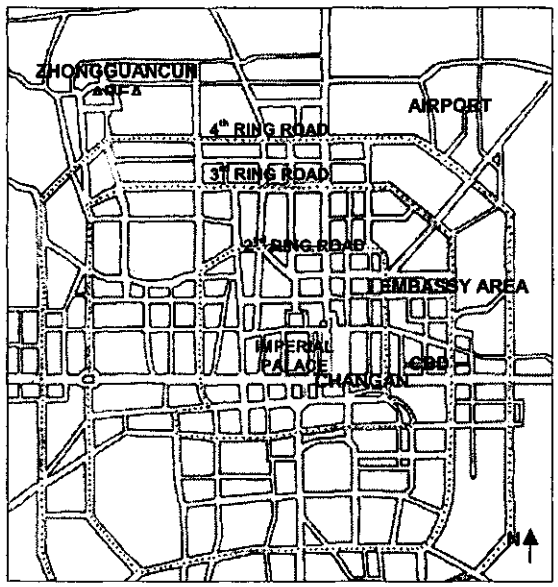

Figure 8.2
Distribution Beijing's office stock.

ment in high-technology fields), the Shangdi Information Industry Base (IT companies), and the Fengtai Industrial Park.

According to Jones Lang LaSalle (2002a), Beijing's office property (grade A, i.e., top segment) is currently blooming in five main locations. The Beijing Central Business District (CBD), the most developed area of Beijing, is a 4 square kilometres section of Chaoyang district with its core at the intersection of Jianguomenwai Avenue and the 3rd Ring Road. The East Changan Area, situated in central Beijing's Dongcheng with the CBD and Finance Street Area in close proximity, is serviced by several 5-star hotels and grade A office buildings. The Third Embassy Area is home not only to several foreign embassies but also to numerous grade A office buildings, privileged too by green areas and comfortable surroundings. The Airport Area, traditionally benefiting from its proximity to the airport expressway, is generally popular among European companies. Finally, the Zhongguancun area, located in Beijing's north-western Haidian district, has recently been the focus of local high-tech companies, incorporating the Zhongguancun Science and Software Parks and a potentially rich supply of labour from the many nearby universities and research institutes, although the concentration of grade A office buildings still lags behind Beijing's other submarkets (see Figure 8.2).

In total, Beijing's grade A office space currently amounts to 3 million square metres, predominantly located in the eastern parts of the city, although standards in Zhongguancun are improving in view of recent and forthcoming completions (Ibid.). Since 2001, office property in Beijing has started to present an increase in vacancy levels with the completion of new supply, where the total grade A office stock is currently estimated to be vacant at 16.3 percent (2002 figures, Ibid.). Rentals, in this context, are continuously declining, particularly in the Third Embassy Area, attributable to emerging competitive rents on offer in newer buildings and the softening of some landlords previously attempting to maintain rental levels high (Ibid.). However, China's entry to the WTO has brought about an economic improvement for the sector since the beginning of 2002, as large financial and insurance corporations stepped up their search for quality office space in the city (CB

Richard Ellis, 2002c). The office property market is expected to grow in the coming years.

Occupancy and support structure

As mentioned above, Beijing has traditionally been a place concentrating activities imbued with political and administrative functions, e.g. national and international exchange, political and macro-economic management, transport node, and information distribution. Since the economic reform, and while still maintaining its national political supremacy, Beijing's economic functions have been growing in importance, leading to a rapid development of banking, trading, and all types of corporative activities in the city.

Therefore, Beijing not only concentrates headquarters of the main national institutions of finance, insurance, trade, and information, but also an increasing number of representative offices of international organisations related to economic administration and information technology, including banking, insurance, credit, postal, telecommunications, consultation, and international trade companies (Ke Huanzhang, 1997; Hu Zhaoliang, 1991). As a cultural centre, Beijing is home to over 60 colleges and universities as well as several science and research institutes. In addition, Beijing also has China's main libraries, stadiums, opera houses, hospitals, and so forth, which have required financial and human resources.

These advantages the city offers, in their turn, further contribute to the growth and consolidation of Beijing as an international business capital. Most of the buildings (and offices) are owned by investors usually in partnership with the Chinese government. Multinational corporations are usually tenants of office space.

Buildings' typology

As China experiences an urban modernisation leap of the greatest magnitude in today's world, its architectural products have become subject to increasing attention. These products, however, are still under-researched, lacking a clear theoretical definition or conceptual framework. On the surface, they appear to be hybrids between foreign technological approaches and national pride, evoking traditional architectural solutions in the conception of modern-looking ensembles. Upon closer examination, however, they seem to be an historical repetition of the period which followed the fall of imperial China (after 1912), appearing thereby to be something like a new learning or cultural process taking place after the country's economic opening and reform.

Post-imperial Chinese architecture was in this respect greatly influenced by the western Beaux-Arts design approach, introduced by American scholars through teaching programmes and design practices in the 1920s and 1930s, producing combinations of traditional elements – especially the Chinese roof profile and some decorative motifs – with modern building types and construction methods (Jianfei Zhu, 1999). Although this movement has somehow persisted throughout the 20th

century, despite the new forms and technologies, it gained an overall socialist realism trait under Mao Zedong's regime until the economic reform of 1978. During this period, architecture in China was largely proletarianised, following much more technocratic aims than cultural ones (Kőgel and Meyer, 2000). A return to the post-imperial China's architectural practices is currently taking place with the 'commercialisation of cultural icons and symbols', coinciding in historical terms with the consolidation of postmodern architecture in the West (Jianfei Zhu, 1999). This period is referred to as the third wave of national style. But the difference as compared to post-imperial China is that it is mostly manifested through high-rise office buildings, whose ensemble is criticised for looking rather like a 'visual cacophony', in which every building strives to be higher, more eye-catching than the other. In Beijing, it is clearly noticeable through the application of roof profiles on high-rises and superblocks, where buildings many times present a composition looser and more open than that of previous decades. Office buildings are normally hermetically sealed from the outside environment through isolated (usually glass box) façades and fully automated, seeking above all space utilisation efficiency or profitability. A case in point here is the administrative headquarters of the Ministry of Electricity, designed to have a free space on one street corner to offer citizens a public space which, on the course of the construction, was built upon following a cost-benefit logic (Wei Gaochuan, 2000).

The third wave of national style is thereby permeated within a dynamic economy, the growing presence of foreign design firms, and the rush of national architects to cope with the never-ending quantities of project commissions. In this respect, estimates indicate that, as compared to the USA, China has ten times fewer architects. Yet each Chinese architect designs five times the volume of work in a fifth of the time, and in exchange for a tenth of professional honoraries (Verdú, 1999; Lin, 2001). As compared again to Europe or the USA, the Chinese architectural scene is organised extremely different, characterised by state planning companies with several hundred employees in a multi-specialist team. Although foreign architects have started to step into professional opportunities in China, they are still relatively few in number. They are not only brought into the country by foreign investors seeking reliable professionals, but in most instances, they are literally *imported* by Chinese companies (including government-owned ones) to supply them with the latest architectural trends, state-of-the-art construction techniques[152], project management systems, and, not less important, a celebrated signature (Ruano, 1999a).

[152] In terms of construction techniques, while emphasis was laid on the construction of industrial buildings in the 1950s, during the 1960s and mid-1970s, a period during which the country did not have much international relations, the building industry mostly developed in engineering works underground and in mountainous areas. It was only since the late 1970s onwards that Chinese construction techniques met international standards, undergoing ever since rapid advances (Xu Ronglie, 1989).

Local infrastructure and environmental profile

While in the 1930s Beijing was often mentioned in Western literature as one of the world's most liveable cities, it has been currently ranked, together with Shanghai, among the top ten most polluted cities in the world by the United Nations[153] (Chang, 1998; Ruano, 1999a). This is of course partly resulting from the high concentration of heavy industries within municipal boundaries[154] and the rise in living standards, but also largely from the commodification of Beijing's property sector and the resulting environmental pressures, where five main environmental themes now dominate.

First of all, Beijing has since the mid-1980s turned into a large construction site, where green areas significantly fall short and where the dust storm (natural) phenomenon is increasingly manifesting. In an effort to curb the problem, a protective forest system was established in the north of China to prevent the storms coming from the Gobi desert (Li Min, 1997). But the problem persists, however, and Beijing's residents currently have only 2.3 square meters per capita of green area, a number far below the average figure laid out by the United Nations (60 square meters per capita), for which the galloping activities of the property sector have a key role to play (Jones Lang LaSalle, 2002b).

Secondly, the heat island effect following high densification of land use is a noticeable climatic phenomenon in Beijing. With a total area of 16,800 square kilometres with mountains in the west and in the north, and a total population over 10 million people, the average air temperature in the inner city in summer months is about three to four degrees higher than that of the suburbs. Considering the city proper alone, which has an area of 1040 square kilometres, the temperature differential is about four to five degrees (Li Min, 1997).

The heat island effect is further exacerbated by a third environmental problem – vehicular and industrial emissions – as anthropogenic heat released from combustion of fuels contributes to the formation of an 'urban heat dome'. The use of automobiles within the municipality, in this regard, has significantly risen during the past decade as the city grows, contributing to a drastic increase in atmospheric pollution in Beijing. But it was only in 1998 that the state prohibited leaded petrol and made purifiers mandatory (Rosario, 2001). According to the Beijing Municipal Environmental Protection Bureau, China's vehicle emissions limit is 2 to 3 times higher than that of developed countries; as a consequence, 74 percent of hydrocarbons and 63 percent of CO_2 in Beijing come from such sources. Besides industrial

[153] In fact, China already has five of the ten most polluted cities in the world (Ruano, 1999a).

[154] Mostly related to material processing, e.g. iron and steel, heavy chemicals, construction materials, glass-making, pulp and paper, not only environmentally intensive but also requiring a tremendous energy load; in 1980, for instance, about 90 percent of the city's total energy supply was consumed by the industrial sector. After the economic opening, and despite the calling for readjustment of the urban industrial sector of the whole country, Beijing's industrial structure remained largely unaltered (Chang, 1998). Nowadays, Beijing is, after Shanghai, the second largest industrial centre in China.

and vehicular emissions, air quality in Beijing is further worsened by chemical industries located in suburbs in addition to residential coal burning and road dust, the latter coming from the 4000-5000 construction sites spread throughout the city and, in a minor scale, from the Gobi desert (Fu-chen Lo and Yu-qing Xing, 1999).

A fourth environmental theme, perhaps the most critical problem aggravated by Beijing's urban growth and the rampant activities of the construction industry, is the water shortage and the subsequent increase in soil erosion the city has been undergoing. Located near the northern tip of the North China Plain, in a region characterised by a semi-arid temperate monsoon climate, Beijing has only about 600 millimetres of annual precipitation. Owing to its topography and monsoon, the distribution of rainfall in Beijing is inconsistent, in addition. In a year of average rainfall, Beijing is endowed with water resources ranging from 4.2 to 4.5 billion cubic metres; in a dry year the amount can reduce to 3.3 billion cubic metres (Chang, 1998). The rainfall period from June to September is about 85 percent of the yearly total and dry years are prone to occur frequently[155] (Luo Tingdong, 1993). Following the speeding pace of economic reform and opening, and due to the rapid development of all undertakings in the city (including population growth and the improvement of living standards), the demand for water in Beijing has increased tremendously in the past decades. According to 1993 figures balancing the supply and demand of water in the city, there is nowadays an estimated shortage of about 200 million cubic metres annually – for a year with normal precipitations, and 1.17 billion cubic metres for a below normal year – and estimates still predict a shortage of 900 million cubic metres by 2010 – for a year with normal precipitations, and 1.98 billion cubic metres for a below normal year – pointing out a sharp conflict between supply and demand (Luo Tingdong, 1993).

Sewerage treatment is another problem in Beijing, also significantly worsening as the city further grows. By 1992, Beijing only had about 9 percent of the total volume of sewage processed (Wu Liangyong, 1992b), counting with 2,880 kilometres of sewers (85 times greater than in 1949, though), 7 sewerage systems and 3 domestic sewage treatment plants, with a daily treatment capacity of 250,000 tons (World Bank, 1994b). These figures have not improved due to the limited investments in the field, resulting, among others in the contamination of the soil and of underground water resources.

Finally, and concerning energy use, although considerable progress has been made in the supply of electricity, central heating, gas, coal, and so on, since the introduction of economic opening policies, the rapid urban development and en-

[155] In terms of surface water resources, Beijing mainly counts with rainwater sources and the Yongding River, the Chaobai River, and the Juhe River. Today, there are 85 reservoirs in Beijing – the largest of which the Guantin Reservoir and the Miyun Reservoir – storing a total of 7.4 billion tons of water on which the city is dependant for its residential, commercial, and industrial urban water supply (Li Min, 1997). It is known that surface water can provide 1.74 billion cubic metres in a normal year, 1.32 billion cubic metres in a semi-dry year, and 1.03 billion cubic metres in a dry year. The average groundwater reserve of the city is of 2.45 billion cubic metres, increasing the amount of water that can be in total supplied to Beijing to 4.19 billion cubic metres, 3.77 billion cubic metres, and 3.48 billion cubic metres, respectively (Luo Tingdong, 1993).

hancement of living standards have made problems of energy shortage increasingly obvious (Wu Xumin, 1993). Coal still remains the main source of fuel, representing 70 percent of all fuels used in the city (World Bank, 1994b). The constant increase in coal consumption, in this respect, has brought about continuous deterioration of the environmental quality, especially during the heating season, when the total suspended particles – e.g. sulphur dioxide, nitrogen oxide – in the air exceed the standards allowed by the state, severely worsening Beijing's air pollution problem. Parallel to this, buildings in Beijing, including grade A office buildings, are estimated to consume far more energy for heating as compared to buildings in similar climatic zones in Europe or the USA, and still to be far less comfortable to be in. Designs, materials, and construction techniques are deemed to be in general highly inefficient, while energy efficiency standards are still lacking, lagging behind, or poorly enforced.

General regulatory framework

In terms of overall legislation (therefore not taking into account environmental issues) the Chinese land and property market – thus the country's urban planning framework and the composition of the urban office stock – have been undergoing a transformation process since the economic reform of the late 1970s. This market took over particularly since 1986 with the institutionalisation of China's Land Administration Act first in development zones and subsequently in Chinese cities (Zou Deci, 1995). While prior to this urban land was assigned gratuitously, Deng's policies conceived a system of urban land administration through which the state levies a tax on the right of land use. The state continues to be the sole urban landowner, but the right of land use, usually set for a period of around 50 years for office buildings and 70 years for housing, becomes an asset separable from its ownership[156]. Under this condition, the right might be transferred, sold, leased, mortgaged, or eventually terminated by the government (see, among others, Zou Deci, 1993, 1995; Ke Huangzhang, 1993; Hu Zhaoliang and Foggin, 1995; Hamer, 1993; Zhao Shixiu, 1994; Gu and Kesteloot, 2001).

Urban planning, in this respect, also developed a new agenda after the economic reform. It had been first introduced in China in the 1950s, under Mao Zedong, following contents and models of the former Soviet Union, then laid fallow during the Cultural Revolution period. Since the 1980s, some experiences from developed countries have been introduced, leading in 1989 to the approval of the Chinese Urban Planning Act, a fairly internationally grounded urban planning system however suitable for the Chinese characteristics, consisting of 6 chapters and 46 articles[157] (Zou Deci, 1995). The first key point of the act is that urban planning

[156] Dr. Zhang Mingshun (IHS-Beijing), Song Mingjie (Division Chief, Environmental Protection Bureau Qingdao City), Zen Yingru (Deputy Director, Environmental Protection Bureau Zhuhai City), and Feng Yurong (Director, Environmental Protection Bureau Zhongshan City), interview.

[157] The overall urban planning legislation in China is set forth by the Urban Planning Act, which is the most important legislation base for Chinese urban planning and building activities. It includes

in China may be divided into master plan (city, neighbourhood level) and detailed plan (building level), both of which may be further divided into several sublevels. Urban plans and construction activities should obey principles specified by the Urban Planning Act, meeting therefore the standards and technical norms set forth by the government (Zou Deci, 1995). The act is complementary to the Land Administration Act and the (related) Environmental Protection Act, which we will get back to later on in this chapter, and may be locally specified with correspondent regional regulations, e.g. the Beijing General Urban Planning Regulation, approved in 1992[158] (Jakubowski, 2000).

As profit-oriented property development companies have been created, foreign investors have started to step up their commercial interests in the market, and urban architectural practices have started to be internationalised, counting with the growing presence of foreign architects. Concerning the latter group, the Chinese law stipulates that foreign architectural firms appointed to work in China need to work in partnership with a Chinese design company for at least the design of executive plans. Preliminary designs are allowed to be done by foreign firms themselves although the Chinese government encourages such partnerships also at this early stage. Constructions, in this sense, must be strictly in line with urban planning and subordinated to the central planning management.

In describing the legislative framework of urban China, it is important to note that together with the internationalisation of urban land use, urban land prices have significantly risen, resulting in the increase of land use efficiency by legal means. Urban densification, particularly in terms of increasing the plot ratio issue (that is, the area of the plot allowed for construction, which was previously controlled by strict guidelines), started to be legitimated, and so did a verticalisation process (Hamer, 1993). According to Gaubatz (1999), despite the fact that China's urban planners now make use of international practices (e.g. zoning regulations, height restrictions, and controlled development), numerous concessions to high-profile developments are commonly being permitted as a result of conflicting regulatory frameworks and ill-defined enforcement procedures, leading to a gap between 'the planned and the built form of the city'. This results in a kind of urban planning that seems to 'follow rather than lead patterns of development and investment' (Gaubatz, 1999). In addition, the lack of tradition in high-rise construction frequently requests local planners to consider American building codes, which in turn leads to several discussions and negotiations between interested parties in a process of 'mutual education' (Ruano, 1999b).

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the general principles for the preparation of urban planning, development of new areas and rehabilitation of existing ones, the implementation of urban plans and the related legal responsibilities, and emphasises that the preparation of urban plans should also address social and environmental issues.

[158] Although the central government is responsible for policymaking, including the formulation of main laws and regulations, the establishment of finance and tax systems, local governments have the authority to draft local regulations, and policies, which should not contradict those promulgated by the central government however (Lin Zhiqun, 1991).

Beijing is a clear example of this. As the country's capital and main historical city, Beijing has, at least on paper, strict height and density controls. The General Beijing's Master Plan of 1982 stipulates that the maximum height of the inner city is 9 metres in the centre and 18 metres in the periphery (Chang, 1998). Due to this reason, investors are frequently unenthusiastic to invest in the old city and the construction of low- and mid-rise structures continue to predominate in Beijing. But economic pressures following the commodification of the property sector have increasingly complicated the implementation and enforcement of the city's urban planning laws, leading many times to infringements. As a result, the revision of the above-mentioned 1982 Master Plan of Beijing, conducted in 1993, had to reconsider significantly height restrictions so as to legitimise existing structures (Gaubatz, 1999).

In Beijing, urban planning issues (e.g. zoning regulation), buildings codes (e.g. concerning height and orientation of buildings), their enforcement, and the issuing of building permits are carried out by the Urban Planning Bureau of Beijing. Concerning the design of office buildings, priority is still given to the architectural typology, that is, aesthetics. In terms of building operation, regulations seem to be more flexible as clients and architects may discuss them with the competent authority[159].

In administrative terms, Beijing is considered to be an 'independent municipality' in China, being directly under jurisdiction of the central government (Chang, 1998). The administrative area of the Beijing municipality, in turn, consists of four urban districts (Dongcheng, Xicheng, Chongwen, and Xuanwu), four inner suburban districts (Chaoyang, Fengtai, Shijingshan, and Haidian), two outer suburban districts (Mentougou and Fangshan), as well as eight rural counties (Mao Qizhi *et al.*, 1997). The People's Congress of Beijing and the Standing Committee of Beijing Municipal People's Congress are the governmental bodies constitutionally empowered to draft and issue municipal rules and regulations[160].

Local management of environmental flows

Nationally, environmental protection was first introduced in China in the early 1970s. The Environmental Protection Act of the People's Republic of China[161] was drafted in 1979 but formally issued only in 1989. The National Environmental Protection Agency (later to be known as SEPA, State Environmental Protection Ad-

[159] Arch. Zhaohui Wu (architect, China Architecture Design & Research Group), interview.

[160] The system of People's Congress is the basic political system in China, representing the entities through which the Chinese people exercise state power. They are determined at national and local levels, elected democratically every 5 years. Standing Committees, in this sense, are set up above the level of People's Congresses (Beijing Standing Committee, 2002).

[161] This Act defined, among other things, that the concept of environment includes the urban environment so that the assessment of environmental risks should be made also in view of urban development, construction, and regeneration practices (Zou Deci, 1995).

ministration) has since then been China's national environmental authority, responsible for, among others, the drafting of national environmental laws, rules, regulations, provisions, and guidelines, the preparation of national environmental protection plans, and the supervision of environmental impact assessments for cross-regional construction projects (World Bank, 1994b).

At the local level, Beijing first opened its Environmental Protection Bureau in 1974, an entity somehow subordinated to and directly supervised by the Urban Construction Committee. The Bureau, and subsequently the Beijing Environmental Protection Committee, were established to strengthen environmental leadership in the city. The responsibilities of the Beijing Environmental Protection Bureau include the drafting of environmental policies, rules, regulations, provisions, and standards for Beijing as well as their enforcement procedures. The Bureau is also responsible to collect excess pollution discharge fees and penalties, revise and approve environmental impact assessments and environmental protection facilities, as well as assist the National Environmental Protection Agency and the Beijing Environmental Protection Committee in the drafting of national, urban, and rural economic, social, and environmental development programmes (World Bank, 1994b, Beijing Municipal Environmental Protection Bureau, 2002b).

Equally to the overall environmental management in China, environmental protection in Beijing follows the San Tong Shi approach[162], which refers to the implementation of environmental control measures from source, in other words, the implementation of clean technology. This approach has been strengthened by the Administrative Measures for Environmental Control for Construction Projects – drafted jointly by the State Council, the State Planning Commission, and the State Economic Commission – detailing requirements for the design, construction, and operation stages of construction projects, and the related responsibilities of the local Environmental Protection Bureaus, construction departments, and construction units (World Bank, 1994b). Based on these measures, at the local level, the Beijing Municipal Urban Planning Commission, the Beijing Economic Commission and the Beijing Municipal Environmental Protection Bureau issued the Detailed Rules for Implementation in Beijing Municipality of the "Administrative Measures for the Environmental Protection of Construction Projects", specifying thereby requirements for construction projects in Beijing as well as related penalties (World Bank, 1994b).

Parallel to such developments in environmental policymaking, the Chinese government has clearly recognised that a deteriorated urban environment acts as a deterrent to further economic growth and that the property sector is 'positively correlated with environmental qualities' (Jones Lang LaSalle, 2002b). In this sense, the Chinese government is now committed to eliminate pollution to further attract foreign investments and boost the urban economy (Ibid.). This implies the environmental upgrading of nearly all industrial sectors, among which the property in-

[162] This approach was first introduced in the 1979 draft of the Environmental Protection Act of the People's Republic of China, specifying penalties for infractions (World Bank, 1994b).

dustry and the related practices involving the development of the urban office stock.

The above-referred measures were in turn further promulgated by the State Council into a set of regulations (the Regulation of Environmental Protection of Construction Projects) in December 1998, requiring an environmental assessment report to be submitted to government authorities in charge (Ibid.) – in the case of Beijing to the Municipal Environmental Protection Bureau – for large-scale commercial and residential projects (industrial projects fall under other regulatory frameworks). For smaller scale projects, the Ministry of Construction has drafted a set of guidelines for the implementation of ecological features in the construction of buildings in general, although no specific environmental prescriptions exist yet in this regard[163]. As for Beijing, priority is being given to water conservation issues, particularly in residential buildings and hotels, for which the installation of recycling facilities are being more and more mandatory[164].

Environmental concerns, in this respect, are becoming an important part of the Chinese construction scene, for which attention is not only focused on the management of local natural resources (i.e., energy and water consumption), but also on broader sustainability issues. As the feasibility of property development projects needs to progressively comply with environmental laws to obtain construction permits, Chinese architects and urban designers have been increasingly sensitised by the issue, reaching consensus on certain points: First, that buildings should address the human scale and seek harmony with the environment. Concepts such as green building or sustainable urban development have obtained growing sympathy among them (Xu Anzhi, 2000). A second point currently thought of is the fact that tradition deserves due respect and historic buildings and public spaces should be preserved. In this regard, although cases of destruction are still many, the Chinese government has guaranteed to retain historic public spaces by using legislation, but it is not yet clear *how* this will be achieved (Wei Gaochuan, 2000). In addition, the government has been seriously committed to invest intensively in green areas – the marketing campaign for the 2008 Olympic Games serving as an indicator (cf. above).

But there are some questions still puzzling Chinese architects. It is still not yet known how the cultural and regional characteristics of Chinese architecture will be preserved in view of globalisation pressures, or how a good environmental and architectural quality will be maintained in the course of rapid urbanisation. Also, and not less critical, how shortsighted, profit-oriented, and environmentally abusive developments will be thwarted amid China's shift towards a market economy. The answers to such questions are not yet clear, despite the fact that China has officially embarked on a comprehensive urban greening process. The following sections describe how the main environmental policy agencies in Beijing are currently imple-

[163] Dr. Zhang Mingshun, Song Mingjie, Zen Yingru, Feng Yurong, interview.

[164] Liu Ailing (journalist, China Building Press) and C. Pelger (Assistant Vice President, ABN AMRO China), interviews.

menting management programmes to improve the environmental impact and the energy and water efficiency of the city's office buildings.

Department for the environment

As indicated above, the outset of environmental protection practices in Beijing was fairly linked to construction activities, as the first Environmental Protection Bureau, inaugurated in 1974, was originally subordinated to the Beijing Urban Construction Committee. This has somehow put Beijing's office stock in a kind of advantage for the eventual start-up of an ecological reform process. As environmental protection issues were gradually prioritised in the city, the Beijing Municipal Environmental Protection Committee was established in the late 1970s. The relationship between construction activities and environmental protection were thereby further formulated in April 1980 into directives on construction in Beijing, promulgated by the Secretariat of the Central Party Committee – namely the Beijing Urban Construction Master Plan – clarifying Beijing's status as China's capital, urging thus stronger environmental politics. In addition, since 1994 a Local Agenda 21 was implanted in Beijing as an effort to promote sustainable policies along with action plans, in the sense of ensuring that the coordination between development, resources, and environment is met (ESCAP, 2003).

The Beijing Municipal Environmental Protection Bureau has nowadays three affiliate institutions (Beijing Municipal Environmental Protection Research Institute, Beijing Municipal Environment Monitoring Centre, and Beijing Municipal Technical Training Centre for Environmental Protection), 11 subdivisions, and employs over 100 persons. One of such subdivisions is the Department of Construction Supervision, through which the Bureau supervises construction activities in the city.

Since December 1998, the Bureau has been officially entitled to control (approve and enforce) the environmental performance of the city's office stock by requesting different kinds of environmental impact assessments, the parameters for which – spanning from energy and water conservation to overall environmental preservation – were specified in April 1999 by the National Environmental Protection Agency. For property developments, including hotels, offices, and residential buildings with a construction area above 60,000 square metres or land area above 30,000 square metres, in all areas, an environmental impact assessment report should be carried out for Bureau's approval. Should these developments be in sensitive areas, the requirement for an environmental impact assessment report would be for projects above 20,000 square metres and land areas of above 10,000 square metres. Regarding non-sensitive areas, projects above 5,000 square metres should fill out an environmental impact assessment registration form, describing the environmental impact on the surrounding environment. Finally, all renovation projects of old districts as well as the development of new districts, disregarding the total area, are required to submit an environmental impact assessment report for Bureau's approval (Jones Lang LaSalle, 2002b).

In terms of penalty, constructions are to be stopped (and developers to be fined up to USD 12,500) should they (i) be initiated prior to the environmental impact assessment procedures; (ii) be modified in their scale, nature, location, or other important aspects without re-submitting the related environmental impact assessment reports, forms, or registration forms; or if (iii) are delayed by five years after the approval of the environmental impact assessment reports, forms, or registration forms, and these are not re-submitted (Jones Lang LaSalle, 2002b).

Energy network

Energy issues in Beijing are basically dealt with by the Economy Commission of Beijing Municipality, which is subdivided into five departments – namely Energy Supply, Energy Saving Office, Industrial Management, Safety Production, and Technical Improvements – acting both as the city's energy manager and main policymaker as well as the city's energy utility (the Beijing Power Supply Bureau). The Commission does not have energy saving programmes directly related to office buildings, which is not yet a priority in Beijing in terms of policy, although its Energy Saving Office manages, to date, the energy efficiency of industrial facilities[165].

Yet, efforts are being made to render Beijing an energy-saving city, mostly owing to the fact that although significant improvements have been achieved in terms of energy management in the city – including better services – the rapid economic development and the enhancement of living conditions have progressively led to shortages in the supply of electricity, thermal energy, gas, and other energy sources as well as to severe deterioration of the air quality due to the extensive use of coal as main energy source (Wu Xumin, 1993).

In this regard, and as indicated above, attention is hitherto rather focused on optimising the efficiency of new and existing high-energy consuming industries, e.g. iron and steel, the upgrading or replacement of their obsolete technologies, as well as domestic energy use, for which more and more co-generation facilities are being promoted for central-heating systems[166]. Energy-related policymaking has not yet reached the city's office stock, although the Chinese government has recently started to support energy-saving demonstration projects, both for housing and office buildings (e.g. the sustainable housing base in Beijing Elk Garden in southern Beijing's Yizhuang Economic Development Zone and the ACCA21 – Administrative Centre for China's Agenda 21 – building, respectively[167]).

Other programmes the Economy Commission has fostered in recent years regarding energy supply in Beijing include: (i) the expansion of the use of natural gas in Beijing in order to provide a gradual substitution of coal burning for gas (although not many further investments are taking place in renewable energies); (ii) the development of a district heating system to gradually replace residential coal burning which causes much environmental damage; (iii) the decrease of sulphur

[165] Dr. Zhang Mingshun, Song Mingjie, Zen Yingru, Feng Yurong, interview.
[166] Dr. Zhang Mingshun, Song Mingjie, Zen Yingru, Feng Yurong, interview.
[167] Jones Lang LaSalle (2002b); Huang *et al.* (1999).

and ash contents in Beijing's coal (iv) the security of energy supply to the development of outer suburbs; and (v) the development of energy supply to municipal rural areas according to the principle of 'suiting measures to local conditions, multiply energy complimenting each other, comprehensive utilization and striving for efficiency' (Wu Xumin, 1993).

Water services network

In terms of water services, the Beijing municipal government includes a Water Management Bureau, the city's water utility and policymaker, which is subdivided into the following departments: Water Resource, Water Saving Office, and Water Supply.

After the economic opening, water conservation in Beijing received a growing attention, given that shortages in the city's water supply system is a recurrent problem. Programmes date back to 1981, when Beijing carried out a Water Saving Policy in an all-embracing way, achieving reductions in water consumption levels, e.g. about 40 percent in industrial consumption terms after 8 years of the programme's implementation (Luo Tingdong, 1993). Similarly, the rate of daily domestic water consumption dropped in percentage from 7.8 percent during the period 1979-1981 to 1.8 percent during the period 1981-1987 (Ibid.). But despite the Water Saving Policy, since China's economic reform daily water consumption has increased tremendously in Beijing. Nowadays it is estimated that each Beijing inhabitant consumes on average about 300 litres daily, several times more as compared to the pre-1978 period. Such increase in water consumption levels in Beijing is also due to the construction of more power plants – such as the Gaobeidian Thermal Power Plant, the Songjiazhuang Thermal Power Plant, the Pinggu Power Plant, and the Ming Tombs Power Storage Station, despite recycling efforts – as well as to the agricultural enhancement policy, whose guiding principle states 'serve the Capital, make the farmers prosperous, and construct the countryside with socialist modernisation', requiring investments in irrigation, although through water saving systems (Ibid.).

Nowadays, the Water Saving Office of the Water Management Bureau develops technical guidelines for the use of water facilities as well as consumption parameters – applicable to all types of buildings – implying a raise in water costs proportional to consumption levels (using a principle of 'use more pay more'). In this sense, while energy efficiency in office buildings is still not so much of a hot topic in Beijing (although energy prices tend to rise), water efficiency is not only a growing political priority as well as a major public concern. Office buildings in Beijing, in this regard, with a total area above 50,000 square metres, are required to

apply a water-recycling scheme[168]. These technical guidelines are in fact expected to be adopted (with certain adaptations) all over China starting in 2003[169].

Global management of environmental flows

Deng Xiaoping's economic opening policies ratified the entry of foreign firms in the Chinese market. Most of such firms have thereby established representative offices starting in the mid 1980s and early 1990s, usually in Beijing or Shanghai, originally to 'explore' economic opportunities in mainland China. As a result, and still 'testing' such opportunities, multinational companies tend not to make large investments in the city, and are in their majority tenants of their offices they maintain in Beijing, renting space from Chinese investors. Consequently, in their majority foreign firms have limited environmental programmes for their offices in Beijing, claiming the size of the spaces to be rather irrelevant for prompting environmental initiatives. As tenants, they are in addition not involved with the design of the space neither directly connected with the utilities and environmental policy agencies, as such connections are intermediated by the investors, through their facility management departments. Environmental innovations in their offices are therefore largely resulting from initiatives stemming from local environmental management practices.

ING Group

ING maintains three quarters of an office floor (approximately 560 square metres) of the Landmark Towers complex in Beijing (see Figure 8.3), situated close to the East 3rd Ring Road, at a walking distance to the CBD and 20 minutes by car from the city's airport. The complex is a prominent one, consisting of three office towers totalling 55,000 square metres of office space, in addition to serviced apartments and a hotel.

ING first established offices in this complex (Landmark Building 1) in the early 1990s, the first offices the company opened in the city. Among the criteria for the selection of the Landmark Towers, ING was looking for a building that would be in line with the company's corporate image, easy to be accessed, reasonably priced, and that would offer a good quality of office space (e.g. good elevators and floor space). No environmental topics took place in the decision-making process for the selection of the Landmark Towers, a process that was coordinated partly by ING and partly by the company's Platform in China, the latter consisting of an internationally composed board of managers. As ING is a bank also involved with

[168] Liang Haichuan (Business and Planning Department, China Architecture Design & Research Group), interview. This standard was introduced in the early 1990s and is apparently strongly enforced. Smaller building, nevertheless, do not need to cope with such standard at the moment.
[169] Dr. Zhang Mingshun, Song Mingjie, Zen Yingru, Feng Yurong, interview.

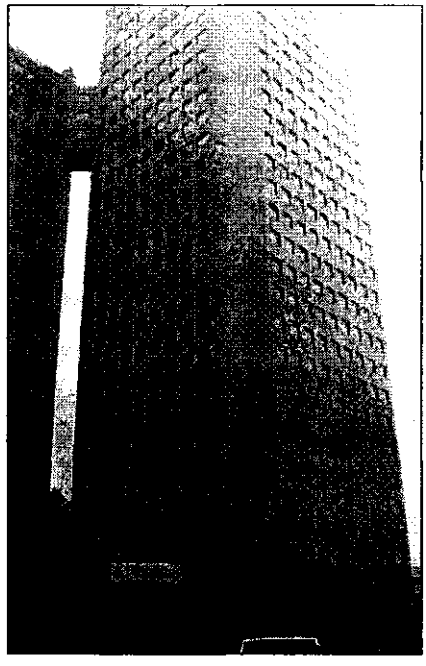

Figure 8.3
ING headquarters, Beijing.

property management, there was no intermediator – e.g. a property agent – for this purpose[170].

The Landmark Towers complex, inaugurated in 1990 (Phase 1, where ING is located[171]), is owned and managed by the Landmark Management Co., which is a Chinese-Singaporean joint venture (shared ownership with the Ministry of Economic Affairs, following Chinese rules). This company collects rents, operates the buildings technical systems, and pays for water and energy bills, among other things, respectively to Beijing Water Management Bureau and to the Energy Commission of Beijing Municipality. In this sense, an interaction of ING with the local networks of environmental management above described is *inexistent*, as all such connections are intermediated by Landmark Management Co. (the same applying to the design phase of the building, during which ING had no participation whatsoever).

In 2002, the Landmark Office Tower Phase 1 underwent a refurbishment process to update part of the building's technical systems; initiatives were taken by Landmark Management Co. For the tenants, a major result from this refurbishment was not so much technical, but financial. Not only did rental fees rise by 22 percent (from USD 18 m^2/month to USD 22 m^2/month) but the electricity bills started to be paid separately to the building manager, whereas they used to be included in the rent prior to the refurbishment. The reason for this shift in the charging system was not only because energy prices tend to rise in the coming years, but also due to the fact that that energy bills can be monitored and differentiated among tenants, as some of the companies consume more or less energy than the others. The same does not apply to the use of water though, as water-consuming facilities are communal to each floor, which is typical to office buildings in Beijing. Although the motivation for this shift was purely economic – and not environmental – it can be expected that more attention shall be paid to energy saving within the offices as companies start to be charged individually. As for the use of water, although the communal use of lavatories (shared lavatories for each storey, whose standard comprises 4 units of office) does not by itself induce to water saving strategies to be launched by the companies (as

[170] P. Lin (MCIOB, Project Coordinator, ING Real Estate, Beijing Representative Office), interview.
[171] The other towers were completed in 1998.

these are not directly involved with the bills), the building operates a water-recycling scheme, following the standards set forth by the Water Management Bureau.

ING, in turn, considers that the environmental load of its offices in Beijing is too light to demand an environmental management system for their running. There are only 15 people working in the office in Beijing and the costs for the implementation of energy and water saving programmes are claimed not to yield a favourable cost-effective balance. In this respect, although common sense is fostered for the use of energy[172] and water, there are no procedures concerning the conceptualisation or implementation of more specific environmental programmes[173]. In this sense, and bringing no environmental innovations to its office space in Beijing, the main environmental feature of the space, which is the water recycling scheme, was introduced by the building owner, following prescriptions set forth by the local water utility.

On the other hand, and as a property company[174], ING considers environmental concerns to become more and more imperative for the projects that it develops in China and elsewhere. In this regard, ING is at the moment involved mostly with the development of (large scale) residential buildings in China, for which it is trying to influence on decisions regarding the environment. This is taking place from the planning phase (including the selection of the site, as well as decisions regarding the energy supply system and water management, to be negotiated with the government), to the design phase (through for instance better designs and appropriate construction techniques), finally to the building management/operational phase. The company however acknowledges that the steering of decisions towards environmental care are not always easy to be attained as ING is often not the major investor in the project.

In terms of corporate management structure, ING Real Estate representative office in Beijing (where decisions regarding the selection and running of the offices of ING in Beijing take place) communicates directly with ING Real Estate located in The Hague (with manager R. Price), who in turn reports to the board of ING Real Estate, which reports to the Asset Management group, which in its turn reports to ING's Executive Board[175]. Although ING's management structure is much hierarchical with a type of management style that seems to be rather top-down, decisions regarding the running of the offices in Beijing, including those regarding environmental management or energy or water efficiency, are to be made *locally* in Beijing. There are therefore no channels from the global company to the local management of the offices regarding the transfer of environmental care concepts.

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[172] The building does not have an intelligent lighting management system, which for instance makes sure that energy is not consumed when the offices are not occupied.

[173] P. Lin, interview.

[174] ING operates four lines of business in China, starting in the early 1990s: ING-Bank, ING-Real Estate, Insurance, Asset Management.

[175] The other business lines of ING communicate with related managers in the Netherlands.

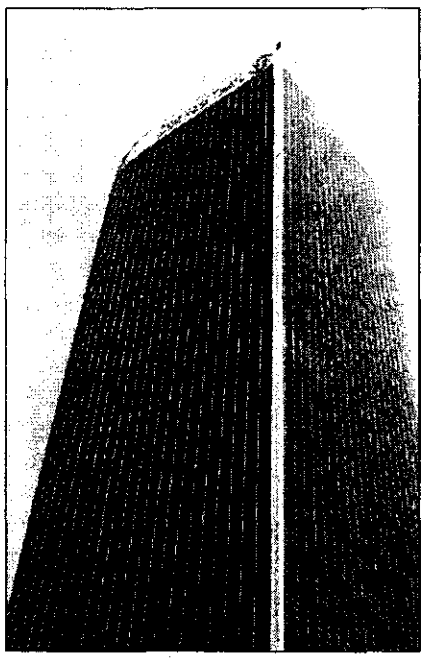

Figure 8.4
Andersen headquarters, Beijing.

Andersen

Arthur Andersen opened its office in Beijing at the China World Trade Center building (see Figure 8.4) in 1991 and closed it down in 2002, when it was absorbed by PricewaterhouseCoopers in China. Since the company's dissolution, former Andersen employees are no longer allowed to speak about Andersen's past management, significantly reducing the scope for the carrying out of this study[176]. However, the construction of the China World Trade Center building proved to be a relevant account in terms of global management of environmental flows, particularly where water efficiency is concerned. As its name indicates, this building symbolises China's opening up to international trade. Profiting from a good location on the Jianguomenwai Avenue, its architecture is much in line with global trends, incorporating the latest fittings, in a 39-storey tower. Current tenants include, among others, KPMG, IMF, Merrill Lynch, and Singapore Airline.

Decisions regarding the construction of the China World Trade Center complex started in 1985, initiated by the Shangri-la Group, the building's investor and developer. The American architectural firm Sobel/Roth won the bidding for the conceptual design of the building, while the Japanese engineering company Nikken Sekkei Ltd. was appointed for the building's engineering design. In 1986 the French company SAE started foundation work; the construction finished in 1989. The building is owned by Shangri-la Group in partnership with the Ministry of Economic Affairs (fifty-fifty). The complex totals 42,000 square metres, comprising two office buildings and two hotels, in addition to a subway station, meeting area, mall, and parking facilities.

The China World Trade Center is notable for being one of the first buildings in Beijing to install a water-recycling scheme. Although this has become a common practice nowadays in Beijing, there were no regulations at the time regarding water consumption in buildings. The idea for the introduction of a water reutilisation system was brought forth by the Japanese engineering firm Nikken Sekkei, although the technology for the whole water equipment was imported from the USA, Hong

[176] Vicky Wu, former employee of Arthur Andersen Real Estate Operations in Beijing, telephone communication as of September 2002. The same secrecy also applies to property intermediators, whose services are dealt with as confidential.

Kong, and Japan (being the most advanced at the time), and the setting of standards was done following American ones[177]. In contrast, however, nothing was done in terms of improving the energy performance of the building beyond conventional standards.

Neither the Beijing Urban Planning Committee nor the Beijing Environmental Protection Bureau did, in their turn, compel any specific requirement regarding the building's environmental performance. There was no legislation at the time requiring the submission of environmental impact assessment reports. In addition, at the time China did not have any specific regulations for such scale of building (neither for the architecture nor the engineering) so new standards had to be developed for the China World Trade Center. In this regard, the innovation of the water reutilisation scheme was brought forth by foreign firms.

ABN AMRO

ABN AMRO opened its first Beijing branch in 1985. In 1999 it moved its offices to the Kerry Centre building complex (see Figure 8.5), located at the Chaoyang district, totalling 921 square metres with 16 employees; all decisions were made by local managers and assisted by the property firm Jones Lang LaSalle. The Kerry Centre was selected among other property options as the building was claimed at the occasion to offer the newest and best foreign managed office space and to be conveniently located near the main business centres of Beijing. There were no environmental considerations in this process[178].

In fact, according to the China Architecture Design & Research Group (which participated jointly with the Hong Kong architectural firm DLN Architects & Engineers in the design process as the Chinese counterparts), and despite being one of the most prestigious office buildings in Beijing, the Kerry Centre is a 'basic' building in terms of energy and water efficiency, complying with – but not going beyond – standards determined by the Beijing Urban Planning and the Water Management Bureaux[179]. In this respect, the building has a small water treatment plant to provide secondary clean water for the flushing of toilets but nothing sophisticated about energy efficiency, apart from a smart lighting management system.

Like the China World Trade Center, the Kerry Centre is also owned by the Shangri-la Group (also in partnership with the Ministry of Economic Affairs). It is managed by one of the Group's companies, the Kerry Properties, which collects rents and pays for energy and water bills (included in rent fees). ABN AMRO, in this regard, interacts with Kerry Properties for issues regarding the office space management – through which environmental topics may possibly emerge – but is not directly involved with the local utilities or environmental policy agencies, such

[177] Professor Wang Lijun (CERIS – Beijing Central Engineering and Research Incorporation of Iron and Steel Industry) and Arch. Han Shaorong (Chief Project Engineer, CERIS), interview.
[178] P. Lamberts (Risk Management Department, ABN AMRO, Beijing Branch), interview.
[179] Liang Haichuan (Business and Planning Department, China Architecture Design & Research Group), interview.

Figure 8.5
ABN AMRO headquarters, Beijing.

as the Water Management Bureau, the Energy Commission of Beijing Municipality, or the Environmental Protection Bureau; neither is it involved with any decisions made during the design of the building.

In this respect, it is of the interest of the building managers to save energy and water. While water is saved through the water-recycling scheme, energy is becoming a growing concern, representing over 20 percent of the maintenance expenditures, the second largest expenditure after the disbursement of salaries. As such, attempts currently made to save energy include the following: (i) turning on external lighting only from 18:00 until 24:00; (ii) turning on and off lifts and escalators at strategic hours; and (iii) running two of the three chillers on steam during the day while only using a third electricity powered chiller during the lowest energy fare hours (from 5:00 until 7:00). The managers estimate that energy and water prices will increase by 20 and 30 percent respectively in the coming years, a fact that will somehow initiate an awareness regarding utility services in the city[180].

Environmental innovations introduced in the building, such as the water recycling scheme and the energy saving options, were totally decided by local actors outside the company; the first following public prescriptions, the second following the motivations of the building managers. ABN AMRO is not bringing any innovation in this regard and neither is the bank interested in investing on specific appliances for its small office space. The bank claims to have a low budget for the premise, so that the selection of specific environmentally sound appliances or the implementation of environmental programmes, which in the short-term might be costly, are easily discarded. Environmental issues, in this context, are not considered due to short-term money saving – that is, the bank is not interested in pursuing environmental programmes that may be costly on the short-term, so that only common sense environmental management issues, such as basic waste recycling are taken into account[181]. ABN AMRO's representative office in Beijing reports to the Operations Department in Hong Kong, which communicates in turn with Amsterdam's headquarters. According to ABN AMRO's Assistant Vice President in Beijing, topics concerning the environment are not raised through these channels[182].

[180] Raymond C.Y. Chow (Property Manager, Beijing Kerry Centre), David Qin (Building Manager, Beijing Kerry Centre), Thomas S.T. Tay (Marketing Director, Beijing Kerry Centre), interview.
[181] C. Pelger (Assistant Vice President, ABN AMRO Beijing branch), interview.
[182] C. Pelger, interview.

IBM

IBM is located at the IBM Tower of the Pacific Century Place complex (see Figure 8.6), which consists of two office towers and a shopping mall, situated at the Chaoyang district. IBM occupies 7 office floors out of the 25 office floors of the IBM Tower (approximately 17,000 square metres and 1,200 employees). The Beijing branch corresponds to the Asia Pacific headquarters of IBM, being thereby a key one.

IBM moved to the IBM Tower in 1998, assisted by the property firm CB Richard Ellis, and following an 'environmental site assessment' procedure, which, following the global policy of the company was the most important criterion for the selection of the Pacific Century Place for the establishment of its offices[183]. The environmental site assessment procedure consists of an appraisal scheme used by IBM to determine the building's history in terms of (indoor) use of chemicals and hazardous materials (such as halon 1301, which is forbidden by IBM), as well as in terms of the energy and water management system, for instance if the water quality meets IBM's standards, and indoor pollution. Apart from this assessment, other criteria that applied for the selection of IBM Tower were the building's accessibility and architecture, which should be in line with IBM's corporate image.

IBM Tower is a property of Jing Wei Real Estate Company, from which IBM rents its office space. There is also an independent service provider (Kell) assigned by the landlord for the general management of the building[184]. IBM however pays for its water and energy bills through its property manager, CB Richard Ellis, and these are not part of the rent fee[185]. In this sense, and like the other case studies in Beijing, IBM is also not directly connected to the local utility and environmental policy agencies in its operational phase; nor was it at the design phase of the building.

Yet, and unlike the other companies in Beijing, IBM introduced in 2002 an environmental management system which, apart from the application of ISO 14001 standards in its production line in China, also involves the running of the offices. As such, it covers (i) solid waste management, involving the separation and proper disposal (as well as recycling efforts) of hazardous and non-hazardous waste; (ii) energy saving, through, among others, constant behavioural campaigns (the building does not have a smart lighting system); and (iii) water saving also through behavioural campaigns (the building also does *not* have a water recycling facility, however). According to IBM's global environmental policy, offices of IBM China are also expected – and checked (by IBM Japan) – to decrease annually their energy and water consumption by 4 and 1 percent respectively. Energy saving, in this regard is an important component of the environmental management of IBM, which is achieved, in addition to the above mentioned behavioural campaigns, also

[183] J. Li (Human Resources, IBM China Company Limited), interview. This environmental site assessment is not carried out to all IBM's branches in the world.
[184] Zuo Peng (General Services, IBM China Company Limited), communication.
[185] J. Li, interview.

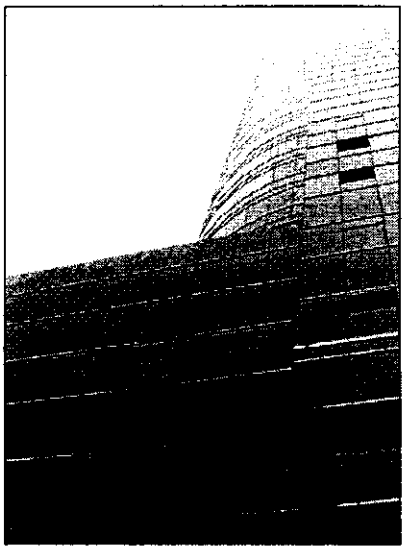

Figure 8.6
IBM headquarters, Beijing.

through a series of standards set forth by the company: (i) setting targets by floor; (ii) shutting down lighting after 20:00; (iii) strictly avoiding redundant lighting devices; (iv) controlling air conditioning use; (v) lowering hot water temperatures at sink; (vi) investing on lighting stabilizers; and (vii) promoting mobile work. In this regard, as local practices of environmental management regarding energy and water consumption are limited (in the case of water consumption, the human resources manager of IBM Beijing claims the building *not to* have a water recycling system[186]), innovations are brought forth through IBM's global environmental policy.

Environmental as well as occupational, health and safety issues at IBM China Beijing branch are still dealt with within the human resources department; the company does not yet have a department for the environment at the moment in Beijing, although environmental themes are growing in importance at the branch. These activities are reported to the China human resources managers (also located in Beijing), who report in turn to the IBM Japan environmental manager (responsible for orienting and checking the Beijing branch), who finally reports to the IBM headquarters in the United States. IBM Japan – following IBM USA – is therefore the main channel to provide the guidelines in terms of energy and water efficiency set forth at the global headquarters level (IBM USA) to IBM's premises in China.

Conclusions

In this chapter we tried to assess how environmental management is applied to Beijing's office stock, by looking at the policies and strategies of local utilities and environmental agencies, and their interception with the strategies of four multinational companies. First we provided an overview of how the modernisation rush since the country's economic opening has sharpened local environmental problems and the use of resources such as energy and water. Secondly we explored the reform that the local planning and regulatory framework have been undergoing ever since, leading to the institutionalisation of environmental directives applicable to office buildings. Among these, we highlighted two of the most prominent instru-

[186] J. Li, interview.

ments: the water recycling standard for office buildings above 50,000 square metres and, also more recently instituted, the request of environmental impact assessment procedures for certain kinds of developments.

From the information gathered, it seems that the ecological reform of Beijing's office stock pursues an environmental policy framework fostering clean technologies, which is historically correlated to the Chinese San Tong Shi approach. The above two instruments indicate that the main environmental discourse tends to explore solutions of dematerialisation – such as through the water recycling systems – as well as substitution of technologies. No sophisticated monitoring systems for energy/water saving purposes could be detected in this research, although the increase in the price of water and energy is a sign of monetarisation. The attempt to apply clean technologies is also manifest through the 'environmental campaign' for the 2008 Olympic Games, as Beijing is claiming to make substantial investments in the years to come including the completion of demonstration projects for a green residential and a office building. It seems that the environmental reform of Beijing also benefits from the fact that the city's Environmental Protection Bureau has been instituted under the Urban Construction Committee, so that the development of environmental management themes are, or at least to some extent, conceptualised and implemented under the umbrella of the environmental challenges of construction activities (such as the environmental impact assessments, for instance).

On the other side of the spectrum, however, the companies analysed in this research demonstrate that environmental themes applicable to their offices are rather limited to 'common sense' approaches (exception made to IBM). Their argument is that they are tenants of the spaces, which are often rather small, representative offices only. This justification is further explained as most of them do not receive incentives (authoritative, financial, or technological) concerning environmental management from the global headquarter level. In addition, societal connections between the global companies and the local utilities and environmental policy agency are practically inexistent, as these connections are primarily intermediated by the facility managers of their offices, which are usually the owners of the buildings. None of the companies analysed in this city was involved with the design of the building either. Perhaps owing to the fact that its premises in Beijing are larger as compared to the other companies, IBM is the only case of our sample to have introduced environmental innovations in its offices, such as the use of an 'environmental site assessment' and an environmental management system also applicable to the use of energy and water in the offices as part of the company's global environmental policy. Paradoxically, it was also the only analysed company to occupy a building that does not have a water-recycling scheme.

From the findings of the research carried out in Beijing, it seems that in general terms the environmental reform of Beijing's office buildings is being triggered by *local* policy as well as economic networks – comprising the water utility and the environmental protection agency, as well as the investors of the buildings (and their facility managers respectively). It also seems that decisions follow both an envi-

ronmental rationale as well as economic motivations: that is, to use resources more efficiently in the sense of making 'more out of less'. This is perhaps confirmed as so far most initiatives concern the use of water, which is now critical in the city, whereas the use of energy, which is not yet priority, still remains rather unchallenged for the moment. Multinational companies claim not to be liable for the environmental management of the spaces as their offices are rather small in Beijing. In this sense, it seems that the conditions that are mostly favouring an environmental reform of Beijing's office stock is a growing awareness raising by the government and local building owners that resources should be used more efficiently. This will ensure the future development of the city and the continuity of commercial-oriented property developments. Whether these events correspond to the tenets of ecological modernisation theory shall be analysed in the subsequent chapter.

9

The Environmental Glocalisation of Office Buildings

WE STARTED THIS RESEARCH speculating about the transformations cities are undergoing in the era of globalisation: namely transnational spaces are being created within the urban space providing a link between the 'local' and the 'global'. These transformations are instituting a new urban order, as in an era of transnational urbanisation numerous social connections between local and global actors are now intermingling in the urban space, redefining its metabolism and shape (cf. Smith, 2001; Sassen, 1994, 2001). This research reflected on the rise of a *vicious circle* of worsening urban environment and growing consumption of environmental flows (e.g. energy, water, waste) thereby resulting. And I put forward that, running counter to this vicious circle, there may be also a *virtuous circle* of urban environmental reforms emerging in the era of globalisation (cf. chapters 3 and 4).

In line with the theory of ecological modernisation, I posited that this virtuous circle is arising insofar as the environment is becoming a central theme of (global) modernity. In this process, new market dynamics are being triggered in which environmental issues emerge as a new and independent set of criteria to be used when assessing and designing industrial performance, parallel to economic ones. This process is leading to what some authors call a 'reinvention of environmental policymaking' (cf. Vaughan, 2001) in a way forward in modernity, in which the state launches enabling environmental policies to be adopted by market and civil society actors. In the era of globalisation and global environmental change, a

number of authors put forward that these market dynamics towards the environmental reform of industrial sectors also takes place on a global, transnational basis, suggesting that global market actors play a key role in diffusing environmental innovations worldwide – particularly to newly industrialising countries. In so doing, these actors promote a race to the top of environmental management in such countries, or a globalising, virtuous, or even a *virtual* circle of environmental reforms.

In view of these arguments, this research explored how multinational companies are possibly triggering a worldwide 'race to the top' in terms of *urban* environmental management. Its enquiry revolved around the environmental dimension of the offices held by such companies in different cities, claiming that (parallel to the worldwide diffusion of industrial environmental management practices that multinational are increasingly compelled to, e.g. regarding pollution prevention) their environmental strategies applied in their offices in home-countries are (to be) applied in their offices elsewhere. However, I also suggested that in order to analyse how multinational companies may be pushing for the environmental restructuring of their offices in different cities it is also necessary to investigate how the environmental policies of such cities are stimulating, or perhaps inhibiting, the process of environmental change. In this light I elaborated an investigation including 12 case studies of the interception between corporate environmental strategies (of ABN AMRO, ING, Andersen, and IBM) and urban environmental policies (of Amsterdam, São Paulo, and Beijing) to understand the dynamics of urban environmental change.

The previous three chapters of this research have provided an overview of the main mechanisms through which the offices of our the four companies in the three cities are undergoing environmental reforms in view of this local-global interface of social practices. At this point, I return to the central research question and explore how the environmental restructuring of transnational office buildings is thereby developing. There is no doubt that in the three cities the different modes and dynamics taking place in view of the local-global interactions are prompting different arrangements of environmental reforms. As I shall argue, however, the environmental restructuring of transnational office buildings in these three cities is also developing similarities in certain aspects. To discuss these similarities and differences I shall recapitulate the empirical findings of this research and compare among the three cities and four companies which general characteristics are governing the interaction of the two spaces – the local and the global – of environmental management. Based on this analysis I put forward a conceptual discussion on the mechanisms that are in place and those that should be enhanced to boost the global dynamics of urban environmental change. Subsequently, I explore the propositions of ecological modernisation theory stated in chapter 4 in the light of our findings. The chapter finishes by discussing the contributions this study makes to both ecological modernisation and global/informational city theories and by proposing directions for further research.

The empirical research in this study was restricted to energy and water issues at the operational phase of the buildings. However, and as argued in chapter 5,

it should be clear that to some extent the dynamics in place are also applicable to other environmental aspects of office buildings related to the operational phase (e.g. solid waste streams). Therefore, the variations to be explored below might be considered as representative of the general state-of-the-affairs of the environmental management of office buildings at the operational phase in these three cities in view of the global-local interfaces explored.

The environmental restructuring of office buildings

In chapter 5 we developed a conceptual model to enable the analysis of the interrelation between local and global dynamics in the greening of transnational office stocks. To answer the research questions and to show the added value of the conceptual model, we will in this section summarise the environmental strategies of our four companies – as actors in the global 'space of flows' – once they are deployed at the level of different cities, which operate as 'nodes' in the global network society. At the same time, at the level of these cities we will also discuss the characteristics of the urban environmental policies and the resulting forms of the global-local, corporate-urban interfaces. For each case, we will first describe the findings in empirical terms and then evaluate them against the backdrop of our conceptual model.

ING Group in Amsterdam, São Paulo, and Beijing

ING's commitment with sustainable building dates back to the late 1970s and early 1980s when it started the construction of the NMB headquarters (ING Bank) in Amsterdam. As the findings of this research demonstrated, the greening of this building was an initiative exclusively of the bank, whose ambitions had in addition to be downgraded due to a number of impediments caused by the municipality of Amsterdam. For instance, the aim of producing an energy sufficient structure was not accepted by the energy company at that time (a public company), which required the building to use at least 20 percent of energy from the mains grid (fearing competition if this was to be done on a large scale). Moreover, the building permit was only issued after one of the directors convinced a high level authority at the municipality of Amsterdam. The introduction of environmental innovations in this example proved therefore to be triggered by the bank, which at the time was not yet a multinational company.

In turn, the environmental management framework of ING Group (the Health, Safety and Environmental Management Systems) started in 1995, when the Group's Executive Board introduced an environmental report and a corporate environmental policy regarding its environmental ambitions in the Netherlands. The framework consists of internal and external guidelines; the former concerning waste processes and energy use in the premises, the latter regarding the development of products that contribute to a better environment. An important feature of

the internal guidelines for our study is the commitment to achieve long-term agreements with the Dutch government for energy efficiency, in view of the prescriptions set forth by the Dutch Ministry of Economic Affairs (the main authority in the Netherlands dealing with topics regarding energy), aiming to reduce by 25 percent the consumption of energy of the bank's premises in the Netherlands (based on 1996 figures, by 2006, these standards are now included in the building code). It is important to note in this respect that the decision to initiate such programme was directly related to the deregulation of the energy market in the Netherlands. It was during this occasion that the Dutch government set up its energy programme – consisting of the energy performance standard and the long-term agreement for energy use, in addition to the energy premium schemes granted to energy companies – so to ensure that energy in the country would be spent in an economic way. This may in turn also be correlated with the endorsement to the Kyoto Protocol at the time, as the Netherlands committed itself to contribute to mitigating global warming by decreasing its emissions of CO_2 in numerous industrial sectors, including buildings. In this sense it is the Dutch Ministry of Economic Affairs – more than the Ministry of Housing, Spatial Planning and Environment or the municipality of Amsterdam (or even the bank so to say) – that was influential regarding the energy saving strategies in this particular case. In terms of environmental strategies at the ING headquarters per se, the reduction in energy consumption has been accomplished ever since through behavioural campaigns (through an Energy Awareness Campaign) and the installation of advanced energy monitoring systems (through an Energy Monitoring Programme), the latter being initiated in conjunction with Novem, the Dutch agency for energy and environment (cf. ING, 2000b). According to ING's head of public affairs, these internal guidelines are mainly developed for financial and marketing reasons, the latter by ensuring a clean record to the public. Regarding the installation of the advanced energy monitoring system, another argument is that this was done mainly due to the privatisation of the energy market in the Netherlands which made it necessary for the users to monitor flows of energy rather precisely.

In view of these internal guidelines, most of the bank's current achievements in terms of sustainable building are related to energy consumption (through advanced monitoring), although the environmental report also demonstrates a slight reduction in water consumption in the premises as well as a concern regarding commuting energy (and related expenses). ING Bank's (NMB) headquarters, constructed strictly according to environmental and health criteria (introducing innovations of radical dematerialisation and substitution for both energy and water), is exceptional for the bank's current environmental ambitions, whose approach has not been replicated. The construction of the ING Group headquarters, for instance, has followed a different path to achieve environmental efficiency, favouring mostly energy-related issues. A discrepancy that can be noted in the Netherlands in this sense is that governmental as well as corporate programmes tend to target energy use in buildings much stronger than water-related issues.

Also in 1995 ING endorsed to the ICC Business Principles (Charter for Sustainable Development), the most widespread voluntary international code of conduct, known for its generic codes of environmental conduct, to which more than 2,000 companies have already endorsed. According to the head of public affairs, this step took place mostly to increase the bank's international credibility and thereby facilitate its access to international markets. In 1999, the bank's Executive Board finally introduced an environmental management framework applicable on a global basis, valid for both the internal and external guidelines described above (cf. ING 2000b). One of its aims was to standardise worldwide the environmental aspects of the Group's properties, such as concerning energy and waste streams.

So far, however, the process of worldwide standardisation of the bank's internal environmental guidelines has started to be implemented in the Netherlands and, according to the environmental report, in Australian branches. From the empirical research we learnt that both in São Paulo and Beijing the Energy Awareness Campaign and the Energy Monitoring Programme are not being implemented at the moment. According to local managers, environmental criteria were not given explicit consideration during the decision making phase regarding the selection of the premises in both cities. In addition, no environmental criteria are being applied in the running of the offices, except for basic environmental management systems based on common sense – which are being carried out according to local initiatives, i.e., voluntarily. In this sense, the only environmental innovation that could be detected was the use of a water recycling system in Beijing's office, a standard of dematerialisation launched by the Beijing Water Management Bureau. In São Paulo, ING's office does not display any environmental innovation, and this is also attributable to the fact that local environmental policy networks do only have incipient programmes targeting office buildings, with rather limited effects. During the energy rationing programme of 2001, the bank's policy was to decrease the number of redundant lighting, start a behavioural programme, switch on an energy generator to cope with the required reduction, and to introduce a smart lighting system in the lavatories. While the latter strategy consists of a long-term solution of dematerialisation, the other three were discontinued at the end of the energy rationing period.

Both in São Paulo and in Beijing, decisions regarding environmental issues at ING are to be raised, decided, and financed at the local branch. Therefore, and in spite of the bank's global environmental policy, there is an apparently mismatch between the planned and the implemented as no channels of environmental management stemming from the global headquarters are influencing the environmental dimension – at the operational phase – of the offices in Beijing and São Paulo. The offices in Beijing and São Paulo only cope, in their turn, with the demands of space efficiency, state-of-the-art of conventional (not environment-related) technologies, location, and architectural image, where ING is a tenant of the space. In both cities, ING has little contact with local institutions dealing with environmental policies applicable to office buildings, so that possible partnerships for the deployment of environmental innovations are also more limited in these two cities. In Amsterdam,

in contrast, the bank is pursuing much more in terms of environmental management, which seems to be attributable to the fact that authorities in this city take a much stronger stand regarding environmental issues, where in addition ING is the owner of its properties.

In this sense, the environmental restructuring of ING's office buildings in the three cities is showing more diversity of policy arrangements, than a global homogenisation of environmental policies or strategies. In Amsterdam the interface between global and local management of environmental flows is mutually constructive, implemented and enforced. Both spaces of social action are gearing towards synergistic effects, in which the local launches constraining policies and incentives (e.g. energy standard, subsidies, etc.) and the global, based on these, responds with environmental management strategies, e.g. energy awareness campaign, energy monitoring system, etc. In São Paulo, in contrast, the picture that emerges is quite the opposite. There, the management of environmental flows conducted by local and global actors is mutually discouraging, as neither actor is prompting environmental change. There, only basic environmental management systems are being carried out, contradicting the statements of the company's global environmental report. Urban environmental policies are also incipient, making no effects, providing no incentives or norms of environmental conduct. ING-São Paulo indicates to be a situation of what some authors have termed environmental management 'stuck in the mud' (e.g. Zarsky, 1999). Finally, the case of Beijing demonstrates that the environmental restructuring of ING's office is dependent of local policy agencies and is exclusively geared towards the dematerialisation of water consumption. In this situation, and as the company is also inconsistent with its global environmental policy, the environmental restructuring of ING's offices is a process unilaterally constructed, implemented, and enforced by the locality.

With regard to our conceptual model, we can conclude from the Amsterdam situation that a nation-state in cooperation with a multinational company tends to get environmental policies started also at the level of the 'space of flows', with the company also referring thereby to transnational codes of conduct such as the ICC charter. In other words, the strategies arising from the Amsterdam-ING interception tend to be translated – at least on paper – to global company strategies. However, the expectation to see these policies becoming implanted and implemented in similar ways at the other nodes of the globalised society that ING as a company is involved in does not turn out to be realistic. One might conclude that the environmental management strategies of ING in the other cities prove to be driven primarily by local actors and policies, resulting ultimately in environmental strategies at a lower level as compared to the regime ING is striving for in Amsterdam.

Andersen in Amsterdam, São Paulo, and Beijing

As the premises of Andersen analysed in Amsterdam, São Paulo, and Beijing indicated, this company does not stand as an example of global network of environmental management practices. The numerous environmental innovations intro-

duced in the (former) Andersen building in Amsterdam South (Amstelveen) were primarily triggered by developers and building companies. These innovations exceeded the requirements set forth in the building code, as the building was a pilot project to set benchmarks for environmental performance. Yet, its construction received support from the municipal government (Amstelveen), which facilitated the procedures for delivering a construction permit. In addition, the investor (a German bank) also received subsidies from the Dutch government for the environmental features of the building. Novem, the Dutch agency for energy and environment, also had a participation in enhancing the energy aspects of the building. The company Andersen, conversely, did not have specific environmental ambitions regarding the building and, as evidence indicates, it seemed to occupy such green building *by chance*. In addition, it also did not have any specific environmental policy framework, neither at the global headquarters in Chicago, nor locally in foreign premises. In Amsterdam, local managers report to have conducted basic environmental management systems voluntarily, mostly based on common sense, i.e. good housekeeping, although no written commitments were ever available. In this sense, the greening of this building in Amsterdam was mainly influenced by local economic networks (the developers and investors), with support of local policy networks (through subsidies and other forms of facilitations), but with no direct interference of the multinational company. The main environmental strategies of these local actors are in the energy area again and they consist of dematerialisation and substitution of technologies through for instance the introduction of solar cells. There is no advanced monitoring in place however.

Against this background, it will not come as a surprise that Andersen's offices in São Paulo were found to be rather poor in terms of environmental management. In this city, local facility managers claimed the company to have only pursued basic environmental management practices, mostly regarding the cleaning of air conditioning systems and waste recycling, where decisions were made and financed with local budgets. As a tenant, Andersen did not have any involvement in the design phase of the office in São Paulo, and for that reason argued not to be liable for the selection of certain energy and water intensive technologies. Yet, the building went through a large refurbishment during which period Andersen did not introduce any specific environmental innovation either. The local facility managers claim to have suggested the installation of energy and water efficiency technologies several times – for cost-reduction reasons mainly. These suggestions were rejected however by Andersen's local management board. During the energy rationing of 2001 the building did not incorporate any long-term strategies, such as related to dematerialisation or monitoring, and it did instead achieve the required reduction in energy consumption mostly by deploying a generator fuelled by diesel. In view of the company's closing, the research did not check whether such strategies continued after the end of the energy rationing.

Andersen's involvement with local agencies regarding environmental care was limited in São Paulo to energy and water companies, for the payment of bills through the facility management department. In this context, and as environmental

strategies launched by local public organisations were also weakin this city, the building does not present any kind of relevant environmental innovation. In Beijing, in contrast, although Andersen could be expected to have shown a similar code for environmental management as in Amsterdam and São Paulo, the building where it maintained its offices (the China World Trade Center building) uses a system of water recycling. What is interesting about this system is that it was introduced during the design phase of the building (mid-1980s) by the engineering firm responsible for the construction (a Japanese company, hence a global economic agent), following the international state-of-the-art in standards and technology available. Although it has now become a standard being applied – and strictly enforced – by Beijing's Water Management Bureau, the China World Trade Center building was one of the first in China to make use of this solution of dematerialisation.

Andersen considered itself as a multinational 'partnership', rather than a multinational company, and as such all units worldwide were fairly autonomous, also regarding decisions for the environmental management of the premises. However, before the company's closing, the global headquarters in Chicago had stated a wish to homogenise the environmental performance of the worldwide premises of Andersen, to be coordinated by the real estate department located in Chicago. Although the company did not last long enough to see this homogenising process taking place, the aim was claimed to be both economic (to save on energy/water bills) and ecological (to protect the environment).

The interfaces of Andersen in the three cities leave little doubt that the environmental strategies of the company's offices are, irrespective of the location, dependent on the local management of environmental flows, either from policy networks or economic networks, or both. In Amsterdam the management of environmental flows materialises as local networks of environmental change are rather strong, and as such the building Andersen maintained in this city represented a breakthrough in terms of environmental standards. The company itself however did not contribute to this greening process. In Beijing, the local networks are rather strong in terms of water management, so the building Andersen occupied in this city had a particular system of water management. Both in Amsterdam and Beijing the main company strategy of environmental change was dependent upon the unilaterally constructed, implemented, and enforced environmental management frameworks as put forward by local agents. Finally, in São Paulo the situation again turned out to be different because of the near absence in this city of local environmental policies. In this city, the building Andersen occupied also can be said to provide proof of this general absence of local environmental care, as we already concluded from the case of ING in the same city.

By evaluating the Andersen-cases in terms of our conceptual model, we are able to specify in more detail the crucial role played by local actors in the environmental reform strategies of office-buildings. Such local actors can either be economic or political actors. The environmental strategies they deploy reach the company and its local facility managers either directly, or via the (representative ex-

perts of) local infrastructural networks involved in the provisioning of water, energy or waste-services, or via both. As the Amsterdam-case clearly shows, local actors might use environmental strategies to attract transnational actors to their local nodes, e.g. the German investment bank via subsidies for green projects. In this sense, and by anticipating upon the top environmental priorities to draw such transnational actors for doing business, local actors are eventually also laying out a kind of 'green carpet' for companies which – now or in the near future – would prefer certain nodes in the global network for their good environmental performance. In view of this theoretical possibility, the local green office stock of company X or Y can be either the result of incidental or ad hoc local environmental policies, or it might prove the result of a global company strategy aiming to pick a green-equipped node in the global network of cities. The Andersen case indicates that the green building it occupied in Amsterdam must be seen as the result of the first mentioned – ad hoc, incidental – type.

ABN AMRO in São Paulo, Amsterdam, and Beijing

ABN AMRO endorsed in 1992 to the Charter of the International Chamber of Commerce, committing itself to integrate environmental considerations into all business decisions. In 1995, an environmental policy was formulated and approved, eventually paving the way for the implementation of the first environmental management system, concerning in-house environmental management (such as waste management, goods purchasing, transport, energy, and environmentally and people-friendly offices) and more sustainable financial products and services. In 1997, following the energy performance standard and the long-term agreement introduced by the Dutch Ministry of Economic Affairs in 1995, the bank launched an energy project for the Dutch premises, consisting of three components: the installation of advanced energy monitoring (counting pulses of energy every 15 minutes to detect and correct abnormalities), the introduction of energy management (through intelligent devices, to make sure that lights are off when human presence is not detected), and the reduction of energy use (by investing in technological substitution). As in the case of ING, the introduction of an advanced energy monitoring system is to a certain extent related to the liberalisation of the energy market, which requires a detailed monitoring of energy consumption in the building. An important component regarding the energy project is the fact that the bank has a fund of EUR 2 million to be spent annually in the Netherlands, for which investments should have a payback period of five years, being thereby an exception to the bank's policy for investing in two-year amortising projects.

So far, the global headquarters in Amsterdam is the greatest achievement of the energy project, being a kind of pilot project that introduced numerous environmental innovations, going beyond prescriptions set forth by the government. In addition to energy monitoring and management, it has also advanced technologies for acclimatisation, including climate façades and climate ceilings, proving therefore to employ solutions of dematerialisation. The municipality of Amsterdam, in its turn,

also had a significant contribution in the greening of the building as it established covenants or methods of cooperation that resulted in the decrease of single car use by employees in commuting as the building would offer a limited number of parking spaces (this was done through Amsterdam's transport authority, which compromised in turn to improve the public transport system). On the other hand, however, neither the bank nor the municipality of Amsterdam did have an influence concerning the decrease of water consumption. In this sense, ABN AMRO is not pursuing the same ambitions it has for energy when it comes to water use, following the claim that water is not yet an environmental priority, and therefore still a cheap resource in the Netherlands. These decisions were (are) made by the Health and Safety Department and partly by the Housing and Real Estate Department, which operate under the Consumer and Commercial Clients business unit, and are supervised by the Management Board. Issues regarding sustainable building are ultimately under responsibility of the bank's Management Board, although it is clear that the greening of this building is a combination of efforts made by both the company and governmental organisations at different levels.

In its turn, the bank's environmental report states that in-house environmental management, unlike the energy project, is applicable on a global basis. As mentioned above, it regards environmentally and people-friendly offices, encouraging thereby improvements in energy consumption, waste, purchasing, and transport throughout the building lifecycle, that is, from raw material extraction, transport, construction, use and demolition (cf. ABN AMRO, 2000b). At the moment, however, when analysing the local premises of ABN AMRO in São Paulo and Beijing such policy is not yet in place. In São Paulo, the local manager reports that the procedures during the acquisition – and renovation – of the properties of Banco Real in 1998, decided by Dutch managers, concerned mostly decoration elements, and did not regard the above in-house environmental policies as such. In its running, only basic – and voluntary – environmental management systems are fulfilled, concerning the cleaning of air conditioning systems and basic waste recycling; no specifications are in fact stemming from the global headquarters. During the energy rationing period in 2001 the building employed a few energy saving solutions, such as the switching off of redundant lighting, but nothing was pursued in terms of longer term strategies (related to dematerialisation, substitution, monitoring). As local networks of environmental policy do also not have specific prescriptions that would prompt environmental innovations in office buildings in São Paulo – neither did they have during the energy rationing – the building ABN AMRO maintains in the city proves to be fairly limited in this regard.

In Beijing, ABN AMRO is tenant of a small office space, which was selected in view of location and standards of architecture and building services, not taking explicitly into account environmental criteria. Standard or mainstream environmental management is taking place only, as the local managers argue the branch to be rather small, and the budgets too limited to compensate any long-term investment. The environmental innovation that exists regards the water recycling system, introduced following prescriptions of Beijing's Water Management Bureau,

and an energy saving system (including a smart lighting system) introduced by the facility managers of the building. While the former solution consists of a standard used by the Water Management Board (to ensure that water resources are managed in a more sustainable way), the later is related to the increasing energy prices in the country, prompting facility managers to use electricity in a more economic way.

Decisions regarding the in-house environmental strategies of ABN AMRO in both cities need (at the moment) to be raised locally, by local managers, although budgets are to be approved by the headquarters in Amsterdam. With regard to ABN-AMRO environmental strategies, two specific characteristics should be discussed. First, the energy project in use in the Netherlands does not apply on the global level. Therefore, in the case of energy projects outside the Netherlands (that would be possibly suggested by local managers at foreign branches), the payback period would have to be of two years (unlike in the Netherlands which is five years), decreasing therefore the scope of possibilities of investing in technologies that might be costly on the short-term. Second, the in-house environmental strategies, though stated in the company's global environmental policy, for various (also local) reasons are not yet in use in São Paulo or Beijing. These topics demonstrate that while much is being accomplished in Amsterdam – and notwithstanding the fact that the bank aims at applying some or most of the Amsterdam elements of environmental management at the global level as well – the bank is at this very moment not (yet) contributing to the greening of its offices in São Paulo and Beijing. In this sense, environmental innovations at the offices of ABN AMRO in Beijing and São Paulo turn out to be (too) strongly dependent on local policy and economic networks. Finally, both in Beijing and São Paulo direct contacts between the company and local environmental policy networks are too limited to make the global company strategy work.

As can be noted, the environmental restructuring of ABN AMRO's offices in the three cities is developing several communal points with the greening of ING's offices. In Amsterdam, both urban environmental policies and corporate environmental strategies are mutually constructed, implemented, and enforced. Local actors launch standards and forms of incentives (e.g. covenants) for environmental change and the global company responds to these by elaborating a pilot project for sustainable building and an energy project, among others. As in the case of ING, the environmental innovations tend to start with energy issues, with energy policies constituting a hybridisation process between urban policies and corporate strategies. In São Paulo and in Beijing, the bank's global environmental policies regarding in-house management are not being implemented while ABN AMRO's facility managers in both cities turn out to be heavily dependent on local agents and actors.

Regarding our conceptual model, the ABN-AMRO case can be evaluated as follows. Environmental policies to be applied to the companies housing strategies were developed at the local level, these policies resulting from an active interplay and mutual reinforcement of local strategies and company strategies. While the company displayed the deliberate intention to generalise (part of) these local experiences into a company-wide environmental strategy to be applied in the space of

flows, this pro-active stance does not automatically result in worldwide successes. When local actors at other nodes of the global network of cities are not willing or able to unfold a 'green carpet' whatsoever and even do not show great willingness to respond to the companies global strategies in green housing, there results only a selective or partial strategy of environmental reform at these nodes.

IBM in Amsterdam, São Paulo, and Beijing

Among the companies analysed in this research, IBM has the longest-standing environmental policy, including strategies introduced back in the 1970s. This is probably due to the fact that IBM, also having production facilities, has been more compelled as compared to the above companies in implementing environmental regimes. In this sense, its global environmental policy is also more solid in terms of scope and enforcement procedures as compared to those of the other companies, and also applicable to the running of its offices. Its main rule is to follow the most restrictive standard, either the local or the one set by the company regarding the design and operation of premises, such as concerning issues related to indoor environmental quality, fire safety, energy/water use, and so on. In addition, another rule is that all premises worldwide need to reduce consumption of energy and water annually by four and one percent respectively (to achieve cost-reductions) as well as carry out periodical environmental audits.

In the Netherlands IBM is currently finishing the construction of an environmentally friendly building, designed by an internationally renowned environmental architect, where most environmental features follow Dutch prescriptions. Like in the case of ING and ABN AMRO, IBM has also installed in its premises in the Netherlands an advanced energy monitoring system, claiming to have done so to facilitate the reading of energy meters in view of the liberalisation of energy markets. To achieve the targets of energy and water reduction, IBM in the Netherlands makes use of behavioural campaigns, downsizes server areas, and substitutes obsolete technologies. The environmental performance of the premises of IBM worldwide are annually inspected by the Real Estate and Site Operations Department located in the USA. As indicated above, IBM's rule regarding in-house management is to follow the most restrictive environmental policy, either the one stemming from its global environmental policy or the one introduced by local authorities. In the case of its offices in the Netherlands, the most restrictive rules are those set forth by local authorities, such as the energy performance standard, the long term agreement, indoor disease management prescriptions (such as legionnaires' disease), and so forth. In this sense, the greening of its new headquarters as well as the greening of the operations of all its offices in the country are being considerably influenced by local policies.

Both in São Paulo and Beijing rather similar environmental standards, though being achieved through different strategies, are being applied in the premises of IBM. In São Paulo these strategies include a study of energy and water saving initiated in 1996, to update the technologies used in the building original from

the 1970s (originally constructed by IBM), leading to the retrofitting of lighting systems, the installation of water efficient sanitary devices, and occupancy densification, among others, decisions made locally but eventually supervised by the Real Estate and Operations Department based in the USA. They also include an environmental management system for the control of the indoor environment, waste management, and water quality. Local facility managers report that the global environmental policy does not impose energy and water efficiency standards as such but the building is annually inspected for the reductions of four and one percent of the consumption. Unlike in Amsterdam, as local environmental policies do not have a significant influence on the environmental performance of office buildings in São Paulo, all the environmental management innovations (such as the substitution of the above mentioned technologies) are being introduced by the company.

In Beijing, IBM's strategies to comply with the global environmental policy include the application of an environmental site assessment for the selection of the office building, through which the indoor environment as well as the management of energy and water are assessed to ensure that, for instance, water quality meets IBM's standards. They also include an environmental management system consisting of waste management (through separation), water saving (through behavioural campaigns), and energy saving (through behavioural campaigns, in addition to saving strategies like avoiding redundant use). The building is also checked annually for the reduction of energy and water consumption, by IBM Japan, which is in turn inspected by IBM USA. While in São Paulo IBM has a facility management department with an environmental subdivision reporting to the global headquarters in the USA, in Beijing environmental issues are still being held within the human resource department, and being reported to IBM Japan. Just like it was the case in São Paulo, all environmental innovations taking place at IBM's premises in Beijing are stemming from the company. In this respect it is noteworthy that, unlike the buildings occupied by ABN AMRO, ING, and Andersen in Beijing, the IBM Tower does not have this specific (local) water recycling system. So local networks turn out not to have a determining influence on its greening.

In view of these findings, the environmental restructuring of IBM's offices in the three cities again can be said to illustrate a specific local-global hybridisation process. This is particularly the case of the buildings in Amsterdam and Beijing, as their greening processes is constructed, implemented, and enforced by both the global company and the local agencies. A difference that emerges is that, as the company's environmental policy is to follow the most restrictive rule, in Amsterdam urban environmental policies surpass to some extent the company's environmental strategy, becoming thus the doming factor in the greening process. In Beijing, the company's environmental strategies surpass the local policies, although the local also has policies of sustainable building (that is, of water management, which paradoxically do not apply to the IBM Tower, cf. chapter 8). Finally, in São Paulo the environmental restructuring of IBM's offices is exclusively dependent on the company's strategies, as urban environmental policies are rather incipient. In

this case, the greening is a process unilaterally conceptualised, put into practice and reinforced by the global.

In this sense, and when evaluating the IBM-based environmental strategies in terms of our conceptual model, there arises the following obvious picture. IBM as pro-active and global actor can be regarded as a front-runner in developing environmental policies in the space of flows. This does not only imply that corporate environmental strategies at the worldwide level are accommodated with global standards for sustainable housing strategies. It also implies that companies *learn* how to deal with the interaction between the space of flows and the space of place. In the IBM-case, this results in the company guideline to always follow the strictest regimes in place, whether originated from local level actors and dynamics or from company strategies as developed in the space of flows. Therefore, to be a pro-active company at the global level, it requires making environmental policies work at *all* nodes in the world network society, regardless the lack of incentive or synergies from the side of local level actors and dynamics.

In a global matrix of urban environmental change

By highlighting the main dynamics that are prompting (or not) environmental change, we come to learn from the above that there are different social triggers and dynamics towards the greening of office buildings as well as various types of arrangements of environmental restructuring in different cities. According to our case studies, environmental policies stemming from the global are in some cases easily adopted or absorbed by the local. In some cases, environmental policies deployed by the local may actively trigger or seek to further policies of the global. At certain times also environmental policies of the global may activate policies of the local and in some cases even trespass or by-pass local actors and infrastructures by implementing company strategies more or less autonomously. In not a single case of our sample, however, are environmental policies of the local actively hindering or obstructing policies of the global, or vice-versa. After interpreting the local-global interface of environmental management for our case studies, we shall now move beyond the sphere of empirical factors and attempt to construe the findings of this research in a more general and theoretical way. In so doing, we shall focus on the opportunities and possibilities for the successful implementation of environmental reforms in a transnational perspective.

When exploring environmental change in office buildings, the empirical findings of this research leave little doubt that we are dealing with two different realms of management practices. On the one hand there exists a local urban perspective, comprising the realm of environmental *policies* mainly, while on the other hand we identify global corporate perspectives comprising primarily the realm of environmental *management*. In general, local environmental policies are elaborated with the ultimate aim to influence the behaviour of both local and global actors in order to realise or maintain the use of natural resources in a more sustainable way.

In general too the degree of institutionalisation of environmental criteria is positively correlated with the degree of importance attached to the environment by a society at large, i.e. the weight and political priority given to environmental protection in the local culture surrounding the nodes of the global network society. In this context, the environmental restructuring of office buildings is primarily one among long-term solutions that are deployed to ensure the sustainability of the local environment and infrastructure in the first place. The dominant discourse in this realm is therefore of *optimising the use of limited resources* or environmental flows, such as the physical streams of energy and water. And the dominant means to influence the behaviour of stakeholders span from constraining policies (e.g. standards), to monetarisation (e.g. increase in energy prices, introduction of eco-taxes), incentives and forms of cooperation or negotiated agreements (e.g. covenants), among others. This also applies to the case of private utilities, as such companies do also want to sell more out of less to ensure the survival of their business. It is self-evident that in different societies environmental interests are of different priority. Where other priorities dominate or monopolise the political agenda – such as poverty, economic downturns, etc. – the environment (and its protective policies) is severely neglected, limiting the local urban influence in greening office stocks.

In contrast, the global realm of corporate management has as its dominant perspective maximising profits and business continuity. Environmental strategies are only viable if they do not (structurally) jeopardise these dominant goals. By the same token, environmental protection also goes hand in hand with the long-term survival of the company, so that the underlying discourse of corporate environmental management is of *preserving the environment under conditions of continuity and profit maximisation*. For companies, the greening of their offices is sometimes welcomed as an opportunity to improve productivity and increase revenues, by for instance reducing the running costs of the premises (e.g. through energy and water bills). In addition, it can be used as an opportunity for the company to perform as a (socially and environmentally) *responsible* company and as such attract clients and satisfy customers. As observed in this research, the main corporate strategies as they are developed to realise goals of dematerialisation of resource use in corporate offices, are based on management principles – e.g. environmental management systems, environmental audits, environmental site assessment, energy saving projects, monitoring, environmental report, and so forth. These strategies may further comprise corporate standards (e.g. reducing energy consumption annually, following the most restrictive rule, etc.), which may in turn also push for technological substitution.

As can be noted, both realms of global corporate environmental management and local urban environmental policies, respectively, are in principle not conflicting. However, a major contradiction in corporate environmental management regards the increase in capital expenditure on the short-term due to the investments involved, which sometimes goes against the profit component of their management discourse. Therefore, it is correct to say that the institutionalisation of environmental care in corporations has to a certain extent to be *activated* or encouraged by

urban policies or by a specific branch of pro-active corporate strategies, such as those discussed above. Local policies do play a role in overcoming the exclusive dominance of profit maximisation strategies for example when making the primary steps to trigger environmental change in a specific location. This explains why in cities with a well-developed environmental management structure, e.g. Amsterdam, companies are more induced to pursue environmental change. On the other hand we witness that global network based environmental institutions and regulations (ICC, WTO) 'directly' trigger actors at the global level as well.

In addition, and transcending the dichotomy of local environmental policies and global environmental management, two other mechanisms can be noted with regards to the greening of office buildings in major cities: transnational urban environmental policies and local corporate environmental management. Local urban environmental policies get increasingly transnationalised via various mechanisms, to land in various cities. Local Agenda 21 initiatives, Sustainable Cities programmes, renewable energy targets strongly triggered by, among others, the Kyoto Protocol, best practice standards in energy efficiency, international transfer of building codes are all policies that started originally with policy-makers at the local or national level, but managed to become part of a global political space of environmental policy-making. Via international conferences, international information systems (such as journals, the Internet), global meetings such as those in Rio de Janeiro (1992) and Johannesburg (2002) and numerous ones in between, but also via international economic and civil society interactions and exchanges, local policies, strategies, and activities become part of a global flow of environmental reform, to feed into and land in other localities. Thus it should not surprise us to find to some extent similar initiatives of local policy-makers and utility sectors in different major cities.

At the same time we find corporate environmental management to 'localise'. Local branches of multinational firms develop their own initiatives in dealing with the environmental dimensions of office buildings, and the central headquarters of multinational companies provide them room for this manoeuvring, be it to a different extent for different firms on different environmental issues. Andersen is a typical example of a multinational firm that leaves larger degrees of freedom to local offices in designing environmental care systems, making the final result of environmental performance in the office buildings more dependent on the local urban environmental policies and local corporate environmental management, than on the transnational environmental management of Andersen as a global firm. 'Localising' policies in this case can also imply that in the end relatively little activities result. Within the local branches of IBM the degree of freedom to develop a local corporate environmental management is more limited, but still there. In this case localising also takes on a specific meaning, namely adapting to local level standards only in case they are stricter when compared to overall company strategies. Another illustration of local corporate environmental management is the case of Andersen in Beijing, which (incidentally) used the water-recirculation system originally launched by a Japanese engineering firm in the building it occupied in

	Local / space of place	Global / space of flows
Urban environmental policy	x	x
Corporate environmental strategy	x	x

Table 9.1
The Matrix of urban environmental change at the local-global interface.

Beijing, which became a standard later on for other buildings in that city. Other economic actors (e.g. developers, architects, construction products manufacturers, etc.) could also articulate and implement greening strategies in local office buildings that might subsequently internationalise via the transnational corporate structures.

As shown above, most dynamics can be accurately described with the help of our conceptual model (cf. Figure 5.1). However, especially the last two mechanisms have further consequences on our original model. It is not so much that the original model is incorrect, but rather that reality turns out to be more complex. The greening of transnational buildings is not just dependent on and influenced by global corporate flows of environmental management and local spaces of environmental policy and utilities. The 'space of flows' and the 'space of places' both show combinations of political and economic dynamics working simultaneously. Transnational urban policies and local corporate environmental management do play a role, which depends strongly on the local environmental capacity and profile of the cities, the structure and corporate image of the firm and the kind of environmental issues that are being dealt with. This translates into a combination of mechanisms and dynamics (or: which quadrant of the matrix in Table 9.1) influencing the greening of transnational office buildings in major cities in the era of transnational urbanisation.

Ecological modernisation theory and transnational office buildings

This research made use of the theory of ecological modernisation to frame its empirical enquiry. Reverting to the hypotheses elaborated in the end of chapter 4 we should now see how the theory, in its descriptive dimension, fits when exploring globalisation and the environmental restructuring of transnational urban spaces. Along these lines I shall also reflect on how our study may contribute to the advance and/or refinement of the theory's core propositions in the light of our empirical and conceptual findings and propose lines for further research.

As its adherents have made clear, ecological modernisation theory is primarily a theory on social change. One of its core hypotheses is that besides economic criteria, production and consumption processes are increasingly being designed and

evaluated also against ecological criteria. These ecological criteria are eventually developing as an 'independent' rationale of global modernity, inducing transformations in the processes of production and consumption towards an ecological *modernisation* logic. In the light of these transformations, the economic rationale of modernity is being ecologised whereas an emerging ecological rationale is being economised while assuming an emancipated status in modernity.

When applied to office buildings, this assumption suggests that in line with other production and consumption processes, office buildings are increasingly designed and operated according to an ecological logic. In chapter 4 we tried to grasp how this logic is taking place and put forward that the emerging ecological criteria for the design and operation of urban/transnational office stocks is developing in an undeniable *modernisation* process, favouring more efficient – rather than self-sufficient – use of resources. Environmental innovations are emerging in a combination of locally embedded techniques, such as passive solar design, with global technologies provided by global suppliers, such as saving equipment (energy, water devices) and high performance materials (such as cladding, windows, and so forth), fostering a partial dematerialisation in addition to a substitution of technologies and monitoring of resource use. Finally, these environmental innovations are emerging as a means to reduce the expenses of the companies that occupy the office space as well as an asset for marketing the environmental performance of such companies.

The empirical evidences of the previous chapters confirm that, though not to the same extent in all its aspects or in all places, ecological criteria are undergoing an empowerment in the design and operation of urban office buildings worldwide, and much along the above lines. Moreover, the evidences also leave no doubt that ecological arguments are consolidating as an important factor of urban development as well as of corporate agendas, a fact that, though in different degrees, applies to most of the case studies analysed in this research. Evidences raised in this research suggest that environmental innovations triggered at the interface between urban policies and corporate strategies are indeed fostering a modernisation process, comprising solutions of monetarisation, monitoring, technological substitution, and dematerialisation. These developments leave little doubt that ecological arguments are indeed ascending in public and private agendas, particularly when it comes to urban policies where a clear concern regarding the sustainability of using limited resources becomes increasingly obvious. In this sense, this hypothesis is indeed helpful when studying the environmental transformation of office buildings in different places.

However, the processes through which such ecological criteria are emerging in the urban office stocks in different locations vary according to the findings of our research. In line with ecological modernisation theory, a second and fundamental hypothesis we stated in chapter 4 regards the transformation of the institutional order when dealing with environmental protection with the changing roles of both the state and the market in carrying out environmental reforms. Whereas in earlier periods of environmental policymaking (i.e., the 1970s) the state had a crucial role to play in instigating environmental reforms – usually through top-down, com-

mand-and-control policies – nowadays the state is rather 'delegating' environmental care tasks to the market via appropriate, enabling policies. When looking at the role of the state in the environmental management of transnational office stocks, this proposition is in turn entangled in another theoretical discussion as, in an era of transnational urbanisation, the role of the state in managing transnational urban spaces also becomes ambiguous (cf. chapter 2).

When assessing the role of the state – in (i) governing the environmental challenges of transnational spaces, and (ii) launching enabling policies – the evidences raised in the previous three chapters seem to add more to divergence than convergence. This is probably due to the different economic and political regimes of the cities selected for this research. In a highly developed, democratic, and relatively state-controlled market economy city as Amsterdam, for instance, it is clear that the state – through both municipal and national governmental bodies – plays a key role in controlling the environmental challenges emerging with the rise of transnational spaces as well as in launching a combination of enabling and constraining policies. In a newly industrialised and socialist market economy city as Beijing it is also clear that the state exerts a great deal of control over the rising transnational spaces, through for instance being a partner in every development that is taking place – although infringements to the building code are being reported. However, its role in managing the urban environment seems to be still approaching mainly command-and-control strategies, as the requirement of environmental impact assessments and the water recycling standard for large buildings indicate. Finally, in a newly industrialised, democratic, and relatively free-market city as São Paulo the state is still fairly lax regarding the general management of transnational spaces, favouring (economic) growth but allowing a rapid environmental transformation of the city, by for instance modifying zoning regulations and issuing policies that allow growth and – paradoxically enough – environmental abuse. On the other hand, the state through different government levels, seems to be slowly launching enabling policies of environmental management, by for instance developing pilot projects of rational use of water (including for office buildings, launched by the water company) and also by requiring private energy companies to optimise the consumption of energy (launched by national energy agency whilst privatisation process). Yet, these enabling policies are not (yet) being effective, putting into question their value in a city where the environment is a topic not prioritised neither in policy/economic circles nor in societal values. In this sense, this proposition on the role of the state in governing environmental change deserves a more careful interpretation when applied to urban spaces on a global scale as we witness that the predictions of ecological modernisation theory are not leading to similar consequences in other locations than Europe.

In contrast, however, though these differences are clearly detected in our study, the third hypothesis that comes to the fore regarding the role of the market in implementing environmental reforms is confirmed throughout our case studies. While environmental criteria are emerging differently in political circles, they are – though in different intensities – being incorporated by economic circles worldwide

when analysing office buildings. That is, besides the evidences raised in the three cities analysed in this study, market actors – developers, companies, banks, construction products manufacturers, and so forth – in numerous instances are indeed playing a crucial role in promoting an environmental shift in urban development and building practices. In addition, there is no doubt that market actors are in certain cases not only complying with constraining policies or assimilating enabling policies launched by the state, but are also contributing to furthering the development of environmental technologies for office buildings as well as environmental management approaches to be applied in offices. Evidence raised in this research indicates that market actors are in a number of cases – and in all the three cities analysed – indeed going beyond the expectations of the government in the carrying out of environmental change.

In this sense, this hypothesis put forward by the ecological modernisation theory is certainly helpful when analysing the dynamics of the environmental restructuring of office buildings. However, differences are to be noted between places with a well-developed environmental care capacity – e.g. Amsterdam, Frankfurt, Tokyo, Sidney, and so forth – and those where the environment is a not highly prioritised topic. In the former, market actors prompting environmental change are more numerous, hence more influential. In the latter, though they also exist, they are much scarcer. This discrepancy brings us back to the discussion raised in the previous section on the role of the state in activating the environmental change of market actors, due to the issue of overcoming the financial short-term obstacles that usually accompany environmental innovations. Therefore, while valid, this hypothesis is still intertwined with the hypothesis (and dependent) on the role of the state in activating environmental change above discussed when analysing different cities.

This said, a culminating hypothesis we thereby raised in this study in the light of ecological modernisation theory is that, if market actors play indeed a role as environmental reform carriers, in the era of globalisation, they may play a role in diffusing environmental innovations worldwide. In so doing, they may prompt a race to the top in environmental management especially for newly industrialising countries. Although in this research we looked at the contributions that multinational companies may be giving in this regard – claiming that once they start to play a key role in influencing in the environmental restructuring of office stocks in their home countries (cf. above, chapter 3) they should do the same elsewhere –, this hypothesis also applies to other global market actors, e.g. developers, investors, and so forth.

Throughout this research we many times came across information regarding global economic actors that are favouring a virtuous, virtual circle of urban environmental reforms. According to the evidences raised, such actors are indeed prime catalysts of an ecological modernisation process, forming a bridge from locality to locality in the transcending of environmental change: distributing new solutions of environmental management, new technologies, new approaches of urban policies, and so forth. There is no doubt that global and local economic agents are one if not

the main engine of environmental management for transnational urban spaces. Although not always activated to transnationalise such environmental innovations (as some of our case studies demonstrate) they are valuable and potential social triggers of urban environmental change. In this light, yes, the global virtuous circle of urban environmental reform seems to have been triggered. Yet, to be thoroughly efficient, the globalisation of the ecological modernisation of office buildings still needs to be ignited in certain aspects, in line with the discussion we had previously in this conclusive chapter.

Epilogue

The ecological modernisation theory taught us that environmental care can be and is at various cases promoted within the framework of a globalising capitalism. The capitalist structures and dynamics are not jeopardised in advancing the greening of office stocks. Yet, a consideration that should be given regards the time frame that such transformation process requires, and the degree to which the greening process (can) takes place within the framework of global capitalism: does it fits the planet's carrying capacity? Empirical evidences raised in this research indicate that urban environmental reforms are long, intricate processes, which depend on the ability of the various stakeholders involved. In the Netherlands, for instance, the institutionalisation of environmental criteria started mostly during and following the energy and environmental crisis of the 1970s. Although 30 years later this institutionalisation has led to the incorporation of environmental criteria in different (public, private) agendas, there is still a huge road ahead. Nowadays only 5 percent of commissioners require a so-called environmentally friendly office building in the Netherlands. This means that the governmental policies have to keep evolving and that further stimuli need to be given to the market. The virtuous circle has been triggered but is not yet surpassing the effects of the vicious circle of environmental disruption.

Theory-wise, the contribution of the study to this field is twofold. First, this study shows that the dynamics of urban environmental change is developing much in line with the theory's propositions, despite the different circumstances analysed in the research. This applies in particular to the emerging ecological criteria and to the role of market actors as catalysts of environmental change, issues that are valid to the three localities explored in the research – be it not to the same extent in each location. In addition, this study being among the first ones to analyse the role of globalisation processes in the environmental restructuring of different localities, it is also among the first to move beyond the Eurocentric background of ecological modernisation theory. For this reason, it contributes to the theory's development above all by showing that despite the many similarities with the theory's core propositions, some social dynamics of environmental reform diverge between the three cities, with different consequences to environmental change. This applies in particular to the role of the government in facilitating environmental reforms (e.g.

the effectiveness of enabling and constraining policies). As discussed above, there is no doubt that in societies where the institutionalisation of environmental care is still a somehow embryonic process – or above all where the environmental considerations are completely overruled by economic growth priorities – certain mechanisms still need to be evoked to trigger the dynamics of environmental change. In this sense, the globalisation of ecological modernisation theory is somewhat dependent on the working out of a number of parallel mechanisms of environmental reform. For this reason, the theoretical contribution of this study is that it reveals that the dynamics of environmental change put forward by the mainstream elaborations on ecological modernisation theory still deserves a more careful deliberation when looking at regions outside North-west Europe or (arguably) the OECD.

Secondly, this study is also helpful in informing the debates on the global/informational city or transnational urbanisation. These debates, advanced by scholars as Manuel Castells, John Friedmann, and Saskia Sassen have been multiplying since the early 1980s, bringing a whole new research agenda into urban theory. While discussing the impacts of globalisation on the spatial, social, economic, and political dimensions of major cities, these debates also converge in the idea that globalisation has indeed turned into a dominant reference point for interpreting contemporary urban change. The contribution of this study in this respect is to highlight the environmental dimension of major cities in this agenda, by analysing the links between globalisation and the environmental disruption and restructuring of the urban space. Globalisation also affects the 'sustenance base' of urban centres. In doing so, the study also makes the link between such research agenda with the one of ecological modernisation theory.

In turn, on a practical level this study also provides inputs to (urban) policymakers, corporate managers, local-global interface organisations (e.g. those developing codes of environmental conduct, such as CERES), and practitioners in general. For the first group of actors this study demonstrates, in a comparative way, the mechanisms for environmental reform that may be in place in different localities as well as their effects, in view of the different circumstances of different places. With this information, policymakers may be in a way better equipped to formulate adequate policies to activate and facilitate these dynamics of environmental change. Corporate managers may also make use of the information of this study to better understand the modes, opportunities, and constraints for in-house environmental strategies worldwide. Interface organisations may learn from this study particularly regarding the procedures of compliance with voluntary codes of environmental conduct (which should be better monitored and more strictly fulfilled). Finally, practitioners as architects, urban planners, developers, and so on may also learn from this study when designing buildings/urban spaces in view of the kinds and shapes of environmental innovations that may be applied, e.g. technological substitution, monitoring, dematerialisation. For this latter group of actors, this study may be of particular use for complementing the mainstream literature on 'sustainable building' by adding to it the societal dimension – e.g. how technolo-

gies or environmental innovations are in general being selected and decided upon – which is usually so much overlooked.

As I have stressed from the outset and especially during the chapter on methodology, this is an explorative study. Consequently, there remains much to be done. Further research on this topic may find fruitful fields by shifting the analysis for instance from the operational phase of office buildings to other phases – e.g. construction – for which a whole new research programme should be elaborated in view of the different stakeholders involved (e.g. commissioners, designers, policy-makers, and so on). In an enquiry into the construction phase, perhaps the participation of multinational companies would be more restricted whereas other global market actors would come to the fore, such as product manufacturers, foreign investors and developers, carrying with them probably numerous environmental innovations. Another research line that needs further development is on different types of buildings in transnational urban spaces between local and global actors. Probably research into commercial facilities such as shopping outlets, airports, and hotels will find abundant information on environmental innovations in this regard. Such research can apply a methodology in line with the one used in our enquiry, seeking for 'how' and 'why' answers. But in addition research will be needed on environmental innovations in transnational urban spaces in a more quantitative way, seeking in turn 'how many' sort of answers. This latter group of studies would involve a larger number of major cities and standardise the research into the emergence of environmental innovations at the local + global interface by focusing on one particular company, one particular foreign investor, or one developer. Or, alternatively, it could select a large number of companies, foreign investors, or developers and see their influence on the environmental restructuring in one or two cities. Clearly, these studies would be helpful to supplement and quantify the argument put forward in this research by providing generalisations of the empirical findings.

Globalisation is indeed a major force of the current phase of modernity and, as we sought to demonstrate in this research, it is affecting the urban environment in plural ways. Although there are several research approaches and techniques to explore how globalisation is prompting environmental disruption and/or reform in different cities, what is important is no so much to find faults amid the stakeholders in pursuing environmental care but above all to find entry points for solutions. Further research into this topic needs therefore to enhance the argument of how – the mechanisms and extent – globalisation, as a dominant and arguably irreversible trend in urban development, may be put at work for activating better environments worldwide.

References

Abel, Chris (2000), *Architecture & Identity. Responses to Cultural and Technological Change*, Oxford: Architectural Press

A Blueprint for Survival (1972), Harmondsworth: Penguin

ABN AMRO Bank N.V. (2000a), *Annual Report*, Amsterdam: Press Relations Department

— (2000b), *Environment Report 1998-2000*, Amsterdam: ABN AMRO Bank N.V.

— (2000c), *Portrait of a Building*, Amsterdam: ABN AMRO Corporate Communications

— (2001), *Annual Report 2001 ABN AMRO Holding N.V.*, Amsterdam: ABN AMRO Holding N.V.

— (2002), *The Electric Energy Sector in Brazil*, São Paulo: ABN AMRO (internal report)

Adams, Jan (1999), *Foreign Direct Investment and the Environment: The Role of Voluntary Corporate Environmental Management*, background paper for the OECD Conference on 'Foreign Direct Investment and the Environment', The Hague, The Netherlands

Adams, W.M. (1990), *Green Development*, London: Routledge

Alexander, E.R. (1998), "Amsterdam in the Red Queen's Country: Interorganisational Coordination and EU-Local Interaction in Spatial Planning and Policy", *European Planning Studies*, Vol. 6, No. 3, pp. 283-298

Albrow, Martin (1997), "Travelling beyond Local Cultures. Socioscapes in a Global City". In: Eade, John (ed.) (1997), *Living the Global City. Globalisation as a Local Process, London*: Routledge

— , John Eade, Jörg Dürrschmidt, and Neil Washbourne (1997), "The Impact of Globalisation on Sociological Concepts – Community, Culture and Milieu". In: Eade, John (ed.) (1997), *Living the Global City. Globalisation as a Local Process*, London: Routledge

AlSayyad, Nezar (1996), "Culture, Identity, and Urbanism in a Changing World: A Historical Perspective on Colonialism, Nationalism, and Globalisation". In Cohen, M.A., Ruble,

Blair A., Tulchin, Joseph S., and Allison M. Garland (eds), *Preparing for the Urban Future – Global Pressures and Local Forces*, Washington, D.C.: Woodrow Wilson Centre Special Studies

Amsterdam Economic Development Department (2002), *Amsterdam Foreign Investment Office*, retrieved from http://www.ez.amsterdam on May 12 2002

Amsterdam Physical Planning Department (2002), *Construction over the Ring Road*, retrieved from http://www.dro.amsterdam.nl on May 12 2002

Anink, D., Boonstra, C. and Mak, J. (1996), *Handbook of Sustainable Building*, London: James & James Science Publishers

Baker, N. and Koen Steemers (2000), *Energy and Environment in Architecture: A Technical Design Guide*, London: E & FN Spon

Banham, Reyner (1969), *The Architecture of the Well-tempered Environment*, London: Architectural Press

Battle, Guy (2003), "The Air We Breath". In: Gissen, David (ed.), *Big & Green: Toward Sustainable Architecture in the 21st Century*, New York: Princeton Architectural Press

Baud, I.S.A. and Hordijk, M.A, (2001). "Resource flows and urban governance: approaching environmental transitions in cities and their hinterland". In: Baud *et al.* (eds.) *Re-aligning government, civil society and the market; new challenges in urban and regional development, Essays in honour of G.A. de Bruijne*, pp. 355-371.

Beck, Ulrich (1992), *Risk Society. Towards a New Modernity*, London: Sage

— (2001), *World Risk Society*, London: Blackwell (first edition 1999)

Beijing Municipal Environmental Protection Bureau (2002a), *1998 Report on the State of the Environment in Beijing*, retrieved from http://www.bjepb.gov.cn/English_homepage/breif_intro/brief_intro.htm on July 5 2002

— (2002b), *Brief Introduction*, retrieved from http://www.bjepb.gov.cn/English_homepage/breif_intro/brief_intro.htm on July 5 2002

Beijing Standing Committee (2002), *The Organisational Set-up of the Standing Committee of Beijing Municipal People's Congress*, retrieved from http://www.bjrd.gov.cn/index_e.html on July 5 2002

Benevolo, Leonardo (1963), *The Origins of the Modern Urbanism*, Paris: Dunot

Bergs, J.A. and S. Renes, "Sustainable Utility Building: a Matter of Sustainable Entrepreneurship", *Journal of Environmental Sciences*, No. 2, Year 15

Bergs, P.O. and Kristian Kreiner (1990), "Corporate Architecture: Turning Physical Settings into Symbolic Resources". In: Gagliardi, P. (ed.) (1990), *Symbols and Artifacts: Views of the Corporate Landscape*, New York: Aldine de Gruyter

Bhatt, V., Casult, A., Covo, D., and Jésus Navarrete (1995), "Les Projets de Reconstruction de Quartiers à Pékin: Le Cas de Huashi Xiejie". In: Henriot, Christian (ed.) (1995), *Les Métropoles Chinoises au XXe Siècle*, Paris: Editions Arguments

Biswas, Ramesh Kumar (2000), "An Approach to Chinese Urban Culture". In: Kögel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburö

Blair, A. R., Joseph S. Tulchin, and Allison M. Garland (1996), "Introduction: Globalism and Local Realities – Five Paths to the Future". In: Cohen, M.A., Ruble, Blair A., Tulchin, Joseph S., and Allison M. Garland (eds), *Preparing for the Urban Future – Global Pressures and Local Forces*, Washington, D.C.: Woodrow Wilson Centre Special Studies

Blowers, Andrew (1997), "Environmental Policy: Ecological Modernisation or the Risk Society?", *Urban Studies*, Vol. 34, Nos 5-6, pp. 845-871

Booman, O. and Roemer van Toorn (eds) (1994), *The Invisible in Architecture*, New York: Academy Editions

Bouman, A.H. (2000), "Nike's European Head Office: a New Approach to Energy Efficiency in Office Buildings", *CADDET Energy Efficiency*, Special Issue on the Netherlands

Borja, J and Manuel Castells (1997), *Local and Global Management of Cities in the Information Age*, London: Earthscan

Brundtland, H. (1987), *Our Common Future*, Oxford: Oxford University Press, for the World Commission on Environment and Development

Brown, R., Carrie Webber, and Jon Koomey (2000), *Status and Future Directions of the Energy Star Program*, Proceedings of the 2000 ACEEE Summer Study

Buttel, F.H. (2000a), "Ecological Modernization as a Social Theory", *Geoforum*, Vol. 31, pp. 57-65

— (2000b), "Classical Theory and Contemporary Environmental Sociology: some reflections on the antecedents and prospects for reflexive modernisation theories in the study of environment and society". In: Spaargaren, G., A.P.J. Mol, and F. Buttel (eds), *Environment and Global Modernity*, London: Sage

Cao Lianqun (1993), "An Exploration of the Thinking and Method of the Revision of Beijing's Master Planning", *China City Planning Review*, vol 9, nos. 1, 2, 3, December 1993, pp. 7-9

Carmona, M. and Jürgen Rosemann (eds) (2000), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

— and Rod Burgess (2000), "Globalization, Infrastructure and Urban Form". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

Castells, Manuel (1997), *The Urban Question: A Marxist Approach*, Cambridge, Mass.: MIT Press

— (1989), *The Informational City: Information Technology, Economic Restructuring, and the Urban-Regional Process*, London: Blackwell

— (1996), *The Rise of the Network Society*, Oxford: Blackwell

— (2000), "European Cities, the Informational Society, and the Global Economy". In: Deben, L., Heinemeijer, W., and Dick van der Vaart (eds), *Understanding Amsterdam: Essays on Economic Vitality, City Life and Urban Form*, Amsterdam: Het Spinhuis

CB Richard Ellis (2001), *News January 2001*, retrieved from http://www.richardellis.co.uk/news on June 17 2002

— (2002a), *São Paulo & Rio de Janeiro Market Index 2002*, retrieved from http://www.cbre.com on June 17 2002

— (2002b), *Global Market Rents*, retrieved from http://www.cbre.com on August 12 2002

— (2002c), *People's Republic of China Market Index Brief*, retrieved from http://www.cbre.com on August 12 2002

CBS (Centraal Bureau voor de Statistiek, the Netherlands) (1997), *Netherlands Official Statistics*, http://www.cbs.nl/en/products/articles/general/a-125/1997/nos97-4.pdf

CETESB (Companhia de Tecnologia de Saneamento Ambiental) (1994), *Relatório de Qualidade do Ar no Estado de Sao Paulo-1993*, Sao Paulo: CETESB

CG/LA Infrastructure (2001), *Snapshot of the Brazilian Electricity Marketplace – Part 2*, Washington D.C.: CG/LA

Chang Sen-Dou (1998), "Beijing: Perspectives on Preservation, Environment, and Development", *Cities*, Vol. 15, No. 1, pp. 13-25

Chappells, H., M. Klintman, A. Lindèn, E. Shove, G. Spaaragaren, B. van Vliet (2000), *Domestic Consumption, Utility Services and the Environment*, Wageningen, The Netherlands: WAU

Chinese Embassy to the United States of America (2001), *PRC Water: Waste a Lot, Have Not: The Problem is Policy not Technology*, retrieved from http://www.usembassy-china.org.cn/english/sandt/watercas.htm on September 4 2001

Chung, C.J, Jeffrey Inaba, Rem Koolhaas, Sze Tsung Leong (eds.) (2001), *Great Leap Forward*, Köln: Taschen

Cohen, Michael A. (1996), "The Hypothesis of Urban Convergence: are Cities in the North and South becoming more alike in the Age of Globalisation?". In Cohen, M.A., Ruble, Blair A., Tulchin, Joseph S., and Allison M. Garland (eds), *Preparing for the Urban Future – Global Pressures and Local Forces*, Washington, D.C.: Woodrow Wilson Centre Special Studies

Conlon, Joseph (1999), *Energy Efficient Improvements enhance Value*, retrieved from http://albany.bcentral.com/albany/stories/1999/05/31/focus5.html on August 6 2001

Cook, Jeffrey (2000), *Evolution of American Office Architecture to 1950. Pollution vs. passive strategies to design the work environment*, background paper for the PLEA 2000 Conference on 'Architecture, City, Environment', Cambridge, England

Coombes, Anthony (1999), "Mass and Void in the People's Republic", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 112-119

Cox, Susan (1985), "No Tragedy of the Commons", *Environmental Ethics* spring, pp.49-61

Cunningham, W. and Barbara W. Saigo (1997), *Environmental Science – A Global Concern*, London: Wm. C. Brown Publishers

D'Arcy, E. and Geoffrey Keogh (1999), "The Property Market and Urban Competitiveness: A Review", *Urban Studies*, Vol. 36, Nos 5-6, pp. 917-928

Daniels, Klaus (1997), *The Technology of Ecological Building: Basic Principles and Measures, Examples and Ideas*, Berlin: Birkhauser

Davies, Colin and Ian Lambot (1997), *Commerzbank Frankfurt, Prototype for an Ecological High-Rise*, Surrey: Watermark/Birkhauser

Deák, Csaba (2000a), "Globalização ou Crise Global?". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

— (2000b), "Globalisation Yesterday and Today". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

Der-Petrossian, B. and Erik Johansson (2000), "Construction and Environment: Improving Energy Efficiency", *Building Issues*, Vol. 10, No. 2, Lund: Lund University, Housing Development & Management

Dewulf, Geert, Peter Krumm and Hans de Jonge (eds) (2000), *Successful Corporate Real Estate*, Nieuwegein, Netherlands: Arko Publishers

Dianchun Jiang, Jean Jinghan Chen, and David Isaac (1998), "The Effect of Foreign Investment on the Real Estate Industry in China", *Urban Studies*, Vol. 35, No. 11, pp. 2101-2110

Dicken, Peter (1997), "Transnational Corporations and Nation-States", *International Social Science Journal* 151, March 1997, pp. 77-89

van Dijk, H. and Paul Meurs (1998), *Megalopolis adrift: São Paulo's structured calamity, Archis* 1998, no. 1, The Netherlands

Dong Guangqi, (1994), "Retrospect and Prospect of the Protection and Reconstruction of Old Beijing", *China City Planning Review* September 1994, pp. 12-16

DTZ (2001), *Global Office Occupancy Costs Survey 2001*, New York: DTZ Research

Duara, Prasenjit (1998), "Transnationalism in the Era of Nation-States. China: 1900 – 1945", *Development and Change*, Vol. 29, No. 4, pp. 647-670

Duijvestein, Kees (2003), *Dansen door de Schalen heen van Wereldklimaat naar lokaal Klimaat*, retrieved from http://www.dmb.amsterdam.nl/beleid/arc/publicaties/handout_duijvestein_kc.pdf on May 17 2003

Dunlap, Riley (2000), "The Evolution of Environmental Sociology: A Brief History and Assessment of the American Experience". In: In: Michael Redclift and Graham Woodgate (eds), *The International Handbook of Environmental Sociology*, Cheltenham: Edward Elgar

Dürrschmidt, Jörg (1997), "The Delinking of Locale and Milieu. On the Situatedness of extended Milieux in a Global Environment". In: Eade, John (ed.) (1997), *Living the Global City. Globalisation as a Local Process*, London: Routledge

Dutch National Team (1998), "Sustainable Building: Enhancing the Energy Performance Coefficient", *CADDET Energy Efficiency*, Newsletter No. 1, 1998

Eade, John (ed.) (1997), "Reconstructing Places. Changing Images of Locality in Docklands and Spitalfields". In: Eade, John (ed.) (1997), *Living the Global City. Globalisation as a Local Process*, London: Routledge

EA.UE (1997), *Designing Ecological Settlements*, The European Academy of the Urban Environment, Berlin: Dietrich Reimer Verlag

Edwards, B. (1996), *Towards Sustainable Architecture, European Directives & Building Design*, Oxford: Butterworth Architecture Legal Series

— (1998), *Green Buildings Pay*, London: E&FN Spon

Eletropaulo (Electric Energy Utility of São Paulo) (2002), retrieved from http://www.eletropaulo.com.br on July 9 2002

Elmroth, Arne (1991), "Building Technology and Energy Management", *Building in China*, Vol. 4, No. 4, pp. 26-30

European Commission (1999), *Status Report on European Telework 1998*, retrieved from http://www.eto.org.uk/twork/tw98/index.htm on August 15 2002

European Commission Thermie Project (1998a), *Design Standards for Energy Efficient Buildings*, Information Dossier, No. 6, March 1998

European Commission Thermie Project (1998b), *Radiant Cooling Systems and Applications*, Brussels: The European Commission Directorate-General for Energy DG XVII

Emplasa (Metropolitan Planning Company of the Great São Paulo) (1990), *Sumário de Dados da Grande São Paulo*, São Paulo: Emplasa

— (2000), *Por Dentro do Município de São Paulo*, São Paulo: Emplasa (CD Rom)

— (2002), retrieved from http://www.emplasa.sp.gov.br on July 7 2002

ESCAP (2003), *Sustainable Development Strategy of Beijing*, retrieved from http://www.unescap.org/drpad/vc/conference/ex_cn_12_sds.htm on October 6 2003

Fainstein, Susan (2000), "The Egalitarian City: Images of Amsterdam". In: Deben, L., Heinemeijer, W., and Dick van der Vaart (eds), *Understanding Amsterdam: Essays on Economic Vitality, City Life and Urban Form*, Amsterdam: Het Spinhuis

Fan Yaobang (1994), " Some Issues concerning the Layout of Beijing City", *China City Planning Review*, March 1994, pp. 12-17

Foster and Partners (2002), *Commerzbank*, retrieved from http://www.fosterandpartners.com on May 18 2001

Friedmann, John (1986), "The World City Hypothesis", *Development and Change*, Vol. 17, pp. 69-83

Frijns, J., Phung Thuy Phuong and Arthur P. J. Mol (2000), "Ecological Modernisation and Industrialising Economies: The Case of Viet Nam". In: Mol, A.P.J. and David Sonnenberg (eds), *Ecological Modernisation around the World. Perspectives and Critical Debates*, London: Frank Cass Publishers

Fu-chen Lo and Yu-qing Xing (eds) (1999), *China's Sustainable Development Framework*, Tokyo: United Nations University, Institute of Advanced Studies

Gaubatz, Piper (1999), "China's Urban Transformation: Patterns and Processes of Morphological Change in Beijing, Shanghau and Guangzhou, *Urban Studies*, Vol. 36, No. 9, pp. 1495-521

Gentry, Bradford (1999), *Foreign Direct Investment and the Environment: Boon or Bane?*, background paper for the OECD Conference on 'Foreign Direct Investment and the Environment', The Hague, The Netherlands

Gemeentewaterleidingen Amsterdam (2000), *Amsterdam Water Supply*, Amsterdam: GWA

Gibbs, David (2000), "Ecological Modernisation, Regional Economic Development and Regional Development Agencies", *Geoforum*, Vol. 31, pp. 9-19

Giddens, Anthony (1990), *The Consequences of Modernity*, Cambridge: Polity

— (1991), *Modernity and Self-Identity. Self and Society in the Late Modern Age*, Cambridge: Polity

— (1994) "Replies and Critiques. Risk, Trust, Reflexivity". In U. Beck, A. Giddens and S. Lash (eds), *Reflexive Modernisation. Politics, Tradition and Aesthetics in the Modern Social Order*, Cambridge: Polity

Girardet, Herbert (1997), "Sustainable Cities. A Contradiction in Terms?", *Architectural Design, The Architecture of Ecology*, New York: John Wiley & Son

— (2001), *Creating Sustainable Cities*, Bristol: J.W. Arrowsmith Ltd (1999, first edition)

Gissen, David (ed.) (2003), *Big & Green: Toward Sustainable Architecture in the 21st Century*, New York: Princeton Architectural Press

Goldenman, Greta (1999), *The Environmental Implications of Foreign Direct Investment: Policy and Institutional Issues*, background paper for the OECD Conference on 'Foreign Direct Investment and the Environment', The Hague, The Netherlands

Gouldson, A. and Joseph Murphy (1996), "Ecological Modernization and the European Union", *Geoforum*, Vol. 27, No. 16, pp. 11-21

Gu Chaolin, Qiu Youliang, and Ye Shunzhan (1997), "The Change of Designated Cities in China before and after 1949", *China City Planning Review*, Vol. 13, No. 2, pp. 10- 23

Gu Chaolin and Christian Kesteloot (2001), "Beijing's Socio-spatial Structure in Transition", *Trialog* vol. 68, pp. 17-24

Guy, S., Simon Marvin, and Timothy Moss (eds.) (2001), *Urban Infrastructure in Transition*, London: Earthscan

Guy, S. and Suzie Osborn (2001), "Contesting Environmental Design: The Hybrid Green Building". In: Guy, S., Simon Marvin, and Timothy Moss, *Urban Infrastructure in Transition*, London: Earthscan

Haarman, H.R., E.N. van Leeuwen and M.A.R. de Haan (2000), "Sustainable Building Policy in the Netherlands", *Journal of Environmental Sciences*, No. 2, Year 15

Hajer, Martin (1995), *The Politics of Environmental Discourse – Ecological Modernisation and the Policy Process*, Oxford: Clarendon Press

— (1996), "Ecological Modernisation as Cultural Politics". In: Lash, S., Szerszynski, B., and Wynne, B. (eds), *Risk, Environment and Modernity*, Sage: London

Hal, Anke van, Ger de Vries, Joost Brouwers (2000), *Opting for Change. Sustainable Building in the Netherlands*, The Netherlands: Aeneas Technical Publishers

Hamer, Andrew (1993), "China Urban Land Management: Options for an Emerging Market Economy", *China City Planning Review*, March 1993, pp. 17-26

Hannigan, J. (1995), *Environmental Sociology: A Social Constructivist Perspective*, London: Routledge

Hansjürgens, B. and Gertrude Lübbe-Wolff (2000), *Symbolische Umweltpolitik*, Frankfurt: Suhrkamp Verlag

Hardt, Michael and Negri, Antonio (2000) *Empire*, London: Harvard University Press

Harvey, David (1989), *The Condition of Postmodernity*, Oxford: Blackwell

Hawkes, David (1996), *The Environmental Tradition – Studies in the Architecture of Environment*, London: E. & F.N. Spon

Heerwagen, Judith (2000), *Do Green Buildings Enhance the Well Being of Workers? Yes.*, retrieved from http://www.edcmag.com/archives/7-00-1.htm on May 7 2002

Held, D. (1995), *Democracy and the Global Order: From the Modern State to Cosmopolitan Governance*, Cambridge: Polity Press

Held, D., A. McGrew, D. Goldblatt, and J. Perraton (1999), *Global Transformations: Politics, Economics and Culture*, Cambridge: Polity Press

Henriot, Christian 1995), *Les Métropoles Chinoises au XX^e Siècle*, Paris: Editions Arguments

Hill, R., Paul Bowen, and Jeremy Soboil (1996), "Environmental Management Systems in the Attainment of Sustainable Construction in South Africa", *United Nations Environmental Programme Review*, Vol. 19 no. 6

Hirst, P. and G. Thompson (1996), "Introduction: Globalisation – a Necessary Myth?", *Globalisation in Question*, Cambridge: Polity Press, pp.1-16

Hoa, Léon (1981), *Reconstruire la Chine. Trente ans d'urbanisme 1949-1979*, Paris: Editions du Moniteur

Hofstede, Geert (1991), *Cultures and Organisations. The Software and the Mind*, London: McGraw-Hill

Hogenboom, J., A.P.J. Mol and G. Spaargaren (1999), "Dealing with Environmental Risks in Reflexive Modernity", In: M. Cohen (ed.), *Risk in the Modern Age. Social Theory, Science and Environmental Decision-Making*, Basingstoke: Macmillan

Hoogvelt, Ankie (2001), *Globalization and the Postcolonial World. The New Political Economy of Development*, Basingstoke: Palgrave, (1997, first edition)

Hou Renzhi (1995), "Views on three Milestones in the Construction of Beijing City", *China City Planning Review*, September 1995, pp. 26-32

Hu Zhaoliang (1991), "Expansion of City – Beijing. Causes and Coutermeasures", *China City Planning Review*, March 1991, pp. 63-71

— and Peter Foggin (1995), "Chinese cities after Reform and Opening to the Outside World", *China City Planning Review*, March 1995, pp. 12-24

Huang, Y., R. Judkoff and M. Sherman (1999), *Feasibility Study of a US-China Demonstration Energy-Efficient Commercial Building*, LBNL-44306, Berkeley, CA: Lawrence Berkeley National Laboratory

Huber, Joseph (1985), *Die Regenbogengesellschaft. Okologie und Sozialpolitik*, Frankfurt: Fisher Verlag

— (1991), "Ecological Modernisation: away from scarcity, soberness and bureaucracy" (translation from: "Ecologische modernisering: weg van schaarste, soberheid en bureaucratie"). In: Mol, A.P.J., G. Spaargaren, and A. Klapwijk (eds), *Technologie en Milieubeheer. Tussen sanering en ecologische modernisering*, Den Haag: SDU

— (2000), "Towards Industrial Ecology: Sustainable Development as a Concept of Ecological Modernisation", *Journal of Environmental Policy & Planning*, Vol. 2, pp. 269-285

Ibay, Leticia V. (1999), *The Impact of FDI on Environmental Standards: Pollution Havens and Pollution Halos*, background paper for the OECD Conference on 'Foreign Direct Investment and the Environment', The Hague, The Netherlands

Ibelings, Hans (1995), *20th Century Architecture in the Netherlands*, Rotterdam: NAI Publishers

— (1997), *Americanism. Dutch Architecture and the Transatlantic Model*, Rotterdam: NAI Publishers

— (1999), *20th Century Urban Design in the Netherlands*, Rotterdam: NAI Publishers

IBM (1999), *Environmental Report*, retrieved from http://www.ibm.com on July 9 2001
IBM (2000), *Mostra Fotográfica do Edifício Tutóia*, São Paulo: IBM (internal report)
Infra (2001), "IBM Tutóia", *Infra Retrofit*, June 2001, São Paulo: Editora Talen
ING Group (2000a), *Annual Report. Ten Years of Growth and Innovation*, Amsterdam: ING Groep bv
— (2000b), *ING in Society 2000*, Amsterdam: ING Groep B.V.
IUCN (International Union for Conservation of Nature) (1980), *World Conservation Strategy: Living Resource Conservation for Sustainable Development*, Gland, Switzerland: IUCN, UNEP, WWF
Jakubowski, Klaus (2000), "The Basics of Chinese Land Law". In: Kögel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburõ
Jänicke, Martin (1985), *Preventive Environmental Policy as Ecological Modernisation and Structural Policy*, Berlin: WZB (IIUG-paper 85-2)
— (1986), *Staatsversagen. Die Ohnmacht der Politik in der Industriegesellschaft*, München: Piper
— (1993), "Über ökologische und politische Modernisierung", *ZfU* 2/93, pp. 159-175
Jensen, Jesper Ole (2001), "Green Buildings in an Infrastructure Perspective". In: Guy, S., Simon Marvin, and Timothy Moss, *Urban Infrastructure in Transition*, London: Earthscan
Jianfei Zhu (1999), "An Archaeology of Contemporary Chinese Architecture", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 90-97
Jing Zhengzhi (2000), "Public Space Typologies". In: Kögel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburõ
Jones, David L. (1998), *Architecture and the Environment*, London: Laurence King Publishing
Jones Lang LaSalle (2002a), *Beijing Grade A Office Market – 1Q 2002*, Beijing: Jones Lang LaSalle
— (2002b), *Environmental Legislation and Real Estate in China*, Beijing: Jones Lang LaSalle
— (2002c), *Beijing Property Index. The Market as of April 2002*, Beijing: Jones Lang LaSalle
Kaimowitz, David (1996), "The Political Economy of Environmental Policy Reform in Latin America", *Development and Change*, Vol. 27, No. 3, pp. 433-452
Kahn, D. and Gerrit van der Plas (1999), "City Profile: Amsterdam", *Cities*, Vol. 16, No. 5, pp. 371-381
Ke Huangzhang (1993), "A Great Across-the-Century Planning to Build Modernised Capital. The Revision of Beijing City Overall Plan", *China City Planning Review*, vol 9, nos. 1, 2, 3, December 1993, pp. 2-6
— (1997), "Beijing 1996-2010: A cross century development plan", *Ekistics* vol. 64, no. 385/386/387, pp. 189-97
Kemme, Guus (1996), *Amsterdam Architecture. A Guide*, Bussum: THOTH Publishers
King, Anthony D. (1991), *Culture, Globalisation, and the World System*, London: Macmillan
Kirkby, John, Phil O'Keefe and Lloyd Timberlake (eds) (1995), *The Earthscan Reader in Sustainable Development*, London: Earthscan
Kloos, Maarten (ed.) (1995), *Amsterdam's High-Rise. Considerations, Problems and Realizations*, Amsterdam: Architectura & Natura Press
Kloosterman, R. and Bart Lambregts (2001), "Clustering of Economic Activities in Polycentric Urban Regions: The Case of the Randstad", *Urban Studies*, Vol. 38, No. 4, 717-732
Kögel, E. And Ulf Meyer (eds) (2000), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburõ

— (2000), "The Chinese City between Tradition and Modernity". In: Kőgel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburő

Koster, E. (1998), *Architecture for Nature – IBN-DLO Wageningen*, Schuyt & Co., The Netherlands

Koster, E. and Theo van Oeffelt (eds) (1997), *High-Rise in the Netherlands*, The Hague: NAI Publishers

Kowarick, L. and Milton Campanario (1986), "São Paulo: The Price of World City Status", *Development and Change*, Vol. 17, pp. 159-174

Krut, R. and Harris Gleckman (1998), *ISO 14001 - A Missed Opportunity for Sustainable Global Industrial Development*, London: Earthscan Publications Ltd.

Larsson, Nils (1996), "Public/Private Strategies for moving towards Green Building Practices", *United Nations Environmental Programme Review*, Vol. 19 no. 6

Leaf, Michael (1997), "Urban Social Impacts of China's Economic Reforms", *Cities*, Vol. 14, No. 2, pp. v-vii

LEED (2003), *Leadership in Energy and Environmental Design*, retrieved from http://www.usgbc.org/LEED/LEED_main.asp on June 12 2002

Lefèbvre, Henri (2000), *Espace et Politique. Le Droit à la Ville II*, Paris: Anthropos

Levett, R., "Tools, Techniques and Processes for Municipal Environmental Management", *Local Environment*, Vol. 2, No. 2, pp. 189-202

Li Min (1997), "Development of Green Space in Beijing", *Ekistics* vol. 64, no. 385/386/387, pp. 255-61

Lin Zhenguo and Liu Yingchun (1005), "Evaluation on the Factors Concerning the Urban Economic Performance", *China City Planning Review*, December 1995, pp. 12-18

Lin Zhiqun (1991), "The Urban Infrastructure of China (1949-1989), *Building in China*, Vol. 4, No. 2, June 1991, pp. 2-52

Liu Bomin (1991), "On the Dynamic Model of the Development of the Urban Business Centre System", *China City Planning Review*, September 1991, pp. 35-42

Liefferink, D. (1997), "The Netherlands: a Net Exporter of Environmental Policy Concepts". In: Michael Skou Andersen and Duncan Liefferink (eds), *European Environmental Policy. The Pioneers*, Manchester: Manchester University Press

Littlefair, P.J., M. Santamouris, S. Alvarez, A. Dupagne, D. Hall, J. Teller, J.F. Coronel, N. Papanikolaou (eds) (2000), *Environmental Site Layout Planning: Solar Access, Microclimate and Passive Cooling in Urban Areas*, London: BRE

Lin, Nancy (2001), "Architecture Shenzhen". In: Chung, C.J, Jeffrey Inaba, Rem Koolhaas, Sze Tsung Leong (eds.) (2001), *Great Leap Forward*, Köln: Taschen

Low, Murray (1997), "Representation Unbound: Globalization and Democracy". In: Kevin Cox (ed.), *Spaces of Globalisation*, New York: Guilford Press, pp. 240-80

Luo Tingdong (1993), "Water Resources in Beijing", *China City Planning Review*, vol 9, nos. 1, 2, 3, December 1993, pp. 15-18

Marshall, Gordon (1998), *Oxford Dictionary of Sociology*, Oxford: Oxford University Press (1994, first edition)

Mao Qizhi and Jin Ying (1997), "Development Issues and Planning Strategies in the Beijing Metropolitan Region", *Ekistics* vol. 64, no. 385/386/387, pp. 203-10

Mawakdiye, Alberto (1998), "Edifícios Inadequados", *Techné*, year 5, no. 33, pp. 48 – 50, São Paulo: Pini

Mc Michael, P. (1996), "Globalisation: Myths and Realities", *Rural Sociology* 61, no. 1, pp. 25-55

McNeill, Donald (1999), "Globalization and the European City", *Cities*, Vol. 16, No. 3, pp. 143-147

Meel, Juriaan van (2000), *The European Office. Office Design and National Context*, Rotterdam: 010 Publishers

Meikle, S. And Julian Walker (1999), "The Changing Face of the Chinese City", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 98-105

Melchert, Luciana Saguas Presas (2001a), *The Ecological Modernisation of the Building Industry. Policy Approaches to Higher Performance Buildings*, background paper for the Conference PLEA 2001 on 'Passive and Low Energy Architecture', Florianópolis, Brazil

— (2001b), *The Ecological Modernisation of the Building Industry. The Role of Stakeholders in the Construction of Sustainable Buildings*, background paper for the Conference UICB 2001 on 'Housing Towards the Future', Beijing, China

— (2001c), "The Environmental and Spatial Transformation of World Cities", *Habitat Debate*, Vol 7 No. 4, December 2001, Nairobi: United Nations Centre for Human Settlements

— (2002b), *Globalisation and Urban Environmental Risks: The Case of São Paulo*, background paper for the Sustainable Building 2002 International Conference, Oslo, Norway

— (2003), "De-globalisation or further globalisation?", *British Journal of Politics and International Relations* Vol. 5, No. 3, August 2003, pp. 455-466

Meyer, Eric (2002), "Pékin: Pour tout l'Or des Jeux", *Match en Chine* no. 2 (numéro hors-serie de Paris Match), February-March 2002, pp. 26-31

Miles, Matthew (1983), "Qualitative Data as an Attractive Nuisance: The Problem of Analysis". In: van Maanen, John (ed.), *Qualitative Methodology*, London: Sage (first edition 1979)

— and A. Micheal Huberman (1994), *Qualitative Data Analysis. An Expanded Sourcebook*, London: Sage

Milieudienst Amsterdam (1998), *Milieuverkenning Amsterdam 1998*, Amsterdam: Milieudienst

MINEZ (Ministry of Economic Affairs, The Netherlands) (1999), *Action Programme: Energy Conservation 1999-2002*, The Hague: MINEZ

Ministério do Trabalho (Brazil Ministry of Labour) (2002), retrieved from http://www.mtb.gov.br/ on July 17 2002

Mol, A.P.J. (1995), *The Refinement of Production. Ecological Modernisation Theory and the Chemical Industry*, Utrecht: Jan van Arkel

— (1996), "Ecological Modernisation and Institutional Reflexivity: Environmental Reform in Late Modern Age", *Environmental Politics*, Vol. 5, No. 2, pp. 302-23

— (2000a), "The Environmental Movement in an Era of Ecological Modernisation", *Geoforum*, Vol. 31, pp.45-56

— (2000b), "Globalisation and Environment: Between Apocalypse-Blindness and Ecological Modernisation". In: Spaargaren, Mol and Buttel (eds), *Environment and Global Modernity*, London: Sage

— (2000c), "Ecological Modernisation: Industrial Transformations and Environmental Reform". In: Michael Redclift and Graham Woodgate (eds), *The International Handbook of Environmental Sociology*, Cheltenham: Edward Elgar

— (2001), *Globalisation and Environmental Reform*, Cambridge, MA: MIT Press

— and Gert Spaargaren (1993), "Environment, Modernity and the Risk-Society. The Apocalyptic Horizon of Environmental Reform", *International Sociology* 8, 4, pp. 431-459

— et al. (2000), "Globalisation and the Dynamics of Environmental Deterioration and Reform". In: G. Spaargaren, A.P.J. Mol and F.H. Buttel (eds), *Environment and Global Modernity*, London: Sage

— and David Sonnenfeld (eds) (2000), *Ecological Modernisation Around the World. Perspectives and Critical Debates*, London: Frank Cass Publishers

Moll, H.C., K.J. Canters, P. Glasbergen and G. de Vries (2000), "Sustainable Building in the Netherlands", *Journal of Environmental Sciences*, No. 2, year 15

Moran (1996), Tools of Environmental Policy: Market instruments versus Command and Control. In: R. Eckersley (ed.), *Markets, the State and the Environment. Towards integration*, Houndsmill and London: Macmillan, pp. 73-85

National Dubo Centrum (2000), *Sustainable Building: Frameworks for the Future*, Rotterdam: National Dubo Centrum

Newman, Paul (1996), "Reducing Automobile Dependence", *Environment and Urbanisation*, Vol. 8, No. 1, April 1996, pp. 67-93

Nederveen Pieterse, J. (1995), "Globalisation as hydridistion". In: M. Featherstone et al (eds), *Global Modernities*, London: Sage

Netherlands National Team (2000), "Aquifer Thermal Energy Storage in the Netherlands", *CADDET Energy Efficiency*, Special Issue on the Netherlands

Nguyen, Phuc Qhoc (1999), *Industrial Solid Waste Prevention and Reduction*, Wageningen, The Netherlands: WAU (REFINE M.Sc. Thesis Series No. 4)

Nijman, Jan (2000), "The Global Movement in Urban Evolution: A Comparison of Amsterdam and Miami". In: Deben, L., Heinemeijer, W., and Dick van der Vaart (eds), *Understanding Amsterdam: Essays on Economic Vitality, City Life and Urban Form*, Amsterdam: Het Spinhuis

Novem (Netherlands Energy and Environmental Agency) (various years), *Novem: in Short*, Utrecht: Novem

— (1991), *Hoofdkantoor NMB – Postbankgroep*, Utrecht: Novem

— (1999), *Energiegebruik. ING Hoofdkantoor Bijlmerplein na Uitbreiding*, Utrecht: Novem

— (2000a), *EnergiePrestaties van Utiliteitsgebouwen*, Utrecht: Novem

— (2000b), *Inspiratiebron voor Duurzame Investeringen*, Utrecht: Novem

— (2000c), *Energieneutraal Bouwen*, Utrecht: Novem

— (2000d), *Energie-efficiënte Nieuwbouw van Utiliteitsbouwen. Wat kan Novem voor u betekenen?*, Utrecht: Novem

Olgyay, Victor (1963), *Design with Climate – Bioclimatic Approach to Architectural Regionalism*, Princeton, New Jersey: Princeton University Press

Passive Solar Industries Council (2003), *Build Better Buildings*, retrieved from www.getf.org/file/toolmanager/O16F10657.pdf on June 15 2001

Pei Cobb Freed & Partners (2001), *ABN AMRO Bank Head Office*, retrieved from http://pcfandp.com/a/p/9304/s.html on June 4 2001

People's Republic of China, State Council (1990), "Provisional Regulations for Development and Management of Land Parcels by Foreign Investment", *Building in China*, Vol. 3, No. 4, pp. 2-5

People's Republic of China (1997), *The Law on Energy Conservation of the People's Republic of China*, retrieved from http://eetd.lbl.gov/EA/partnership/China/chinaeelaw.htm on July 18 2002

Phantumvanit, D. and Winai Liengcharernsit (1989), "Coming to Terms with Bangkok's Environmental Problems", *Environment and Urbanisation*, vol. 1, No. 1, April 1989, pp. 31-39

Philippi, Arlindo (1990), *Urban Management and the Environment: São Paulo City Environmental Profile*, (PhD Thesis draft August 1990)

Prefeitura do Município de São Paulo, Secretaria Municipal do Verde e do Meio Ambiente (1997), *Agenda Local 21. Compromisso do Município de São Paulo*, São Paulo: Prefeitura do Município de São Paulo, Secretaria Municipal do Verde e do Meio Ambiente

— (1998), *Do Global ao Local. Agenda Local 21. Compromisso do Município de São Paulo*, São Paulo: Prefeitura do Município de São Paulo, Secretaria Municipal do Verde e do Meio Ambiente

Ragon, M. (1986), *Histoire de l'Architecture et de l'Urbanisme Modernes – De Brasilia au Post-modernisme 1940-1991*, Paris: Collection Points

Raymond, S. and Roger Cunliffe (2000), *Tomorrow's Office. Creating Effective and Humane Interiors*, London: E&FN Spon

Redclift, Michael (2000), "Environmental Social Theory for a Globalising World Economy". In: G. Spaargaren, A.P.J. Mol and F.H. Buttel (eds), *Environment and Global Modernity*, London: Sage

— and Graham Woodgate (eds) (2000), *The International Handbook of Environmental Sociology*, Cheltenham: Edward Elgar

Reijnders, L. and M.A.J. Huijbregt (2000), "Tools for the Evaluation and Improvement of Buildings", *Journal of Environmental Sciences*, No. 2, Year 15

Ribbeck, Eckhart (2001), "Peking – vom Kaiserpalast zur Investoren Stadt", *Trialog* vol. 68, pp. 9-14

Rienstra, Sytze and Piet Rietveld (1999), "Spatial Economic Impacts of International Head Office Locations: a Case Study of Amsterdam South", *European Urban and Regional Studies*, Vol 6, No. 1, pp. 85-89

Rincón, Hugo R. (2000), "São Paulo". In: Romanos, Michael C. (ed.), *Spatial Transformations. Turning Points in the Evolution of Cities.*, Cincinnati: University of Cincinnati, School of Planning

Rinkevicius, Leonardas (2000), "The Ideology of Ecological Modernisation in 'Double-Risk' Societies: a case study of Lithuanian environmental policy". In: Spaargaren, G., A.P.J. Mol, and F. Buttel (eds), *Environment and Global Modernity*, London: Sage

Ritzer, George (2000), *The McDonaldisation of Society*, Pine Forge Press (3rd edition)

Roaf, S. and Mary Hancock (eds) (1992), *Energy Efficient Building: A Design Guide*, Oxford: Blackwell Scientific Publications

Roberts, Peter (1998), "Ecological Modernisation: a Model for Future Urban and Regional Planning and Development". In: Kivell, P.T., P.W. Roberts, and G.P. Walker (eds), *Environment, Planning and Land Use*, Hants: Ashgate Publishing Ltd

Robertson, Roland (1991), "Social Theory, Cultural Relativity and the Problem of Globality". In: King, A. (ed.), *Culture Globalization and the World-System*, London: MacMillan

— (1992), *Globalization: Social Theory and Global Culture*, London: Sage

Rocca, Jean-Louis (1995), "Un Mal Nécessaire. Le Contrôle des 'Nouvelles Populations' dans la Municipalité de Pékin". In: Henriot, Christian (ed.) (1995), *Les Métropoles Chinoises au XXe Siècle*, Paris: Editions Arguments

Rocco, Roberto (2000), "São Paulo: Globalisation, Governance and Urban Form". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

Rogers, Richard (1997), *Cities for a Small Planet*, London: Faber and Faber

Rolnik, Raquel (1997), *A Cidade e a Lei. Legislação, Política Urbana e Territórios na Cidade de São Paulo*, São Paulo: Fapesp, Studio Nobel

de Roo, Gerritt (1999), *Environmental Conflicts in Compact Cities – Complexity, Decision making and Policy Approaches*, Gröningen, The Netherlands: University of Gröningen

Roodman, D. M. and N. Lenssen (1995), *A Building Revolution: How Ecology and Health Concerns are Transforming Construction*, Washington D.C.: Worldwatch Paper 124

Roqué, Julie A. (1996), "The Social Dimensions of Technological Change: Reshaping Cities and Urban Life". In Cohen, M.A., Ruble, Blair A., Tulchin, Joseph S., and Allison M.

Garland (eds), *Preparing for the Urban Future – Global Pressures and Local Forces*, Washington, D.C.: Woodrow Wilson Centre Special Studies

Rosario, Louise (2001), "Pain Barrier", *World Architecture* vol 1000, October 2001

Rosenfeld, Arthur H. (1999), "The Art of Energy Efficiency: Protecting the Environment with Better Technology", *Annual Review Energy and Environment*, Vol. 24, pp. 33-82

Rosenlund, Hans (2000), "Climatic Design of Buildings Using Passive Techniques", *Building Issues*, Vol. 10, No. 1, Lund: Lund University, Housing Development & Management

Rosemann, Jürgen (2000), "Urban Transformation and Governance: The Case of The Netherlands". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

Ruano, Miguel (1999a), "Urban Impressions", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 14-27

— (1999b), "Strangers in...paradise?", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 30-87

Rugman, Alan (1994), "A Canadian Perspective on Nafta", *International Executive* 36, no. 1, pp. 33-54

Sabesp (Water Utility Company of São Paylo) (2002), retrieved from http://www.sabesp.com.br on July 17 2002

Raymond, Santa (2001), "Offices that Send the Right Signals", *Financial Times*, Tuesday May 29 2001

Santamouris, M. (2001), "The Canyon Effect". In: Santamouris, M. (ed.) (2001), *Energy and Climate in the Urban Built Environment*, London: James & James

Sassen, Saskia (2001), *The Global City, New York, London, Tokyo*, Princeton, New Jersey: Princeton University Press (1991, first edition)

— (1994), *Cities in a World Economy*, Thousend Oaks, CA: Pine Forge Press

— (1999), "Hong Kong-Shanghai: Networking as Global Cities", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 106-111

Savitch, H.V. (1996), "Cities in a Global Era: A New Paradigm for the Next Millennium". In Cohen, M.A., Ruble, Blair A., Tulchin, Joseph S., and Allison M. Garland (eds), *Preparing for the Urban Future – Global Pressures and Local Forces*, Washington, D.C.: Woodrow Wilson Centre Special Studies

Scholte, J.A. (1996), "Beyond the buzzword: Towards a critical theory of globalisation". In: Kofman, E. and G. Youngs (eds), *Globalisation*, Pinter

Scholten, N.P.M., G. Huppes and H.A. Udo de Haes (2000), "Environmental Analysis for Building Legislation Purposes. A Challenge to Science and Policy Making", *Journal of Environmental Sciences*, No. 2, Year 15

de Schiller, Silvia (2000a), "Transformation of Urban Tissue and Environmental Impact: The Case of Buenos Aires". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

— (2000b), "Sustainable Urban Form: Environment and Climate Responsive Design". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

Schmid, Peter (1986), *Bio-logische Baukonstruktion – Wege zu einer integralen Bau- und Ausbautechnik*, Köln: Rudolf Müller

Schteingart, M., "The Environmental Problems Associated with Urban Development in Mexico City", *Environment and Urbanisation*, Vol. 1, No. 1, April 1989, pp. 40-50

Schwarz, Petra (2000), "Sustainable Redevelopment in Chinese Cities". In: Kögel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburő

Seade (Fundação Sistema Nacional de Análise de Dados) (2000), *Investimentos Privados Anunciados no Estado de Sao Paulo*, retrieved from http://www.seade.gov.br on July 18 2002

— (2002), *São Paulo: the emerging economies' metropolis*, retrieved from http://www.seade.gov.br/negocios/english/snpct01i.html on July 20 2002

Secretaria do Verde e do Meio Ambiente do Município de São Paulo (1997), *Agenda 21 Local. Compromisso do Município de São Paulo*, São Paulo: Secretaria do Verde e do Meio Ambiente

— (1998), *Agenda 21 – do Global ao Local*, São Paulo: Secretaria do Verde e do Meio Ambiente

Secretaria dos Transportes Urbanos do Município de São Paulo (2002), retrieved from http://www.stm.sp.gov.br on July 20 2002

Shen Yahong (1992), "Enlightment from the Development of Ancient City Planning in China in the Ancient Times", *China City Planning Review*, March 1992, pp. 65-75

Shiva, Vandana (1993), "The Greening of the Global Reach", *Global Ecology*, W. Sacchs, pp. 149-154

Silva, Ricardo T. (2000a), "Utilities Regulation and Urban Segregation. Research Notes on the Brazilian Context". In: Carmona, M. and Jürgen Rosemann (eds), *Globalisation, Urban Form & Governance*, Delft, The Netherlands: Delft University Press

Silva, Ricardo T. (2000b), "The Connectivity of Infrastructure Networks and the Urban Space of São Paulo in the 1990s", *International Journal of Urban and Regional Research*, Vol. 24, No. 1, pp. 139-164

Simonis, U.E. (1989), "Ecological Modernisation of Industrial Society: Three Strategic Elements", *International Social Science Journal* 121, pp. 347-361

Sinton, J. and David G. Fridley (2000), "What goes up: recent trends in China's Energy Consumption", *Energy Policy*, March 2000

—, Levine, M, Yang, F., and Jiang Lin (1999), *Status Report on Energy Efficiency Policy and Programs in China*, San Francisco: Lawrence Berkeley National Laboratory

Smidt, M. de (1992), "A World City Paradox – Firms and the Urban Fabric". In: Dieleman, F.M. and S. Musterd (eds), *The Randstad: a Research and Policy Laboratory*, Netherlands: Kluwer Academic Publishers

Smith, Michael Peter (2001), *Transnational Urbanism. Locating Globalization.*, Oxford: Blackwell Publishers

Smith, M., John Whitelegg and Nick Williams (1998), *Greening of the Built Environment*, London: Earthscan

Soja, Edward (2000), "The Stimulus of a Little Confusion: A Contemporary Comparison of Amsterdam and Los Angeles". In: Deben, L., Heinemeijer, W., and Dick van der Vaart (eds), *Understanding Amsterdam: Essays on Economic Vitality, City Life and Urban Form*, Amsterdam: Het Spinhuis

Spaargaren, G. (1987), "Environment and Society: Environmental Sociology in the Netherlands", The Netherlands' *Journal of Sociology* 23, 1, pp. 54-72

— (1997), *The Ecological Modernisation of Production and Consumption – Essays in Environmental Sociology*, Wageningen: WAU (PhD Thesis)

— (2000), "Ecological Modernisation Theory and the Changing Discourse on Environment and Modernity". In: Spaargaren, G., A.P.J. Mol, and F. Buttel (eds), *Environment and Global Modernity*, London: Sage

— (2003), "Ecological Modernisation Theory and Domestic Consumption", Wageningen: Wageningen University and Research Centre (unpublished paper)

— and A.P.J. Mol (1992), "Sociology, Environment and Modernity. Ecological Modernisation as a Theory of Social Change", *Society and Natural Resources* 5, pp. 323-344

Statham, Heathcote (1950), *A History of Architecture*, London: B.T. Batsford

van Steekelenburg, Ester (1996), *An Emerging Land and Real Estate Market in the People's Republic of China*, Amsterdam: University of Amsterdam, Department of Planning and Demography (MSc thesis)

Sun Shiwen (1995), "Economic Restructuring and the Further Development of Urban Planning", *China City Planning Review*, June 1995, pp. 2-6

Tang Zhenggang (1994), "Environmental Problems of Opening Cities in China During the Development of Internationalisation", *China City Planning Review*, September 1994, pp. 30-34

Taverne, Ed (1994), "Randstad Holland: Horizons of a Diffuse City", *Archis*, July 1994

Taylor, P. and D.R.F. Walker (2001), "World Cities: A First Multivariate Analysis of their Service Complexes", *Urban Studies*, Vol. 38, No. 1, pp. 23-47

Tjallingii, S. (1995), *Ecopolis Strategies for Ecologically Sound Urban Development*, Leiden: Backhuys Publishers

TU Delft (Technical University Delft, Faculty of Architecture) (2002), *Architecture in the Netherlands; 1900 – 2000*, Rotterdam: NAI Publishers

UNCHS (United Nations Centre for Human Settlements) (1999), *Cities in a Globalising World*, available at: http://www.urbanobservatory.org/swc1999/

UNEP (United Nations Environmental Programme) (1996), "The Construction Industry and the Environment", *United Nations Environmental Programme Review*, Vol. 19 no. 6

Unger, B. and F. van Waarden (eds), *Convergence or Diversity? Internationalisation and Economic Policy Response*, Avebury: Aldershot

Vale, B. and Robert Vale (1991), *Green Architecture. Design for a Sustainable Future*, London: Thames and Hudson

Vaughan, Scott (2001), "Reforming Environmental Policy". In: Drabek, Zdenek (ed.), *Globalisation under Threat: the Stability of Trade Policy and Multilateral Agreements*, Cheltenham, UK: Edward Elgar Publishing Limited

Vliet, Bas van (2002), *Greening the Grid. The Ecological Modernisation of Network-bound Systems*, Wageningen: Wageningen University (PhD Thesis)

Verdú, Vicente (1999), "The Chinese Castle", *2G International Architectural Review* No. 10, 1999/II, Barcelona: GG, pp. 4-13

Veer, J. van der (1998), "Metropolitan Government in Amsterdam and Eindhoven: a Tale of Two Cities", *Environment and Planning C: Government and Policy*, Vol.16, pp. 25-50

VROM (Ministry of Housing, Spatial Planning and the Environment, the Netherlands) (1996) *Sustainable Building in the Netherlands, a National Package*, The Hague: VROM (Department for Information and International Relations)

— (1998a), *Besluit Woon en Verblijfsgebouwen Milieubeheer*, The Hague: VROM

— (1998b), *National Environmental Policy Plan 3*, The Hague: VROM

— (1999a), *Sustainable Building: Quality and Amenity*, The Hague: VROM

— (1999b), *Sustainable Building Policy Programme 2000-2004. Firmly Embedding*, The Hague: VROM

— (1999c), *Sustainable Building Monitoring. Results of the Action Plans 1995-1999*, The Hague: VROM

— (2000), *Sustainable Building Regulation in the Netherlands: Towards Environmental Performance Standards for Buildings – a Description*, The Hague: VROM

— (various years), *Sustainable Building in the Netherlands, National Package*, The Hague: VROM

— (2001), *Fifth National Policy Document on Spatial Planning 2000/2020*, The Hague: VROM

Wagner, S. and Karsten Sippel (2001), "Traditionelle Bauformen in Peking", *Trialog* vol. 68, pp. 15-6

Wallerstein, I. (1990), "Culture as the Ideological Battleground of the Modern World-System", *Theory, Culture & Society* 7, pp. 31-55

Wang Hui (2001), *PRC Cultural Studies and Cultural Criticism in the 1990s*, retrieved from http://www.lib.duke.edu/positions/issues/vol06issue01/hui_css.html on August 20 2001

Wang Tianxi (1989), "National Style and Contextualism", *Building in China*, Vol. 2 No. 2, pp. 18-25

Wang Xiaodong (2000), "The Change of the City Concept". In: Kőgel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburő

Waters, Malcolm (1995), *Globalization*, London: Routledge

Watson, Donald (ed.) (1993), *The Energy Design Handbook*, The American Institute of Architects

Weale, A.(1992), *The New Politics of Pollution*, Manchester/New York: Manchester University Press

— (1993), "Ecological Modernisation and the Integration of European Environmental Policy", in: J.D. Liefferink, P.D. Low and A.P.J. Mol (eds) *European Integration and Environmental Policy*, London/New York: Belhaven

Wei Gaochuan (2000), "Public Space as a Stage". In: Kőgel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburő

Wei Shiheng (1991), "On City Chracteristics", *China City Planning Review*, March 1991, pp. 3 –20

Wever, Grace (1996), *Strategic Environmental Management: Using TQEM and ISO 14000 for Competitive Advantage*, London: John Wiley & Sons

White, Leon (1967), "The Historical Roots of our Environmental Crisis", *Science*, vol. 155, pp. 1203-1207

Wilson et al. (1998), *Green Development*, Rocky Mountain Institute, John Wiley & Sons, USA

Wolf, Tom (1991), *Da Bauhaus ao nosso Caos*, Rio de Janeiro: Editora Rocco

Wooley, T., Kimmins, S., Harrison, P. and Rob Harrison (1997), *Green Building Handbook*, Vols. 1 and 2, London: E & FN Spon

World Architecture (1996), "Special Report: Offices", *World Architecture* 52

— (1997), "Country Focus: Brazil", *World Architecture* 59, pp. 46-71

— (1998), "Special Report: Headquarters", *World Architecture* 64

— (1998), "Country Focus: The Netherlands", *World Architecture* 69

— (1999), "Sector Analysis: Energy Efficient Buildings", *World Architecture* 74

World Bank (1991), *The Environmental Profile of São Paulo*, Washington D.C.: The World Bank (Urban Management and the Environment series)

— (1994a), *Infrastructure for Development*, Washington: World Bank

— (1994b), *Environmental Management Institutions & Organizations in Beijing*, City Working Paper no. MEIP/BEI11, Washington D.C.: The World Bank

— (1997), *Vehicular air pollution : experiences from seven Latin American urban centers*, World Bank technical paper no. WTP 373, Washington DC: The World Bank

— (1999a), *World Bank Development Report 1999/2000*, Oxford: Oxford University Press

— (1999b), *World Bank Development Report 1999/2000*, Oxford: Oxford Univ. Press

Wu Jin (1993), "The Historical Evolution of Chinese Urban Morphology", *China City Planning Review*, September 1993, pp. 36-51

Wu Liangyong (1992), "The Mega-Cities in China: Development, Problems and Prospect", *China City Planning Review*, vol. 8, no. 2, June 1992, pp. 3-13

— (1992), "The Mega-Cities in China: Development, Problems and Prospect" (continuation from vol. 8 no. 2), *China City Planning Review*, September 1992, pp. 3-11

— (1997), "Development Strategies for Beijing: The need for a holistic approach", *Ekistics* vol. 64, no. 385/386/387, pp. 198-202

Wu Qingzhou (1994), "Comprehensive System for Urban Flood Prevention in China and Counter-measures to Reduce Calamities", *China City Planning Review*, December 1994, pp. 26-29

Wu Xumin (1993), "Energy Supply Programme of Beijing", *China City Planning Review*, vol 9, nos. 1, 2, 3, December 1993, pp. 20-22

Ye Yaoxian (1991), "Analysis of some Structural Failures in China", *Building in China*, Vol. 4, No.1, March 1991, pp. 14-19

Yeang, Ken (1994), *Bioclimatic Skyscrapers*, London: Artemis

— (1995), *Designing With Nature – The Ecological Basis for Architectural Design*, McGraw-Hill, New York

— (1996), *The Skyscraper Bioclimatically Considered*, London: Academy Editions

Yin, Robert K. (1984), *Case Study Research. Design and Methods*, London: Sage

Xu Anzhi (2000), "Introduction". In: Kõgel, E. And Ulf Meyer (eds), *The Chinese City. Between Tradition and Modernity*, Berlin: Jovis Verlagsburõ

Xu Ronglie (1989), "Construction Technology over the Last Fourty Years in China", *Building in China*, Vol. 2, No. 3, pp. 10- 17

Zarsky, Lyuba (1999), *Havens, Halos and Spaghetti: Untangling the Evidence about Foreign Direct Investment and the Environment*, background paper for the OECD Conference on 'Foreign Direct Investment and the Environment', The Hague, The Netherlands

Zhang Jinggan (1993), "Two Strategic Diversions in the Urban Development of Beijing", *China City Planning Review*, vol 9, nos. 1, 2, 3, December 1993, pp. 10-14

Zhang Jingyi (1996), "Legislation on Real Estate", *China City Planning Review*, Vol. 12, No. 2, pp. 46-52

Zhang Yuanrui (1992), "Reform and Development of China's Real Estate Industry", *China City Planning Review*, December 1992, pp. 54-59

Zhao Baoshan (1991), "Development Budget for Joint-venture Projects in the Beijing Region", *Building in China*, Vol. 4, No. 1, March 1991, pp. 2-13

Zhao Bingshi (1997), "Beijing: Urban Development and Planning", *Ekistics* vol. 64, no. 385/386/387, pp. 211-54

Zhao Haiying (1997), "Foreign Trade in the People's Republic of China: Past Performance and Future Challenges", *Asian Development Review*, Vol. 15, No. 1, pp. 88-110

Zhao Shixiu (1994), "Establishing an Operational Mechanism of Urban Planning in Line with the Socialist Market Economy", *China City Planning Review*, June 1994, 15-17

Zhou Ganzhi (1993), "Policy Framework for the Development of Real Estate and the Real Estate Industry in China", *China City Planning Review*, March 1993, pp. 2-16

— (1994), "In Search for a Healthy, Civilised and Sustainable Development", *China City Planning Review*, September 1994, pp. 2-4

— (1996), "Transport in China's Megacities: Problems and Advice", *China City Planning Review*, Vol. 12, No. 1, pp. 8-12

Zimmermann, K. et al. (1990), *Ökologische Modernisieung der Produktion, Strukturen und Trends*, Berlin: Sigma

Zou Deci (1990), "The Review and Prospect of Chinese Urban Planning from 1980s to 1990s", *China City Planning Review*, September 1990, pp. 3- 16

— (1993), "An Impact by the Leasing System of Urban Land upon Urban Development", *China City Planning Review*, March 1993, pp. 27-30
— (1995), "The Introduction of Urban Development in China", *China City Planning Review*, March 1995, pp. 25- 32

Appendix 1

List of persons interviewed

In the Netherlands (Amsterdam): A.H. Bouman, Netherlands Agency for Energy and Environment (Novem); Drs. A.J. de Miranda, Health and Safety Department, ABN AMRO Holding N.V.; Drs. P.M. Kroon, Head of Public Affairs, ING Group; Ir. B.A.G. de Bont, Chief Architect, T+T Design; Prof. Dr. Ir. Peter Schmid, Technological University Eindhoven; Drs. R. Cleophas, Health and Safety Department, IBM; Ir. E. Timár, Environmental Advisor, Milieudienst Amsterdam; Ir. M. van Huut, Chief Architect, Architectenbureau Alberts & Van Huut BV; Ir. M. Ballieux, Architect, Architectenbureau Alberts & Van Huut BV; Dr. Ir. J.J. van Meel, Faculty of Architecture, Delft University of Technology; Drs. R. van Veldhoven, Gemeentewaterleidingen Amsterdam (telephone communication); Drs. M. Vink, Head Facility Management, Andersen-Netherlands (telephone communication); and Drs. Patrick Teunissen, Dienst Waterbeheer en Riolering (telephone communication).

In Brazil (São Paulo): A. Campiglia, associate director, ABN AMRO Brazil; Ir. C. Monea, facility manager, Andersen Brazil; Ir. W.O. Machado, assistant facility manager, Andersen Brazil; J.D. do Prado, associate member, Andersen Brazil (telephone communication); Ir. M. Rosemberg, facility management, IBM Brazil; S. de Biasi, chief operating officer Latin America, ING-Barings Brazil; M. Cozim, premises manager, ING-Barings Brazil; Arch. J. Wilheim, Secretaria do Planejamento, São Paulo; Prof. Dr. G.C. Gasperini, Aflalo & Gasperini Arquitetura; Arch. R. Dini, Julio Neves Escritório Técnico; Dr. R.X. de Lima, marketing department, Eletropaulo AES; Ir. J.H. Boaratti, sales depart-

ment, Cia. Bandeirante de Energia; Arch. R. Siqueira, Ricardo Julião Architetura e Urbanismo; C. de Paula, commercial supervisor, Grupo Energia; Dr. N.M. Simões, director, Sabesp (communication); Arch. A. Oliveira, researcher, Jones Lang LaSalle São Paulo; Arch. M. Miranda, researcher, Jones Lang LaSalle São Paulo; and Ir. C. Alonso, Cetesb (communication).

In China (Beijing): Arch. Cui Kai, Vice President, Chief Architect, China Architecture Design & Research Group; Dr. Zhang Mingshun, Institute for Housing and Urban Development Studies, Beijing; Song Mingjie, Division Chief, Environmental Protection Bureau Qingdao City; Zen Yingru, Deputy Director, Environmental Protection Bureau Zhuhai City; Feng Yurong, Director, Environmental Protection Bureau Zhongshan City; Arch. Zhaohui Wu, China Architecture Design & Research Group; Liu Ailing, journalist, China Building Press; Zhang Zaidong, General Manager, Beijing Jinxiudadi Real Estate Development Co. Ltd.; Paul Lin Wen, MCIOB, Project Coordinator, ING Real Estate, Beijing Representative Office; Vicky Wu, Real Estate Operations, Arthur Andersen China (telephone communication); Prof. Wang Lijun, CERIS – Beijing Central Engineering and Research Incorporation of Iron and Steel Industry; Arch. Han Shaorong, Chief Project Engineer, CERIS – Beijing Central Engineering and Research Incorporation of Iron and Steel Industry; C. Pelger, Assistant Vice President, ABN AMRO, Beijing branch; P. Lamberts, Risk Management Department, ABN AMRO, Beijing branch; Liang Haichuan, Business and Planning Department, China Architecture Design & Research Group; Raymond C.Y. Chow, Property Manager, Beijing Kerry Centre; David Qin, Building Manager, Beijing Kerry Centre; Thomas S.T. Tay, Marketing Director, Beijing Kerry Centre; Jessica Li, Human Resources, IBM China Company Limited; and Zuo Peng, General Services, IBM China Company Limited (communication).

Elsewhere: Dr O. Nielsen, Danish Ministry of Housing (communication).

Summary

The 1990s saw the growth of two distinct strands of debates on the transformations and emerging problems besetting the urban space. One of these has focused on the relationship between globalisation and the similar changes metropolitan cities are undergoing, as they become home to numerous global economic agents such as multinational firms. According to it, globalisation can be understood as a worldwide reaching 'space of flows' – of money, information, and physical streams – emerging within a 'network society', and landing into the urban space triggering multiple cultural, political, economic, societal, and spatial transformations. In so doing, globalisation is prompting new challenges in dealing with urban management issues, once the 'space of flows' meets the 'space of place', that is, the physical contiguity of the urban node, governed by the particularities of the city's regime, such as its political, cultural, and economic background.

Developing in parallel, the other strand of debates has focused on the relationship between the natural and built environments, exploring the ecological footprint of buildings, their impacts on local infrastructures and new technologies that are emerging to curb them. Rather technocratic, this line of thought describes buildings as one of the main environmental disrupters of modernity – accountable for elevated indexes of energy, water, and finite natural resources' use, and related ecological problems spanning from local infrastructure overburden, to global warming, ozone depletion, deforestation, desertification, and so on.

Both strands of debates have been elucidating. On the other hand, they have also been incomplete. While demonstrating how globalisation has become a dominating key point for understanding contemporary urban change, the first line overlooks the urban environmental dimension, that is, how globalisation may trigger urban environmental challenges and/or may be a vehicle for introducing environmental management solutions. The other approach, while quantifying the environmental impacts of buildings in general and describing technical solutions to mitigate them, falls short when analysing the societal processes that are leading to, or hindering, an ecological upgrading of buildings – i.e., how such technological modernisation is or may be steered amid different social actors.

This study aims at making a bridge between such two research lines by providing an environmental perspective to the global city research as well as a societal dimension to the sustainable building literature. As segments of the urban space have transnationalised with globalisation, with the presence of multinational firms and other global economic agents connecting key cities throughout the planet, the skyscraper has turned into a 'transnational building'. This is a local structure that not only rules the skyline of the global city, posing numerous local environmental burdens, but which is now also embedded in the global space of flows, subject to its regimes. This study analyses how the transnational building may become a sustainable building, canalising environmental innovations from the global space of flows into the urban space. By focusing on offices held by multinational firms in specific locations, it explores how and why such firms are – or are not – promoting in-house environmental management practices, and whether they may form a worldwide virtuous circle leading to a global network of urban environmental change. Its aim is to understand how sustainable building practices are being activated in certain urban nodes of the network society and may transcend to other urban nodes, and how the dynamics of urban environmental change at the interface between the space of flows (the environmental regimes of global companies) and the space of places (urban environmental

and utility management policies) may vary in view of the different economic and political backgrounds of each city. How is the greening of transnational buildings developing in different urban settings? Which actors are pushing for, and which are hindering, such greening process?

To deal with these questions, both theoretical perspectives as well as empirical research methods are used. Theory-wise, a central proposition organising the enquiry suggests that a new trend in environmental politics has emerged, in which the state 'retreats' from developing top-down environmental policies while market actors start to play a central role in triggering environmental change. While the state remains imperative as an environmental change 'enabler', the dynamics of environmental change is nevertheless implemented by market actors, following an ecological *modernisation* logic, in which the environment becomes a central criterion in production and consumption processes. Deriving from this, and in the tradition ecological modernisation studies, a central hypothesis this research puts forward is that, in the era of globalisation *global* market actors may trigger urban environmental reforms, with multinational firms concentrating head offices in key cities while dispersing their activities throughout the planet. In this case, such firms may form a virtuous – as well as *virtual* – circle of worldwide urban environmental change.

To empirically analyse the adequacy of this hypothesis, the study adopts a qualitative and explorative research methodology. This consists of a case study research design, exploring how and why environmental innovations are being triggered in transnational buildings at the interface between local and global societal dynamics in different urban settings. To this end, the in-house environmental management practices of four high environmental-profile multinational companies (ING, Andersen, ABN AMRO, and IBM) are evaluated in three global cities, which altogether portray a sample of three different 'state-economy' combinations: Amsterdam (a democratic, partially state-regulated city with a well-developed environmental capacity), São Paulo (a democratic and free market economy context), and Beijing (a state-regulated urban setting). The combination of these three cities and four companies result in 12 case studies of global-local interception, which are investigated making use of personal interviews (in each company in the three cities as well as at city planning agencies), in addition to general observations and secondary literature.

The findings of this research make it clear that, although showing differences, the greening of transnational buildings in the three global cities displays some similarities in certain aspects. First it can be noted that local public actors play a crucial role in activating the environmental reform of transnational buildings. Environmental policies deployed by urban environmental agencies, for instance, may actively trigger or seek to further policies of global companies, resulting in sustainable building practices. In addition, local public actors may develop environmental strategies through legal and economic instruments to attract transnational actors to invest in their local nodes, laying a kind of 'green carpet' for global companies, which would favour certain nodes of the network society for their good environmental performance.

Secondly, local public actors developing sustainable building policies in cooperation with a multinational company tend to get environmental innovations started also at the level of the 'space of flows', that is, at the level of global company strategies. However, the expectation to see these policies materialise in other urban nodes of the network society does not always turn out to be realistic, resulting too often in weaker corporate environmental policies as compared to original regimes striven in nodes working in city-company cooperation.

Third, the research observes that successful cases of global in-house corporate environmental management require companies to 'learn' how to deal with the interaction between the space of flows and the space of place. These companies may pursue a global environmental policy, which, while determining its own standards of in-house environmental performance, always follows the strictest regime in place, whether originated from public policies or from the company's environmental policy. In so doing, such companies are making their sustainable building goals work at all nodes of the network society, regardless the lack of incentives from local agencies. Such approach may not only trespass or by-pass local environmental policies and standards by implementing company strategies more or less autonomously. In some cases it may also activate environmental policies of urban agencies, to be applied in other buildings in the same city.

Based on the observations above, this study demonstrates how the realms of urban environmental management and corporate environmental management are not conflicting, as both cities and companies seek to optimise the use of finite resources such as energy and water and ensure sustainability. However a contradiction to be noted regards the short-term increase in capital expenditure due to the investments sustainable building involves, which goes against the profit component of the corporate management discourse. This research makes it clear that the institutionalisation of sustainable building practices in corporate premises has to a certain extent to be activated by urban policies. In that sense, although examples of market actors prompting environmental change are numerous, the role of public authorities remains crucial in activating the greening of transnational buildings, regardless the different (political-economic) urban settings.

On the other hand, this research also demonstrates that, beyond multinationals, global market actors as developers and manufacturers are turning into prime agents of this ecological modernisation process, forming a bridge from locality to locality in the transcending of environmental change: distributing new solutions of environmental management, new technologies, new approaches of urban policies, and so forth. It thereby supports the statement that global market actors are one if not the main engine for launching environmental innovations in transnational urban spaces. In this light, the global virtuous circle of urban environmental reform seems to have been triggered. Yet, to be thoroughly efficient, such virtuous circle needs to be ignited by adequate public policies, to be elaborated in accordance with the specificity of each space of place.

Samenvatting

De jaren negentig hebben twee afzonderlijke stromingen voortgebracht in het debat omtrent de transformaties en terugkerende problemen van het stedelijke gebied. Eén van deze verhaallijnen is gericht op de relatie tussen enerzijds globalisering en anderzijds de vergelijkbare verandering die metropolen wereldwijd ondergaan, nu zij een thuis bieden aan talrijke mondiale economische actoren, zoals multinationale ondernemingen. Globalisering wordt dan opgevat als een stelsel van wereldomvattende stromen – van geld, informatie en materiële goederen – die ontstaan in een 'network society' maar uiteindelijke voet aan de grond krijgen in de stedelijke ruimte, waar zij culturele, politieke, economische, sociale en ruimtelijke veranderingen teweegbrengen. Deze zogenoemde 'space of flows' ontmoet daarmee de 'space of place', te weten de fysieke contiguïteit van het stedelijke knooppunt en zijn specifieke eigenschappen, zoals de lokale politieke, culturele en economische achtergrond. Globalisering brengt hiermee nieuwe uitdagingen voor stedelijke managementvraagstukken.

Het tweede, zich parallel ontwikkelende debat, is gericht op de relatie tussen de natuurlijke en de gebouwde omgeving. Het verkent de milieugebruiksruimte van gebouwen, hun impact op lokale infrastructuren en de technologieën die ingezet worden om deze milieuimpacts te verminderen. Deze nogal technocratische verhaallijn bestempelt gebouwen als één van de voornaamste milieuzondaars van de moderniteit. Ze zijn verbonden met toenemend gebruik van energie, water en natuurlijk hulpbronnen en verantwoordelijk voor problemen variërend van lokaal overbelaste infrastructuur, tot ontbossing en het broeikaseffect.

Beide debatten of verhaallijnen afzonderlijk zijn zowel verhelderend, als incompleet. Het eerste debat laat zien dat globalisering een prominent kernbegrip is in het begrijpen van de hedendaagse stedelijke dynamiek, maar gaat voorbij aan de milieudimensie. Daarbij negeert het de rol van globalisering in het veroorzaken van stedelijke milieuvraagstukken en het aandragen van oplossingen daarvoor. Het tweede debat kwantificeert weliswaar de negatieve milieuimpact van gebouwen en draagt hiervoor technologische en organisatorische oplossingen aan, maar schiet tekort in een analyse van de (mondiale) sociale processen die ten grondslag liggen aan de ecologische opwaardering van gebouwen. De totstandkoming en sturing van technologische moderniseringsprocessen temidden van verschillende sociale actoren in een mondiale 'network society' wordt daarmee bijvoorbeeld buiten beschouwing gelaten.

Dit onderzoek beoogt beide debatten met elkaar in verband te brengen door ten eerste een milieu perspectief te geven op het bestaande onderzoek inzake de 'global city', en ten tweede een sociale en mondiale dimensie toe te voegen aan de literatuur op het gebied van duurzaam bouwen. Segmenten van de stedelijke ruimte zijn, onder invloed van multinationale economische actoren die steden wereldwijd met elkaar verbinden, verworden tot transnationale ruimte, en de wolkenkrabber tot een transnationaal gebouw. Dergelijke transnationale gebouwen domineren niet alleen de 'skyline' van de mondiale stad waar zijn talrijke lokale milieuproblemen veroorzaken, maar zijn tegelijkertijd ingebed in wat Castells aanduidt als de 'global space of flows' en daar geldende regimes. Dit onderzoek bestudeert hoe het transnationale gebouw een duurzaam gebouw kan worden, door milieuinnovaties afkomstig uit de mondiale 'space of flows' en uit het lokale stedelijke milieu- en infrastructuurbeleid. Het verkent de vraag hoe en waarom multinationale ondernemingen al dan niet actief zijn in het promoten van 'in-house'

milieumanagement activiteiten in hun kantoorgebouwen in specifieke stedelijke locaties. Wat is hun (potentiële) rol als drijvende kracht in een mondiaal netwerk van stedelijke milieuverandering? Het doel van deze studie is daarmee inzichtelijk te maken hoe activiteiten van duurzaam bouwen tot stand komen in specifieke stedelijke knooppunten van de 'network society' en of deze (kunnen) doorstromen naar andere stedelijke knooppunten. Een belangrijke vraag in dit verband is hoe de stedelijke veranderingsdynamiek op het raakvlak van 'space of flows' (milieubeleid van mondiale bedrijven) en 'space of place' (stedelijk milieu- en infrastructureel beleid) varieert tussen stedelijke knooppunten. Hoe ontwikkelt de milieuvernieuwing van transnationale gebouwen zich tegen verschillende stedelijke achtergronden? Welke actoren en instituties stimuleren en hinderen deze milieuinnovatie processen?

Om een antwoord te geven op bovenstaande vragen worden theoretische perspectieven gecombineerd met empirisch onderzoek. Het theoretische vertrekpunt van dit onderzoek is de vooronderstelling dat er sprake is van een opkomende vernieuwing van het milieubeleid, waarbij de staat terughoudender wordt in het ontwikkelen van top-down milieubeleid en markpartijen een steeds belangrijker rol spelen als drijvende kracht achter milieuverandering. De staat blijft weliswaar onmisbaar bij milieuverandering, maar het zijn marktpartijen die milieuveranderingsprocessen implementeren. Zij gaan daarbij uit van de rationaliteit van ecologische modernisering, en wijzen aan milieu een centrale plaats toe in processen van productie en consumptie. In lijn met ecologische moderniseringstheorie volgt hieruit de voor dit onderzoek centrale stelling dat mondiale marktactoren – in dit tijdperk van globalisering – een rol spelen in het aanjagen van stedelijke milieuhervormingen. Multinationals concentreren hun kantoren in metropolen, maar zijn actief in de gehele wereld en kunnen daarmee een effectieve – en tevens virtuele – cirkel van wereldwijde stedelijke milieuvernieuwing tot stand brengen.

Om bovenstaande hypothese empirisch te toetsen wordt in dit onderzoek gebruik gemaakt van een kwalitatieve, verkennende onderzoeksmethodiek in de vorm van case-studies. De analyse richt zich op de vraag hoe, waarom en in welke mate milieuinnovaties in gang gezet worden in transnationale gebouwen, tegen verschillende stedelijke achtergronden en op het raakvlak van locale en mondiale sociale dynamiek. Hiertoe wordt het in-house milieumanagement van vier, vanuit milieuoogpunt 'high-profile' multinationals geëvalueerd (ING, Andersen, ABN AMRO, and IBM) in drie stedelijke locaties. De drie locaties vertegenwoordigen drie verschillende politiek-economische constellaties: Amsterdam (een democratische, deels overheidsgereguleerde stad met een goede milieucapaciteit), São Paulo (democratisch in een vrije markt context) en Peking (gekenmerkt door overheidsregulering). De combinatie van vier bedrijven in drie steden resulteert in 12 cases, die ieder zowel lokale als mondiale componenten in zich verenigen. Voor de dataverzameling is gebruik gemaakt van: 1) face-to-face gestructureerde diepte-interviews met managers van de bedrijfsvestigingen en hoofdkantoren, en met ambtenaren van lokale overheden en utiliteitsbedrijven; 2) observaties; en 3) literatuuronderzoek.

Het empirisch onderzoek leidt tot een aantal conclusies rondom 'verduurzamingsprocessen' van transnationale gebouwen in de drie verschillende steden. Ten eerste valt in dit verband op dat lokale publieke actoren een cruciale rol spelen in het stimuleren van milieuhervormingen in transnationale gebouwen. Zo kan milieubeleid van stedelijke milieuoverheden actief bijdragen aan een verdere ontwikkeling van het milieubeleid van multinationale ondernemingen, daarmee leidend tot een duurzaam bouwpraktijk van deze bedrijven. Lokale overheden en nutsbedrijven kunnen verder milieustrategieën ontwikkelen waarbij zij met gebruik van juridische en economische

instrumenten multinationals aanmoedigen om in hun stedelijk knooppunt te investeren. Zij kunnen als het ware een 'groen bed spreiden' voor bedrijven die een duidelijke voorkeur hebben voor knooppunten met een goede milieuprestatie.

Ten tweede blijkt dat lokale overheidsactoren die in samenwerking met multinationals beleid op het gebied van duurzaam bouwen ontwerpen, ook milieuveranderingen in de 'space of flows' in gang kunnen zetten. Dat wil zeggen: milieuveranderingen op het mondiale niveau van internationale bedrijfsstrategieën. Dit bedrijfsbeleid blijkt echter niet altijd te materialiseren in andere stedelijke knooppunten van de 'network society' en wordt vaak afgezwakt in vergelijking met het originele beleid zoals ontwikkeld in knooppunten waar het multinationale hoofdkantoor en stedelijk overheid samenwerken aan milieuvernieuwing.

Ten derde blijkt dat het voor een succesvol mondiaal in-house bedrijfsmilieubeleid noodzakelijk is dat bedrijven 'leren' om te gaan met interacties tussen 'space of flows' en 'space of place'. Bedrijven die hierin slagen kunnen een mondiaal milieubeleid ontwikkelen dat bij het vaststellen van in-house milieuprestatieindicatoren altijd uitgaat van het meest stringente plaatselijke milieuregime, ongeacht of dit het eigen bedrijfsbeleid is, of het beleid van de stedelijke overheid. Op deze wijze implementeren bedrijven hun doelstellingen op het gebied van duurzaam bouwen in alle knooppunten van de 'network society', ondanks een mogelijk gebrek aan stimuli vanuit de lokale overheid. Door het zelfstandig implementeren van bedrijfsstandaarden wordt lokaal beleid niet alleen minder relevant of zelfs voorbijgestreefd; het kan tevens een impuls bieden aan het verder ontwikkelen van milieubeleid door stedelijke overheidsinstanties, om uiteindelijk geïmplementeerd te worden in andere gebouwen in dezelfde stad.

Op basis van bovenstaande bevindingen toont dit onderzoek aan dat stedelijke milieubeleid en bedrijfsmilieubeleid niet conflicterend zijn, daar waar steden en bedrijven streven naar duurzaamheid en een minimaal gebruik van schaarse hulpbronnen zoals energie en water. Hierbij moet echter de kanttekening worden geplaatst dat de investeringen voor duurzamer bouwen op de korte termijn tot stijgende kapitaal uitgaven leiden, en dus strijdig is met het winstoogmerk van het bedrijfsmanagement discours. Dit onderzoek wijst uit dat institutionalisering van 'duurzaam bouwen' op bedrijfsterreinen tot op zekere hoogte actief gestimuleerd moet worden door stedelijk milieubeleid. Hoewel er talrijke voorbeelden zijn waarin marktpartijen milieuinnovaties aandrijven, speelt de lokale en nationale overheid nog steeds een cruciale rol in de 'verduurzaming' van transnationale gebouwen, ongeacht de specifieke (politiek-economische) stedelijke setting. Anderzijds laat dit onderzoek zien dat mondiale marktpartijen als ontwerpers en producenten primaire spelers kunnen zijn in het beschreven ecologische moderniseringsproces. Zij fungeren dan als bruggenbouwers tussen verschillende lokaliteiten in het doorvoeren van milieuverandering: zij distribueren innovatieve milieumanagement strategieën, nieuwe technologieën, en nieuwe benaderingen voor stedelijke milieubeleid. Dit ondersteunt de stelling dat mondiale marktactoren één van de motoren zijn achter het lanceren en aanzwengelen van milieuinnovaties in de transnationale stedelijke ruimte. In dit licht lijkt een effectieve cirkel van stedelijke milieuhervorming in gang gezet. Echter, om daadwerkelijk efficiënt te zijn moet deze cirkel gevoed worden met adequaat overheidsbeleid en uitgewerkt in overeenstemming met de specifieke eigenschappen van elke 'space of place'.

About the author

Luciana Melchert Saguas Presas is a Brazilian architect born in August 1973. While conducting her studies in São Paulo she worked with designers and developers in the construction of several architectural projects, mostly office buildings. In 1998 she joined the Institute of Housing and Urban Development Studies (IHS) in Rotterdam, first in an MSc programme on Urban Environmental Management and subsequently as research associate, where she was involved with the development of research and a training programme in the field of sustainable building. In 2001 she started her PhD research in Wageningen University's Department of Social Sciences, Environmental Policy Group.