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The environmental dimension of growth in frontrunner companies

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Summary

There is a correlation between environmental degradation and economic growth. The consequences and reasons for this indirect relation have been debated since *The Limits To Growth* was published in 1972. The environmental dimension of growth is a contested topic in environmental policy making and a divisive issue amongst environmentalists. The discourse of growth and how to tackle its environmental dimension concerns predominantly macro-economics, not corporate policies. Seven frontrunner companies and their growth strategies are researched to explore the role of Environmental CSR in addressing the environmental dimension of growth.

The key areas of research are (1) the literature on the sustainability of growth resulting in arguments, methods and strategies from both the proponents and opponents of growth to address the environmental dimension of growth and (2) policy documents of, and interviews with representatives of, frontrunner companies on how they address the environmental dimension of their growth.

In literature, the argument that economic growth is complementary with environmental sustainability is built on several arguments. Economic stability which continued growth can provide is seen as necessary to transition to a more sustainable economy. The environmental Kuznets curve is used to make the argument that the environmental impact of growth will decrease if we keep growing the economy.

The opponents of growth argue that there are rebound effects that prevent the environmental impact of human activity to decrease when economic growth continues. The limits to growth in resources, energy, carrying capacity and even human ingenuity are used to argument that growth cannot continue or be harmonised with environmental sustainability.

How do frontrunner companies address the environmental dimension of growth? The policy documents of Ahold, Heijmans, Interface, Philips, Ricoh, Siemens and Van Houtum are investigated and representatives of these companies are interviewed.

The results show that, unlike in the sustainable growth debate, the stances towards growth are more pragmatic than ideological. Concepts and strategies such as the circular economy, ecological modernisation and absolute reduction targets are applied to address the environmental impact of their growth. Limits to growth are not being self-imposed by the researched frontrunner companies, but all have set specific conditions to their growth which address environmentally impactful ways of growth.

There are two main stances towards growth found in this research. The competitive stance sees growth as a condition for increasing the eco-efficiency quicker than their competitors. This can be considered a pro-growth stance, but with strict conditions to the content of

growth. The collaborative stance sees growth as an outcome or reward for environmentally sound practices rather than a necessary precondition for sustainability.

The most radical strategy found to address the environmental dimension of growth is Interface's mission zero. The aim is to have zero environmental impact in 2020 with the intention to have a positive impact after 2020. This reverses the growth – impact relation on a company level.

An important difference found between the debate in literature and the frontrunner companies is the understanding of impact. In literature impact is seen as necessarily negatively impacting the planet, while the frontrunner companies, next to their aim to minimize the negative impact, are working to maximize their positive environmental impacts. The frontrunner companies are, whether intended or not, challenging dominant logic of the linear pro-growth economy.

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1. Introduction

1.1 The environmental dimension of growth as a frontier of CSR.

Environmental Corporate Social Responsibility has made substantial progress in greening the world's production chains over the last decades (Sarkis, 2006). This contributed to the reduction of the environmental impact per product on the environment. Despite this effort the aggregate impact of human activity on the environment kept increasing during this period (Rockström et al., 2009). The process of increasing eco-efficiency is thus partly the answer of the sustainability challenge as simply replacing current practices with more efficient ones alone doesn't create a sustainable economy on itself (Alcott, 2005). The environmental dimension of economic growth, which is the increased environmental impact contributable to an increase in growth, will need to be dealt with as the prevailing type of growth, the increased throughput of goods, cannot be sustained on our finite planet (Rees, 2013). How do environmentally conscious frontrunner companies expand their environmental Corporate Social Responsibility (Henceforth CSR) policies to include the environmental dimension of growth?

Sustainability is increasingly becoming part of company culture through CSR. The benefits of implementing CSR policies have shifted from direct efficiency gains to strategic advantages as companies are advancing in their CSR achievements. The usage of a wider timeframe allows companies with a full environmental sustainable strategy to be ahead of legislation and their competition through working with higher standards. This foresight and early adaptation enhances the competitiveness as it allows companies to take control of a situation before it becomes a problem. This attitude makes frontrunner companies more likely to address the long term and systemic risks than compliance-oriented companies. Tackling the problem posed by the environmental dimension of growth, be it by preparing for a post-growth economy as mega-trend or revising the business model to address the environmental dimension of growth can be seen as an issue of gaining strategic advantage and risk management.

The debate on growth is increasingly polarized and politicized (Klein, 2011). Growth is either intrinsically good and the solution to a wide range of problems (Solow, 1956, Walter, 1981, Dasgupta and Heal, 1979, Calderón et al., 2014) or growth is a perverse mechanism that destroys the planet while enriching a small number of people (Douthwaite, 1993, Hamilton, 2004, Lloyd, 2009, Grant, 1983, Schumacher, 1973). This research does not side with either the "cornucopians" or the "doomers" (Stahl, 2008), but does identify and utilize arguments from both sides to assess the growth strategies of frontrunner companies.

Thinkers from both sides agree that the growth process isn't neutral which makes not taking a stance increasingly difficult. The questioning of the sustainability of growth has created

difficulties and dilemmas for frontrunner companies on how they proceed their efforts to green the planet. The search for solutions that companies can apply is central to this thesis.

The debate on the sustainability of growth has little regard for the role of companies as most of the attention goes to governmental growth policies, GDP and macroeconomics. The strategies of frontrunner companies to deal with the contested area of growth and sustainability is the gap in knowledge this thesis addresses. The existence of this gap and the necessity for addressing it is acknowledged by Tomi J. Kallio: *“It is time to question the taboo of continuous growth, and open it up for debate. It might be thought this debate would be important not least for the CSR scholars”* (Kallio, 2007)

1.2 Research questions

General research question:

- How do frontrunner companies address the environmental dimension of growth?

Specific research questions:

1. What is the environmental dimension of economic growth?
2. What are the proposed solutions in literature to address the problems of economic growth?
3. What are the growth strategies of frontrunner companies with a full environmental sustainability strategy?

1.3 Methods

The selection of frontrunner companies took place first by a preselection of companies from a list provided by Triodos bank with companies that are regarded “best in class”. From this list a selection of 10 frontrunner companies is created by using the 4 stage model and assessing their CSR achievements and goals. The four stage model is used to select companies as it allows for measuring the progress of the environmental management of a company. Additionally the frontrunner network from MVO Nederland was used to find company contacts.

CSR documents and performance reports issued by the companies are assessed, as well as secondary sources such as media and news platforms with a specific focus on statements regarding growth and sustainability. The same process took place for screening interviewees to be able to ask specifically tailored questions. Most frontrunner companies have a relatively open attitude and share detailed data about their performance on their website. Questions emerging from researching the documents are asked to a company representative in the form of an interview.

7 companies were researched: Ricoh Nederland, van Houtum, Interface, Philips, Heijmans Nederland BV, Siemens and Ahold.

The content of the results consists of the CSR documents of the frontrunner companies and the outcomes of semi-structured interviews with an employee. The interviews are written down in condensed reports. The interviewed people and their position within their company are listed in table 1.

| Name: | Company: | Function: |
|-------------------|------------|--|
| Geanne van Arkel | Interface | Sustainable Development at Interface |
| Nicolette Kaay | Ricoh | Manager Community Investment |
| Onno Franse | Ahold | Program Director Healthy Living and Environment |
| Bas Gehlen | Van Houtum | Managing director |
| Jan Erik Ouwehand | Siemens | Head Marketing Communication |
| Robert Koolen | Heijmans | Director Strategy and Policy, Program Manager Sustainability |
| Thomas Marinelli | Philips | Senior Director Environment, Health and Safety |

Table 1. The interviewees of this research.

1.4 Structure of report

In chapter two definitions are given and the relation between growth and the environment is explored. This chapter analyses the debate between the proponents and opponents of growth from an environmental perspective. This chapter answers the first specific research question: What is the environmental dimension of economic growth?

In the third chapter the perspectives for frontrunner companies are explored. Bridging concepts that allow companies to make meaningful progress in addressing the environmental dimension of their growth are presented and the second specific research question is answered: “What are the proposed solutions in literature to address the problems of economic growth that can be applied on a company level?”

In chapter 4 the interviews with frontrunner companies are analysed and the company reports and policy documents are investigated. The focus lies on the third research question: “What are the growth policies of frontrunner companies with a full environmental sustainability strategy?”

The discussion will reflect upon the used theories, The validity of the results and on how the boundaries of this thesis are set.

The conclusion wraps up the results of the company studies and the preceding theoretical chapters. The conclusion will answer the main research question “How do frontrunner companies address the environmental dimension of growth?” for the companies that are covered in this research and a general conclusion on the role and compatibility of companies in the sustainability discourse. This is followed by recommendations for further research.

2. The connection between economic growth and the environment

2.1 Key concepts

Frontrunner company

The term frontrunner stems from sport where it is used to describe the person taking the lead or head position. The metaphor is clear when we look at the definition: a contestant who runs best when in the lead. The companies classified as frontrunners do perform best because they innovate and push the boundaries of their performance. They are at the front when it comes to scientific understanding of problems, dare to experiment and to internalize externalities. They see the strategic advantage of being ahead of their competitors and set the pace.

Economic growth

There is not an agreed upon, formal definition of economic growth. Most economists agree that economic growth means the increase of the throughput of goods and services in the economy over a period of time. How to measure this growth and what is to be included is debated. The most common definition of economic growth is the increase in economic activity and expressed as a proportional increase of the Gross Domestic Product (GDP).

Economist Margrit Kennedy differentiates between three types of growth based on the growth curve instead of the content of growth. According to her there are three archetypal growth shapes: natural growth, linear growth and exponential growth (Kennedy, 1995). The type of growth that most closely resembles incremental economic growth as experienced in the post-war period is the exponential growth curve.

It is important to distinguish between growth and the seemingly synonymous “development” and “progress”. Growth is a quantitative measurement of the increase in throughput while development and progress concern qualitative increases.

Corporate social responsibility

CSR is a form of self-regulation (Wood, 1991) concerning the impact of businesses on their externalities (Pezzey, 1992) beyond compliance. This entails local communities, employees, the environment and various ethical issues that are directly influenced by a business (Carroll, 1991). Numerous standards have greened the corporate world and accelerated the implementation of efficiency measures in the last decades beyond the capabilities and ambitions of the governments to do so. The central idea is that companies can radically change without a legislative obligation. The success of socially and environmentally sound companies has contributed to the emergence of green washing amongst competitors (Delmas and Cuerel Burbano, 2011). Green washing is excluded from the definition of CSR in this thesis.

2.2 Economic growth

Historical perspective

The focus on economic growth in society is a relatively new phenomenon. Most of human history economic growth rates were very low and hardly noticeable as little changed from generation to generation in terms of wealth (Martenson, 2011). This also meant that jobs and income stayed the same. For example: novels often included the salary of the main characters to give an indication of their economic position. This went out of practice around the same time as inflation and growth made the numbers increasingly unintelligible (Piketty and Goldhammer, 2014a).

The origins of GDP and thus the measurement of growth lay in the works of United States economist Simon Kuznets who made the first attempt in 1934 to measure the total size of an economy and compare that to previous years (Kuznets, 1934). The purpose is the production of a single metric that includes production by companies, government and individuals. The larger this number, the better an economy performs. The Gross Domestic Product became one of the most important indicators of economic performance after Bretton Woods in 1944 (Dickinson, 2011).

How the process of growth is rooted in history has been theorized most notably by Rostow and Diamond. Rostow's stages of growth (Rostow, 1961) describes the pre-industrial stage as change-averse, agricultural, rigid and undeveloped. According to his theory, growth only takes off when various criteria are met, most notably an increase in demand for raw materials, development of agriculture and technological innovation. From that moment it is a self-reinforcing feedback loop where more innovation and efficiency leads to more and better products and services leading to more growth (Rostow, 1961).

Diamond describes growth as the result of an increase in complexity (Diamond and Ordunio, 2005). Humanity increases the complexity of society in order to solve problems. The collection of technologies and management schemes required for halting and reversing climate change require a tremendous amount of complexity and orchestration. The increase of complexity comes at a price according to Diamond. Just like ecosystem complexity is linked to the amount of energy within the system (Ulgiati and Brown, 2009), the complexity of society is limited by the available energy. Given that humanity relies to a large extent on fossil energy sources that are the main driver of anthropogenic climate change we have to choose between solving and coping with climate change (Kay et al., 1999). We can either increase our energy consumption, and thereby the severity of climate change, to increase societal complexity in order to manage climate change, or we choose not to solve the problem of climate change by avoiding the worst impacts and gradually reduce the size of the economy (Diamond, 2005).

The difference between the approaches between Diamond and Rostow to explain the development of societies is the role they ascribe to humanity. In Rostow's stages of growth economic development is a linear process, pushed forward by exogenous factors such as novelty and technological advancement. Societies are destined to grow, whether intended or not. Diamond approaches growth as a product of increased complexity needed to overcome barriers. Both describe the development of economic growth but have different appreciations for technological advancement, resources and the inevitability of the growth trajectory as Rostow argues that growth cannot be stopped once taken off.

Monetary perspective

"A fundamental problem with the debt method of creating money is that, because interest has to be paid on almost all of it, the economy must grow continuously if it is not to collapse." (Douthwaite, 1999)

Growth is regarded of high importance for the health of an economy. The most common metric for measuring growth, GDP, does equate to the health of an economy for many. The money system itself is seen to necessitate growth.

The growth of the money supply is of great importance for economic stability. An annual economic growth rate of around 2,5% is strived for by governments and promoted by economists (Koopmans, 1965, Kuznets and Murphy, 1966). As 97% of money is created out of debt by private banks (Werner, 2014, McLeay et al., 2014) and these debts have to be repaid with interest, there is a perpetual shortage of money (Douthwaite, 1999). Only through a growing money supply, these debts can be serviced. Therefore it is argued that growth is needed to service current debts without deflation. While GDP is the measurement of the throughput of goods and services, it uses money as an indicator of the value of these flows. Thus when the GDP increases, the total amount of money available in the economy or the rate at which money changes hands has to be increased (Jackson and Dyson, 2012).

The situation of debt-based money not only applies to macroeconomics but also to companies. As companies take out loans that have to be repaid with interest, they are forced to attract more capital, in one way or another aiding to the competition between companies. This debt-based lending practice is incompatible with a non-growing economy and harmful to the diversity of choice needed for a functioning free-market economy. For example: 100 companies operating the same niche borrow each 100.000 euro and have to repay that with 5 percent interest. The revenue needed to service the debt and interest has to come from outperforming competitors. In this scenario, where no additional money flows into this sector as it performs under no growth conditions, 5 companies will have to file for bankruptcy regardless of their performance. The amount of money available divided by the

total amount of money owed by the bank $1.000.000/1.050.000 = 0,95$. On the long term this mechanism will lead to the monopolization of markets.

Companies are generally in favour of growth of the money supply as it makes it easier to attract credit, it increases the demand for goods and services allowing for more sales without necessarily having to outcompete other companies and a more stable economic situation provides space for companies to experiment and innovate.

Marxist perspective on growth

From a Marxist perspective economic growth is the speed in which capitalism spreads (Varma, 1977). Money is used to acquire capital which is then used to generate more money. This process is known as the $M - C - M^1$ formula of capital investment (Marx, 1867) which is a positive feedback loop increasing the power of investment over the power of labour.

The upward spiral of converting money into capital to gain more money, which in turn is converted in the creation of more capital, is seen as the main driver of economic activity from a Marxist perspective. The capital on itself does not generate the surplus value of M^1 , but the production of goods or the provision of a service does. Thus the increase in productive capital is seen as the driver of economic growth. The objectionable part for Marxists is that this use of capital is a form dominance or violence against both 'wage slaves' and to nature through the use of externalities.

The speculation with capital such as seen in the housing market can be excluded to a large extent from the growth balance as these are financial bubbles that, on the long term, create as much revenue as they generate in costs afterwards. No surplus value is created.

The political necessity for continuous economic growth from a Marxist perspective is to sustain the increasing inequality of capitalism by manufacturing consent (Herman and Chomsky, 1988) through marginal increases of the quality of life for the labour class. Thomas Piketty's data shows that the return on capital has been greater throughout most of history than the economic growth rate, resulting in an increase in inequality (Piketty and Saez, 2014).

If growth is to be halted one has to halt the return on capital as well. This challenges the core of capitalism: why would one in a steady state economy invest if the initial investment is the highest possible return? From a Marxist perspective one cannot challenge growth without challenging the nature of capitalism¹ (Klein, 2014). Rising inequality is seen as an inherently

¹ This does not imply that Marx's solution, communism, does not face the same problems of growth. Cold War Russia had a growth driven economy with a strong emphasis on converting natural capital into assets which partly contributed to the demise of the USSR (ORLOV, D. 2008. *Reinventing collapse: The Soviet example and American prospects*, New Society Publishers.). Nor does it mean that companies as a vehicle for production are unsustainable by definition. The funding model of these

unsustainable process (Berg and Ostry, 2011) that needs to be halted and reversed in order to avoid a system collapse (Maniatis and Passas, 2013). It is beyond the scope of this thesis to investigate this claim as the environmental dimension of growth is considered, not the social dimension.

A negative return on capital is needed when both the size of the economy and inequality are to decrease in a gradual manner (Piketty and Saez, 2014). A property tax (popularly known as the Piketty tax) higher than the return on capital and the shrinking rate of the economy combined can decrease the inequality.

Marx described a growth driven economy as an upward spiral based on the $M - C - M'$ formula of capital investment (Marx, 1867). One could interpret the idea of a circular economy as a flattened spiralling economy. The idea of the circular economy does challenge the extractivist stance towards nature of the growth economy (Gudynas, 2013), which is seen as part of the problem by Marxists.

Another realisation is that companies themselves are not seen as the problem, the business model and ownership structure behind the company can be. These aspects can be changed. For example by implementing cooperative ownership and post-extractivist ways of conducting business.

2.3 The environmental dimension of growth

The arguments from both the proponents and opponents of growth with regard to the environmental dimension of growth are discussed in this section.

2.3.1 *Economic growth and the environment as complementary*

The invention of the GDP by Simon Kuznets made striving for growth by governments possible as the size of an economy could be measured. Yet the idea of economic growth as a positive phenomenon is older and is found in work by Adam Smith and David Ricardo. In classical economics free trade is regarded as mutually beneficial. Both involved parties have increased their utility as they both voluntarily decided to trade. The more free trade takes place, the more actors are maximizing their utility, the larger the economy becomes. From this perspective it is unethical to be against growth as reduction the throughput of goods and services reduces the extent in which needs are being met, especially for the poor (Johnson, 1973).

Free trade is regarded as universally good as both the seller and the buyer increase their utility. Because free trade is mutually beneficial the increase in economic activity can only be

companies which demands surplus value to be created is regarded unsustainable from a Marxist perspective.

a good thing as it means more people enjoy the benefits of trade and/or the benefits of trade are enjoyed more intensely.

The economy necessitates continuous, incremental growth to remain stable (Jackson, 2011) This has to do with how the money system works. In Modern Monetary Theory (Wray, 2012) the amount of money in circulation depends largely on the willingness of private banks to create loans. These banks are controlled indirectly by central banks by setting interest rates and buffer sizes to control the value of the currency. As the money is created with interest bearing debt there has to be more money in the future to be able to pay back the loan and interest. When growth falters, borrowers are unable to pay off their debts resulting in a financial crisis. The current money system is thus incompatible with a steady-state economy or a degrowth economy as banks will not create money when they cannot get it back at a future point in time. Accepting this, growth is not only desirable as it increases our wealth, it is necessary for stability.

The “Better Growth, Better Climate” report argues that the trade-off between the environment and the economy is a misconception (Calderón et al., 2014). According to this publication by The New Climate Economy “there are a number of reform opportunities that can reduce market failures and rigidities that lead to the inefficient allocation of resources, hold back growth and generate excess greenhouse gas emissions” (Calderón et al., 2014).

The environmental dimension of growth as a market failure to account for environmental externalities is an important argument in favour of re-defining growth. It is not the growth process or the mechanisms of the free market that make the economy harm the environment but a market failure to address the externalities. By removing bad incentives from the economy and putting a price on nature, the market can solve the climate problem with little governmental intervention.

Proponents of economic growth see growth as a necessity to get the sustainable solutions implemented quickly enough. Growth is a precondition for sustainable development as the investments that have a long payback time require a stable economy to be desirable.

From an economic and philosophic perspective the ideas of "no-growth futurism" are described as immoral and unnecessary (Walter, 1981). Without transforming human nature and political institutions we can greatly reduce the environmental impact and increase economic development according to Edward Walter (Walter, 1988). The transition to a steady state is neither necessary nor desirable.

Environmental Kuznets curve

The Kuznets curve is a projection of the trajectory of economic growth. Originally formulated by Simon Kuznets in the 1950s this hypothesis describes in an inverted U shaped curve how the process of growth first increases inequality and at a later stage decreases the inequality.

According to this theory, pre-industrial societies have a relatively equal wealth distribution but are poor and undeveloped. As growth takes off in the initial industrialization phase the inequality rises as some sectors are more prone to grow and a growing gap between rural and urban emerges. When societies get richer and basic needs are increasingly being met, the organizational power of governments increases and more revenues from taxes are gained. Social security measures are implemented which then reduces the economic inequality in society which can improve the quality of life for both the poorer and richer parts of society (Wilkinson et al., 2011). The Kuznets curve presents growth as a self-correcting mechanism and provided an argument for promoting unfettered growth. The neoclassical economists therefore didn't think inequality on itself was of any importance as growth would solve that issue.

The Environmental Kuznets Curve is a derived from this hypothesis and describes how the environmental pollution increases at first when industrialization starts and how pollution peaks and decreases when growth advances, for example through better technologies and management.

According to Piketty growth is needed for changes in society (Piketty and Goldhammer, 2014a). In his reasoning a steady state economy will not only have stopped growing, but will also have stopped developing. *"A society in which growth is 0.1–0.2 percent per year reproduces itself with little or no change from one generation to the next: the occupational structure is the same, as is the property structure"*(Piketty and Goldhammer, 2014b) . As changes are needed to transition to a sustainable economy growth is mandatory in this line of reasoning.

2.3.2 Economic growth and the environmental sustainability as conflicting ambitions.

“We are living in an unsustainable society, whose core rationale – the maximising of economic growth – is incompatible with its long-term survival.” (Giddens, 2009)

Since the days of Malthus (Wrigley, 1988) the growth imperative has been challenged in modern society. While his projections were wrong on many accounts he introduced the argument that infinite biophysical growth on a finite planet is impossible. Because economic growth indicates the increase in goods and services, it is not just an abstract number. Growth has a physical component (Bardi, 2014).

Most of the critique on growth from a non-environmental perspective has to do with growth not living up to the "a rising tide lifts all boats" promise. The argument is that economic growth fails to deliver welfare of all without having to reduce the economic inequality as claimed by neoclassical economists.

Unfettered growth as a problem entered the realm of environmentalism with “the limits to growth” 40 years ago (Meadows et al., 1972) and gained traction again in 2008 when the banking crisis occurred and the economic sustainability of growth was questioned (Witt, 2013, Tverberg, 2012).

The challenging of growth fits well with the emergence of the risk society (Mol and Spaargaren, 1993) where the effects of progress and controllability of the risks posed by progress are contested. Challenging economic growth fits within the broader concept of post-modernity and the emergence of the New Left in the United States (Perrow, 1972).

The debate shifted from the idea of growth to the content of growth, and specifically: the measurement of growth through GDP.

After growth became measurable through the invention of GDP many critics of growth have focussed on this metric and its shortcomings. In the late fifties for example the economist Abramovitz has his doubts on the accuracy of GDP and its ability to measure welfare (Abramovitz, 1959). Nowadays economists from all sides of the spectrum acknowledge shortcomings of GDP as a progress indicator and various alternatives, such as the Genuine Progress Indicator, have been developed (Lawn, 2003). The anti-growth rhetoric by critics on economic growth often focuses on GDP and its weaknesses. They seem more concerned with our obsession to cover progress in a single economic indicator that excludes important externalities (such as social and environmental indicators) than the problems caused by the growth process itself. For this research it is not the measurement of growth but the growth process itself that is researched and therefore the focus of this chapter is put on the

environmental dimension of growth, not the inability of the GDP indicator to capture the environmental dimension.

“Anyone who believes in indefinite growth in anything physical, on a physically finite planet, is either mad or an economist.” (Boulding, 1973)

Central to the opposition of growth from environmentalists is the notion that an increase in throughput of goods and services necessarily results in an increase of environmental impact (Wiedmann et al., 2015). The curves of growth and environmental impact seem to correlate well with the history of growth and pollution levels (Omri et al., 2014, Jorgenson and Dietz, 2015). The Stockholm resilience institute speaks of “The great acceleration” of impacts from the industrial age onwards that has made us enter a new epoch, the anthropocene (Steffen et al., 2011). This change in epoch is contributed to the combination of population growth, technologic advancement and economic growth of the last two hundred years.

This does however not prove a direct or causal relationship between economic activity and environmental degradation. The argument that economic growth almost always comes with an increased resource extraction and/or increased pollution levels does indicate the difficulty of a responsible growth strategy based on historic cases, not the impossibility of developing one in the future. Tim Jackson concludes in *Prosperity without Growth* that there is no growth scenario that meets the conditions for a sustainable future:

“The truth is that there is as yet no credible, socially just, ecologically sustainable scenario of continually growing incomes for a world of 9 billion people. In this context, simplistic assumptions that capitalism's propensity for efficiency will allow us to stabilize the climate or protect against resource scarcity are nothing short of delusional” (Jackson, 2009)p. 86).

An unexpected opponent of the economic growth paradigm is the Vatican church which has released a Papal Encyclical on the Environment. In the encyclical ‘*Laudato Si*’ Pope Francis explicitly mentions the growth as incompatible with our finite world.

"This has made it easy to accept the idea of infinite or unlimited growth, which proves so attractive to economists, financiers and experts in technology. It is based on the lie that there is an infinite supply of the earth's goods, and this leads to the planet being squeezed dry beyond every limit. " (Francis, 2015) section 106)

2.3.2 Post-growth perspective

“What matters is the content of growth-the composition of inputs (including environmental resources) and outputs (including waste products).” (Arrow et al., 1995)

The post growth perspective is more a diagnosis of the current situation than a value judgement on the desirability of growth. The argument is that economic growth has faltered

in most parts of the world as a result of the cascading of crises (Kenourgios and Dimitriou, 2015). The banking crisis, the credit crisis, the housing bubble, the sovereign debt crisis in Greece and Iceland and the euro-crisis are barriers to the return of growth rates through increased financial instability (Korowicz, 2012). The narrative is changing from being about the desirability of growth to being about the feasibility of growth (Latouche, 2009).

The post-growth perspective and takes, unlike the proponents and opponents of growth, no stance on the desirability of growth but questions whether growth can return to levels as experienced between the second world war and the crisis of 2008 (Spash, 2015). The diminishing energy return on investment (Heinberg, 2011) in the fossil fuel sector, the increasingly marginal gains of complexity in problem solving through complexity (Tainter, 2011), the fact that throughout history growth rates have mostly been below 1% (Piketty and Goldhammer, 2014a) and the growing debt burden are seen as structural barriers to revert to economic growth (Blewitt, 2014).

The solutions put forward in post-growth literature are to decrease and dismantle the growth-dependencies in the economy and to increase resilience (Victor and Rosenbluth, 2007). Reducing fossil fuel dependence (Moriarty et al., 2014) and monetary reform (Jackson and Dyson, 2012) are examples of reducing the dependency on growth. The increase in resilience can for example take the shape of deliberate simplification (Alexander, 2012) and climate adaptation (Hollender, 2014).

Company growth does not have the same limits as economic growth in the post-growth perspective. Companies can still grow but will do that at the expense of other companies as their markets do not grow. The growth of companies in a post-growth world will thus reduce the amount of companies and lead to monopolies (Blauwhof, 2012)

Policy suggestions in post-growth literature are mainly aimed at governments but some are applicable by companies (Ferguson, 2013). Reducing the working hours of employees while maintaining their salaries, cooperative business models, reducing income inequality and substituting energy-intensive, high-output practices with low-energy and more labour intensive practices. These measures are likely to negatively affect the profit margin of the company on the short term but make the company more likely to flourish in a post-growth world.

2.4 Operationalisation of the environmental dimension of growth.

The environmental impact attributable to an increasing the throughput of goods and services in an economy is the environmental dimension of growth. Debate is on how to respond to the environmental dimension. There is little consensus on how, and through which intervening variables, economic growth is connected to the speed of environmental degradation. Two

historical perspectives, a monetary perspective, a Marxist perspective and a post-growth perspective are presented to highlight the different approaches to explaining, opposing or justifying economic growth. This raised more questions than it answered. Is economic growth a choice or destined to occur? Is there an unchallengeable growth imperative? Is economic growth based on the extraction or the creation of value? Does economic growth have diminishing returns? Is economic growth the cause or effect of environmental degradation? Or both?

The current state of the debate does not allow these questions to be answered in a satisfactory, scientific manner. The exploration of these perspectives does help to better understand the proposed solutions.

3. Addressing the impacts of growth

To address the environmental dimension of growth several strategies have been developed. To compare the different strategies the different aspects of the impact of growth will first be covered using the I=PAT formula. The strategies to address growth are divided into two parts. The first part covers the strategies aimed at governments and the second part focusses specifically on strategies to address the environmental dimension of growth as a company.

3.1 The I=PAT formula.

The I=PAT abstraction (Chertow, 2000, Ehrlich and Ehrlich, 1990) by Paul Ehrlich is used here to break down the environmental impact of growth. This increase of impact takes place either through an increasing population (P) and/or increasing affluence (A). The technology (T) parameter represents the resource efficiency of production.

Economic growth, the increase in throughput of goods and services, is mainly linked to the affluence parameter as the amount of goods that people possess increases. The other two parameters have at most an indirect connection. The link between economic growth and population growth is weak, especially compared to the link between education and population growth. On one hand countries with a higher GDP per capita tend to have fewer children but on the other hand increased wealth leads to an increase in life expectancy. Also, larger economies are capable of servicing a larger population as the capacity to deliver goods and services is bigger. The third parameter is technology. Through the economics of scale and increased competition between competitors the technological efficiency can improve at a greater speed in a larger economy but the size of the economy is not the only, or even decisive, parameter determining the pace of technological innovation (Grossman and Helpman, 1993).

Impact

Companies can not only reduce the impact through improving the environmental performance of their operations. There are indirect and non-market related actions that companies can take to reduce their impact on the environment. The concept of corporate citizenship for example acknowledges that companies can play a larger role in society than just being a facilitator of goods and provider of jobs. This impact can be divided in two segments: the upstream and downstream impact.

Upstream impact

Through the sourcing of goods and requesting to comply to environmental standards from suppliers companies can reduce the impact of their products. For example requesting compliance with ISO-14000. To what extent one is allowed to interfere in someone else's

business is debatable. On the other hand: companies are free to choose where they source their goods and on what criteria.

Downstream impact

The use phase of a product and the disposing afterwards can be environmentally impactful and the reduction of this impact can be necessary for the frontrunner company to achieve its desired reduction. It is possible to influence the use of a product. This ranges from nudging consumers into more environmentally friendly behaviour to changing the ownership structure by leasing instead of selling the product to stay in control during the use phase. For example the copy machines from Ricoh remain the property of the company during the use phase. Intervening downstream can potentially reduce the rebound effect as the benefits of increased efficiency are allowed to be captured before being turned into an increase in consumption. There is an ethical dimension to interfering with the use of a product as it can be felt as patronizing or limiting the freedom of the consumer. When buying a product it is implied that one can use it how he or she sees fit and managing the downstream impact challenges that notion.

To assess how frontrunner companies can reduce the environmental impact they can either reduce the P, A or T variable. It is regarded unacceptable and unethical for a company to interfere with population size and thus the possibilities of reducing the environmental impact through reducing the population will be excluded from this thesis.

Technology

The technology variable is the most emphasised parameter by companies and governments as technological development can increase the resource and energy efficiency, reduce the costs of production, increase ephemeralization (Fuller et al., 1963) and compatible with a triple bottom line. The high level of measurability makes the impact quantifiable. For example the switch from selling light bulbs to energy-efficient LED light bulbs reduces the energy needed for the same service to a large extent. Through the application of LCAs it is possible to include more variables which make more complex improvements such as improved recyclability and increased lifetime quantifiable as well. These are often in-house improvements that are controllable and measurable to a large extent which makes them suited for quantifiable improvement. To actually achieve the maximum environmental benefit this improved good or service has to have 1:1 substitution of the inferior product or service which is hard to measure. In the example of the light bulbs one has to check for all LED light bulbs if they are replacing the old light bulbs or are used for new uses. Also there is an interaction between the A and T variable where the increased performance of the technology can lead to a higher consumption (Alcott, 2005).

Investments are necessary for research and development to reduce the environmental impact of a product through technological innovation. This has to be earned back to make it economically sustainable. When this is done through increasing the number of sales further than the amount of products that can be replaced, the environmental gains of this innovation are reduced. The technology on itself is not what makes a society more environmentally sustainable, it is the application of the technology.

Affluence

The affluence variable is applicable to frontrunner companies. They can in their communication with stakeholders focus on the less environmental damaging parts of affluence and/or take and promote a different perspective on growth. A shift towards prosperity and sufficiency instead of aiming at continually increasing consumption levels would reduce the affluence variable.

This may involve purposefully sell less products which not only has economic consequences but also ethical. Is it ethical to limit production and thus prevent people from buying your product? Who determines how much is enough?

3.2 Strategies to address the environmental dimension of growth

3.2.1 Governments

Harmonising growth with environmental sustainability

A strategy applied by governments to address the impact of growth is to promote a specific type of growth that has a lower or no environmental impact. There is a series of redefinitions of growth which all put specific conditions to economic growth. Strategies known as Sustainable growth and Green growth are already pursued by governments (Jones and Yoo, 2011). What these redefinitions have in common is that they put conditions to growth to harmonise growth with environmental sustainability. The claim is that once they are harmonised there are, from an environmental point of view, no objections to economic growth. For this to happen the eco-efficiency of an economy has to increase faster than the change in population multiplied by the increased buying power. This is derived from the aforementioned $I=PAT$ abstraction by Paul Ehrlich.

In all strategies that rely on harmonising growth with environmental sustainability the carbon intensity of an economy which will need continuous reduction and in has to approach zero in the long term. It is unknown how efficient technology can be and if there are limits to human ingenuity to bring about this innovation. There is evidence of diminishing returns on innovation (Huebner, 2005) and our ability to solve problems (Tainter, 1996). This is countered by the argument that innovation and scientific advancement have non-linear characteristics (Janszen, 2000).

The affluence parameter has to continually increase for growth to take place. The pace of growth has to be lower than the gains in eco-efficiency but greater than zero. This is the aggregate of total increase in affluence and doesn't consider inequality for example. The possibility and desirability of an ever-increasing affluence in society are questioned (Easterlin, 2015), as well as the possibility of ever-increasing efficiency (Santarius, 2012). Does more wealth make us happier? Research has shown that the amount of happiness does correspond with wealth until a certain point and then plateaus (Easterlin, 1995).

The aim of green growth is to harmonise economic growth with environmental protection (Hallegatte et al., 2012). This has to be done without slowing down the pace of growth (Jacobs, 2012). For critics this is making the growth part of the term of more importance than the green part (Spash, 2014).

So far Green Growth has not taken place globally as the increase in population and wealth outnumbered the decrease in carbon intensity according to Prof. Jackson. The carbon intensity has decreased by 0,7% annually from 1990 to 2007, but the combination of a 1,3% in population growth and 1,4% of increased income resulted in a net-increase of emissions from 1990 to 2007 (Jackson, 2009, Kliemann, 2015). That the growth from recent decades cannot be qualified as Green Growth does not mean that this type of growth will not occur in the future. It does however give an indication of the effort that is needed to decrease the carbon intensity of the economy in order to allow for the other parameters to increase. Continuous innovation is needed for Green Growth (Aghion et al., 2009).

A highly similar concept is sustainable growth. The main difference is that sustainable growth can be used ambivalently to either describe the content of growth (Murray, 2013) or to describe a growth curve that can go upwards for a long time span (Ingves, 2015). A more cynical reason why green growth is starting to replace sustainable growth is that the opposition towards sustainable growth presented the idea as an oxymoron (Sneddon et al., 2006, Daly, 1990).

Harmonising economic growth with environmental sustainability is an important part of the ecomodernist vision as found in the 'Better Growth, Better Climate' report (Calderón et al., 2014) and 'An Ecomodernist Manifesto' (Asafu-Adjaye et al., 2015) by the Breakthrough Institute. This is a well-developed and coherent vision for using growth and intensification to stabilize climate change. Technological advancement and the decoupling of our dependence on ecosystems will allow humanity to shape the Anthropocene for the better. Modernism will liberate humanity from nature. Growth is seen as desirable because *"More-productive economies are wealthier economies, capable of better meeting human needs"* p. 23

Despite frequent assertions starting in the 1970s of fundamental "limits to growth," there is still remarkably little evidence that human population and economic expansion will

outstrip the capacity to grow food or procure critical material resources in the foreseeable future. To the degree to which there are fixed physical boundaries to human consumption, they are so theoretical as to be functionally irrelevant. – An Ecomodernist Manifesto p. 7 (Asafu-Adjaye et al., 2015)

Despite the rejection of limits to growth, the entire second chapter is dedicated to the likelihood and necessity of peaking impacts in the next century. Population growth, pollution and fossil energy use are described to plateau and decline but not because of limits, but because we no longer want and need it. The limits to growth are mentioned in the context of limits to consumption: *“in contradiction to the often-expressed fear of infinite growth colliding with a finite planet, demand for many material goods may be saturating as societies grow wealthier.” p.14 (Asafu-Adjaye et al., 2015)* How the stagnation of consumption relates to maintaining a growth economy is not explained. Ecomodernism adds a condition to the modernist vision of intensification, efficiency, innovation and progress to take humanity to a higher, more prosperous level: the detachment from nature.

Sustainable Degrowth

Sustainable Degrowth is defined by Schneider, Kallis and Martinez-Alier as: *“an equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions at the local and global level, in the short and long term.”* (Schneider et al., 2010). It is a variation on the wider concept of degrowth which is essentially the opposite of economic growth. The GDP, as it is currently measured, not only has to decrease in sustainable degrowth, it has to be done in a way that increases the quality of life and the environment. Some authors even argue that reducing GDP will automatically increase wellbeing as they define some countries as over-developed through uneconomical growth (Douthwaite, 1993, Daly, 1999).

Like green growth its fundamentals can be explained with the I=PAT abstraction (Ehrlich and Ehrlich, 1990). The total impact of human activity has to decrease to live within the planetary boundaries. Out of the three parameters, Population, Affluence and Technology, the affluence parameter is the only parameter that can ethically and sufficiently make sure that the total impact is reduced. The willingness to reduce the affluence parameter and the lack of faith in sufficiently boosting the technology parameter are the biggest differences with green growth.

Sustainable degrowth does intend to reduce the affluence out of necessity. The reduction of population can only be done ethically in a very slow pace by, for example, increasing education and the provision of anti-conception and is not regarded the focus of degrowth. Technology alone cannot reduce the impact of humanity on the planet either in this view. If we do not change the economic system the gains from increased efficiency will be used to increase production instead of shrinking the environmental impact. The drive for growth and

competition does not allow for a tragedy of the commons situation to be controlled (Jakob and Edenhofer, 2014).

What proponents of degrowth envisage is a world with less marketisation, more commons, more cooperation, less mobility in terms of cars and planes but more social mobility through reduced inequality. As a response to “an Eco-Modernist manifesto” (Asafu-Adjaye et al., 2015) a degrowth manifesto has been written that challenges the growth imperative for a sustainable society and sums up the fundamental differences in worldview with the Eco-Modernists (Caradonna et al., 2015). The growth-related disagreements are, firstly, that growth is assumed as a given by the Eco-Modernists instead of growth as a choice, and secondly that absolute decoupling of economic growth from environmental degradation at the speed necessary to stay below the 2 degrees of warming is highly unlikely to occur in even the most optimistic scenarios.

Steady state economy

The steady state economy can best be regarded as the predecessor of Degrowth. The claim is that the growth process has to be halted in order to prevent that the planetary boundaries are crossed and irreversible damage is done to the ecosystem. As the current ecological footprint of the global economy is one and a half times the size of the planet a degrowth process has to be first initiated before the economy can become steady state. The concept of the stationary state (Mill, 1848) has been useful in the theoretical development as a contrast with the growth economy.

A-Growth

The a-growth perspective sees the growth discussion as covered in this thesis as irrelevant to a large extent. One should not aim to let the economy grow or degrow, or even bother to care about growth itself (van den Bergh, 2010). It is about the content of the economic activity, not the size. A-growth does not agree with either side of the growth debate as both are regarded to have ideological blind spots. The a in a-growth stands for agnosticism. It does recognize that there is such a thing as economic (de)growth but it doesn't see the value in pursuing it.

To implement this perspective fully in a company or government context one has to stop making projections and set targets for economic activity to fully embrace a-growth. A more indifferent stance to growth projections and targets would help to both shift the debate back towards the content of growth (Van den Bergh, 2011) and depolarize the debate between the proponents and opponents of economic growth.

Imposing limits

From this viewpoint governments are responsible for the safety of their citizens. This includes the protection against hazardous substances. Good examples are the ban of asbestos and radioactive materials but also alcohol and tobacco are regulated as they can, when the consumption exceeds a certain level, negatively impact the population. What these substances have in common is their direct impact on the individual and close link to specific products. This cannot be said for fossil carbon as the impact is indirect through climate change and diffuse as it does not necessarily target those who emit most greenhouse gasses.

Yet imposing a limit on a resource has been proven as a solution in farming where milk-quota were introduced and in fisheries that work with a maximum sustainable yield. The law can play an important role in establishing a limits based system to prevent exceeding planetary boundaries (Cox and Manton, 2012). As countries have a protective duty for their citizens and have to prevent violations of human rights within their borders a case can be made for their liability for the damage of climate change (Cox, 2014). If fossil fuel companies can be held liable for not respecting the global carbon budget and thus create risk for people living in coastal area's is currently investigated (Knight, 2014).

The introduction of a global limit on the extraction of fossil fuels can in theory guarantee that we do not emit more than our planetary carbon budget allows for, yet the introduction of such a cap on global carbon is unlikely to happen in the foreseeable future (Jopling, 2013, Davey and Douthwaite, 2012).

Companies are not considered of much importance in establishing and maintaining a limit-based system. Following the rule of law will suffice once the system is established. There are cases where companies use an internal carbon price to incentivise departments to use less fossil fuels (Hoffman, 2007), but the implementation of a self-imposed carbon budget has so far not taken place.

3.2.2 Companies:

The growth of a countries' economy consists to a large extent of the sum of all activity by the companies present within its borders. If a company grows it is therefore likely to contribute to the broader economic growth. The relation between economic growth and company growth is not perfect: not all company growth contributes to GDP and GDP consists of more than value and throughput generated by companies. It is therefore not possible to copy the ways of addressing the environmental dimension of economic growth to company growth. There have been developed ways of dealing with environmental impact on a company level that include the environmental dimension of growth. This section presents three strategies: the circular economy, the offsetting of impact through compensation and ecological modernisation.

Circular economy

The circular economy is a concept that is aimed at minimizing the environmental impact by focussing on various connections and streams, such as resources and energy (Preston, 2012). The output of one stream is used as an input thus giving the flows a circular character when applied. The opposite of the circular economy is the linear economy where natural resources are converted into products which in turn end up as waste. As not necessarily the reduction but the connection of different streams is the aim it can deliver both a constantly lowering environmental impact and with a continuous throughput (Webster, 2013). The circular economy concept originates from Walther Stahel's 'The Limits To Certainty' (Giarini and Stahel, 1989) which is a follow-up on the Club of Rome report "The limits to growth" on how industrial economies can operate within ecological limits. The emphasis lies on making the economy more sustainable as a system, not on making the growth sustainable. It thus bears more resemblance to what proponents of the steady state economy would describe as the ideal economic model for companies to operate. Felix Preston describes the circular economy as a way to "de-link prosperity from resource growth" (Preston, 2012).

While the circular economy literature is mostly focussing on the company's own efforts to 'close the loop', as it is called in circular economy terminology, it is a concept that embraces collaboration. One cannot embrace the circular economy without the acknowledgement that one is part of a bigger system. The linking of output flows to input flows creates dependencies and often involves multiple stakeholders.

Offsetting

Offsetting the negative impact of by arranging a positive impact as a counterforce is a method that, in theory, results in a net-zero impact. There are businesses whose core business value proposition is the offsetting of impact. 'Green seats' for example allows you to fly with a net zero impact by paying for the capture of the CO₂ released through planting trees.

Offsetting is seen as controversial for several reasons:

The severity of the negative impact does only on paper match the amount of positive impact of counteraction. This is partly because these are one-dimensional metrics (such as CO₂ for example) and partly because of the limited time span. If for example the introduced CO₂ was from a fossil source and the compensation took place by planting a tree the CO₂ is only captured during the lifespan of that tree, it does not equal the introduced fossil CO₂ as that is added to the pool forever. As not all aspects of the negative impact are, or even can be, measured in all cases, making it doubtful whether it is possible to nullify a negative impact.

A second argument is that offsetting forces actors towards making unethical decisions. It justifies bad behaviour as compensating is regarded better than nothing. How many villages

do you provide with clean drinking water to compensate for poisoning a river? Shouldn't the money spent on offsetting not better be spent on the prevention or reduction of the negative impact?

The offsetting of impact is ideologically more distant from the neo-classical economic school of thought than it initially seems. To offset one has to first accept that there is a negative impact and that it is the company which can be held accountable for it. This goes against the idea of externalities and the idea that markets are perfect, as the problem would solve itself if there is sufficient demand for solving it.

A hopeful environmentalist would consider offsetting a “gateway drug” into embracing ecologically sound practices, yet a pessimistic environmentalist would see offsetting as a way to create public support with marginal green washing. Fact is that offsetting is rapidly developing both in scale and sophistication. The convenience of not having to change anything fundamental about the way business is conducted makes it accessible for a wider scope of companies than more rigorous methods.

Ecological Modernisation

In Ecological Modernisation Theory the technological progress, combined with simultaneously increasing the measurement and accounting of externalities, is seen as a way to reduce the environmental dimension of growth. The impact of the economy on its environment can, according to Ecological Modernization Theory, be reduced through technological advancement and lead to absolute decoupling (Hayden, 2014).

Ecological modernisation utilises the competitive element of capitalism to initiate a race to the top of ‘Mount Sustainability’ (Young, 2012). It appeals to the enlightened self-interest of companies by presenting environmental action as a win-win. Increasing the eco-efficiency is both a profitable and environmentally friendly thing to do. This optimistic view of development bears close resemblance to the ideas presented in the eco-modernist manifesto. The implication of embracing ecological modernisation is that companies are taking the responsibility of aligning their practices with environmental sustainability.

4. Results

The results consist of several sections. First the goal-setting and processes are described. After that the different concepts that have to do with company growth and sustainability are discussed one by one. The chapter ends with business model innovation, the strategies to address the environmental dimension of growth and a distilled categorization of stances towards growth encountered in this research.

4.1 Compensation

The compensation or offsetting of negative impacts with positive counterforces is a controversial topic amongst the frontrunner companies. Van Houtum opposes offsetting from a business perspective. Bas Gehlen: *“try not to compensate but to solve the problems. You can plant trees to solve your CO₂ emission but well, every euro you put in offsetting you cannot put in innovation.”* Other respondents see compensation of impact as a first step in the process of reducing the environmental impact. It is a low effort, low risk method that does not require changes to the production process or business model.

Geanne van Arkel from Interface told with slight unease about the possibility to compensate the remaining environmental impact of their products through the Cool Carpet package (Interface, 2015a). This is offered because of a demand-pull in the green, certified building sector and ideally there would be nothing left to compensate for in Interface’s supply chain. Instead of regarding compensation as a first step Interface uses this mechanism as a last step to cover for the remaining impacts caused in the product’s life.

4.2 Impact

Bas Gehlen from Van Houtum approaches impact from a chain oriented viewpoint: *“We look at the impact of the chain, for instance for Elephant grass² it has been investigated whether it can be grown without pesticides, whether it degrades soil quality and whether it’s positive for biodiversity. So indirectly we do strengthen this. The real impact is throughout the chain.”*

The impact of a company does not necessarily have to mean a negative impact. Heijmans for example is anticipating and developing the positive impacts of their products for the environment. Robert Koolen: *“Shared value creation is how we approach this. By doing good things for society we can make more profit. For instance the question: Can we build roads and with this improve biodiversity? Or: Can you make a house which has better air inside than on the outside? The almost paradox breaking concepts are the ones that are of interest. The more roads you build or the more houses you sell, the better it is then.”* This

² Also known as Napier grass or Ugandan grass

way of looking at impact fits within the I=PAT formula by using negative number for T. It is important to note that this is about a single parameter impact such as biodiversity or air quality instead of the aggregate of all possible impacts.

Difficulties arise when setting the boundaries to account for the impact. Heijmans is currently exploring the inclusion of natural capital. Koolen: *"[Connecting to natural capital] is still an exploration, we have three main goals in the "outline of tomorrow"; our ambition is that (1) products have to be energy-neutral, (2) everything we make has to be completely recyclable and (3) to strengthen the spatial quality. Of course natural capital falls under the third section. We are still working on further defining and elaborating the third pillar."*

4.3 Decoupling

Thomas Martinelli from Philips said they have *"been investing a lot in sustainable innovation for years"* in order to decouple the impact from their growth. This is not just about their own company growth but regarded part of the bigger decoupling of impact in the economy. In an interview with Greenbiz Marinelli said: *"We're aiming to decouple economic growth from the use of natural resources."*(Clancy, 2014).

The decoupling can take shape in the form of efficiency gains as there is much room for improvement there according to Ahold: *"Improving current affairs contributes both to the business and to sustainability. There we see that we can often keep going for a long time. For instance when you look at the amount produced per hectare, this has already increased a lot, but worldwide there is still enormous potential. When Chinese farmers start to produce just as much per hectare as Dutch farmers."* The perceived large potential of efficiency gains in this sector makes it seem unnecessary to look at limiting the company's growth.

Geanne van Arkel from Interface warns for short-termism when efficiency gains from decoupling are monetized too early: *"You also have companies that save some and then think; good that's some extra profit again, but this only works on the short-term. We invest our profits back into sustainability, which further improves our returns. This is a big part of the New Industrial Model. This is a step that we've been executing for years, which made us draw the conclusion that this is the right way to go."*

4.4 Sustainable growth

The term sustainable growth and its derivatives such as green growth are sparsely used and mostly absent in the CSR reports and communication of the researched companies. This can partly be explained by the reactions during the interviews when asked about sustainable growth. During the interviews the participants felt uncomfortable with the term "sustainable growth". Robert Koolen from Heijmans said about sustainable growth *"We need a systems-*

definition first. We cannot tell for now whether the growth is sustainable, since the setting of boundaries is difficult. Is it about the product, the own conduct of business or the whole chain? I think that sustainable growth sounds like a nice marketing-term, only when the term starts to really get meaning, with a clear definition, you are able to do something with it.”

Nicolette Kaay from Ricoh sees sustainable growth in the context of her company as a growth in sustainable practices and products, not as the growth process itself as being sustainable: *“Because we deliver sustainable products and services I see chances to grow there further”*

Nicolette Kaay from Ricoh and Bas Gehlen from Van Houtum both describe sustainable growth as something they are aiming for in the future. Gehlen: *“That is exactly what we want to achieve, we do not have all the answers but this is the way we want to go.”* Kaay said: *“I believe very strongly in sustainable growth. This is something we do not realise sufficiently; I think it is something that is a requirement for our future.”* Both describe sustainable growth as a largely unexplored direction and see it as the inclusion of sustainability into growth.

On the website of Philips a speech can be found called “Innovation as driver of sustainable growth” by Gerard Kleisterlee, the CEO of Philips at that time. “innovation can help us all to make economic growth sustainable” (Kleisterlee, 2007). This view closely corresponds with the sustainable growth strategy where growth is made sustainable through innovation.

4.5 Circular Economy

The concept of the circular economy was explicitly mentioned by van Houtum, Philips and Interface. All three interviewees regard their company as being part of an emerging circular economy.

Bas Gehlen from Van Houtum: *“We work on sustainability by making our factory into a resource roundabout.”*³ The idea of speaking of a factory as a resource roundabout shows the sense of a direct responsibility for their products. The outputs are linked to the inputs so whatever you put out there will come back. Gehlen: *“How can we add value to everything and pass on the resources we do not use?”*. Heijmans titled the chapter on sustainability in their year report “adding value instead of subtracting”(Wijnhoven et al., 2013) p. 12). This can be regarded a post-extractivist mindset (Gudynas, 2013) as it is about adding value and ultimately: the refusal to extract anything else than (a portion of) the added value as profit.

³ In the circular economy much of the terminology has to do with circles. Closing the loop, closing the cycle, upcycling and in this case a resource roundabout are all examples of that.

Life Cycle Analysis (LCA) is what Interface uses to make the flows their production process more circular. As Geanne van Arkel said: *“It helps that we use LCAs with which we can clearly communicate where we stand today. Mapping which resources are used at which stage of the process is, especially in the context of the circular economy, the smart thing to do.”* Interface has a product that allows for more involvement than van Houtum thus it is also able to connect flows even after the product has been sold.

Scarcity is mentioned as a driver to adopt the circular economy. Increasing prices on the paper market incentivised van Houtum to look for alternatives and now elephant grass is explored as a new and renewable source.

Philips is a proponent of the circular economy. In the year report is stated: *“We see a shift from a linear to a circular economy as a possibility to create value. A linear economy uses a product for a short time before it is discarded. In a circular economy products are designed in such a way that they become part of a value-network where reuse and renovation guarantee a continuous reutilisation of resources.”* (Philips, 2013)

The understanding and meaning of the circular economy concept as applied by these companies is consistent and non-conflicting. All prioritize the connection of streams within their company through re-use, remanufacturing and repair before connecting to flows from others.

4.6 Post-growth

The economic context in which most of the researched companies operate is increasingly insecure and whimsical since the euro crisis started. One would expect relatively more financial difficulties for companies that spend more on achieving ecological and social goals than other companies. This research can only speak for the few companies that have been researched but the expected relationship seems not to occur.

Bas Gehlen from Van Houtum noted on the impact of the economic crisis on the conduct of business: *“Surprisingly, I think extremely positive. Our Sanito Black brand, the most sustainable brand we offer, grows well and has fixed value and survives the crises well.”* Also Heijmans claims in their year report that *“austerity and the financial crisis do not cancel*

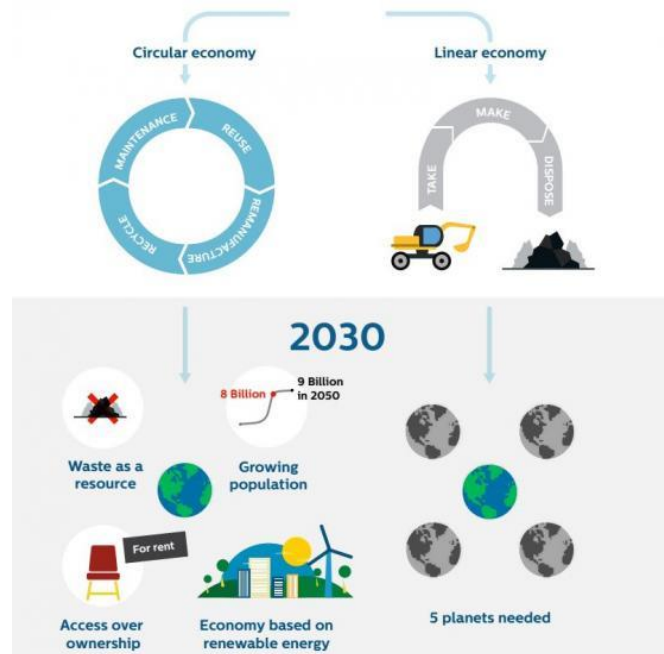


Figure 1: Infographic by Philips on the circular economy

out sustainability, but have further accelerated the upward trend” (de Waal, 2013). The researched frontrunner companies are described as being less prone to crises and more resilient by the interviewees.

The CEO of Siemens Netherlands describes the crisis as a tipping point in his foreword of the year report: *“Changes show that the economic crisis in recent years was not a temporary interruption but a tipping point.”* (van der Touw, 2013). It implies that from the crisis onwards things are different, but it is not made explicit what is different in this statement or anywhere else in the report.

4.7 Ecological Modernisation

The status of frontrunner has become part of the identity of all researched companies to some extent. Interviewees from companies as Siemens, Ricoh, Philips and Heijmans mentioned that maintaining their position as a frontrunner is a key driver for sustainability in their companies. The competitive edge of being regarded the most sustainable in their niche is used to justify the investment in sustainability.

A good example was given by Jan Erik Ouwehand from Siemens: *“It will be a disaster if we are not first on the Dow Jones Sustainability index in our sector next year”*. And by Nicolette Kaay from Ricoh: *“in 2016 we want to be a well-known and recognised frontrunner in the field of sustainability”*

This illustrates how sustainability is starting to become incorporated as one of the competitive fields in capitalism (Mol et al., 2014). Proponents of the Ecological Modernization Theory predicted the emergence of such a field of competition (Simonis, 1989). The aim of this competition is that the tension between companies increases the innovation and development of low-carbon technologies (Mol et al., 2009).

The required increase in innovation for sustainable solutions can be seen as an enabler of company growth. During the interview Robert Koolen from Heijmans said: *“Heijmans strives for Growth due to sustainability. According to us sustainability is not just a trend, but a permanent requirement.”* Instead of seeing growth as a precondition for sustainability like the eco-modernist, Heijmans sees an inverted causal relationship between growth and sustainability for their company. But does it make a difference? Jan Erik Ouwehand from Siemens sees this as a semantic issue with little relevance. *“Profit due to sustainability or sustainability due to profit is a discussion I’ve had before and it’s more a play upon words than that it’s actually usable.”*

This struggle for growth equates the struggle for survival according to Jan Erik Ouwehand from Siemens: *“The economic principle of contemporary companies is that we have to grow in order to survive. You have to be in the top 3 to stay alive. The world economy is growing,*

recently it faltered but it is growing nonetheless, so we have to grow as hard as our portfolio lets us. If you don't do that, you will be engulfed by those who do grow."

This stance is regarded as being part of the current economic paradigm. Sustainability is something a company does, not necessarily something that a company embodies. Ouwehand: *"That is the economical principle, we grow by offering our portfolio sustainably, meaning that we offer an energy plant that is more efficient than the ones from the competition, causing lower emissions. As long as we have the best price-performance ratio, we can keep fulfilling that role."*

Growth is seen as necessary to succeed by Ahold. *"Without being a responsible retailer, we cannot fulfil our promise to get better every day, and we cannot create and enable the growth of our company that we need to succeed"* (Ahold, 2013) p.10). The success of the company in this case means being able to execute the responsible retailing strategy.

This approach to growth renders the options to slow down the pace of growth or to stop growing unfeasible and outside of the scope of companies. Companies do not bear responsibility for their decision to grow because a company is perceived to be economically unsustainable if it refuses to grow. Companies are seen as part of a bigger system with certain rules where it is not up to the companies to challenge these rules. Objecting growth in this worldview is like complaining to the players of the board game monopoly that only one can win the game. The critique on growth should thus be addressed to those who write the rulebook, not the players.

Ecological Modernization Theory does not necessarily encourage or discourage growth. It does promote competition over collaboration but specifically with an increase in eco-efficiency in mind. The competitive element of EMT that describes greening production chains as a contest does make it compatible with the economic ideas that describe growth as a top priority.

4.8 Business model innovation

The new industrial model is a business model developed and used by Interface. The company pro-actively spreads their business model as they hope that other companies will follow their lead. The role of a frontrunner is interpreted as more than leading by example; other companies and governments are to be persuaded to become more sustainable. One of the products of this mission for positive change is the lobbying at the European level to incentivise big industries to go green. This is formulated in a people-planet-profit frame and uses the potential of increasing the competitiveness of Europe's industry as an argument. While the framing is conservative, the measures that are asked for are not: 100% renewable energy as input for industrial processes, switch to recycled and bio based inputs and

increased taxation on resource use instead of labour. Geanne van Arkel explained why the new industrial model works for Interface: *“In many cases the use of sustainable resources is more expensive, but when you first make sure that you reduce your usage, it can be an economically cost-effective step. For instance, we now use bio-gas instead of the cheaper fossil fuel gas, but because we first investigated our possible savings when we decided to make the switch, now we only need 50% of this gas. This combination is what we’ve implemented for years and years and this is also why we have no problems financing sustainable development.”*

A key component of the new industrial model is the allocation of efficiency gains. The money saved by improving the performance or resource efficiency is re-invested in innovation. Geanne: *“Especially thanks to sustainability we manage resources more effectively, causing us to realise savings, which in turn we reinvest into sustainability.”* The application of a revolving fund makes the innovation trajectory less vulnerable to crises and budget cuts as it funds itself, the low hanging fruits can often generate a quick return to increase the volume of the fund in the early stages and lastly a large revolving fund might be necessary to tackle the tougher problems once the company is entering unexplored territory. The business model of Van Houtum and Interface are strikingly similar in this aspect.

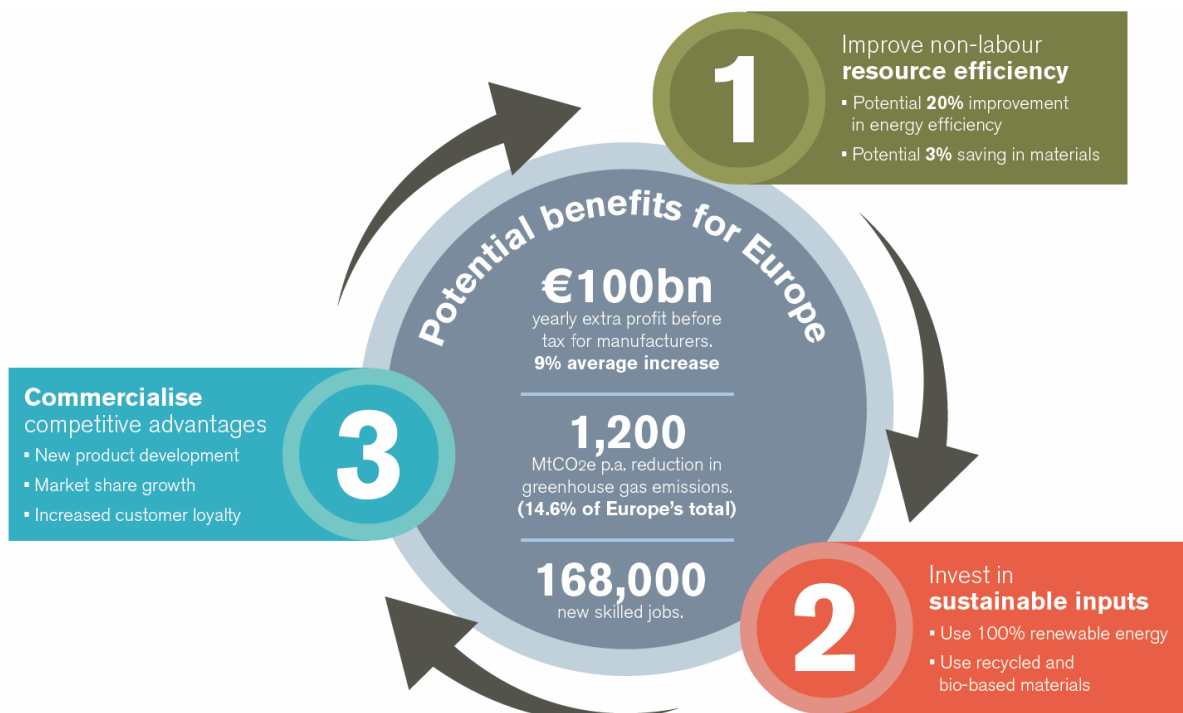


Figure 2. The New Industrial model (Lavery and Pennell, 2014)

Philips has the desire to transition to a different value proposition that better fits with sustainability. Thomas Marinelli from Philips: *“The goal is to transfer to a service-oriented business model in which Philips remains owner of the products, as is the case with for*

instance copying machines.” This is seen as the next step for Philips. Marinelli: *“In the next annual report the emphasis will be more on new business models.”* For lightning there are already several service-based products that redefine the ownership and responsibility for the product.

Ricoh has made the service based approach a key component of their business model. Nicolette Kaay mentioned that when looking at the impact during the full life cycle the priorities for Ricoh became clear: *“where does the product come about, what does the customer do with it? The latter is the most detrimental step in the process and therefore has a strong focus within our company.”*

4.9 Conditions to growth

All researched companies have set specific conditions to their growth. Nicolette Kaay from Ricoh distinguishes between ‘growth for profit’ and a broader, more inclusive type of growth that includes other social and environmental values. Kaay: *“In the old way of thinking growth would indeed be growth for profit. The growth of Ricoh is more than that. I’ve been with Ricoh for a long time now and I’m sure of it that the values of people planet profit are applied that way.”*

Just like the other aspects of the company the growth is seen as something that can be made in a sustainable and responsible manner.

Van Houtum applies a hierarchy of goals, of which a set of company goals is regarded more important than the goals for growth. Bas Gehlen from van Houtum: *“The environmental goals are part of the company goals, just like the growth goals are.”* By making the environmental and economic goals equally important in their policy and by making both subject to higher company goals their structure allows to make an ethical decision if growth and environment are conflicting.

Ahold has created a company specific condition to growth. Onno Franse said: *“We believe that you cannot have sustainable growth without responsible retailing.”* Responsible retailing is an umbrella term used by Ahold for their 5 pillar program: Healthy living, community well-being, our people, responsible products and care for the environment (Ahold, 2013). All these aspects are regarded as necessary to have sustainable growth.

4.10 Goals and processes

This chapter describes the processes and structures utilised by the frontrunner companies to balance the environmental with the economic dimension. CO₂ is used as an example as all participating companies have set CO₂ related reduction goals and because the containment of atmospheric CO₂ is both regarded highly important and little contested by climate scientists.

The reduction of CO₂ emissions is used to describe the differences as all researched companies have targets concerning CO₂ emissions. The first notable difference is the choice between relative and absolute CO₂ reduction targets. This is more than a semantic difference as an absolute target does include the impact growth while a relative CO₂ reduction target does not.

Relative reduction targets

Ahold has a relative reduction target based on the square meter of sales surface. The reasoning behind this lies in the structure of the company. Ahold manages several different brands such as Albert Heijn, Etos, Gall&Gall, Bol.com and several others. When the company decides to sell or buy a new brand of stores the absolute CO₂ impact can increase or decrease dramatically without any actual performance improvements. The square meter of sales surface gives a better and more comparable indication of the CO₂ intensity of the company. The downside is that relative reduction targets do not address the total amount of CO₂ emissions. It is possible that the CO₂ reduction targets are being met while the actual amount of CO₂ has increased due to an increase of sales volume higher than the efficiency gains. The targets for improving the efficiency per square meter of sales volume by Ahold are not used as a limiting factor for the expansion of the sales surface.

Siemens uses the CO₂ intensity of their turnover as to set targets for reduction. This is a relative reduction target that is coupled to money. The difference with per-product targets is that the pricing of the product can be used to reduce the intensity by making low-carbon products cheaper and high-carbon products more expensive. This metric incentivises the steering of consumers towards more environmental conscious products through pricing and it incentivises the company to develop and improve the performance of their products. The decrease in CO₂ intensity of the turnover is not linked to the increase of the turnover, thus the overall impact can increase while the environmental performance per dollar increases.

Absolute reduction targets

An absolute reduction target for CO₂ means in this context the formulated ambition to reduce the total amount of emissions by a company.

Ricoh Netherlands for example has their environmental targets imposed from the European headquarters: *“The goal of Ricoh is to be at 1/8th of our footprint at 2050. In the European head office in London the sustainability goals are converted into sustainable targets for the other countries.”* The result is a fixed reduction target where the freedom for Ricoh Netherlands lies in how they intend to achieve this reduction. The balancing of growth with environmental impact thus happens on national level. The ecological footprint is a wider concept than just CO₂ reduction as it includes for example water use and biodiversity loss. As

the impact of CO₂ is part of the ecological footprint it is hard to conceive that the reduction target of 1/8th of the current footprint can be reached without a reduction of total CO₂ emissions. Moreover: the aim of reducing CO₂ is a proxy for the reduction of the environmental impact and the ecological footprint is a measure that tries to encapsulate this impact in total. It should be noted that the ecological footprint as a measurement tool does not cover all aspects (Fiala, 2008, Van den Bergh and Verbruggen, 1999) and still leaves room for discussion. What can be considered an appropriate ecological footprint for a company as Ricoh? If the usefulness of Ricoh for humanity increases, for example through new or improved products and services, should Ricoh then be able to claim a larger footprint? And at whose expense should the footprint increase? There are ethical questions that come into play when determining the allowable footprint of a company.

The difference with the relative reduction targets is that the ecological footprint has to reduce to 1/8th by 2050 regardless of the growth of the company. The Ricoh sustainability report however is the most growth-oriented of the researched companies as it explicitly mentions that the sustainability efforts are good for the growth and profitability of the company (Kondo and Miura, 2014). It will be interesting to see what happens to the growth ambition when we come closer to 2050.

Interface is the most radical of the researched companies in setting their absolute reduction target. Their aim is to have an impact of zero in 2020. *“We’re on a mission. We call it Mission Zero. It is our promise to eliminate any negative impact our company may have on the environment by the year 2020.”* (Interface, 2015b) Geanne van Arkel explained the difference in attitude: *We want to double our revenues and at the same time realise mission zero [...] It’s not “double the business, half the impact”, no it’s “double the business, make no negative impact at all”.*

4.11 Strategy

The strategic side of sustainability can be related to company growth. Ahold for example sees their responsible retailing program as a component of a bigger strategic framework to accelerate growth. *“Our strategy to reshape retail is helping us to meet the changing needs of consumers today, and accelerate the growth of our company in the future.”* (Responsible retailing report 2013, p. 10)

Van Houtum does make different business decisions to uphold their image of being a sustainable company.

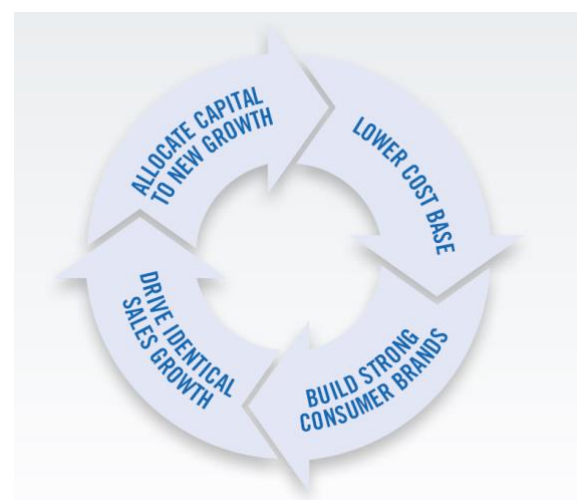


Figure 3. Ahold growth strategy (Ahold, 2013)

Bas Gehlen: *“The used paper market is becoming more scarce, which means that we have to look at alternatives. Can’t we figure out something different than cutting trees? Something that better fits our circular economy image?”* The search for a more sustainable pathway is increasingly becoming an internal part of day to day practices in companies. As Geanne van Arkel said: *“Some companies have a regular and a sustainable innovation trajectory. I cannot understand this, you have to integrate them! Our experience is that when you integrate sustainability in everything you do, this will lead to much better results since you look at things from a different perspective.”* From a strategic point of view it is preferable to not only act sustainable but to integrate it as much as possible into company culture. At Heijmans this step is currently being taken. Robert Koolen said in an interview on “Transparantiebenchmark”: *“In the past we used to work with sustainability indicators and company indicators, but these indicators are now slowly coming together”* (Transparantiebenchmark, 2013).

According to Nicolette Kaay from Ricoh the internalisation of sustainability is more exception than rule amongst companies *“I believe it’s unfortunate that lately companies start to look at sustainability more and more as a side-track instead of as a main goal. The term is seen as a “nice to have” instead of a “need to have”. Because our sales and marketing team embraces sustainability, it goes very fast. Otherwise you keep knocking on doors and you never make progress.”*

Thomas Marinelli from Philips said that the strategic part of sustainability is the focus of the company. By investing in the most potent and promising clean-tech solutions and a long term focus in risk management Philips does use their resources effectively. This is different sustainability strategy than Interface and Van Houtum as the Philips strategy is more portfolio-oriented and it does not specifically focus on internalisation of sustainability in company culture. Marinelli acknowledged that as sustainability is treated as a separate category: *“We have different programs: green operations and green manufacturing. Here we look how we can minimise the impact on the environment”*. The work by Philips in the development of the circular economy hints that one day all sections of the company become part of the circular economy but this is currently not a formulated strategy or ambition in their CSR reporting.

The frontrunner status has strategic advantages. Being considered sustainable not only provides brand value but does at this stage require the company to be closer to the customer than before to manage the downstream impact. This intensified relationship can be a strategic advantage when managed well. Being a frontrunner is said to reduce the vulnerability to, and the impact of, crises by Heijmans and Van Houtum.

The Strategy by Siemens is that of the triple bottom line: “People, planet and profit are being used as a base for long term profitable growth” (Siemens Nederland, 2013). The balancing of these three aspects is seen as the key to sustainability. Bas Gehlen from Van Houtum is not in favour of the idea of sustainability and growth as a balancing act: *“The most important thing is that the chain and processes should be designed in a way that there is no reason to make a choice between sustainability and growth.”*

4.12 Conclusion of results

From these results two different approaches to harmonise environmental sustainability with company practices can be derived as shown in table 2. The respondents and their companies do not necessarily entirely fit in one category or the other as this is a generalisation.

| Competitive stance | Collaborative stance |
|---|---|
| Competition | Collaboration |
| Sustainability as something you do | Sustainability as something you embody |
| Growth as a driver of sustainability | Growth as a result of sustainability |
| Sustainability and growth as a balancing act | Sustainability and growth reinforce each other when conditions are met. |
| Emphasis on technological component of sustainability | Emphasis on social component of sustainability |
| Goal oriented | Process oriented |
| Managerial view on nature | Co-existence based view on nature |

Table 2. The two dominant worldviews and their characteristics.

Both the competitive and collaborative stance are compatible with economic growth to a large extent. The competitive worldview does have a stronger emphasis on growth as it is regarded one of the drivers of sustainable development and can be considered pro-growth, but with strict conditions to the content of growth. The collaborative stance has more in common with the a-growth stance as growth is considered an outcome or reward for environmentally sound practices rather than a necessary precondition for sustainability.

How do the investigated frontrunner companies address the environmental dimension of their growth?

- Interface aims to eradicate all negative impact in 2020 to completely decouple the environmental impact from their growth.
- Van Houtum takes a post-extractivist stance to make growth align with environmental sustainability. Both growth and environmental sustainability are internalized and subject to the company goals.
- Siemens and Ahold aim to improve their eco-efficiency at a greater pace than the growth of their company; Green growth. Both rely heavily on thorough mega-trend analyses and future scenarios for their forecasts.
- Ricoh uses the combination of lifecycle management and the setting of absolute reduction goals.
- Philips is aiming for absolute decoupling, using the circular economy for Green Growth.
- Heijmans makes a net-positive environmental impact for certain parameters and is working on the merging of company indicators and sustainability indicators, striving for full alignment.

5. Discussion

5.1 Methods

The seven companies that are researched differ in size and are active in different sectors. This is an intended diversification to avoid overlap or blind spots in selecting the sample. Three companies can be considered to be operating in the same sector: Philips, Siemens and Ricoh. This was chosen as clean-tech plays a central role in addressing the environmental dimension of growth in many articles.

The sample size of this research is relatively small, but that doesn't dismiss the findings. This qualitative research is focussing on exemplary companies to understand how they address the environmental dimension of growth. There is no intention to draw conclusions on how sectors or even the corporate world as a whole can address the environmental dimension of growth.

This research focussed on the policy documents and ambitions of frontrunner companies as reported by themselves, not on external sources. There might be a discrepancy between the reality and what is stated during the interviews and written in the reports. This was a conscious decision as the trustworthiness of environmental CSR is not the focus of this thesis, but its capability of aligning company goals with environmental sustainability. Whether the ambitions, statements or goals are, or can be, applied as stated in these reports is an entirely different question. The statements by interviewees were consistent with their own reports.

5.2 Results

The quotes from reports and interviews have been translated from Dutch to English. The literal quotes are written down in condensed reports which can be found in the source material. The original audio recordings can be requested from the author and are to be treated with respect to the privacy of the interviewee.

This research has some unexpected and surprising findings. There are frontrunner companies with the ambition to have a net-positive environmental impact, be it for specific parameters or the entire company as a whole. The idea of impact being something to maximize instead of minimize was not anticipated. Another unexpected finding is the level of decoupling (both achieved and intended) by some of the frontrunner companies. As absolute decoupling of economic growth on a macro-level is not occurring for many environmental impacts it is striking to see how well frontrunner companies have been able to decouple their impact from growth.

During the interviews no distinction was made between the personal opinion of the interviewee and the company standpoint. In all conversations it was clear that the interviewee was acting on behalf of their company. The interviewee has likely a coloured view

of their own company. This has been taken into account by, firstly, checking if what has been said is consistent with the company reports and secondly by using literal quotes from the interviewees in the result section to keep it at all times apparent how this information is sourced.

5.3 Theory

The role of corporations in sustainable development and the environmental dimension of economic growth are both heavily contested topics with strong ideological ties. Both sides of the debate are no closer than when the debate on the sustainability of growth started in 1972. A telling example is the fact that respected publications from both sides describe the other side as a conspiracy. The ‘Better Growth, Better Climate’ publication describes the unsustainability of growth as a myth propagated by environmentalists that do not want to make you believe that growth and sustainability go hand in hand. Naomi Klein’s ‘This Changes Everything’ sees growth agenda as an elitist, colonialist force to enrich the one percent at the cost of both the planet and the rest of humanity. The economy versus climate frame has merit as both extreme ends of the spectrum agree to think in either/or terms. The downside is that this reduces the depth of the debate to prioritizing one over the other. Synergies or system change are unthinkable within this frame. Ultimately, both the “wreck the planet to save the economy” and the “wreck the economy to save the planet” stance are unproductive positions. While it is questionable whether a win-win situation for both the economy and the planet are still possible it is not necessarily a binary choice. There are elements of the economy that can contribute to ‘save’ the planet and elements of the ecosystem that can help to ‘save’ the economy. Figuring out which elements are essential to preserve and improve in both systems is essential to depolarise the debate and to improve our understanding of what is needed to re-align human activity with environmental sustainability.

I expected that company growth would have more in common with the bigger growth debate such as a high polarisation or at least an ideological stance towards it. The relaxed and open attitude of frontrunners towards this politically sensitive issue of growth surprised me. This attitude towards growth seems to be more effective when addressing the environmental dimension of growth than the attitudes of both the opponents and proponents of growth.

The a big difference between the larger debate of growth and the sustainability of company growth is the intention. The frontrunner companies are to a large extent mission-driven. The result is that the growth of a company is not solely there to increase stakeholder value but to increase the positive impact of realising its mission. This research did purposefully avoid the intentions of frontrunner companies behind their sustainability-related practices. The important thing is that they are doing it and to what extent they are doing it, not why they are

doing it. Looking into the soul of companies to find the ‘true reasons’ behind their environmental CSR program is deliberately not part of this thesis.

That being said, the extrapolation of the results can give us an indication of how these companies might act in the future. I believe that there inevitably will be a point where the conflict between further company growth and the environmental goals start to conflict. For example: Interface can only produce and sell a finite number of carpet tiles, regardless of the positive impacts and good intentions. The decision whether to contain the growth or to choose to overexploit to reach the financial targets will have to be made. Without deviating into pure speculation I believe that the researched frontrunner companies are more likely to choose containment to overexploitation. The reasons are firstly that frontrunner companies have an impressive track record in choosing environmental sustainability over short term profit, secondly are aware of their impacts, which are increasingly being measured and improved, and thirdly that there is a willingness to change the core rationale of the company to (re-)align its practices with environmental sustainability. Sustainability is ingrained into company culture of the frontrunner companies making the choice for overexploitation both a hard sell toward the consumers, who make their choice for frontrunner companies based on its environmental performance, but also towards its own employees who will likely see it as conflicting with their work.

Frontrunners are more open to change and new ideas. They have a track record in challenging the existing paradigm of corporate practice and are re-defining the relationship between companies, governments, consumers and the planet. If, for example, it becomes sufficiently clear that a degrowth or steady state scenario is a necessary step for companies, it might be that these frontrunners are likely to be amongst the first to embrace it. There is a willingness to reconsider and redesign the business model to make it align with sustainability goals. The behavioural aspect and the dynamics between niche versus regime players can be a very interesting follow up to explore what role frontrunner companies can play in challenging the growth imperative.

The addressing of the environmental dimension of company growth can be put in the tradition of setting conditions to growth. The minimisation of negative environmental impacts and optimisation of positive environmental impacts is seen as an ongoing process by frontrunner companies and are open to radically revising these practices to improve their environmental performance. There is no reason to assume that the environmental dimension of growth is fundamentally different than the environmental dimension of other practices that have already been addressed successfully.

6. Conclusion

Both the extraction of resources and the pollution resulting from human activity contribute to environmental problems. There is a correlation between the amount of throughput and the level of environmental degradation. Economic growth, which is the throughput of goods and services in the economy, thus has an environmental dimension.

However, there is much debate in literature on how to understand and address this environmental dimension. It is unclear how economic growth and environmental sustainability are connected and through which intervening variables. How economic growth is linked to environmental sustainability is debated since 'The Limits To Growth' was published in 1972. Positions in this debate on the sustainability of growth range from growth as a key driver of environmental degradation to growth being part of the solution to environmental problems.

Solutions to address the environmental dimension of economic growth have been developed. Sustainable growth and green growth are aimed at harmonising growth with environmental sustainability, the steady state economy proposal is a zero-growth system to operate within environmental limits and sustainable degrowth is a proposal for intentional downscaling of economic activity to operate within planet's regenerative capacity. From a post-growth perspective the debate should be on the limited feasibility of growth, not on the desirability of growth. To address the problem of the environmental dimension of economic growth in a post-growth way we have to stop projecting, measuring and valuing economic growth.

The circular economy, ecological modernisation theory and offsetting are concepts that can be used to address the environmental dimension of company growth. The Circular economy concept was developed to create an industrial model compatible with the limits to growth (Giarini and Stahel, 1989). It addresses the environmental limits to growth by managing all resource flows in a circular way to prevent pollution and avoid extraction. Ecological modernisation theory utilises the competitive elements of company culture to increase the eco-efficiency for absolute decoupling of the company growth from environmental impact. Offsetting allows companies to compensate their negative impact by paying others to make a positive impact.

Both science and governments struggle with the environmental dimension of growth and with strategies to address it. Can frontrunner companies address the environmental impact of growth? What can we learn from their efforts? The investigation of seven frontrunner companies resulted in the following strategies to address the environmental dimension of growth:

1. The circular economy: is a way of addressing a large part of the environmental dimension of growth as it connects flows that otherwise could harm the environment. Many frontrunner companies see themselves as part of the circular economy and apply its principles. Interface, Heijmans, Ricoh and Van Houtum are applying this strategy on a company level.
2. Sustainability as a competition: The competitive element of greening production chains is an important aspect, predominantly for the technology-oriented frontrunner companies. For example the Dow Jones Sustainability Index is seen as a driver to become more sustainable. This closely resembles the Ecological Modernisation Theory. While competition does not address the environmental dimension of growth directly it accelerates the process of greening production chains. Philips, Siemens and Ahold put a strong emphasis on the competitive element of environmental CSR.
3. Absolute decoupling of the environmental impact from growth: a strategy where the company increases its eco-efficiency faster than its growth. This addresses the environmental dimension of growth as long as this condition is met. The track record and long term ambition to keep decoupling growth from impact make this a viable strategy from an environmental point of view. Relative reduction targets, for example the setting of targets on a per-product or per-square-meter basis, do not address the environmental dimension of growth. The use of these relative reduction targets obscures the challenge of absolute reduction of environmental impacts and masks the impact of growth. Setting absolute reduction targets can be seen as part of an a-growth stance as the target is unrelated to company growth.
4. The offsetting of impact as a mechanism is frowned upon by frontrunner companies and only seen as appropriate when used as a last resort. Addressing the environmental impact itself instead of paying for compensation of the impact is seen as more cost-effective and more responsible on the long term. None of the researched companies utilizes offsetting as their strategy to address the environmental dimension of growth.
5. Mission zero. The most radical way the environmental dimension of growth is addressed by a frontrunner company is Interface's effort to not only decouple growth from environmental impact but break the connection between the two. Mission zero

will, once reached, allow interface to have no negative environmental impact at all. Thereby addressing the environmental dimension of growth to the largest possible extent.

This research has found two common stances towards growth amongst frontrunner companies. The competitive stance towards sustainability was found in combination with strategy 2 and 3 and collaborative stance towards sustainability with 1 and 5. The competitive stance puts a strong emphasis on growth because it is regarded one of the drivers of sustainable development and can be considered a pro-growth attitude, but with strict conditions to the content of growth. The collaborative stance is closer to the a-growth concept as growth is considered an outcome or reward for environmentally sound practices rather than a necessary precondition for sustainability. The frontrunner companies are, whether intended or not, challenging dominant logic of the linear pro-growth economy.

Limits to growth, as presented in literature, are not being self-imposed by the researched frontrunner companies. All of the researched companies have set specific conditions to their growth, making it an umbrella strategy for addressing the environmental dimension of growth. Growth is allowed only when certain criteria regarding for example the decarbonisation, biodiversity, recyclability of resources and water use are being met. Step by step the frontrunner companies are making the content of their growth more sustainable by adding more and stricter conditions. The process of Environmental CSR has been one of internalizing externalities and there is no reason why the environmental dimension of growth cannot be internalised.

7. Recommendations

7.1 Recommendations for further research

While Environmental CSR is a self-regulatory measure there is the need for clarity from society on what an appropriate ecological footprint for a company is. Companies base their policy largely on what is feasible, not on what is regarded necessary. There has to be a societal debate on how we decide to divide the carbon budget. The proportionality of the measures taken by frontrunner companies can only be judged if there are criteria or guidelines on what a fair portion entails. This type of analysis has been done for nation-states and on a per-capita basis. The Quantifying sustainability approach (Ulanowicz et al., 2009) can be a good first step in this yet to be explored field.

While companies are addressing the impact of growth themselves they ask governments for stricter regulation, for example stronger and binding climate targets. The role of frontrunner companies is not just to lead by example but to look at the bigger picture and actively lobby for the legislation needed to address environmental degradation. The role of corporate citizenship in addressing the environmental dimension of growth is worth further exploring, especially because addressing the rebound effects requires an orchestrated effort.

The results show that there are frontrunner companies either set their environmental CSR targets based on what the competition is doing or based on their own ethics and climate science. Do frontrunners in sectors that have both types of goal-setting present perform better on environmental issues? The hypothesis “every sector should have at least one frontrunner that bases its environmental policy on climate science” is worth investigating. The idea is that if one company bases its goals on what’s necessary and the competition bases its goals on outperforming that frontrunner, the total environmental gains will be higher than when the companies would base their goals on either what’s necessary or on what the competition is doing.

As the concept of growth has become embedded within our economic paradigm it has become a “deep frame” according to Lakoff. This means that we do not necessarily think of growth in technical or even rational terms. Studies in the field of linguistics (Lakoff, 1993) provide evidence for growth being understood as a metaphor (White, 2003). Not only the formal definition of growth is important: also the perception of growth plays a role. This interesting aspect is worth exploring in further research on frontrunner companies. Do they perceive growth differently? A discourse analysis with an emphasis on framing could provide valuable insights in the link between worldviews and attitudes towards growth (Matthews and Matthews, 2014).

The role and influence of stakeholders in both upholding growth and in challenging the growth paradigm are not discussed in this thesis. It could be interesting to explore the potential and assess the impact of activist stakeholders and divestment campaigns as done by Jamie Hendry (Hendry, 2005) but with a focus on the extent to which companies address the environmental impact of growth.

7.2 Recommendations on debating growth

Despite the high urgency to address the environmental dimension of growth from a climate science perspective, the debate on the environmental dimension of growth did not advance much since its inception in 1972. Both the opponents and proponents of growth use essentially still the same arguments. This is problematic as the different attitudes towards growth have become a divisive force in the environmental movement and thus becoming a barrier to collaborate to effectively address climate change.

I believe that the debate on growth needs to progress in order to coherently address climate change. I suggest the following:

- Economic growth is the speed at which the economy runs and is not an indicator for wellbeing. The genuine progress indicator is better suited for that. Especially in the context of developing countries we shouldn't force them to take the 'pollute oneself to prosperity' route which most first world countries have taken.
- Economic growth is not just an abstract measurement of intangible things; most of the economy is throughput of goods and energy. Both proponents and opponents should be able to acknowledge that. By making the connection between environmental targets and growth policies on a national level based a decarbonisation rate target can be set, preferably based on climate science.
- The best practice of setting conditions to growth as frontrunner companies demonstrate can be a strategy for addressing the environmental dimension of growth in governmental policy. The banning or taxing of the most hazardous manifestations of growth and the incentivising the environmentally beneficial types of growth is a sensible thing to do, regardless of whether growth and environmental sustainability are compatible.

References

- ABRAMOVITZ, M. 1959. The welfare interpretation of secular trends in national income and product. *The Allocation of Economic Resources: Essays in Honor of Bernard Francis Haley*, Stanford University Press, Stanford, 1959, 1-22.
- AGHION, P., VEUGELERS, R. & HEMOUS, D. 2009. No green growth without innovation.
- AHOLD 2013. Responsible Retailing Report 2013.
- ALCOTT, B. 2005. Jevons' paradox. *Ecological economics*, 54, 9-21.
- ALEXANDER, S. 2012. Resilience through Simplification: Revisiting Tainter's Theory of Collapse. *Simplicity Institute Report 12h*.
- ARROW, K., BOLIN, B., COSTANZA, R., DASGUPTA, P., FOLKE, C., HOLLING, C. S., JANSSON, B.-O., LEVIN, S., MÄLER, K.-G. & PERRINGS, C. 1995. Economic growth, carrying capacity, and the environment. *Ecological economics*, 15, 91-95.
- ASAFU-ADJAYE, J., FOREMAN, C., PRITZKER, R., BLOMQVIST, L., KEITH, D., ROY, J., BRAND, S., LEWIS, M., SAGOFF, M., BROOK, B., LYNAS, M., SHELLENBERGER, M., DEFRIES, R., NORDHAUS, T., STONE, R., ELLIS, E., PIELKE, R. & TEAGUE, P. 2015. An Ecomodernist Manifesto. The Breakthrough Institute.
- BARDI, U. 2014. *Extracted: How the quest for mineral wealth is plundering the planet*, Chelsea Green Publishing.
- BERG, A. & OSTRY, J. D. 2011. Inequality and Unsustainable Growth: Two Sides of the Same Coin. *International Monetary Fund*, Washington DC.
- BLAUWHOF, F. B. 2012. Overcoming accumulation: Is a capitalist steady-state economy possible? *Ecological Economics*, 84, 254-261.
- BLEWITT, J. 2014. *The Post-Growth Project: How the End of Economic Growth Could Bring a Fairer and Happier Society*, Do Sustainability.
- BOULDING, K. 1973. Attributed to Kenneth Boulding in: United States. Congress. House (1973) Energy reorganization act of 1973: Hearings, Ninety-third Congress. *first session, on HR, 11510*, 248.
- CALDERÓN, F., OPPENHEIM, J. & STERN, N. 2014. Better Growth, Better Climate: The New Climate Economy Report. Washington: The Global Commission On The Economy And Climate.
- CARADONNA, J., BOROWY, I., GREEN, T., VICTOR, P., COHEN, M., GOW, A., IGNATYeva, A., VERGRAGT, P., WANGEL, J., DEMPSEY, J., ORZANNA, R., LOREK, S., AXMANN, J., DUNCAN, R., NORGAAARD, R. B., BROWN, H. & HEINBERG, R. 2015. A Call to Look Past An Ecomodernist Manifesto: A Degrowth Critique. *Resilience.org*, 21.
- CARROLL, A. B. 1991. The pyramid of corporate social responsibility: toward the moral management of organizational stakeholders. *Business horizons*, 34, 39-48.
- CHERTOW, M. R. 2000. The IPAT equation and its variants. *Journal of Industrial Ecology*, 4, 13-29.
- CLANCY, H. 2014. Why Philips' EcoDesign play is paying off in more than one way. Available from: <http://www.greenbiz.com/blog/2014/07/07/why-philips-wants-product-designers-think-circular> [Accessed 17/2 2015].
- COX, R. H. 2014. The Liability of European States for Climate Change. *Utrecht Journal of International and European Law*, 30, 125-135.
- COX, R. H. & MANTON, E. H. 2012. *Revolution Justified*, Planet Prosperity Foundation.
- DALY, H. E. 1990. Sustainable growth: A bad oxymoron*. *Journal of Environmental Science & Health Part C*, 8, 401-407.
- DALY, H. E. 1999. Uneconomic growth in theory and in fact. *The first annual Feasta lecture*, 16.
- DASGUPTA, P. S. & HEAL, G. M. 1979. *Economic theory and exhaustible resources*, Cambridge University Press.
- DAVEY, B. & DOUTHWAITE, R. 2012. *Sharing for Survival: Restoring the Climate, the Commons and Society*, Feasta, The Foundation for the Economics of Sustainability.
- DE WAAL, R. 2013. 2.0. *Heijmans Jaaroverzicht Duurzaamheid 2013: De Contour van Morgen*.
- DELMAS, M. A. & CUEREL BURBANO, V. 2011. The drivers of greenwashing. *California Management Review*.

- DIAMOND, J. 2005. *Collapse: how societies choose to fail or succeed: revised edition*, Penguin.
- DIAMOND, J. M. & ORDUNIO, D. 2005. *Guns, germs, and steel*, National Geographic.
- DICKINSON, E. 2011. GDP: a brief history. *Foreign Policy*.
- DOUTHWAITE, R. 1993. *The Growth Illusion: How Economic Growth Has Enriched the Few, Impoverished the Many, and Endangered the Planet*, ERIC.
- DOUTHWAITE, R. J. 1999. *The ecology of money*, Resurgence Books.
- EASTERLIN, R. A. 1995. Will raising the incomes of all increase the happiness of all? *Journal of Economic Behavior & Organization*, 27, 35-47.
- EASTERLIN, R. A. 2015. *Happiness and Economic Growth—The Evidence*, Springer.
- EHRlich, P. R. & EHRlich, A. H. 1990. *The population explosion*, Simon and Schuster New York.
- FERGUSON, P. 2013. Post-growth policy instruments. *International Journal of Green Economics*, 7, 405-421.
- FIALA, N. 2008. Measuring sustainability: Why the ecological footprint is bad economics and bad environmental science. *Ecological economics*, 67, 519-525.
- FRANCIS 2015. *Laudato Si: On Care for Our Common Home*, Vatican, The Catholic Church.
- FULLER, R. B., FULLER, R. B. & FULLER, R. B. 1963. *Nine chains to the moon*, Southern Illinois University Press.
- GIARINI, O. & STAHEL, W. R. 1989. *The limits to certainty*, Springer Science & Business Media.
- GIDDENS, A. 2009. Walking the climate talk. *The Guardian*.
- GRANT, L. 1983. The Cornucopian Fallacies: The Myth of Perpetual Growth. *Futurist*, 17, 16-22.
- GROSSMAN, G. M. & HELPMAN, E. 1993. *Innovation and growth in the global economy*, MIT press.
- GUDYNAS, E. 2013. Transitions to post-extractivism: directions, options, areas of action. *Beyond Development*, 174 - 187.
- HALLEGATTE, S., HEAL, G., FAY, M. & TREGUER, D. 2012. From growth to green growth-a framework. National Bureau of Economic Research.
- HAMILTON, C. 2004. *Growth fetish*, Pluto Press London.
- HAYDEN, A. 2014. *When green growth is not enough: Climate change, ecological modernization, and sufficiency*, McGill-Queen's Press-MQUP.
- HEINBERG, R. 2011. *The end of growth: Adapting to our new economic reality*, New Society Publishers.
- HENDRY, J. R. 2005. Stakeholder influence strategies: An empirical exploration. *Journal of Business Ethics*, 61, 79-99.
- HERMAN, E. S. & CHOMSKY, N. 1988. *Manufacturing consent: The political economy of the mass media*, Random House.
- HOFFMAN, A. J. 2007. *Carbon strategies: How leading companies are reducing their climate change footprint*, University of Michigan Press.
- HOLLENDER, R. 2014. Post-Growth in the Global South: The Emergence of Alternatives to Development in Latin America.
- HUEBNER, J. 2005. A possible declining trend for worldwide innovation. *Technological Forecasting and Social Change*, 72, 980-986.
- INGVES, S. 2015. Supporting sustainable growth: the role of safe and stable banking systems. *Financial Stability Review*, 65-73.
- INTERFACE. 2015a. COOL CARPET® – SERVICE VOOR CO2-NEUTRAAL TEGELTAPIJT [Online]. Available: http://www.interfaceflor.nl/web/nl/duurzaamheid/duurzame_producten_diensten/coolcarpet [Accessed 6/5 2015].
- INTERFACE. 2015b. Mission Zero [Online]. Available: http://www.interfaceglobal.com/careers/mission_zero.html [Accessed 14 June 2015].
- JACKSON, A. & DYSON, B. 2012. *Modernising Money: Why Our Monetary System Is Broken and How It Can Be Fixed*, Positive Money.
- JACKSON, T. 2009. Prosperity without growth?: The transition to a sustainable economy.
- JACKSON, T. 2011. *Prosperity without growth: Economics for a finite planet*, Routledge.

- JACOBS, M. 2012. Green growth: economic theory and political discourse. *London: Centre for Climate Change Economics and Policy Working Paper No, 108.*
- JAKOB, M. & EDENHOFER, O. 2014. Green growth, degrowth, and the commons. *Oxford Review of Economic Policy*, 30, 447-468.
- JANSZEN, F. 2000. The age of innovation. *Financial Times/Prentice Hall, London.*
- JOHNSON, W. R. 1973. Should the poor buy no growth? *Daedalus*, 165-189.
- JONES, R. S. & YOO, B. 2011. Korea's green growth strategy: Mitigating climate change and developing new growth engines. OECD Publishing.
- JOPLING, J. 2013. Co-creating a global climate commons regime.
- JORGENSEN, A. K. & DIETZ, T. 2015. Economic growth does not reduce the ecological intensity of human well-being. *Sustainability Science*, 10, 149-156.
- KALLIO, T. J. 2007. Taboos in corporate social responsibility discourse. *Journal of Business Ethics*, 74, 165-175.
- KAY, J. J., REGIER, H. A., BOYLE, M. & FRANCIS, G. 1999. An ecosystem approach for sustainability: addressing the challenge of complexity. *Futures*, 31, 721-742.
- KENNEDY, M. 1995. Interest and inflation free money. *Seva International.*
- KENOURGIOS, D. & DIMITRIOU, D. 2015. Contagion of the Global Financial Crisis and the real economy: A regional analysis. *Economic Modelling*, 44, 283-293.
- KLEIN, N. 2011. Capitalism vs. the Climate. *The Nation*, 28, 11-21.
- KLEIN, N. 2014. *This changes everything: capitalism vs. the climate*, Simon and Schuster.
- KLEISTERLEE, G. 2007. *Innovatie als stimulans voor duurzame groei* [Online]. Philips. Available: http://www.philips.nl/philips1philipsnl/about/news/speechesandpresentations/innovatie_al_s_stimulans_voor_duurzame_groei.page [Accessed 10 April 2014].
- KLIEMANN, C. 2015. Are we prepared to change to prevent climate change? *SHIFT Magazine.*
- KNIGHT, D. 2014. Update on the "Sink or Sue" climate litigation project.
- KONDO, S. & MIURA, Z. 2014. Ricoh Group Sustainability Report 2014. Ricoh.
- KOOPMANS, T. C. 1965. On the concept of optimal economic growth.
- KOROWICZ, D. 2012. Trade Off: Financial system supply-chain cross contagion—a study in global systemic collapse.
- KUZNETS, S. 1934. National Income, 1929-1932. *National Income, 1929-1932*. NBER.
- KUZNETS, S. & MURPHY, J. T. 1966. *Modern economic growth: Rate, structure, and spread*, Yale University Press New Haven.
- LAKOFF, G. 1993. The contemporary theory of metaphor. *Metaphor and thought*, 2, 202-251.
- LATOUCHE, S. 2009. *Farewell to growth*, Polity.
- LAVERY, G. & PENNELL, N. 2014. The New Industrial Model: Greater profits, jobs and reduced environmental impact. Interface.
- LAWN, P. A. 2003. A theoretical foundation to support the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI), and other related indexes. *Ecological Economics*, 44, 105-118.
- LLOYD, B. 2009. The growth delusion. *Sustainability*, 1, 516-536.
- MANIATIS, T. & PASSAS, C. 2013. Profitability Capital Accumulation and Crisis in the Greek Economy 1958–2009: a Marxist Analysis. *Review of Political Economy*, 25, 624-649.
- MARTENSON, C. 2011. *The crash course: The unsustainable future of our economy, energy, and environment*, John Wiley & Sons.
- MARX, K. 1867. *Capital: A Critique of Political Economy*, Digireads. com Publishing.
- MATTHEWS, L. & MATTHEWS, A. 2014. *Framespotting: Changing How You Look at Things Changes How You See Them.*
- MCLEAY, M., RADIA, A. & THOMAS, R. 2014. Money creation in the modern economy. *Bank of England Quarterly Bulletin*, Q1.
- MEADOWS, D. H., GOLDSMITH, E. & MEADOW, P. 1972. *The limits to growth*, Universe books New York.

- MILL, J. S. 1848. Of the stationary state. *Principles of political economy Book IV: Influence of the progress of society*.
- MOL, A., SONNENFELD, D. & SPAARGAREN, G. 2009. The Ecological Modernisation Reader: Environmental Reform in Theory and Practice, London and New York. Routledge.
- MOL, A. P. & SPAARGAREN, G. 1993. Environment, modernity and the risk-society: the apocalyptic horizon of environmental reform. *International sociology*, 8, 431-459.
- MOL, A. P., SPAARGAREN, G. & SONNENFELD, D. 2014. Ecological Modernisation Theory: Where Do We Stand? *Ökologische Modernisierung-Zur Geschichte und Gegenwart eines Konzepts in Umweltpolitik und Sozialwissenschaften*. Campus Verlag.
- MORIARTY, P., HONNERY, D., FLOYD, J. & A. SLAUGHTER, R. 2014. Future Earth: declining energy use and economic output. *foresight*, 16, 512-526.
- MURRAY, J. Transitioning to more balanced and sustainable growth. Federal Reserve Bank of San Francisco Proceedings, 2013. 1-6.
- OMRI, A., NGUYEN, D. K. & RAULT, C. 2014. Causal interactions between CO₂ emissions, FDI, and economic growth: Evidence from dynamic simultaneous-equation models. *Economic Modelling*, 42, 382-389.
- ORLOV, D. 2008. *Reinventing collapse: The Soviet example and American prospects*, New Society Publishers.
- PERROW, C. 1972. *The Radical Attack on Business: A Critical Analysis*, Harcourt Brace Jovanovich, Inc.
- PEZZEY, J. 1992. Sustainable development concepts. *World*, 1, 45.
- PHILIPS 2013. Philips Jaaroverzicht 2013: Delivering Innovation that Matters to You.
- PIKETTY, T. & GOLDHAMMER, A. 2014a. Capital in the twenty-first century. Belknap Press.
- PIKETTY, T. & GOLDHAMMER, A. 2014b. Capital in the twenty-first century. Belknap Press.
- PIKETTY, T. & SAEZ, E. 2014. Inequality in the long run. *Science*, 344, 838-843.
- PRESTON, F. 2012. A global redesign? shaping the circular economy. *Energy, Environment and Resource Governance*. London: Chatham House.
- REES, W. E. 2013. 22 Confronting collapse. *Confronting Ecological and Economic Collapse: Ecological Integrity for Law, Policy and Human Rights*, 288.
- ROCKSTRÖM, J., STEFFEN, W., NOONE, K., PERSSON, Å., CHAPIN, S. I., LAMBIN, E., LENTON, T. M., SCHEFFER, M., FOLKE, C. & SCHELLNHUBER, H. J. 2009. Planetary boundaries: Exploring the safe operating space for humanity. *Ecology & society*, 14.
- ROSTOW, W. 1961. *The Stages of Economic Growth: A Non-Communist Manifesto*.
- SANTARIUS, T. 2012. Green growth unravelled. *How rebound effects baffle sustainability targets when the economy keeps growing*. Wuppertal Institute/Heinrich Böll Foundation, Wuppertal.
- SARKIS, J. 2006. *Greening the supply chain*, Springer.
- SCHNEIDER, F., KALLIS, G. & MARTINEZ-ALIER, J. 2010. Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue. *Journal of cleaner production*, 18, 511-518.
- SCHUMACHER, E. 1973. *Small is beautiful. A study of economics as if people mattered*, Blond & Briggs.
- SIEMENS NEDERLAND, N. V. 2013. Maatschappelijk Jaarverslag.
- SIMONIS, U. E. 1989. *Ecological Modernization of Industrial Society—Three Strategic Elements*, Springer.
- SNEDDON, C., HOWARTH, R. B. & NORGAARD, R. B. 2006. Sustainable development in a post-Brundtland world. *Ecological economics*, 57, 253-268.
- SOLOW, R. M. 1956. A contribution to the theory of economic growth. *The quarterly journal of economics*, 70, 65-94.
- SPASH, C. L. 2014. Better Growth, Helping the Paris COP-out? Fallacies and Omissions of the New Climate Economy Report. Institute for the Environment and Regional Development, Department of Socioeconomics, Vienna University of Economics and Business.
- SPASH, C. L. 2015. The Future Post-Growth Society. *Development and Change*, 46, 366-380.

- STAHL, W. A. 2008. From Peak Oil to the Apocalypse: Cultural Myths and the Public Understanding of Scientific Models.
- STEFFEN, W., GRINEVALD, J., CRUTZEN, P. & MCNEILL, J. 2011. The Anthropocene: conceptual and historical perspectives. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, 369, 842-867.
- TAINTER, J. 1996. Complexity, problem solving, and sustainable societies. *Getting down to*.
- TAINTER, J. A. 2011. Resources and cultural complexity: Implications for sustainability. *Critical Reviews in Plant Sciences*, 30, 24-34.
- TRANSPARANTIEBENCHMARK. 2013. Robert Koolen van Heijmans: "Ik houd van de hectiek die bij de laatste fase hoort". *Transparantiebenchmark* [Online]. Available from: http://transparantiebenchmark.nl/blogs/robert_koolen_van_heijmans_ik_houd_van_de_hectiek_die_bij_de_laatste_fase_hoort [Accessed 5/9 2014].
- TVERBERG, G. E. 2012. Oil supply limits and the continuing financial crisis. *Energy*, 37, 27-34.
- ULANOWICZ, R. E., GOERNER, S. J., LIETAER, B. & GOMEZ, R. 2009. Quantifying sustainability: resilience, efficiency and the return of information theory. *ecological complexity*, 6, 27-36.
- ULGIATI, S. & BROWN, M. T. 2009. Emergy and ecosystem complexity. *Communications in Nonlinear Science and Numerical Simulation*, 14, 310-321.
- VAN DEN BERGH, J. C. 2010. Relax about GDP growth: implications for climate and crisis policies. *Journal of Cleaner Production*, 18, 540-543.
- VAN DEN BERGH, J. C. 2011. Environment versus growth—A criticism of "degrowth" and a plea for "a-growth". *Ecological Economics*, 70, 881-890.
- VAN DEN BERGH, J. C. & VERBRUGGEN, H. 1999. Spatial sustainability, trade and indicators: an evaluation of the 'ecological footprint'. *Ecological economics*, 29, 61-72.
- VAN DER TOUW, A. F. 2013. Innovatieve kracht tonen. *Maatschappelijk Jaarverslag 2013*, 4-5.
- VARMA, V. P. 1977. Economics in Marx's 'Capital'. *The Indian Journal of Political Science*, 315-344.
- VICTOR, P. A. & ROSENBLUTH, G. 2007. Managing without growth. *Ecological Economics*, 61, 492-504.
- WALTER, E. 1981. *The Immorality of Limiting Growth*, SUNY Press.
- WALTER, E. 1988. Industrial and economic growth from a moral perspective. *Technology in society*, 10, 267-281.
- WEBSTER, K. 2013. What Might We Say about a Circular Economy? Some Temptations to Avoid if Possible. *World Futures*, 69, 542-554.
- WERNER, R. A. 2014. Can banks individually create money out of nothing?—The theories and the empirical evidence. *International Review of Financial Analysis*, 36, 1-19.
- WHITE, M. 2003. Metaphor and economics: the case of growth. *English for Specific Purposes*, 22, 131-151.
- WIEDMANN, T. O., SCHANDL, H., LENZEN, M., MORAN, D., SUH, S., WEST, J. & KANEMOTO, K. 2015. The material footprint of nations. *Proceedings of the National Academy of Sciences*, 112, 6271-6276.
- WIJNHOFEN, L., KOOLEN, R. & DE WAAL, R. 2013. Heijmans Jaaroverzicht Duurzaamheid 2013: De Contour van Morgen.
- WILKINSON, R. G., PICKETT, K. & CHAFER, C. 2011. *The spirit level*, Tantor Media, Incorporated.
- WITT, U. 2013. The crisis behind the crisis. *Environmental Innovation and Societal Transitions*, 6, 120-122.
- WOOD, D. J. 1991. Corporate social performance revisited. *Academy of management review*, 16, 691-718.
- WRAY, L. R. 2012. *Modern money theory: A primer on macroeconomics for sovereign monetary systems*, Palgrave Macmillan.
- WRIGLEY, E. 1988. The limits to growth: Malthus and the classical economists. *Population and Development Review*, 14, 30-48.
- YOUNG, S. 2012. Ray Anderson: Climbing Mount Sustainability.

