Steering energy demand by envisioning future scenarios of everyday life

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Abstract

Common scenario-planning and forecasting methods employed in the energy sector prioritise and limit possible futures. In particular, the advent of smart technologies has resulted in future scenarios framed around a limited set of socio-technical imaginaries. This paper critiques these smart technology scenarios and proposes an alternative approach premised on future scenarios which are informed by changing social practice. Towards this end, the paper proposes the concept of 'social practice imaginaries' to help develop alternative future scenarios grounded in trends in everyday life.

The paper draws on a recent Australian smart technology scenario-planning exercise known as the Future Grid Forum (CSIRO 2014). I argue that households are imagined as sites of technological intervention, with their future practices oriented towards the adoption of or interaction with new energy demand and supply solutions. In contrast, I ask what would happen if visions for the future were based on what social practices households are likely to participate in, rather than what technologies they are likely to have and use.

Following this line of argument the paper presents a 'stay-at-home pets' scenario to demonstrate how future pet practices could change the very nature of the energy problems which demand managers seek to address. I show how depicting different scenarios of future everyday practices expands opportunities for steering and shifting energy demand. The paper concludes by discussing the implications of adopting different epistemological and ontological positions to envision possible futures.

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Advertisements, scenarios, forecasts and policies are rarely presented as future imaginations, and yet they are imbued with assumptions about current and future ways of life and the role technologies play in those. These predictions for the future inevitably inform future possibilities, and shape the policy responses and research funding available to realise them (Law 2009). One area where these imaginaries are having a profound impact on actual and anticipated futures is the realm of smart energy technologies. Smart meters, homes, grids and cities are bound up in epistemologies of planning and predicting, or ways of knowing the future (Strengers 2013). Such technologies are touted as 'revolutionary' (European Commission 2006), 'transformative' (Wimberly 2011) and disruptive. While commonly represented as factual, rational, technical and functional narratives; policies, reports and articles portraying smart futures are also embroiled in imagining ways of life, with social and cultural ramifications positioned as the natural *outcomes* of smart technology deployments.

This chapter seeks to reveal the implications arising from current smart technology visioning exercises for realising alternative energy futures. Additionally, the chapter provides an alternative analytical approach which places changes in social practice at the centre of future planning. I exemplify the problems associated with current methods of imagining smart futures through an examination of Australia's Future Grid Forum scenarios (CSIRO 2013), which propose possible technological arrangements Australian households are likely to encounter by 2050 to address challenges such as peak electricity demand. Turning this process on its head, I then ask what *practices* we might expect to emerge between now and 2050 as a result of current trends in everyday life. Towards this end, I propose a scenario based on changes in household pet care practices. My aim is not to reimagine smart energy technology visions, but to develop *social practice imaginaries* which explore different future ways of life. This, I argue, not only invites us to consider how we might live in a future inhabited by smart energy technologies; it also invites us to consider a greater range of possible futures.

Imagining the future

There is a long history of scholarship devoted to analysing the ways of life which large-scale technical projects and visions prioritise. Sociotechnical imaginaries (Jasanoff & Kim 2009) or techno-scientific imaginaries (Vesnic-Alujevic et al. 2016) are one such method that examine the social orders embedded in large-scale scientific and technological projects. The terms themselves reflect governments' preoccupations with the technical, the aim being to uncover the social implications of technological arrangements.

Such analyses are valuable in revealing not only what technologies are proposed for the future, but what '*kinds of world*' might be brought into being as a result of their development and deployment (Macnaghten & Szerszynski 2013, p. 466; emphasis in original). The implied analytical focus therefore rests on acknowledging that future developments of technology are also inherently 'future societal developments *with* technology' (Grunwald 2014, p. 283; emphasis in original). They are not merely artefacts or infrastructures, they legitimise and normalise particular ways of life (Feenberg 1999). An examination of socio-technical imaginaries thus recognises that technological visions and enterprise contain within them deeply ontological and philosophical questions and predictions about how we should and shall live (Ozaki & Shaw 2013). Analysing and unpacking these assumptions and ambitions is a profoundly important pursuit.

However, this focus also limits the scope for reimagining alternative futures to those enrolled in realising or critiquing large-scale or dominant technical arrangements. While some imaginaries arguably reimagine ways of life by drawing attention to marginal or sidelined technical possibilities, such as car free societies (Dennis & Urry 2009) and off-grid communities (Vannini & Taggart 2015), these too prioritise modes of existence which revolve around old or new technologies. What is rarely considered are future visions grounded in social practice and the material arrangements they necessitate, integrate and transform.

I am not simply arguing that the social should come before the technical in imagining possible futures. Rather, the alternative I am proposing here follows post-humanist social practice theories (Reckwitz 2002; Schatzki 2001; Shove et al. 2012), which posits that material arrangements are *already* intimately embroiled within the social, and shape the very structure and direction of social order. In this broad ontology, 'materials' are positioned as 'participants' in social practices which are 'handled' and 'interpreted' by human agents in certain ways (Reckwitz 2002). Beginning from this theoretical starting point, I not only wish to demonstrate what 'kinds of world' are being advocated by smart socio-technical imaginaries, but also what alternative technology arrangements could be possible when imagining future scenarios grounded in changing social practice.

Future Grid Forum

My analysis draws on a recent and typical smart technology visioning exercise undertaking by the Australian Government's national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The CSIRO's website states the aim of the organisation as being to 'shape the future … by using science to solve real issues' (http://www.csiro.au/en/About). Their research is presented as factual, scientific and highly influential. In 2013 the CSIRO published its *Future Grid Forum* report, which set out 'to inform and inspire a national conversation and provide a way forward for the sector, its stakeholders and, most importantly, all Australians'. The Forum proposed four smart technology scenarios for 2050 'that have far-reaching implications for the current and future electricity supply chain and would alter the electricity system in Australia'. These are listed as:

- set and forget – where consumers rely on utilities to automate energy demand response;
- rise of the prosumer – where consumers actively design or customise energy demand solutions;
- leaving the grid – where consumers disconnect from the grid and produce their own power; and
- renewables thrive – where large-scale renewable and energy storage technologies play a large part in entire electricity system.

A uniting theme between the scenarios is their focus on technologies — specifically smart ones. Various combinations of automated devices, renewable generation, micro-grids, electric vehicles and battery storage feature in these possible futures. Even in the *least* progressive of these scenarios — renewables thrive — the scenario is defined by its *absence* of smart technology and the maintenance of a 'status quo'.

This process is not an isolated example. Internationally, similar influential forecasting exercises are taking place. For example, the UK's *Future Energy Scenarios* claims that 'by providing a range of credible futures, we can be confident that the reality will be captured somewhere within that range' (National Grid 2016, p. 2). The stakeholder feedback report provides four scenarios, characterised by different levels of 'prosperity' and 'green ambition': 'consumer power', 'gone green', 'no progression' and 'slow progression'. Like the *Future Grid Forum* these scenarios are informed by 'hard' data, such as energy modelling and quantitative research. Each scenario highlights the social implications of different technological and market-based arrangements, with consumers variously predicted to embrace the 'gadget' world (consumer power scenario), or 'make conscious choices, actively engaged with reducing carbon and mitigating climate change' (gone green scenario) (National Grid 2016, p. 22). Other similar forecasting efforts are more subtle, represented in the form of policies, strategies and statements, such as the European Commission's *Energy 2020* document , which proposes that smart meters will be important 'innovation tools' to reinforce efficiency in Europe's energy supply (European Commission 2010, p. 8).

In focusing on discrete social engagements with energy markets and smart technologies, householders are framed entirely in terms of their relationship with these markets and technologies — as 'resource men' who make rational and autonomous decisions about energy (Strengers 2013), or as energy consumers who make and reject choices in line with relatively narrow cost and value considerations. By taking everyday life largely out of the equation, these scenarios unintentionally invite their participants and readers to ignore changes in social practice. Social practices are essentially frozen in time in these scenarios; they are either assumed to continue more or less as they are, or to change in a way that will not affect any of the scenarios proposed. In this way we are also invited to forget that the very problems smart technologies and energy markets seek to address are in fact outcomes of changing social practice. Peak electricity demand, for example, is not a technological by-product; instead, it is an outcome of changing practices and patterns of heating and cooling (Powells et al. 2014; Strengers 2012).

Returning to the CSIRO scenarios, a pertinent question thus arises: how will everyday life have changed by 2050? If past history is anything to go by, the answer is a lot. For example, residential air-conditioning penetration more than doubled over a ten-year period around the turn of the 21st Century in Australia, leading to increases in electricity prices resulting from rising peak demand on hot summer days (Strengers 2010). As already mentioned, this is not a trivial point. One of the most often-cited reasons given to justify the need for the smart grid in Australia is increased air-conditioning peak demand – that is, changing expectations for cooling. In other words, Australia's energy system has needed to change *because* of changing social practices.

So what does the next 35 years hold? What will everyday life look like in 2050? And how might this change the very problems the energy sector is trying to address? Such questions invite a consideration of alternative scenarios grounded in theories of social practice, particularly those which are likely to affect energy planning and future technology forecasting. They also invite us to value different kinds of knowledge, particular those which cannot be easily garnered through 'hard' statistical data.

But where to start? We could imagine many future social practice scenarios based on current trends. Increased e-working and in-house childcare practices could change the energy demand profiles of households if trends continue along current trajectories. Similarly, the proliferation and multiplication of ICT and entertainment practices in the home has implications for energy demand

which are still not well-understood (EST 2007; Nicholls & Strengers in press; Røpke et al. 2010). The following section outlines one possible scenario based on recent research on Australian pet care practices.

Stay-at-home pets scenario

Australia has one of the highest pet ownership rates in the world. There are 4.2 million dogs and 3.3 million cats, and of these 92 per cent of cats and 76 per cent of dogs are kept exclusively or partly indoors (AHA 2013). Simultaneously, pets are becoming increasingly humanised (Strengers et al. 2014). Dogs and cats go to grooming salons, play ipad games, eat gourmet meats, and have their own fashion accessories, electric toys and heated mats (AHA 2013). Pet care is a booming and growing business: in the United States alone, the industry is worth US$50 billion, having almost doubled in a decade (Pearse 2012). Due to their high meat consumption, many pets in the west already have higher ecological footprints than humans (Vale & Vale 2009).

Part of the humanisation of furred companions has involved increasing concern for the health and comfort of pets, which Power (2008; 2012) argues is tied up in the performance of 'respectable' middle class identities of home life. Heating and air-conditioned kennels, for example, are marketed alongside an emerging trend towards heating and cooling homes or rooms exclusively, or partly, for pets. A 2013 press release by E.ON UK on 'hot-dogs and thermo-cats' found that more than half (52%) of UK dog and cat owners increase the temperature for their pets when they leave the home (http://pressreleases.eon-uk.com/blogs/eonukpressreleases/archive/2013/03/20/1923.aspx). Similarly, our Australian studies of household energy use have found an emerging trend towards heating and cooling spaces either partly or exclusively for pets, even when other household members are not at home (Strengers et al. 2014). Additionally, this research finds examples of pets participating in new entertainment practices involving energy consumption, such as watching television, listening to the radio and playing computer games, particularly when their human companions are out of the house.

Based on these emerging practice trends, the stay-at-home pets scenario proposes a future where companion animals (particularly dogs and cats) live in thermally-regulated indoor spaces, and participate in various forms of electronic entertainment, *even when their humans are not at home.* This has several potential implications for energy demand forecasting and smart grid scenarios. For example, if the majority of houses are thermally regulated 24/7 (for animals and humans), or if stay-at-home pets have 'extra' heating and cooling demand during the day, this could contribute to a flattening of peak electricity demand, and/or a possible increase in average (daily) demand. Rather than the normal afternoon/ early evening peak experienced in Australian households, changes in pet care practices may mean a shift or reduction in this peak, potentially alleviating or reducing the need for load-shifting smart technologies proposed in the CSIRO's *Future Grid Forum* scenarios.

Whether this scenario will unfold or not is unknown. My assumptions are based on a cursory examination of past and emerging practices informed by past empirical research (Strengers et al. 2014), which is not always a strong indicator of the future. Other changing trends in practice, such as moves towards automated whole-of-house climate control, might also change or disrupt future patterns of electricity demand in the home. And it is highly possible that changes in practices which we have not even been anticipated yet will disrupt things further. The point is not to accurately predict the future, but to plan for different possibilities. The inherent uncertainty and changeability

of everyday life points towards a need for adaptable, resilient and flexible power systems than can cope with these different scenarios (Shove & Walker 2010).

The stay-at-home pets scenario may seem strange at first, but it is a deliberate manoeuvre on my part; itself a form of disruption into a conversation dominated and steered by technology. Proposing that energy planning should revolve partly around pets may at first seem dubious. This is not because it inherently is, but because scenarios tied to future technologies are assumed to be more dependable than those which are not. Part of my aim is to challenge this position by claiming that scenarios premised on future pet care trends are no more fantastical, reliable or rigorous than those based on future energy technologies. Just as smart technologies are *already* available and accessible; pet care practices are *already* being performed to varying extents. Neither scenario is more advanced or 'known' than the other, although both involve different methods of knowing. Both scenarios involve speculation, assumptions and inference; and both to some extent ignore other potential changes in large-scale technical arrangements and social practice that might occur during the period of prediction. And yet, while one set of scenarios is represented as 'scientific' and developed for the specific purpose of 'shaping the future', the other is likely relegated to the realm of 'soft' and slightly quirky social research.

This is a problem for those wishing to imagine and disrupt different possible futures, and the types of technologies which might populate them. If future scenarios premised on smart technologies are represented as 'fact' and those premised on everyday scenarios as 'fiction', our possible futures are limited not only by a specific set of accepted epistemologies about how the world *should be known*, but also by a narrowly framed 'smart ontology' about how the world *should and will be* (Strengers 2013).

Reimagining a post-carbon future

There are clear and obvious implications for the energy grid when we avoid questions about changing ways of life. As illustrated by one scenario involving pets, peak electricity demand and current justifications for the smart grid may be irrelevant by 2050 if different practice trajectories unfold. More profoundly, employing different scenario-planning techniques doesn't just uncover interesting insights, it creates the opportunity to *enact* different realties (Law 2009) and potentially intervene in the future.

For example, a scenario premised on stay-at-home pets provides opportunities for energy demand managers to attempt to shift and steer pet cooling and heating practices in less energy-intensive directions. This might involve partnering with animal protection agencies and veterinary clinics to promote and provide alternative pet cooling materials, such as evaporative cooling mats and vests promoted by the Royal Society for the Protection of Cruelty against Animals (RSPCA). This scenario also allows energy planners to consider how different types of smart technology could be integrated into everyday practices to reduce energy demand in a post-carbon world, such as the use of automated pet doors to allow animals to regulate their own thermal environment (by moving in and around the house) without compromising home security or creating heating and cooling losses associated with open doors and windows. It might also invite discussion about pet sharing practices or other companion species (such as backyard chickens), which may be less susceptible to humanisation trends and carbon impacts.

By envisioning futures revolving *only* around smart energy technologies, social scientists (and others) narrow possible future realities to ways that support, challenge or solve energy issues *using smart*

technologies. In contrast, by developing social practice imaginaries we are invited to engage with, and potentially help realise, a much broader set of possibilities for the future.

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