Smart energy futures and social practice imaginaries: Forecasting scenarios for pet care in Australian homes

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A B S T R A C T

In this article we demonstrate how existing scenario-planning and forecasting methods employed in the energy sector envision, prioritise and limit possible futures. We propose that 'social practice imaginaries' can be mobilised to develop alternative future scenarios grounded in changing everyday life. To undertake this we critically interrogate the sociotechnical imaginary given rise through an Australian smart technology scenario-planning exercise, which asked: 'what might Australia's electricity sector look like in 2050?' Proposing that this question needs to be reframed to account for the question of 'what might everyday practices look like in 2050?' we experiment with a 'stay-at-home pets' scenario. We draw on secondary data on pet care trends and a decade of ethnographic research with Australian households. Through this example, we demonstrate how viewing futures through pet care and entertainment practices shifts the conceptualisation of the energy problems that the sector seeks to address through smart technology deployments. We conclude by emphasising how this social practice imaginary expands opportunities and pathways for understanding and intervening in possible futures, and call for further analysis through this conceptual lens.

1. Introduction

The energy sector is in the midst of a techno-utopian project centred on emerging, smart and digital technologies emblematic of the so-called Fourth Industrial Revolution [1]. Smart meters, grids, homes and cities are touted as 'revolutionary' [2], 'transformative' [3] and 'disruptive' [1], referring to their assumed role in significantly changing and improving the future. These technologies are increasingly being adopted by governments and the energy industry to address a range of issues including climate change, peak electricity demand, energy security and energy poverty [4]. In addition, smart technologies such as grids, meters, and the services they enable are central to forecasting methods such as scenario planning that help anticipate, plan for and enact desirable futures [5].

Smart energy technologies are undeniably participating in the processes through which everyday and wider societal futures are emerging. However, as analysts of techno-utopian visions have frequently observed, the future is not a single destination unfolding exactly as planned. Instead, futures are multiple [6], contingent [7–9] and uncertain [10]. When smart technology inevitably encounters the social world it also meets with processes of improvisation, adaptation and rejection, and considerable 'flex, slop and play' ([11]: 93).

Subsequently, Pink et al. [12]: 2) have argued that we need to understand technological futures 'as contingent circumstances where users will draw on and engage the affordances of emerging and as yet unknowable technologies in order to improvise to accomplish mundane goals as they move through everyday environments'. The challenge is therefore to develop ways of accounting for the uncertainty that the future presents, whilst still meaningfully contributing to energy sector planning.

Future visions employed in the energy industry are currently produced by a relatively narrow network of technological and economic experts who place high value on rational and technically driven narratives (as noted by Ballo [13]). Subsequently in policy and industry agendas the focus is on influencing processes of consumer decision-making and acceptance of seemingly inevitable or desirable smart energy technologies. This is problematic given that many social science analyses have revealed flaws in the technological determinism and 'solutionism' [14] that commonly pervades dominant narratives that assume technology will drive beneficial change if people accept and adapt to it. The situation moreover presents two key problems for the types of forecasting methods dominating the energy sector.

The first problem is that such forecasts are rarely presented as speculations by the industry, despite being deeply imbued with

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assumptions about current and future ways of life. Instead, dominant industry methods and concepts used to envision smart technology futures – such as energy scenarios and technology 'roadmaps' – appear as factual and highly probable accounts of the future, often grounded in economic analysis and modelling, which strengthens their sense of robustness. However, as other social scholars of the future have identified, forecasts often turn out to be wrong [11,15].

For example, in Australia, consumer energy demand is modelled by analysing key variables such as population and economic growth, appliance and broad-brush technology trends, customer response to electricity prices, and connection activity. However, residential energy consumption has not followed modelled forecasts; it has dropped or stabilised in all electricity supply regions of the National Electricity Market [16]. Meanwhile, peak electricity demand, which is primarily linked to extreme summer temperatures, has changed erratically and unpredictably due in part to lifestyle and technology trends, such as increased expectations for residential air-conditioning and unprecedented uptake of rooftop solar photovoltaic (PV) panels [17]. As a result of under- and over-investment in electricity infrastructure (partly due to the rapid growth in home cooling), Australian energy consumers have experienced significant rises in electricity prices, with network costs now exceeding those in other comparable advanced economies [18]. This has also increased the risk of electricity network infrastructure becoming 'stranded assets', and incentivising wealthier consumers to install their own 'off-grid' electricity generation, leaving lower numbers of financially less advantaged consumers paying higher supply charges (a phenomena known as the 'energy market death spiral') [18]. Such examples illustrate the need to account for changing social dynamics in forecasts for future energy demand, and to plan for uncertainty in possible futures [10].

The second problem is that anticipatory modes in general, and energy forecasts in particular, also contribute to shaping the conditions in which futures come about. As Law [19] and other science and technology studies (STS) scholars have demonstrated (e.g [20]), modes of analysis and prediction inevitably inform some future possibilities and exclude others, through what Brown & Michael [21] term a 'sociology of expectations'. The narrow range of sociotechnical visions circulating in the energy sector at present means that policy makers and industry practitioners are focused on creating solutions for a limited range of identified problems and future possibilities. Furthermore, these future problem-solution scenarios shape the policy responses and research funding available to realise them [20]. As Mankoff et al. [22] argue, steering possible futures is an inevitable outcome of predicting anything: the danger lies when we overlook the fact that this is what we are doing. While social scholars of the future may be aware of our role in steering the future, we are concerned that the energy industry may not.

In addressing these two issues, this article contributes to the growing body of social science and STS scholarship on energy futures [23]. It also engages with recent scholarship about uncertainty and possibility [10,24,25], outlining a conceptual and methodological approach to forecasting that allows us to disrupt problem-solution narratives through a research focus on the practices of everyday life. Thus we view the development of our methodology as a way of both anticipating the future and potentially intervening in it.

We proceed by critically analysing a highly influential Australian energy scenario planning exercise through the conceptual lens of the 'sociotechnical imaginary' [26], to draw attention to the narrow range of possible futures being prioritised and represented as factual and likely outcomes. Specifically, we analyse the Future Grid Forum [27], undertaken by the Australian Government's national science agency – the Commonwealth Scientific and Industrial Research Organisation (CSIRO). We selected this project because of its critical role in shaping energy futures in Australia. The Forum proposed four possible scenarios for 2050 to address energy challenges such as peak electricity demand. It was oriented by a central question: 'What might Australia's electricity system look like in 2050?' As a response to this process, we propose the

concept of a 'social practice imaginary'. This concept invites us to flip our analysis around to ask what *practices* might emerge between now and 2050 as a result of current trends in everyday life. Drawing on a decade of ethnographic research with Australian households and national pet ownership trends, the paper proposes the 'stay-at-home pets scenario' as a social practice imaginary. This scenario draws attention to emerging trends in providing heating, cooling and digital entertainment for household pets, which we argue could have significant implications for residential energy demand (and peak demand) in Australia. Our analysis invites consideration of a greater range of possible futures and their energy demand, along with creative interventions that could help steer practices and their future trajectories in more sustainable directions.

2. Anticipating the future with sociotechnical imaginaries

There is a long history of scholarship devoted to analysing the ways of life which large-scale technical projects and visions prioritise. The concept of sociotechnical imaginaries [28] or techno-scientific imaginaries [29] from STS has been used to critically examine the social orders embedded in these projects and visions. According to Jasanoff & Kim [28]: 190) imaginaries are 'collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects'. The prefix of 'socio-technical' or 'techno-scientific' reflects governments' preoccupations with the technical, the aim being to uncover the social implications of technological arrangements. In this paper we view narratives, discourses and visions as part of sociotechnical imaginaries.

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 ([30]: 466; emphasis in original). Sociotechnical imaginaries thus revise technological narratives by acknowledging that future developments of technology are also inherently 'future societal developments *with* technology' ([31]: 283; emphasis in original) and that technologies are not merely artefacts or infrastructures but also legitimise and normalise particular ways of life [32] and are 'powerful cultural resources that help shape social responses to innovation' ([26]: 190). The concept therefore recognises that technological visions and enterprises contain within them deeply ontological and philosophical assumptions and predictions about how we should and shall live in the future [33].

There are a growing number of studies depicting the user, stakeholder and public imaginaries of smart grid and energy projects, many of which are published in this journal [13,29,34–41]. Such studies have gone a considerable way to demonstrate the narrow purview and future visioning of many large-scale smart technology projects. However, an analytical focus on what social worlds might be enacted through large-scale or dominant technological projects may also limit scope for imagining alternative futures. While some sociotechnical imaginaries arguably reimagine ways of life by drawing attention to marginal or sidelined technical possibilities, such as car free societies [42] and off-grid communities [43], these too prioritise modes of existence premised on emerging technology and infrastructure. In other words, they take technology as the entry point for analysing changing ways of life. A further defining feature of many sociotechnical imaginary studies critiqued by Tidwell & Tidwell is that they prioritise 'expert discourses as the locus of collective social visioning' ([44]: 103).

In response to these concerns, many scholars have approached the future through a socio-cultural analytical lens. Sociologists like John Urry and his colleagues, for example, have examined questions of the future by exploring possible social transformations and responses to major disruptions and shifts in energy sources, such as the emergence of peak oil [42]. In his latest and final contribution, Urry called on social scientists to examine the future as complex systems entailing the evolution of society [45]. Within the field of sociotechnical imaginaries, there are also valuable contributions exploring changing social and