Energy Futures

Anthropocene Challenges, Emerging Technologies and Everyday Life

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Introduction

The everyday is a dynamic site through which to investigate energy futures. It is where the mundane but crucial activities, feelings, and relationships that underpin more spectacular or visible domains of life play out. Expressed directly for academics, the everyday is where, to be dressed to deliver an in-person lecture, you need to have done your laundry. The everyday is composed of many such background activities, materialities, technologies, and sensory experiences, all demanding energy for their ongoing maintenance, and ultimately entangled with the climate, political, and health crises, resource extraction, inequalities, infrastructures, and technologies which characterise our present and possible future environments.

In anthropology, design and science and technology studies (STS) there is growing attention to mundane anticipation (Pink and Postill 2019, Bryant and Knight 2019) and to how smart technologies are implicated in the anticipatory modes of home (Johnson 2020, Michael 2016, Strengers and Kennedy 2020, Knox 2021), mobility (Pink, Fors, and Glöss 2018) and work (Pink, Ferguson, and Kelly 2022). In this chapter we understand everyday energy futures from three perspectives.

First we stress that energy and technology use are configured in the everyday narratives of life in homes, mobilities and work in the present (Strengers 2013, Pink and Leder Mackley 2015, Pink, Fors, and Glöss 2019, Velkova et al. 2022), and acknowledge the many inequalities of digital capitalism (e. g. Eubanks 2018, Sadowski 2020). We need to foreground tensions between the messy realities of the everyday with the visions of energy and technology futures presented by politically and economically powerful stakeholders; how do messy and contingent everyday life realities complicate the sanitized, quantified mainstream future visions of energy demand proposed by consultancies, industry, and technology news media? Second, we emphasise the need to examine how energy futures are creatively imagined in everyday life. How does energy use participate in people's everyday values, hopes, expectations, and anxieties for their near and far futures? Third, how does energy use come about through these messy reali-

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ties of life in the present and as it is imagined for the future, as always relational to other everyday priorities and activity?

To engage with these questions ethnographically we foreground the stories of people in affluent nations whose access to everyday energy is predominantly via electricity grids, fuel stations, and consumer products, and shaped by the techno-solutionist agenda of neoliberal governments and powerful industry stakeholders. In pursuing their stories we raise a set of issues. A richness of ethnographic material has been produced with participants living in such circumstances, enabling comparison. This is ironically indicative of how research funding has supported energy research initiatives in wealthy countries, and signals the need for a more diverse agenda (see Chs. 4 and 5). Moreover, dominant narratives about energy and technology futures proposed by consultancies, industry, and policy bodies appear usually to refer to such societies. Here we seek to complicate their future visions from the very sites that they superficially appear to be consistent with.

In Australia and Europe, the sites we write from, we have experienced recent climate events – including bushfires and extreme heat in Australia, flooding in the United Kingdom, and the COVID-19 pandemic. Such events are both the outcomes of resource depletion and have energy demand implications. Across all our fieldwork and writing sites, lockdowns and home-working between lockdowns have focused work and life on the home, increasing the use of digital technologies in homes, and generating speculation on the reduced energy demands of digital mobility and reduced commutes (Holmes et al. 2021). This chapter creates a close-up encounter with 'anthropology at home' (Amit 2000), yet in doing so dislodges the claims of conventional anthropologies at home. Doing research about energy *futures* in the everyday, or *everyday energy futures*, disrupts the possibility that anthropologists are at home. Although we inhabit our futures in our visions of them, the future is in fact the home of no one.

This, we argue, is precisely why we need to respond; we need to occupy energy futures with *possible* futures, of the kind that complicate the predicted futures that are so often advanced by dominant narratives. Everyday energy futures are already being colonised by the consultancies, the energy and technology industries, and by governments. Often their moves are well-meaning, they are also often paternalistic and usually support corporate capitalism. Such organisations predict and claim futures through their practices of envisaging 'better' more sustainable futures, automated for the supposed convenience and comfort of 'consumers' and to optimise their effectiveness. They colonise futures and seek to bring people into line with their visions, in supposing people will enact different everyday lives, routines, and priorities once they 'properly' use future technolo-

gies, systems and modes of automation. We need to make everyday energy futures our new intellectual and applied anthropological home.

Anthropologies of everyday energy and futures

Anthropologies of energy in everyday life vary vastly in their localities and sites, their modes of ethnographic practice, engagements with institutional, corporate, government, other-sector, or activist stakeholders, and their sources of funding. Compared with other disciplines, anthropologies of everyday energy in homes took off slowly, initially in Scandinavian countries with a stronger tradition of applied research in this field (Henning 2005, Wilhite 2005, Bille 2018). There are different anthropological modes of working with everyday futures, all of which have been fruitfully engaged in energy anthropologies.

One trend is the *anthropology of the future* (Bryant and Knight 2019), which uses social practice theory (SPT) to study how the present is shaped by anticipated futures. Sociologists such as Elizabeth Shove in the UK, Kirsten Gram Hannsen in Denmark, and Yolande Strengers (2013) in Australia developed SPT as a lens for rethinking energy demand in homes, with a critical agenda against the behaviour-change policies advanced by neoliberal governments that tended to frame everyday life in the home as culpable for energy waste. Scholars have engaged SPT to argue both that everyday life practices shape energy demand, and energy use is not a behaviour that can be changed by appealing to rational actors. Ellsworth-Krebs (this chapter) applies SPT to discuss how the socio-materiality of the everyday shapes energy demand in the UK and Australia. Pink's collaboration with Strengers has combined SPT with futures anthropology (Strengers, Pink, and Nicholls 2019). Social practices have been studied in order to understand how historically situated practices performed today can tell us something about opportunities for change. SPT has also been applied to understanding how changes might be imagined and experimented with in the future and practice-centered design for change initiatives is a growing field of research. The example that Michiel Köhne and Elisabet Dueholm Rasch elaborate suggests that everyday practices 'may have limited ability to shape sociotechnical imaginaries themselves' but are an important factor in the energy transition (Schelhas 2018: 186); they are also limited in their use for designing possible futures (Pink and Leder Mackley 2015), but important for understanding everyday practice in the present.

The other approach to futures in anthropology, *futures anthropology* (Pink and Salazar 2017, Pink 2021), is rooted in phenomenological and design anthropological theory and investigates possible futures by working in speculative or

experimental modes. It is particularly useful for attending to how energy, emerging technologies, and digital data intersect in the everyday present and possible futures. In increasingly datafied environments (Couldry and Mejias 2019), big-data analysis, predictive analytics and emerging technologies are integral to visions of how future home energy demand will be created and mitigated (Strengers et al. 2021) and technological solutionist visions see EVs as pivoted to become ubiquitous, using secure blockchain transactions to pay for automatically wireless charging (Pink 2022, Ortar and Ryghaug 2019). Design anthropological approaches define the everyday as a site of ongoing emergence (Smith and Otto 2016, Akama, Pink, and Sumartojo 2018), where forms of resistance, creative adaptation, and invention characterise people's evolving relationships with and modes of learning with technology. Combined with the futures anthropology emphasis on the contingency of everyday life in the present and future, such work alerts us to the dynamic nature of the everyday, and the impossibility of holding it still for prediction, as dominant narratives seek to. Design anthropological approaches to emerging technologies (e.g. Pink et al. 2022) emphasise the need to respond to such narratives by attending to how these technological possibilities will play out in the real everyday. Speculative approaches, typically associated with design and 'the experiment', an STS methodology, have increasingly become engaged with this question in anthropological and sociological work on everyday energy. For instance, sociologist Mike Michael's collaboration with designer William Gaver produced a speculative object placed in participants' homes in the United Kingdom (Michael 2016); Julia Velkova and colleagues undertook research alongside the trial of an automated energy demand management system in Sweden (Velkova, Magnusson, and Rohracher 2022); and anthropologist Hannah Knox's experimental work with participants and their own hand-made energy monitoring data leads her to argue for a new propositional approach (Dányi et al. 2021: 84).

These speculative studies exceed the conventions of long-term ethnographic fieldwork by creating generative experiments in the present. They additionally generate insight concerning how people live and learn with speculative technologies, systems, services, or processes that do not usually inhabit their everyday present, when they are accommodated *into* it. Whether or not we should call scenarios like technology tests and trials, or people's experiences of them, possible futures is debatable. But they do create situations where people's ongoingly emergent futures are opened to new possibilities, which could not have occurred without research, design, or experimental interventions. Such interventions offer the only empirical knowledge we have of how people experience and engage with new energy-related technologies in the everyday. They provide unique possibilities through which to question or complicate the assumptions about what

everyday human futures will look like with new energy technologies promoted in dominant narratives.

Another way to engage with everyday energy futures interventionally is through the notion of energy democracy, which emphasises the importance of efforts by citizens to exercise more control over energy decisions and as such to construct their desired (renewable) energy future. Rather than looking for a technological fix, energy democracy questions who controls energy, to what end, and to whose benefit (Fairchild and Weinrub 2017). Energy democracy scholars propose decentralised ways of governing energy (Burke and Stephens 2017, 2018), but focus on people who can afford to invest in renewable energy solutions. Energy democracy is thus not only an element of an energy future, but also a way of giving form to and moving towards that renewable energy future. The example discussed in the case presented by Köhne and Rasch below adds a new dimension to the discussion on energy democracy by introducing how social housing residents can be part of the construction of energy democracy and an inclusive renewable energy future.

However, in advocating for energy futures from the everyday, we do not directly pitch the everyday against industry, government, policy, and such like, or see them as operating at different poles of a continuum. Rather we see benefits in bringing together diverse stakeholders in everyday energy futures. We collectively believe and show how our work should be relevant to a wide range of organisations including: governments, municipalities or social housing corporations aiming to reach net zero emissions targets or engage tenants in renewable energy programmes; energy companies to guide energy demand forecasting and future infrastructural investments; property developers in reprioritising away from a sales-focused model to consider changing demographic trends and housing needs; designers, architects, and planners; energy entrepreneurs; local energy cooperatives; and coworking organisations. We must enter into dialogue with such organisations, to demonstrate the benefits of everyday anthropological thinking. We moreover need to engage collaboratively with other disciplines to understand the possibilities for researching and intervening in visions of plausible everyday energy futures. The theoretical tools available to our field outlined above likewise should not be activated to compete with each other, but to provide the agility through which to achieve the engagement required for our participation.

Future visions and everyday energy futures

Industry and consultancy visions frequently predict future everyday life through techno-solutionist narratives. These tend to be based on assumptions about the impact technologies will have on people (usually referred to as users or consumers) when – or *if* – they use them as intended. In particular, the need to decarbonise the energy system raises a number of key challenges for the energy sector, in which people's everyday actions and decisions are often perceived as 'barriers' to an optimised energy system. It is subsequently assumed that such behaviours can be overcome either through economistic visions which suggest consumers can be influenced through the right mix of incentives and price signals, or through erasing their inefficient behaviour entirely through outsourcing energy decision making to automated systems (Sadowski and Levenda 2020). However, such visions ignore the complex ways energy use is entangled with everyday practices, priorities, and ethics. People are often visioned into such technologically determinist views of energy futures as personas, whose rational actions will align with the ambitions of efficient energy systems. Social scientists have critically responded to this caricaturing of human experience and practice, by showing up the personas for what they are. Yolande Strengers's (2013) Resource Man, Charlotte Johnson's (2020) Flexibility Woman, and Kari Dahlgren and colleagues' techno-hedonist (2021) personas outline the dissonance between what we consider to be realistic possible everyday futures, and the kinds of people that are imagined to inhabit everyday energy futures.

Visions of future everyday energy demand often have utopian feel-good narratives, precisely because they focus on possible adjustments to sustainable living and energy demand reduction, without accounting for the reality that the contingencies of everyday life will lead to resource depletion in other invisible ways. By situating our research in the everyday we can view the tensions between utopian visions of energy demand reduction at the local scale and the energy and resource depletion that new modes of automation and technologies demand globally, and/or in other global sites. Coworking reveals that the very technologies that make the reduced travel and local focus of coworking possible, generate e-waste, deplete minerals, and themselves demand energy for their production, maintenance, transportation, and data storage. Electric vehicles generate environmental costs through their production and shipping. While, due to health and social inequality issues, questions of overcrowding have dominated discourses on floor- area trends, issues of excess and over-consumption have been missed. Social housing tenants experience a very different sense of ownership over energy decisions from what is represented in utopian feel good-narra-

tives where renewable energy is owned and produced by more privileged groups to maintain comfortable lifestyles.

The next four sections bring this to life through ethnographies of the everyday.

The cases

In the following four sections, we discuss examples from across Australia and Europe concerning: the tensions between industry visions and everyday imaginaries of future electric vehicle (EV) charging (Kari Dahlgren and Sarah Pink); how energy demand is produced at the intersection between mobility, home, and work futures, through a focus on the rise of coworking (Nathalie Ortar and Aurore Flipo); a reconsideration of dominant visions of the relationship between everyday priorities relating to house size and energy demand (Katherine Ellsworth-Krebs); and a consideration of ownership as a central pillar of energy democracy (Michiel Köhne and Elisabet Dueholm Rasch). In doing so we collectively bust the techno-solutionist myths that are part of assumptions that: coworking leads to a sustainable energy future; people inevitably wish for bigger homes in the future, which impacts on energy efficiency; tenants have ownership over energy decisions about their homes, disregarding how this may be reduced through limited financial resources or of a different kind while using frugality as a strategy rather than renewable investment; e-mobility can be generalised without changing everyday practices. We advocate for energy futures reimagined from the everyday.

Complicating smart charging electric vehicle futures

Kari Dahlgren and Sarah Pink

In Australia the climate crisis has in the last years manifested visibly in bushfires, flooding, and extreme heat and these environmental and weather events have direct consequences for domestic energy demand. Within this, electric vehicles (EVs) are frequently seen as part of a solution or techno-fix to the problem of reducing carbon emissions, which requires the buy-in of both future drivers and government in providing infrastructure and incentives. Our Digital Energy Futures (DEF) project has explored how people anticipate or imagine how EVs

could figure in their possible everyday futures, by allowing participants to contemplate how the complexity of their own lives, values, and desires for different futures complicate mainstream industry and policy narratives. Our research reveals the potential of ethnographic futures research to contest techno-solutionist narratives of the energy sector.

Our work in DEF is in collaboration with sociologists, Yolande Strengers, Larissa Nicholls, and Rex Martin. DEF is Australian Research Council and industry-partner funded, with two Australian energy distribution companies, AusNet and Ausgrid, and Energy Consumers Australia, and in its final stages collaborates with quantitative energy forecasters (Strengers et al. 2021). Its first and second stages, discussed here, involved a review of industry reports, developing probe materials, and online ethnography designed to invoke and compare industry-framed futures and possible everyday futures.

The probes we created were a series of comic strips informed by the qualitative content analysis (Schreier 2012) of 64 digital technology and energy sector reports (international but focused on trends likely to affect Australian households), which identified current industry trends, predictions, and visions for how everyday practices are anticipated to change in the near (2025 – 2030) and medium-far (2030 – 2050) futures. Reading these reports also entailed an immersion into the logics, discourses, and future visions of industry and policy, making them a fieldsite of future imaginations, speculations, and predictions from which we gathered key claims and imaginaries of the energy and technology industry, and consultancies (Dahlgren et al. 2021). In order to challenge these dominant visions of the future we needed to articulate them, and to engage participants with them. The key findings of the review were published in a report (Dahlgren et al. 2020) and synthesised into six comic strip scenarios, which playfully depict how the digital technology and energy trends and visions are predicted to impact everyday life. As aggregated versions of the future trends and visions found in the reports reviewed, the scenarios do not represent the research team's own future visions, but those that have been extrapolated from the review of reports. They distilled the discourse of these reports into an accessible and entertaining form of encountering their implications for the future home, which we used in our ethnography. Below we discuss one comic strip scenario, representing visions of electric vehicles and their integration into the 'smart grid' and energy demand management through the smart home (Fig. 2.1).

Dominant EV narratives

Electric Vehicles (EVs) are expected to overtake combustion engine vehicles in the coming decades, predicted to reach 100 % of all new vehicles sold in Australia by 2040 (KPMG 2018a). Our analysis showed EVs are often viewed as a crucial technology for decarbonising society, allowing the replacement of petroleum with electricity, ideally derived from renewable sources. EVs promise a simple solution to petroleum powered transport without having to significantly alter travel patterns or expectations of individual mobility. However, they raise another problem. For the electricity sector, electric vehicles represent a significant increase in electricity demand, which if not properly managed, could potentially stretch energy infrastructure to the breaking point. As the title of a KPMG report on EVs asks, "Is the Energy Sector Ready?"

Unlike oil, electricity is a peculiar commodity that resists storage. Supply and demand must be carefully matched to avoid outages, but both fluctuate radically based on weather conditions (for renewables) and how humans pattern their social life. Australia's electricity sector is affected by 'peaky' conditions, where on hot summer afternoons electricity demand can double as Australians collectively switch on their air conditioners. The thought that someday they will also all be plugging in their electric vehicles to charge when they arrive at their air conditioned homes is a frightening prospect to those charged with securing the electricity supply, and would undermine potential decarbonisation gains, should increased fossil-fuelled electricity be required to meet such demand.

However, our analysis revealed that even in the face of this new problem, the logics of technological solutionism are unrelenting, as a new solution is proposed in the form of "smart charging", which also brings into focus the broader goal for energy demand management issues to be solved by the 'smart grid'. The 'smart grid' promises a responsive electricity system that manages supply from an increasing number of distributed energy resources (DER) such as rooftop solar PV, and controls demand through load-shifting digital technologies that are responsive to dynamic pricing. Consultants to the energy sector warn that "if business models, market design and technology do not align consumer incentives with efficient behaviour, even a modest increase in electric vehicles could strain our generation and network infrastructure" (Deloitte 2018). This emphasis on "consumer incentives with efficient behaviour" represents what Strengers (2013) calls the Resource Man vision of energy consumers – a tech-savvy and energy-interested version of homo-economicus – which she points out is central to the sector's vision of a price-responsive energy system. However, beyond market design, Deloitte's words emphasise technology's envisioned role in making behaviour more 'efficient', in two interrelated ways. First, EVs can be integrated

into the electricity grid, becoming mobile batteries providing network services to distributed energy resources. Second, Artificial intelligence (AI) and Automated Decision-Making (ADM) can ensure that the use of EVs and their charging are optimised in response to electricity availability.

Thus, according to these narratives, EVs can be transformed from a burden into a potential solution to other technology-created solutions-turned-problems, that is, the need to integrate the increasingly distributed energy system, particularly household solar PV, into stable, reliable, and balanced loads. One particular manifestation of this is vehicle-to-home, or vehicle-to-grid technologies, whereby the electric vehicle serves as a mobile battery, and its charge and discharge are utilised to level electricity loads while maintaining sufficient charge for travelling. This technology requires particular patterns of use, high levels of flexibility, price responsiveness, and sufficient charging infrastructure. This vision also privileges a particular form of vehicle user: Australia's National Science Agency CSIRO portrays 'a household that has access to charging via both home off-street parking and at their normal place of daytime parking (i. e. at work or in a carpark)' (Graham and Havas 2019). These future visions assume that applied as such, technology directly improves people's lives. CSIRO states that for 'Over nearly a century, we've been improving the lives of people everywhere with our science' (CSIRO nd).

ADM is increasingly viewed as a solution to a range of assumed 'barriers to adoption' of EVs, including customers' range anxiety and the perceived inconvenience of charging (Pink 2022). From the perspective of the energy sector, it is clear that ADM is also crucial to their vision of how the electricity system will manage to incorporate high rates of EV ownership and turn EVs from a potential threat to the electricity system to a solution to the increasing prevalence of distributed energy generation. Electric vehicles and ADM for energy demand management may represent opportunities for increased decarbonisation, but they reflect a technological-solutionist framing of climate change. They offer easy technological solutions that don't require any fundamental alterations of our practices or social structures. As Morozov has described for techno-solutions, 'In promising almost immediate and much cheaper results, they can easily undermine support for more ambitious, more intellectually stimulating, but also more demanding reform projects' (Morozov 2013: 9). EVs don't require us to question our mobility practices or question the market logics of continued economic growth, planned obsolescence, and green consumerism, nor any of the interconnected environmental impacts of our Anthropocenic lives, such as the multiple manifestations of planetary damage, or modernity's ontological dualisms which ignore human and nature mutualities and entanglements. Thus the decarbonisation they promise involves shifting rather than solving problems.

Further, technological solutions often fail when they meet up against social life, which is always made in complex assemblages of humans and non-humans. Therefore ethnography presents an opportunity to challenge these future visions through people's everyday lives, values, and desires for their futures. However this also entails a challenge for ethnography in terms of how to engage participants in research in the sites of possible futures which exist beyond their immediate experience and imaginations (Markham 2021, Dahlgren et al. 2022).

Comic-strip scenarios for EV futures

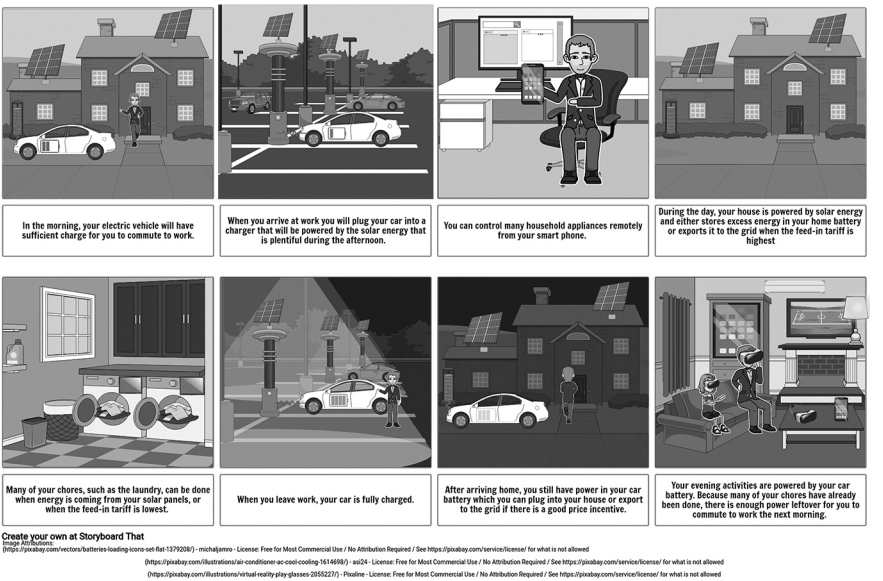

Fig. 2.1: The Active Smart Charging Commuter comic strip. Published with permission of the Digital Energy Futures project.

The comic strip in Fig. 2.1 represents the ideal version of the smart charging EV owner with vehicle-to-grid technology portrayed in the reports analysed. It shows the availability of charging at home and workplace, flexible use of smart household appliances in response to price incentives, and both the smart home appliance users and the 'set and forget' ADM that automatically trades energy in relation to dynamic pricing. This vision of the EV future is the idealised techno-solutionist response to the need to decarbonise society. Practices including the commute, washing and drying clothes, and high evening energy use are maintained, but technology has seamlessly enabled this ongoing pat-

tern of consumption and mobility while promising to deliver the energy required through optimised renewable sources. Household chores are flexible, capable of being performed in optimal energy load conditions, whereas the commute is regular, routine and predictable following an archetypal middle-class pattern.

The comic strip reveals problematic assumptions underlying these visions of the future: that householders have a high interest in energy usage data and price signals, and a willingness and ability to make changes in response to these data and incentives, which past research indicates is not always the case (Strengers 2013, Hargreaves, Wilson, and Hauxwell-Baldwin 2018). The reports assume that most people's energy usage is flexible, while research indicates that everyday practices can be difficult to shift through data and price signals or are considered essential and non-negotiable activities (Nicholls and Strengers 2015). Reports privilege an affluent 'consumer' who can afford to purchase technologies, an individual operator or head of household who controls technologies, rather than how such decisions are made in households that contain a mix of adults, children, and pets. They also assume the repetitiveness of everyday routines, rather than the constant change, variations, and ongoing exceptions that are part of everyday life.

The comic strips allowed a form of ethnographic access to these industry envisaged futures, by the very people they are being imagined for: Australian households. Research participants were able to think through how their own life did and did not fit into such a future. The comic strips were used after in-depth interviews and ethnographic home tours with participants, most of which were conducted online due to the interruption of the Covid-19 pandemic (see Dahlgren et al. 2022).

Complicating the narratives in the everyday

We focus on one example, of Cindy, who had recently completed a home renovation which saw her install many efficiency upgrades into her home in a regional Australian town. Cindy was particularly proud of her solar panels, and derived pleasure from using the mobile app that allowed her to check in real-time her household electricity usage, how much was coming from the grid, and how much she was selling back to the electricity grid. When purchasing her solar panels, she intentionally picked ones that could be connected to a battery but was waiting for batteries to become less expensive before investing in one. She was currently unemployed and spent much of her time tending to her garden and caring for her ageing mother who lived with her. Her adult son also lived with her but was busy working in construction.

Our ethnographic household visit involved an extended tour of her house, where she explained and recreated her everyday routines, and household practices, such as cooking, cleaning, and laundry. This visit was one of our first, just before the Covid-19 pandemic disrupted in-person fieldwork. Many of her practices were motivated by a strong conservation ethic. For example, she was particularly adamant that she would never purchase a clothes dryer, screaming 'No!' when we asked her. She found it excessively wasteful. Hanging laundry on the outside line worked perfectly well. She kept a bucket under the taps to save the water that she ran before it was hot enough for a shower or washing dishes, for watering the garden. However, she was concerned about the comfort of her house, and particularly concerned with keeping the house a comfortable temperature for her mother, so ran the air conditioning and heat regularly. She recognised this was in tension with her conservation priorities, but her care duties were more important to her.

After the home tour, we sat down with Cindy and showed her the comic strip scenario in Fig. 2.1. After briefly explaining the scenario, she shook her head in agreement, uttering 'makes sense'. We asked if she thought this scenario would work for her, she thought for a moment and said that there would need to be some checks in place to ensure she still had enough charge for her car. Using the scenario after the household visit meant we were already familiar with Cindy's household practices and routines, and could draw on this to ask how her life would fit into the scenario. When we asked if she would be willing to relinquish some of the comfort derived from heating or cooling at her preferred level, in order to preserve the battery, she said that she was not willing to sacrifice her comfort. She told us she was 'not money motivated', but added, 'for other people' it might work.

The scenario also shows an automated laundry machine operating when solar energy is available. Initially Cindy thought she could use this, but then paused and asked, 'but who would hang the laundry out?' Thinking some more she solved the problem herself by imagining it as a washer/dryer combo. When we asked her if she could imagine herself using a dryer in such a future, even more adamantly than previously, she fully shouted "No!, but for other people! I've gone as far as I can putting myself into this scenario."

This distinction Cindy drew between her own life, and how others might live was consistent across our research participants. Technology-led futures might 'make sense' in the abstract, but once imagined in the realities of the participant's own everyday life, they begin to fall apart, making more problems than they solve. Presenting future scenarios to people in the context of their home lives revealed both layers – both the ways that their logics convince, and how people's actual lives complicate the narratives.

We asked Cindy if the same situation would make sense for her son, who works in construction and goes to different worksites each day. She explained how it would not since

> if you're going to work at one place this is very relevant, but I don't know how relevant this scenario is for most people these days because a lot of people do work from home, a lot of people...this is a very old school scenario this 'go to one place of work.' In 2050 is this going to be the scenario that people work in, doubt it

What did she think the future would be like? She continued:

> A lot of people working from home and being at home 24/7; people travel so much for work, so no one is leaving their car in one spot; a lot of people are *in* their car for work. A lot of people are working online, or like [my son] a lot of people are traveling to different places for work...This scenario is taking an old scenario and putting it into the future which may not translate.

Cindy recognised that not only did the future envisioned in the scenario not fit into the conditions of her own life, but also that it was inherently conservative: it privileged middle-class routines, of commuting to a single place of work with dedicated charging infrastructure, rather than the 'flexible', contract, and gig work that characterises much of the Australian workforce's existence. This was only further disrupted through the experience of the Covid-19 pandemic.

Calling for ethnographic energy futures

The reports envisioned flexible energy usage for domestic appliances and tasks, but expected predictable patterns of mobility. In contrast Cindy, while willing to do her laundry at a different time, could not be flexible since she needed to be physically present to hang out her laundry and needed to keep the house at a comfortable temperature for her mother. Although she had access to her energy data through the smartphone app which tracked the solar production and her electricity consumption linked to her solar PV system, these data did not translate into flexible practices around energy consumption.

As Cindy rhetorically asked of the comic strip: 'Who lives like this?'

It may be that it is the authors of the reports we reviewed: those working in the technology and energy sector, consultants, and policy advisors, who might themeslves be versions of Resource Man (Strengers 2013). However, the future they are envisioning, planning for, and thus contributing to making is not the future that many Australians see themselves in. The techno-solutionist logic

that has infiltrated this vision of the EV attempts to write humans out of the future. This technologically deterministic view of social life, which paints humans as the problem itself, underlies visions of EV futures. This is not to discount the potential benefits of electrifying transport, but if we are to address the multi-dimensional and complex problems that the Anthropocene presents, we need a broader lens. We need to recognise that without a broader mandate for the energy transition that takes into account everyday life and priorities, we end up only shifting problems rather than solving them.

Coworking space as low energy futures?

Nathalie Ortar and Aurore Flipo

Coworking spaces are seen as one of the outcomes of the 'second digital revolution'. They have gradually established themselves as the heralds of new work expectations. In parallel, development of new information and communication technologies (ICTs) has made possible new lifestyles and generated new forms of remote work (Ortar 2018, Sajous 2019) as well as new needs for meeting and copresence (Benedetto-Meyer and Klein 2017, Flipo and Ortar 2020). Consistent with a 'Californian spirit' that combines technology and ecology, community practices and market economy, coworking spaces rely on the assumption that the transition towards a more sustainable future cannot be achieved without the digital transition (Monnoyer-Smith 2017), while their energy costs are not evaluated. Composed of people with neither hierarchical nor customer-to-supplier relationships, coworking spaces are based on the idea of serendipity and randomness. They have certain characteristics typical of start-up culture, including forms of scenography (creative rooms, paperboards) and furniture typically associated with the home rather than work (sofas, hammocks, table football, etc.).

In France, coworking spaces have expanded thanks to the support of public authorities and private finance. In 2019, with over 1,200 coworking spaces it had more than most countries on the planet (Leducq 2021). While some closed as a result of the spring 2019 first COVID-19 lockdown, with the dramatic growth in home-working many new coworking places have opened since then, despite the ongoing sanitary restrictions (Leducq 2021). As part of research conducted between 2017 and 2019 and in a coworking space during the pandemic, we sought to understand who these coworkers are, their uses of these collaboration spaces as well as their assumptions about energy and their visions of the future. The investigation was carried out in three stages. Interviews were conducted with

Fig. 2.2: Sharing values in a coworking space. Photography by Aurore Flipo.

the founders of coworking spaces, then a questionnaire was administered to the users of these spaces, and finally forty interviews were conducted about the coworkers' residential and professional biographies and their uses of coworking spaces.

An ethnography of two coworking spaces was conducted to grasp participants' everyday use. Coworking space C, located downtown in Lyon, is part of a brand that owns four coworking spaces in the city plus several in other cities around France. Its brand sells coworkers an experience of sharing, with everyone who wants to participate, through presentations over lunch and at tea-time. It also organises events ranging from theme-based workshops, meals and sport to drinks. The other coworking space, U, was in the rural context of Drôme. This non-profit organisation uses the vacant space of a factory and aims to contribute to the social, cultural, and economic development of the territory through sharing knowledge and skills. This space welcomes IT workers as well as craftspeople who need workspace. In addition to offering an open space for work, meeting rooms, Wi-Fi, and a printer, kitchen and coffee machine, this coworking organisation holds ecology-focused activities.

Living the coworking experience and digital life

I met Étienne in the courtyard of the C Lyon coworking space, fitted out in a former workshop – in contrast to the others which are located in large bourgeois flats. When I arrived a group of people, who were sitting around tables, sharing a coffee, invited me to join them while I waited for Étienne to arrive. Étienne explained to me that this coworking space is also the only one where ecology is a shared concern, represented in a sign post about the need to turn off the light after leaving particular meeting rooms which do not benefit from natural light, as well as in messages about how to avoid food waste in the kitchen and a collective compost in a corner of the courtyard next to the bicycle parking. This coworking space is also distinguished by its huge hammock that occupies the whole centre space of the second floor below a canopy that sheds natural light onto the open space below where most of the coworkers are working.

Étienne's story and his reasons for working there are very similar to those of most people I met. After studying engineering, he found a job in Paris, working for a large online sales company. Two years later he changed jobs and seized a promotion to live in London, where he spent two years. Tired of the working rhythm, which left him little personal time, he took a new job in Lyon. He had studied in Lyon and decided to move back there because of the more modest size of the city, compared with the megacities, along with its busy nightlife, its climate, the possibility of commuting by bike, and its relative proximity to the Alps. After a year he resigned from his position to create an online platform dedicated to the sale of organic farming products. While moving to Lyon fulfilled his need for a change of pace and direction in his daily life, his new job did not give meaning to his work or fulfil his wish to be part of the creation of a different, less profit-oriented, and less energy-hungry society. This change implied a significant loss of income during the creation of the platform as well as in the long term. Étienne described his professional retraining as ethical, and aligned with his commitments to avoid travelling by car or plane, stop eating meat, and more generally pay attention to the carbon impact of his actions. However, what struck me as a researcher was that he didn't account for the energy costs of his platform, which relies on energy-hungry data centres (see Ch. 4 below).

Working in a coworking space was not an a priori choice but the isolation of working from home did not work for Étienne and he had soon wished to meet people. His new professional partner lived in Annecy, a medium-sized city located in the Alps where C also offers a coworking space. Choosing C allowed them to have an office and a place to meet outside their homes in both cities as well as an office in Paris when needed, and for Étienne another office in Nantes, where his family lives. Coworking space also seemed a place where they could establish

interesting professional relationships. Attracted by the possibilities offered by the digital economy, Étienne is also representative of an ideal of life built through opportunities (Bauman 2008). An individual who requires, to become a subject, to have the capacity to be an actor, to build his existence, to master his experience, and be responsible (Wieviorka 2008). This also implies the ability to adjust his project between contradictory desires and moral injunctions, such as aspirations and material and financial constraints. This coincides with the desires for good lives conveyed by the imagination of lifestyle migrants (Benson and O'Reilly 2009, Cook 2020) offered here by the opportunities of the digital economy, which is perceived as a solution for the future of the planet, rather than as generating its own environmental problems.

Muriel and Olivier's story resonates in some ways with Étienne's, but presents another aspect of the implication of coworking. I met Muriel and Olivier in 2018, and have continued to work with them over two separate projects. They used to live in Paris. Muriel was working for one of Paris's museums, while Olivier worked in industry as an engineer. More and more aware of the impact of his activity on climate change he decided to change jobs in 2008 and work for a non-profit organisation dedicated to developing the energy transition. In 2012, after the birth of their children, they decided to move to the Drôme because of the presence of Montessori schools and the fact that the Drôme Valley is a territory of experimentation of energy and agro-transition. However, Olivier still had a six-hour commute to Paris at least once a week. They chose the city of Crest because of its proximity to one of the high-speed rail stations and the presence of a coworking space; Muriel was then a stay-at-home mother. Two years later, she started to organise events for U, as a volunteer, where she met the creator of an NGO aiming to develop rural sustainable mobility. A few months later she was employed as the coordinator of the NGO. While Olivier is still commuting on a regular basis to Paris and working at U when in the Drôme, Muriel now works for the NGO full time from U, alongside two colleagues.

During the lockdown of spring 2019, U had to close. As a non-profit organisation depending on the office rental income, it was near bankruptcy as coworkers stopped coming and paying. It reopened in July 2019 with a gauge. Over the summer the demand for space stayed low but increased in the autumn and suffered less from the spring 2020 lockdown, since going to work was allowed twice a week. Being out of the way of the major Internet infrastructure, the major difficulty for U has been to meet the increased demand for high-speed connection. This situation was not entirely new but in the aftermath of Covid-19 the situation further deteriorated, mostly due to the increase of on-line meetings. To return to Muriel and Olivier, both already used on-line meetings as much as possible

Figs. 2.3 and 2.4: Rural coworking spaces. Photography by Aurore Flipo.

before the Covid-19 pandemic, but their interlocutors were not necessarily ready to do so. This situation has since changed dramatically and although in-person meetings are possible again, on-line meetings have become a "normal" way to avoid unnecessary car commutes, which is presented as an environmental bonus.

This situation paradoxically gives some "visibility" to the usually invisible infrastructure of the Internet. For many of the coworkers, moving to the Drôme, as for other areas in rural France, involved their assumption that thanks to the Internet it was possible to live everywhere. However, some coworkers already worked in U before the pandemic because its connection was better than the one they could get from their home. When choosing their homes they had focused on factors including proximity to transport axes such as highways or high-speed rail. Ironically, since the pandemic, as they became less dependent on the transport system, coworkers increased their dependency on the digital infrastructure. While this may not discourage people already settled in rural areas, it has discouraged second-home owners who considered moving permanently. It has also created a renewed interest in the small coworking spaces in the centre of the villages where the digital coverage is better than in more remote locations. However, what is still invisible are the energy costs of such delocalisation.

What are coworking energy futures?

Coworking spaces are both emergent from and indicative of the imaginaries and of the future represented by digital capitalism. Presented by its founders and those who have developed it as the future of work, coworking is embedded with contemporary changes in management practices, as well as new expectations about what a good life can be, which in turn stand for a slower and less energy-intensive lifestyle which prefers proximity to long-distance commuting. Coworkers bring new visions of work, they want to choose where they live and with whom and how they work. Moreover, their renewed vision of work settles in a neoliberal framework. Indeed, since coworking spaces are usually chosen on the basis of being where people live or stay, they can also be part of nomadic lifestyles, as offered by C's model, which is designed to meet such needs. Unlike Étienne, many workers did not come from the digital world, rather they all – whether self-employed or employees – shared the desire to find a work environment near their home. The co-workers surveyed were mostly people who had chosen to come to live in Lyon or in the Drôme or had refused to leave the area. Lyon was chosen for these same amenities that attracted Étienne rather than for the vitality of its economic fabric, while those slightly older people mov-

ing to the Drôme were looking for a quiet space to raise their family, like Muriel and Olivier.

The Covid-19 pandemic has increased this trend. Homeworking has become the norm for most of the population, for at least part of the week, and the demand for coworking spaces is increasing. Indeed, the search for a work environment perceived as more productive, less distracting, and allowing for a better separation between the private and the professional was and still is one of the main motives of workers who use coworking spaces (Cook 2020, Flipo and Ortar 2020, Orel 2019).

In her ten measures for a sustainable housing presented on 13th October 2021, the French minister of housing stated that along with improved insulation to lower the energy bills, the addition of outside spaces in flats, and bigger windows to allow more light, the creation of coworking spaces should be considered in order to meet new modes and demands of work. When we started the research, coworking was presented as a form of work dedicated to the happy few. It is now a phenomenon of the near present, in which employees will outnumber the self-employed.

Yet these new trends do not change some of the common enduring invisible trends related to coworking. Rather than having similar professions, the common characteristic of the coworkers was and still is their daily dependence on transportation, energy, and digital infrastructures (Internet routes as well as data centres), in order to communicate, store and share data, undertake work activities, or to simply go to work. Indeed, although coworkers have settled to live in chosen locations, these places are not randomly chosen. As the example of the coworking space U suggests, living along secondary roads comes with a cost in terms of access to high-speed Internet. In that respect, cities are still at the nexus of physical and now immaterial flows. However, when work-related energy use is envisaged it is still in relation to transportation and, for people living in rural areas, focused on the car. Work itself is considered as almost neutral in terms of energy, since the work space is shared, the consumption of the laptop is considered as almost insignificant, and the energy costs of storing data are either ignored or presumed to be balanced by the improved efficiency of data centres. The infrastructure and their maintenance needed to move physically and digitally, the nuclear power plants and the data centres required to store data and enable digital work are absent from the imaginary of sustainability surrounding this lifestyle. Technophiles for the most part present technology as something that can and should help find solutions, never as a source of problems. Although some people are anti-digital, those who are pro-digital think that digital technologies can support the ecological transition. More generally, this dimension overlaps with attitudes to technology and the opposition between

those who think that technology is the cause of environmental problems and those who think it can provide a solution to those problems, and embodies the renewed relevance of this debate in the context of the current acceleration of digitisation and of the development of 5G, which is going to be even more energy intensive.

Coworking spaces are thus designed to offer workspaces to people who are intended to achieve their aspirations in terms of living environment. Although driven by an ideology of alternative lifestyles, they are also expressions of digital capitalism, and the ultimate avatar of 'nomadism', post-telework. The coworking spaces allow one to leave home and no longer be isolated at home on a daily basis without making long commutes.

Despite the lower energy expenditure linked to daily trips, these ways of working have several energy costs. They need large-scale transport infrastructures for travel to in-person meetings, and require access to Internet infrastructure and data centres in order to provide the digital connectivity needed. The question of energy consumption for professional travel is relatively present in narratives about coworking, where it is presented as a necessary evil linked to the constraints of professional life. In contrast, the question of consumption associated with the use of storage space in the cloud and Internet services is missing. The future is associated with greater freedom of residential choice and the possibility to combine a life on the move with a more settled one (Cook 2020). It is accompanied by a palette of chosen forms of employment, which serve the objectives of digital capitalism while ignoring the forms of consumption that they in turn induce. Nevertheless, cities remain at the core of the possible life choices that characterise this contemporary scenario. Cities are where the nexus of the different types of infrastructure that underpin contemporary work is located. Therefore, two future energy scenarios are possible. In the first cities would become less central, resulting in lowering the energy needs implied by commuting, and making companies more physically dispersed. This would allow for diverse lifestyle choices, but at the price of increased digitalisation, and the energy costs associated with it over a greater area. The second scenario would be a continuation of the impulse arising from the Covid-19 pandemic. This situation would require both digital and transport infrastructures, and demand energy for travel and for digital working from outside the cities.

Energy-demanding expectations: house size, privacy and domestic energy research

Katherine Ellsworth-Krebs

House size and domestic space per person are important determinants for energy demand, largely because increasing space results in more space to heat and/or cool, even as systems become more efficient (Ellsworth-Krebs 2020, Huebner and Shipworth 2017, Lorek and Spangenberg 2019). Yet little is known about if, how, and why people value bigger homes. In this ethnographic case, I offer new insights into the lived reality of house size and domestic space in relation to everyday practices and expectations of what a home is for. In doing so I draw on research which compares how British and Australian households were attracted to their dwellings, their ideal and future homes, and their satisfaction with their current space per person. By exploring the experiences and explanations of living with more space in different cultures, it considers the ways in which space expectations vary based on life stage, temporality, and geography.

I recruited 24 households, half from the UK and half from Australia. I found participants through an agency in order to compare differences based on age (three equal-age cohorts, aged 20 – 30, 40 – 59, and 60 – 80), income (half above and half below national average income) and domestic situations (one-person, two-person, multi-generational household) (Fig. 2.5). Nonetheless, even though I based my sampling strategy on household size and income, the UK households generally lived in half the space of their Australian counterparts. I carried out interviews and virtual home tours in August 2018, involving all members of the household (over the age of 18) together.

I began interviews by asking for descriptions of normal weekday and weekend routines (e. g. where was time spent with others and on their own), what they liked and disliked about their current home. Then participants imagined features of their ideal home, described desired changes to their current home, whether size was an important consideration, and whether they would want a bigger or smaller home in the future. Finally, I asked similar questions about all their previous homes to get a sense of their housing history and how this shaped their current expectations and images of home.

		UK			AU		
Age (cohort)	**Household (income)**	**House (m^2)**	**Floor area per capita**	**Household (income)**	**House (m^2)**	**Floor area per capita**	**Average: House/Person**
20 – 39 (Cohort 1)	1	59	59	1	94	94	UK – 70 /39 AU – 146/71
	2 (low)	72	36	2 (low)	125	63	
	2 (high)	74	37	2 (high)	144	72	
	4	74	25	4	220	55	
40 – 59 (Cohort 2)	1	30	30	1	55	55	UK – 80/30 AU – 167/81
	2 (low)	100	50	2 (low)	250	125	
	2 (high)	62	31	2 (high)	132	66	
	5	150	30	3	230	77	
60 – 80 (Cohort 3)	1	45	45	1	70	70	UK – 86/44 AU – 245/114
	2 (low)	70	35	2 (low)	150	75	
	2 (high)	150	75	2 (high)	465	233	
	4	80	20	5	200	40	
Average		79	38		180	79	

Fig. 2.5: Participants by household and house size, age, and country.

'Thirty-four square metre flat and it was, oh, my God, we almost had a divorce'

The vignettes presented here were chosen to offer commonality from a heterogeneous sample with a mixture of household sizes and genders, half each from the United Kingdom and Australia being presented below. Drawing on two Cohort 1 households (20 – 40 years) highlights the limitations of putting too much stock into planning or policy based solely on what people might imagine they want in the future.

Brazilians Cynthia and Gabriel emigrated to London, UK four years ago. Their second apartment in south-central London was one-bedroom and 60 m^2, which they described as 'spacious enough' so that they decided to rent out the bedroom and sleep in the living room. After two years, they discovered a flat located centrally which allowed them both to walk to work. Cynthia explained 'we thought it was going to be a good idea. Yeah, let's downsize and not pay the trav-

el card Oyster [£3360/year and actually] go out and enjoy things around.' They imagined an improved quality of living even in a smaller flat: more ease to meet friends, more money to spend eating out, less time commuting. With these imaged benefits they downsized to a one-bedroom 34 m^2 flat near Oxford Street. Yet this turned into a 'stressful home': 'We tried to avoid being at home because we didn't like it and felt very trapped' (Cynthia). Cynthia and Gabriel both enjoy cooking together, but the tiny kitchen led them to 'not want to cook' and instead 'grab something in the street' (Cynthia). Their glamourous and positive image of eating out transformed into something negative in reality. Being unhealthy and eating out became associated with an uncomfortable home. The lack of space in their new flat heightened with visitors staying with them for four out of the twelve months they lived there: 'We are from Brazil, so we have visitors all the time, family and friends. And it was just one bathroom for the whole place and it was chaos' (Cynthia). The number of visitors was higher than previous years, yet with their desire to stay in touch with family and friends from Brazil, having a spare bedroom became an essential part of their vision for an ideal home. As soon as possible, Cynthia and Gabriel moved into their fourth and current, 74 m^2 two-bedroom, two-bathroom new-build flat. Cynthia concluded 'the size now is like perfect for us'. Their experiences are common in the sense that we have to try something to know if it suits us – and they both suggested that under different circumstances or a different layout 34 m^2 could work for them.

While the imagined positives of downsizing did not suit this London couple's needs in the end and led to their moving out of the city centre for more space, an Australian family similarly reflected on downsizing because of their home being 'too big' (Figs. 2.6 and 2.7).

'The other one was just too big'

Abi and Loren are new parents living in a two-storey house with their two- and three-year-old children outside of Melbourne, Australia. Before having children, they completely remodelled a 220 m^2 single-storey detached four-bedroom, two-bathroom house on 750 m^2 of land. They imagined raising children with a huge garden to run around: landscaping, spending all their spare time doing the remodel themselves, calling traders and getting quotes to keep costs down. Yet when children arrived, the house and garden size were less important to their imagined ideal future home than reducing time for house work, maintenance and commuting. The commute became too lengthy – it took 2 hours each way and 'basically we wanted to spend more time with them [our kids]' (Loren,

Figs. 2.6 and 2.7: Abi and Loren's two-storey house outside Melbourne, Australia. Photograph by anonymous research participant, permission granted through consent form.

20 – 40, AU). They downsized in order to afford to move closer to work – now 30 to 40 minutes each way. Their new home has a similar square footage, but feels smaller because it is on two storeys and has one less bedroom. Abi and Loren reflected preferring this smaller home because of less time spent on garden maintenance ('some grass area is OK but you don't want to spend two

hours or more on a weekend just taking care of all that' Abi) and cleaning ('I would like something I can manage in terms of cleaning' Loren). Neither wants as large a home as they had previously in their imagined future, yet their space needs may change as their children get older.

'The size of what I was moving into wasn't relevant at the time, I was moving away from a situation'

Both of the vignettes presented in this section come from Cohort 2 (40 – 60 years old) single households talking about the satisfaction and necessity of living on their own. Similar to the above examples, and public discourse, they emphasised that what attracted them to their homes was a trade-off between the primary factors of location (i.e. reducing commute) or size (i.e. space more expensive towards the city centre). Yet interviews and house tours (as opposed to a short survey) allowed for a more in-depth discussion of motivations, highlighting again the contribution anthropology offers in distinguishing between what people say, do, and say they do. Moving and choosing a home are complex.

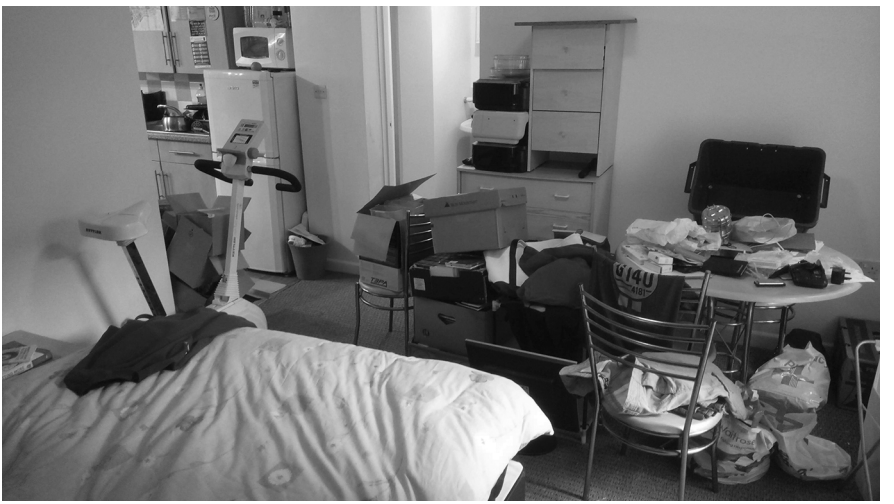

Fig. 2.8: Roger's tiny little flat in Reading, United Kingdom. Photograph by anonymous research participant, permission granted through consent form.

Roger recently separated from his wife, moving out from living with her and his three children: 'so my wife and my kids live there in this lovely big house, and I live in this tiny little flat in Reading' UK. He stressed his choice in a new home

as influenced by affordability ('rather cheap' and 'renowned for drug dealers') and central location (e. g. can walk to work and save £1300 on annual commuting costs because 'money's a little bit tighter'). He decided at his age it 'didn't quite appeal' to have to share accommodation, being too much of a 'lottery' living with strangers. Roger's move is still explained in terms of affordability and location, with some implied sadness over it being 'tiny' compared to his previous 'lovely big house.' Yet he also raised the lack of privacy as a contributing factor for needing to move out. Roger reflected on the lovely big home becoming filled and 'cramped', from first moving in with a bean bag and no bed, and sleeping on the floor to expanding the home as the family grew, adding a bedroom and two bathrooms. Nevertheless, he said that no room felt like 'his' and 'when I left, all the rooms were full of children, and stuff and toys.' Nowhere was quiet and that impacted his housing satisfaction: 'one of the things that I didn't like about my previous house, and I struggled with, and now I have what I wanted actually, is just a bit of personal space.' Roger's story is a reminder that home is not fixed: it is a process, in flux, reactive and not always aspirational. The large family home with one's spouse and kids is often seen as 'the ideal', but that does not mean it is always or necessarily comfortable or satisfying.

Barbara moved into her two-bedroom 55 m^2 flat outside Sydney after living with and caring for her father before he passed away. Initially she mentions being attracted to her current home because of what she could afford on disability payments and inheritance. She also liked the location for its 'sense of life' with cafés, cinemas, and the beach nearby. At the time, though, a key motivation was to have somewhere on her own to recover from her caring responsibilities:

> I basically spent quite a few years recovering from the trauma of looking after him, because it did...things were sort of disappearing in my social life and my sense of self, and what I could do in my own space, and the demands that were placed on me. (Barbara, 40 – 60, AU)

Barbara moved back to her childhood home to look after her father and even in a home with four bedrooms and a large garden that she had once shared with three sisters and her parents, during this return as a carer she felt she had no space to herself. In the final year, she describes her privacy as one day a week when another carer came or when her father was sleeping. Even then she states she had to be 'constantly with him.'

These four vignettes reveal how everyday practices, such as cooking, cleaning, caring, and commuting, impact energy demand resulting from home heating and mobility. For instance, for Cynthia and Gabrielle (UK), home cooking was a source of pleasure, companionship, and leisure. Their choice to downsize from a 30 m^2 to 17 m^2 domestic space per person resulted in the practice of home cook-

ing becoming impossible. The pleasure of the home being a site of cooking disappeared and led them to eat out, spend as little time as possible at home, and created tension between them ('we almost had a divorce'). Socialising or *caring* for family was another key domestic practice shaping their desire for space. With family regularly visiting from Brazil, they would sleep on the sofa in the open-plan living room–kitchen, giving their bedroom to guests, which further undermined the home as a place of rest and privacy. Furthermore their sleep was disrupted by different practices competing for synchronised performance in the same space. Having only one bathroom exacerbated the experience. In other words, moving to a larger home (i. e. 47 m^2 domestic space per person; two-bedroom, two-bathroom flat) was due to the practices and expectations of home that this space enabled: companionship, relaxation, cooking, cleaning, and socialising. In this sense, intervention into reducing space per person requires alternative configurations targeting collective ways of cooking or hosting guests, such as communal canteens and bookable guest rooms in blocks of flats. On the other hand, Abi and Loren were overwhelmed by the time and effort demanded of certain practices (i. e. cleaning and gardening) required in a large home (i. e. 110 m^2 domestic space per person) and once they had children these activities, alongside a two-hour commute, led them to downsize (i. e. 55 m^2 domestic space per person). Thus certain everyday practices, especially in relation to cleaning, tidying, mowing, and commuting, can also impact a desire for (less) space due to the home no longer being experienced as a place of rest.

In relation to energy demand, factors such as commuting distance, transport infrastructure, and house size influencing residential preferences also have clear implications for consumption due to fuel for mobility and heating. Residential mobility describes the process of a household reacting to shifts in their housing needs and preferences and addressing this through moving house (Mulder and Hooimeijer 1999). The vignettes presented here highlight the interconnection between location, especially its impact on commuting, and house size (e. g. less space, shorter commute; more space, more expensive commute). Cynthia and Gabrielle, for instance, went through a process of goldilocks-ing, trialling a walkable commute for a tiny flat in London and finding it unsatisfactory and then moving to somewhere with more domestic space and accepting a longer, more expensive commute. In this way, residential preferences tangle past experiences with imagined futures (e. g. dream of the homely home), yet they depend on the availability of particular housing forms (e. g. detached house). Over the life course, household sizes often decline, as children move out of the family home for instance, and Roger and Barbara are interesting reminders that residential mobility is not always aspirational (e. g. the most central location, the big house with a picket fence). While much academic research and discussion

is about the 'ideal' home driving demand for domestic space, and resulting energy consumption, house size and moving also depend on pragmatic considerations such as the dissolution of households ('I was moving away from a situation'). Roger's and Barbara's both choosing to live alone later in life was partly due to a desire for privacy and personal space that they did not get in their previous home due to caring responsibilities for family. There was often an acceptance of cohabiting and sharing accommodation when first leaving the parental house, but later in life it was deemed inappropriate or too much of a 'lottery' to live with strangers. Births, deaths, marriages, divorces, job offers, promotions and employment insecurity were all potential catalysts for moving house and re-evaluating necessary features and affordances of homes.

Participants' explanations of living with more and less space in different cultures reveal the dissonance between their experiences and both their own and broader public assumptions that more domestic space is better. Moreover, the vignettes highlight how domestic space per person, and expectations that the home should offer privacy and personal space (Ellsworth-Krebs, Reid, and Hunter 2020), vary in relation to people's life stage. Trends towards increasing domestic space per person influence and are influenced by our images of future and ideal homes in the sense that the home has a current material existence and yet is hugely shaped by a pursuit of images of the improved future home.

Homes are in flux, a process, a pursuit, and if we continually expect more space, this affects imagined future homes and how homes will continue to evolve. More space per person is a trend that pushes 'normal' life towards being increasingly energy-demanding in high-income countries and should not be overlooked in energy research. Moreover, energy reduction is a systemic issue, not an individual responsibility, and understanding wider societal trends that shape individual's choices and environmental footprint, such as developers creating ever bigger homes or declining household sizes in high-income countries (Ellsworth-Krebs 2020), is essential to designing appropriate interventions.

"I want to be able to open my windows!": Reflections on ownership as a central pillar of energy democracy

Michiel Köhne and Elisabet Dueholm Rasch

Ownership, as one of the pillars of energy democracy, is about the politics of energy: who gets to decide about energy provision and consumption? And how? (Szulecki 2017). In this section we reflect on the different dimensions of ownership over energy decisions in the transition towards a renewable energy future. We argue that different temporal orientations (Bryant 2019) inform, and at the same time become manifest in, different experiences and practices of ownership over energy decisions about consumption and production, which in turn shape different routes towards new energy futures. This argument builds on two central claims regarding lower-income groups' energy practices (Rasch and Köhne 2017): first, their narrow financial margins strongly limit their control over energy decisions, and second, their practices of energy-frugality constitute a way of claiming ownership over energy decisions. We do so by way of a case study of energy practices in the Noordoostpolder (The Netherlands). In what follows, we first briefly discuss the methods that we used during our fieldwork, before we go on to explore how different social groups experience and claim ownership over energy decisions.

Methodology

We collected the material presented in this article between 1 May 2016 and 1 July 2019. The key methods that we used during this period were participant observation, unstructured and semi-structured interviews, and Participatory Action Research. In total we interviewed 25 people that relate in different ways to renewable energy production and consumption. Interviews with renewable energy prosumers, farmers that invested in wind farms, as well as interviews with social housing residents were often conducted prior to, during, or after (or a mix of all these moments) 'walking tours' around houses and businesses related to renewable energy. In addition we conducted participant observation in meetings that discussed ways forward towards a renewable energy future.

The PAR workshops were organised in close collaboration with the social housing corporation Mercatus in December 2018. During three workshops, with 12–15 participants each, we discussed energy practices and experiences

Fig. 2.9: The setting of our PAR workshops with tenants of the social housing corporation Mercatus in Emmeloord (the main town of the Noordoostpolder). Photograph by Michiel Köhne and Elisabet Rasch.

with residents of social housing projects in the Noordoostpolder. We did so by way of a drawing-mapping exercise. We asked the participants to draw a map of their home and indicate their energy practices on these maps. These drawings were the point of departure for our discussions that followed afterwards, where we would invite participants to explain their drawings.

Ownership over carbon-free home-making

Anne has been on social benefits since she was made redundant four years ago, devoting her time to needlework to raise money for the local food bank. Notwithstanding her precarious financial situation, she did save up for an energy-efficient refrigerator. She would also like to have solar panels on her roof, but 'that is such an investment, that is way beyond my means'.

Anne's position illustrates the first tension related to ownership over energy decisions that we identified: the (financial) room for manoeuvre to decide about how to become future-proof in terms of renewable energy. Social housing resi-

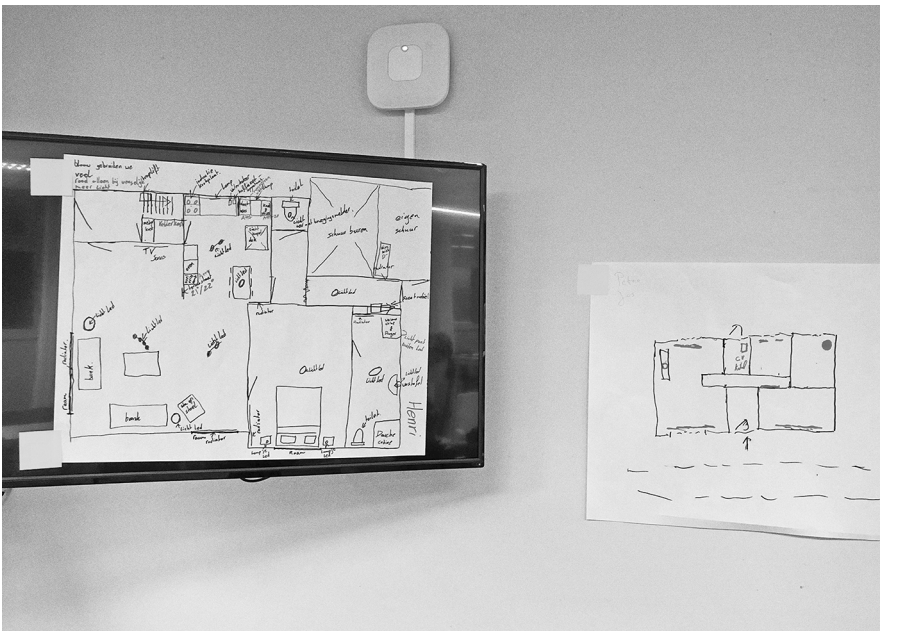

Fig. 2.10: During the PAR workshop, we asked participants to draw a map of their home and indicate their energy practices on these maps. Picture by Michiel Köhne and Elisabet Rasch.

dents can only make small energy investments, and depend on the housing corporation for more radical future-oriented changes, such as extra insulation or solar panels. However, this does not mean that they sit back passively for Mercatus, the social housing corporation in the Noordoostpolder, to step in.

A first way in which social housing residents can claim ownership over their future energy is by informing Mercatus about their needs. Some tenants have had good experiences with this, as is illustrated by Jack: 'I say "well, the wall is freezing cold, something must be wrong", and then they came with a camera and looked into the wall cavity and found that it was completely, hum, collapsed, and then later they fixed it [...].' Mercatus finds it important to align renovations with the needs and wishes of its tenants, but also finds it difficult to involve social housing residents in its energy decisions. Social housing residents often don't find the time to show up at meetings oriented towards the future, or do not respond to letters send out, like Otto: 'Two or three years back we all got a letter [...] in our street nobody replied to that, me neither [...] so, well, then nothing happened, [this] makes sense. Two roads down, they did answer the letter and a lot has been done to their houses.'

Notwithstanding the formal possibilities for participation in energy decisions, many social housing residents express feelings of insecurity and anxiety when it comes to prospective renovations. Often, they do not know when (or if) their houses will be renovated or demolished. In addition, they worry about what a renovation will do to their homes, about the limited ability of a heat pump to heat up their living room, about not being able to open their windows, about draughty living rooms, and about cooking on electric stoves. These anxieties about the unknown future might partly originate from rumours, but they do shape the ways that tenants experience (future) renovations. They are also rooted in a fear of losing control over the ways that tenants can transform their houses into homes. In the end, renovations entail technical improvements whereas tenants worry about their *homes*.

Another way that social housing residents can claim ownership over their future energy use is by making small investments that contribute to smaller energy bills, such as energy-efficient refrigerators and LED lighting. LED lighting is a considerable investment, but worthwhile, according to most tenants we spoke to: 'It uses just 2 watts, with the same amount of light.' LED lamps are often bought one by one, as most tenants have only limited funds available: 'In the end you just do your sums, really, and then you say to yourself, that's all for now.' Mercatus also helps out here. Its energy coaches provide advice on energy use during house visits giving away a few LED lamps as an enticement.

The ways in which social housing residents carve out small niches to claim control over the energy future of their homes contrast sharply with the strategies that several more well-to-do stakeholders in the Noordoostpolder employ to go 'off-grid' and no longer depend on energy providers in the future. This is the case for private homeowners, but also for several large-scale consumers such as greenhouse horticulturists. In addition, Energy Network[1] members consider the local production of renewable energy as an opportunity to gain complete ownership over energy decisions. Especially during the first Energy Network meeting, several members argued that ownership over renewable energy production should be kept away from stakeholders from 'outside the polder', repeating the statement: 'Renewable energy should be of, by, and for the Noordoostpolder' several times. In tune with this line of thought, the Network is setting up membership schemes with relatively low fees for a large solar panel park. However, most social housing residents do not have access to such initiatives because these low fees are still too high for them.

1 This Energy Network is the *NETwerk Noordoostpolder Energieneutraal*, the local renewable energy network that was established in 2017 as a platform working towards a carbon–free polder.

Energy-frugality as ownership

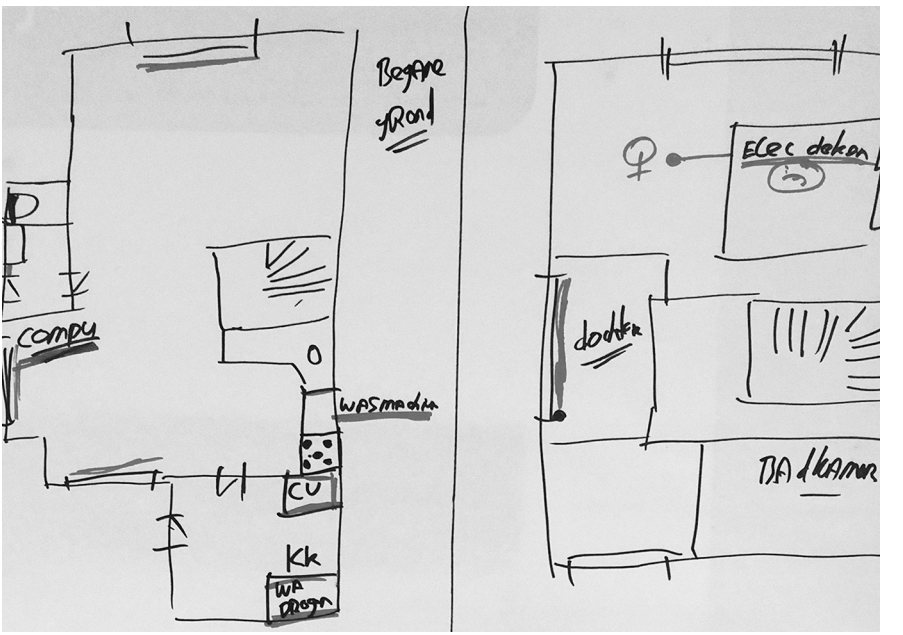

Fig. 2.11: One of the drawings made during the PAR workshop detailing the locations of energy use such as washing machine, computer, and electric blanket. Picture by Michiel Köhne and Elisabet Rasch.

Misha did not choose the house he lives in. It was assigned to him after a very difficult period in his life. He had to start all over again, with almost no resources as he had lost everything: his wife, his job, his house, his car. His economic way of life – recycling water, only using a small gas heater, reusing envelopes to write down groceries – little by little helped him rebuild his life.

Misha's situation illustrates the second tension that we identified and that becomes visible in the two different routes towards a renewable-energy future: everyday-life energy frugality versus producing as much renewable energy as possible with a long-term time horizon. These two routes become visible in the contrasting energy practices and related planning horizons of social housing residents and renewable-energy entrepreneurs.

The most important way in which social housing residents claim ownership over energy decisions is through everyday energy frugality. Saving energy means saving money. Tenants employ a plethora of frugality tactics informed by a short-term temporal orientation and limited resources. The most important one is sav-

ing on heating. Almost all tenants that we spoke to looked for ways to keep the thermostat as low as possible while still feeling comfortable; using blankets, heating only a single room, and sometimes monitoring their energy use on a monthly basis. Although some participants in the PAR workshops agree that there is no need to set the temperature higher than 16 or 17 degrees, most use slightly higher settings, and all discuss the thermostat setting as the most important energy-frugality strategy: 'Normally I never set the temperature higher than 18 degrees and in the evenings at 19.5 ... when I would still be cold I use a plaid and on rare occasions when it is really that cold, I set it a little bit higher.'

Many tenants also economise on hot-water use. The way Anne makes sure not to waste any water, is exemplary: "I always take a very short shower and I always catch the cold water that comes first while waiting for the hot water in a bucket to feed the plants." When Michiel visited Peter, he demonstrated how he fills the kettle using the cups that they would drink from, in order not to heat a drop more than would be used for preparing the tea. Another energy-frugality tactic is saving on light. Many participants of the PAR workshop use LED lamps or use just one lamp at a time. This also became clear in an interview with Ginger, who pointed at the three-bulb light fixture above her kitchen table, saying: "I always use just one, two is not needed for me, and only when I sit here to do something, if I sit on the couch I switch this light off and use the light over there." Saving energy is part of many different aspects of tenants' everyday life and as such constitutes important ownership over energy decisions.

These energy frugality tactics emerge from a short-term temporal orientation in which the everyday reality of running a low-income household, going from day to day and from month to month, limits planning horizons. For some tenants energy frugality is more than a way to make ends meet; they find it important to contribute to climate-change mitigation, and to look further ahead, like Anne: 'You hope that your grandchildren will also be able to have a nice life and this may cost a bit extra.' However, most tenants discuss energy-frugality tactics primarily as a way to make ends meet.

In contrast to claiming ownership over energy decisions through energy frugality, stakeholders in the Energy Network (re)appropriate ownership over energy decisions by way of producing as much renewable energy as possible. Such energy production in the Noordoostpolder is primarily driven by farmers who seek livelihood security through diversification and is characterized by large investments and long-term planning. In tune with this point of view, most energy decisions are geared towards producing enough energy to maintain a comfortable lifestyle, in contrast to saving energy and adapting to a less luxurious lifestyle. For them, monitoring energy use is less a worry about monthly payments

and more about the pleasure of witnessing how their investments transform into profit.

Fig. 2.12: Solar panels on top of the town hall. Picture by Michiel Köhne and Elisabet Rasch.

Discussion

In this case we examined how social housing residents experience and claim ownership over energy decisions and how this is informed by temporal orientations, contrasting this with well-to-do home owners and renewable energy entrepreneurs. Energy transition policies are often rooted in long-term temporal orientations. In line with such policies, proposed renovations for a future-proof housing stock often anticipate similarly distant futures. In addition, policies tend to focus on technological fixes, rather than on processes and practices of home-making that are important for social housing residents. Such energy policies are in tune with the temporal orientations of renewable energy entrepreneurs and more well-to-do homeowners. Social housing residents, however, often experience anxiety and insecurity about energy-related renovations. Living from day to day, their main way of claiming control over energy decisions is by practising 'energy frugality'.

Temporal orientations towards the future inform (everyday) energy practices and experiences of ownership in energy decisions. In Bryant's words: 'Whether fleeting moments or the result of long-term planning, whether individual feelings or part of a collective vernacular, we are constantly anticipating, expecting, hoping for, and speculating about – and thus living – the future' (Bryant 2019: 4). In the case of the Noordoostpolder, socio-economic positions shape the ways that people 'live the future'. Tenants' short-term temporal orientation limits their ownership over energy to decisions about small home-energy improvements and everyday energy frugality. More well-to-do people install state-of-the-art renewable energy equipment and need only to wait to see their energy costs diminish over a longer period of time. Renewable-energy entrepreneurs work with time horizons up to ten years and more, claiming full ownership over local energy production. As a consequence, social housing residents often feel excluded from (decision-making processes related to) the energy transition towards renewable energy.

Fig. 2.13: Large-scale energy production by the Noordoostpolder Windpark. Picture taken by Michiel Köhne and Elisabet Rasch.

Social housing residents' perspectives on ownership over energy decisions offer some important insights about the meaning of "ownership" for energy democracy. Energy democracy as an ideal builds on the idea that renewable energy's potential for decentralised production could foster decentralised ways of governing energy (Burke and Stephens 2017, 2018). In this line, scholars that work on energy democracy question who controls energy, to what end, and to whose benefit (Fairchild and Weinrub 2017).

Our research with tenants in the Noordoostpolder shows that marginalised groups with little resources to spend and, consequently, short-term temporal orientations often feel excluded from energy decisions that affect their homes. They voice the desire to be able to decide on small home improvements, such as being able to open windows, to be better informed about what will happen, and above all to know for sure that it will not cost them more. For social housing residents, dealing with the future of energy means economising in the present. Limited resources, as well as short-term temporal orientations (which, in turn are rooted in these limited resources), limit the options for tenants to invest in, and thus profit from, renewable-energy technologies. In addition, the social housing corporation decides in the end what will happen to their homes. Hence social housing residents do not own renewable energy technologies and their participation in energy decisions is often limited.

Our research offers two possible entry points for including social housing residents more explicitly in participatory governance of energy: ownership over home improvements and ownership over energy use. Both dimensions are important ways for tenants to turn their houses into homes and at times contrast with housing corporations' (ideas for) investments and renovations that seem to be more about house improvement and technological fixes than about home improvement. Information that fits tenants' daily living circumstances as well as spaces for participation that suit their daily routines could both contribute to more inclusive ways of governing energy. Tenants take control over energy decisions through day-to-day frugality. These day-to-day savings are a near-future-oriented energy practice and, although prompted by limited resources, do contribute to a fossil-free future. Hence, energy frugality, a way of dealing with day-to-day energy challenges, rooted in a short-term temporal orientation, brings the distant, undefined fossil-free future into the present. Being able to control the use and the costs of energy is an important dimension of ownership for social housing residents.

These dimensions of ownership are very different from the ways that renewable energy entrepreneurs and the powerful Energy Network claim ownership over energy decisions. Their talk of long-term planning, energy production, and comfortable lifestyles excludes groups with limited financial resources

and short-term planning horizons from their vision and their policies. As such, the transition towards a renewable energy future reproduces categories of exclusion: social housing residents do not benefit from the advantages of renewable energy, like comfort and lower energy bills, or even an extra income.

Temporal orientation and ownership

In sum, our case shows how limited (financial) resources and short-term temporal orientation towards the future shape experiences of ownership over energy decisions. In general, housing corporations decide about technical fixes to make their housing stock future proof. This can cause feelings of anxiety and insecurity among social housing residents. In addition, tenants have limited resources to invest in renewable energy technology. In contrast, more privileged groups and renewable energy entrepreneurs have long-term temporal orientations and claim complete control in energy decisions to go off-grid. The most important way for social housing residents to claim control over energy decisions is through energy frugality. We conclude that the democratising potential of renewable energy production technologies for social housing residents lies in taking into account these two dimensions of ownership when developing policies regarding future-proof social housing.

Next steps

The cases presented above surface multiple ways that the everyday complicates dominant narratives about energy futures. In turn they indicate new ways forward through attention to the alternative narratives that emerge from everyday experience and imagination. We draw attention to three key points:

The everyday complicates dominant future visions in each of the cases. We see how people's priorities, routines, and practices, and abilities to improvise, all participate in directing energy futures along particular routes. The cases revealed this in several ways. We learned how dominant narratives are contested in the present as people live out everyday practices of anticipation. For example, Köhne and Rasch contrast orientations to the future in the everyday life of social housing tenants with those of more privileged groups and renewable energy entrepreneurs, as an example of how techno-solutionist future visions diverge from everyday life energy futures. This complicates dominant policy narratives by critiquing the ways in which such tenants' own energy futures remain unseen, ignored, and not built upon by policy makers, thus exemplifying a disregard

for energy democracy. Ortar and Flipo unravel the entanglements of working location and lifestyles choices. The implications on the future of energy consumption are multiple: if less energy is spent on everyday transport, potentially negatively impacting the availability of public transport and exacerbating inequalities for those who can't make such choices, home sizes will increase due to the need for home-offices; allowing more liberty in the choice of where to live will increase the need for everyday car travel to reach working and coworking spaces in response to increased demand for digitalisation in combination with a need for longer distance travel to reach head-office. Dahlgren and Pink explore the likelihood of future industry visions for EV futures being played out in everyday futures, where people have particular priorities and ways of being and living that they are not prepared to give up. As their case shows, however much 'sense' future scenarios might make to people, this doesn't mean that they consider them viable for their own future lives.

Everyday uncertainties and anxieties also form part of the anticipatory modes of life through which energy futures are shaped. Uncertainty is an essential element of our human condition, and no less so in everyday life. We found that people across the diverse sites of our research coped with uncertainty in different ways. For instance, ways of living with and controlling uncertainty can include everyday energy frugality, charging an EV at a particular time of the day because you don't know when you will need it, or coping with the unreliability of the Internet when working from home and having increased dependency on digital infrastructures but using a coworking centre. One way to research and explore uncertainties is to develop experimental methods, which take people out of the temporalities in which they feel they know what is likely to happen next, to open them up to new possibilities (Akama, Pink, and Sumartojo 2018). As Dahlgren and Pink's case showed, when confronted with uncertain futures people often still hold on to their priorities, and to the values that underpin their everyday actions.

People plan for their everyday futures in particular ways which shape the possibilities for energy use that open up for them. Life trajectories usually shape up as personal or household projects, as people consider where they would like to live, in what kind of home, and with what amenities nearby. The modes of life planning that this involves also means that people look ahead to their everyday futures. As Ellsworth-Krebs's case showed, the expectations of home and moving house has energy implications, especially from space heating and cooling, which is influenced by everyday considerations that were highlighted in occupant's previous homes. Indeed, sometimes the acquisition of the idealised big family home (Dowling and Power 2012) is revealed not to be as satisfying in reality. Too much gardening, a long commute, or a breakdown in familial relationships

can lead to a desire for smaller homes or households later in life which might be unexpected when home is so often imagined and researched in predominantly abstract and aspirational ways (Brickell 2012). The shifts and changes in life also participate in shaping energy demand, as people might begin to work from home, create new transportation needs shapes, and generally re-shape the way life is configured.

Ethnographic research draws our attention to the everyday inequalities that are so fundamental to the concerns of social scientists. The solutions proposed in dominant narratives tended to focus on the privileged lives of middle-class households, and men who commute to work. The cases questioned the ability of technological solutions to suppress inequalities, and invite us to consider questions of whose everyday life even affords access to EVs, spacious housing, moving out of the city to start a new life in the countryside, having the luxury to choose to work from home or from a coworking centre or producing or accessing renewable energy.

Conclusion

As we write, responses to the multiple issues that we face when we think about futures – including public health, climate and energy transition – are emerging, including in the sites of everyday life. These responses are still shaping aspects of energy futures. The ways of living, working, and playing that are still emerging are also crucial to understanding how energy futures can possibly be imagined, in everyday or institutional contexts. Yet, as existing studies show clearly, industry visions of futures are often misaligned with the possible futures that are revealed by ethnographic research. This makes it all the more important to follow our focus in this chapter on everyday life in homes, mobilities, and coworking spaces as it evolves through and 'after' the pandemic and engages with the climate crisis; in this chapter we offer a starting point, to make it clear what the direction of research and action, as we move into uncertain futures needs to be. Indeed in an ongoingly emerging world, we cannot speak of endpoints, but rather of approaches with which to move forward.

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References

Akama, Y., Pink, S., and Sumartojo, S. (2018). *Uncertainty and possibility.* London: Bloomsbury.

Amit, V. (2000). *Constructing the field: ethnographic fieldwork in the contemporary world.* London: Routledge.

Bauman, Z. (2008). *The art of life.* Cambridge: Polity Press.

Benedetto-Meyer, M., and Klein, N. (2017). Du partage de connaissances au travail collaboratif: Portées et limites des outils numériques. *Sociologies pratiques*, 34(1), 29–38. Cairn.info. https://doi.org/10.3917/sopr.034.0029.

Benson, M. C., and O'Reilly, K. (2009). *Lifestyle migration: expectations, aspirations and experiences.* Farnham: Ashgate Publishing, Ltd.

Bille, M. (2018). *Homely atmospheres and lighting technologies in Denmark: living with light.* London: Bloomsbury.

Brickell, K. (2012). 'Mapping'and 'doing' critical geographies of home. *Progress in human geography*, 36(2), 225–244.

Bryant, R. and Knight, D. M. (2019). Orientations to the future: an introduction. In Rebecca Bryant and Daniel M. Knight (eds.), *Orientations to the future.* https://american ethnologist.org/features/collections/orientations-to-the-future

Burke, M. J., and Stephens, J. C. (2017). Energy democracy: goals and policy instruments for sociotechnical transitions. *Energy research and social science*, 33, 35–48.

Burke, M. J., and Stephens, J. C. (2018). Political power and renewable energy futures: A critical review. *Energy research and social science*, 3578–3593. https://doi.orghttps://doi.org/10.1016/j.erss.2017.10.018.

Cook, D. (2020). The freedom trap: digital nomads and the use of disciplining practices to manage work/leisure boundaries. *Information technology and tourism*, 22, 355–390.

Couldry, N., and Mejias, U. A. (2019). Data colonialism: rethinking Big Data's relation to the contemporary subject. *Television and new media*, 20(4), 336–349. https://doi.org/10.1177/1527476418796632.

CSIRO, nd. About-CSIRO. https://www.csiro.au/en/about.

Dahlgren, K., Pink, S., Strengers, Y., and Nicholls, L. (2022). Co-presence and contingency: comics as a methodological innovation in researching automated futures. *Qualitative inquiry*. https://doi.org/10.1177/10778004221097630.

Dahlgren, K., Strengers, Y., Pink, S., Nicholls, N., and Sadowski, J. (2020). Digital Energy Futures: review of industry trends, visions and scenarios for the home. Emerging Technologies Research Lab (Monash University). Melbourne, Australia. https://www.monash.edu/__data/assets/pdf_file/0008/2242754/Digital-Energy-Futures-Report.pdf.

Dahlgren, K., Pink, S., Strengers, Y., Nicholls, L., Sadowski, J. (2021). Personalization and the smart home: questioning techno-hedonist imaginaries. *Convergence*, August 2021. doi:10.1177/13548565211036801.

Dányi, E., Spencer, M., Maguire, J., Knox, H., and Ballestero, A. (2021). Propositional politics. In J. Maguire, L. Watts, and B. R. Winthereik (eds.), *Energy worlds in experiment*. Manchester: Mattering Press. 66–94.

Deloitte (2018). Energy accelerated: a future focused Australia. https://content.deloitte.com.au/20180824-ene-inbound-energy-accelerated-registration?_ga=2.201387857.1767206790.1632981964-533022645.1632981964.

Dowling, R., and Power, E. (2012). Sizing home, doing family in Sydney, Australia. *Housing studies*, 27(5), 605–619.

Ellsworth-Krebs, K. (2020). Implications of declining household sizes and expectations of home comfort for domestic energy demand. *Nature energy*, 5, 20–25.

Ellsworth-Krebs, K., Reid, L., and Hunter, C. J. (2019). Integrated framework of home comfort: relaxation, companionship and control. *Building research and information*, 47(2), 202–218.

Eubanks, V. (2018). *Automating inequality: how high-tech tools profile, police, and punish the poor*. London: Picador, St. Martin's Press.

Fairchild, D., and Weinrub, A. (2017). Energy democracy. In *The community resilience reader*, 195–206. New York: Springer.

Flipo, A., and Ortar, N. (2020). Séparer les espaces pour maîtriser le temps. La reconstruction des barrières temporelles et spatiales entre vie privée et vie professionnelle par le coworking. *Temporalités. Revue de sciences sociales et humaines*, 31–32. http://journals.openedition.org/temporalites/7712.

Graham, P., and Havas, L. (2019). Projections for small scale embedded technologies. CSIRO. Australia. https://aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/Inputs-Assumptions-Methodologies/2020/CSIRO-DER-Forecast-Report.

Hargreaves, T., Wilson, C., and Hauxwell-Baldwin, R. (2018). Learning to live in a smart home, *Building research and information*, 46(1), 127–139. doi:10.1080/09613218.2017.1286882.

Henning, A. (2005). Climate change and energy use: the role for anthropological research. *Anthropology today*, 21, 8–12. https://doi.org/10.1111/j.0268-540X.2005.00352.x.

Huebner, G. M., and Shipworth, D. (2017). All about size?–The potential of downsizing in reducing energy demand. *Applied energy*, 186, 226–233.

Johnson, C. (2020). Is demand side response a woman's work? Domestic labour and electricity shifting in low income homes in the United Kingdom. *Energy research and social science*, 68, 101558. https://doi.org/10.1016/j.erss.2020.101558.

Knox, H. (2021). Climate change and the politicisation of the mundane. In J. Maguire, L. Watts, and B. R. Winthereik (eds.), *Energy Worlds in Experiment*. Manchester: Mattering Press.

KPMG (2018). Electric vehicles: is the energy sector ready? Available at https://assets.kpmg/content/dam/kpmg/au/pdf/2018/electric-vehicles-is-the-energy-sector-ready.pdf.

Leducq, D. (2021). Après un an de crise, quelles perspectives pour les espaces de coworking? *The Conversation*. https://theconversation.com/apres-un-an-de-crise-quelles-perspectives-pour-les-espaces-de-coworking-157069.

Lorek, S., and Spangenberg, J. H. (2019). Energy sufficiency through social innovation in housing. *Energy policy*, 126, 287–294.

Markham A. (2021). The limits of the imaginary: challenges to intervening in future speculations of memory, data, and algorithms. *New media and society*, 23(2), 382–405. doi:10.1177/1461444820929322.

Michael, M. (2016). Speculative design and digital materialities: idiocy, threat and com-promise. In S. Pink, E. Ardevol, and D. Lanzeni (eds.), *Digital materialities: anthropology and design*. London: Bloomsbury.

Monnoyer-Smith, L. (2017). Transition numérique et transition écologique. *Annales des mines – responsabilité et environnement*, 87(3), 5–7. Cairn.info. https://doi.org/10.3917/re1.087.0005.

Morozov, E. (2013). *To save everything click here: technology, solutionism and the urge to fix problems that don't exist*. London: Penguin.

Mulder, C. H., and Hooimeijer, P. (1999). Residential relocations in the life course. In *Population issues*. Dordrecht: Springer. 159–186.

Orel, M. (2019). Coworking environments and digital nomadism: balancing work and leisure whilst on the move. *World Leisure Journal*, 61(3), 215–227. https://doi.org/10.1080/16078055.2019.1639275.

Ortar, N. (2018). Mobile/immobile: Qu'apporte le télétravail aux familles de grands mobiles? In C. Imbert, E. Lelièvre, and D. Lessault (eds.), *La famille à distance*. Aubervilliers: Éditions de l'INED. 293–308.

Ortar, N., and Ryghaug, M. (2019). Should all cars be electric by 2025? The electric car debate in Europe. *Sustainability*, 11(7). 1868.

Pink, S. (2022). Trust in automation. In S. Pink, M. Berg, D. Lupton, and M. Ruckenstein (eds.), *Everyday automation: experiencing and anticipating emerging technologies*. London: Routledge.

Pink, S., and Leder Mackley, K. (2015). Social science, design and everyday life: refiguring showering through anthropological ethnography, *Journal of design research*, 13(3), 278–292.

Pink, S., and Postill, J. (2019). Imagining Mundane Futures. *Anthropology in action*, 26(2), 31–41. https://doi.org/10.3167/aia.2019.260204.

Pink, S., Fors, V., and Glöss, M. (2018). The contingent futures of the mobile present: automation as possibility, *Mobilities*, 13(5), 615–631. doi:10.1080/17450101.2018.1436672.

Pink, S., Fors, V., and Glöss, M. (2019). Automated futures and the mobile present: in-car video ethnographies. *Ethnography*, 20(1), 88–107.

Pink S., Ferguson, H., and Kelly, L. (2022). Digital social work: conceptualising a hybrid anticipatory practice. *Qualitative social work*, 21(2), 413–430. doi:10.1177/14733250211003647.

Pink, S., Ruckenstein, M., Berg, M., and Lupton, D. (2022). Everyday automation: setting a research agenda. In S. Pink, M. Berg, D. Lupton, and M. Ruckenstein (eds.), *Everyday automation: experiencing and anticipating emerging technologies*. London: Routledge.

Rasch, E. D., and Köhne, M. (2017). Practices and imaginations of energy justice in transition. A case study of the Noordoostpolder, the Netherlands. *Energy policy*, 107, 607–614.

Sadowski, J., and Levenda, A. M. (2020). The anti-politics of smart energy regimes. *Political geography*, 81, 102202.

Sajous, P. (2019). Le télétravail: Sur la voie de la banalisation? Étude à partir d'un cas de télétravail à temps complet (Soho solo, Gers) et d'un cas de télétravail à temps partiel (Safran Nacelles). *Espace population sociétés*, 2. https://doi.org/10.4000/eps.9089.

Schelhas, J., Hitchner, S., and Brosius, J. P. (2018). Envisioning and implementing wood-based bioenergy systems in the southern United States: Imaginaries in everyday talk. *Energy Research & Social Science*, 35, 182–192. https://doi.org/10.1016/j.erss.2017.10.042.

Schreier, M. (2012). *Qualitative content analysis in practice*. London: SAGE.

Smith, R. C., and Otto, T. (2016). Cultures of the Future: Emergence and Intervention in Design Anthropology. In R. C. Smith, K. T. Vangkilde, M. G. Kjærsgaard, T. Otto, J. Halse, and T. Binder (eds.), *Design anthropological futures*. London: Bloomsbury Academic. 19–36.

Strengers, Y. (2013). *Smart energy technologies in everyday life*. Basingstoke: Palgrave MacMillan.

Strengers, Y., and Kennedy, J. (2020). *The smart wife: why Alexa, Google Home and other smart home devices need a feminist reboot*. 1st edn. Cambridge, MA: MIT Press.

Strengers, Y., Pink, S., and Nicholls, L. (2019). Smart energy futures and social practice imaginaries: forecasting scenarios for pet care in Australian homes. *Energy research and social science,* 48, 108–115.

Strengers, Y., Dahlgren, K., Nicholls, L., Pink, S., and Martin, R. (2021). Digital energy futures: future home life. Emerging Technologies Research Lab (Monash University). Melbourne, Australia. https://www.monash.edu/__data/assets/pdf_file/0011/2617157/DEF-Future-Home-Life-Full-Report.pdf.

Strengers, Y., Dahlgren, K., Pink, S., Sadowski J., and Nicholls, L. (2022). Digital technology and energy imaginaries of future home life: comic-strip scenarios as a method to disrupt energy industry futures. *Energy research and social science*, 84, 102366.

Szulecki, K. (2018). Conceptualizing energy democracy. *Environmental politics*, 27(1), 21–41.

Velkova, J., Magnusson, D., and Rohracher, H. (2022). 'Smart thermostats and the algorithmic control of thermal comfort', in S. Pink, M. Berg, D. Lupton, and M. Ruckenstein (eds.), *Everyday automation: experiencing and anticipating emerging technologies*, 171–184. Abingdon: Routledge.

Wieviorka, M. (2008). *Neuf leçons de sociologie*. Paris: Éditions Robert Laffont.

Wilhite, H. (2005). Why energy needs anthropology. *Anthropology today*, 21(1–2). doi:10.1111/j.0268-540X.2005.00350.x.