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The Anti-Politics of Smart Energy Regimes

Abstract

In this paper, we explicate how smart energy infrastructures embed and enact politics. By advancing the framework of technopolitics, and building on two in-depth case studies of the US and Australia, this paper analyzes the emergence and effects of the smart energy sector. With the aim of economizing electricity, the "modernization" of the energy sector has followed from historical dynamics of deregulation and marketization. Based on interviews and document analysis, we argue that a specific logic, which we call anti-politics, is now being enacted through the creation of policies and technologies that aim to reduce and remove human agency from energy systems. Analyses based on post-politics do not fully capture the extent to which politics—the continual process of disagreement and deliberation—has been purged from the ideologies and institutions that govern energy and society. In addition to the technocratic evolution beyond politics, we are witnessing the neoliberal elimination of politics.

Keywords

techno-politics; electricity; infrastructure; anti-politics; smart technology

Introduction

Electrons have politics. Electricity networks are generative of technological and political regimes in charge of producing, distributing, managing, and converting electrons to light, heat, or work. The governance of electricity—the technical systems, government policies, corporate interests, consumer choices—is central to the governance of society. The ways people can and cannot use electricity, for example, affects the way they live. Restricted access to electricity—e.g., by being priced out of the market or disconnected from the grid—impacts people's ability to participate in contemporary society. Parts of the energy system are highly politicized, such as the consumption

of fossil fuels, while other parts are rarely subjected to political scrutiny, such as the energy meters installed in our homes. Fossil fuel mining and energy meters are both manifestations of a logic of extraction and value production—coal for the former and data for the latter (Kragh-Furbo and Walker 2018; Mezzadra and Neilson 2017; Sadowski 2019). These broad examples call attention to the ways in which sociotechnical systems, in this case electricity infrastructures, assemble and transform societies and spaces. Scholarship on the social studies of infrastructure shows how these systems have social and spatial impacts that unequally benefit different groups, how values are embedded in systems design, and how systems become obdurate and difficult to open up to critical inquiry or imagine otherwise (Winner 1978; Pinch and Bijker 1984; Hommels 2005; Stirling 2008). In other words they show how technological systems *are political*.

In this paper, we explicate how smart energy infrastructures *embed* and *enact* politics. We seek to further unpack the now accepted ideas that infrastructures are always political by asking what kinds of politics they contain, and how they are (de)politicized (Folkers 2017). Advancing the frameworks and concepts of technopolitics (Hecht 2009; Mitchell 2002; von Schnitzler 2017), we analyze the emergence and political effects of smart energy technologies in the US and Australia. Smart energy broadly refers to the integration of "smart" technologies that are data-driven, network-connected, and (semi-)automated into nearly every level of the energy system—from extraction to generation to transmission, distribution, and end-uses. In both the US and Australia, smart energy technologies represent a period of infrastructural "modernization" that corresponds to an era of advanced neoliberalism. Early 20th century periods of public infrastructure provision in the US and Australia associated with the modernist welfare state showed how infrastructures were developed as a political technique to bolster nationalism and state power (Collier 2011; Collier et al 2017; Lovell 2019). Smart energy infrastructures have coevolved with the politics of neoliberalism marked by privatization, deregulation, and hyper-individualism to "re-program" energy infrastructures for neoliberal times (Collier 2011; Slayton 2015; Ozden-Schilling 2016).

While smart energy technology is a vast field, we can understand these seemingly disparate parts as plugging into, and manifestations of, a distinctive technopolitical regime, or what Hecht (2000, p. 16) defines as "linked sets of people, engineering and industrial practices, technological artifacts, political programs, and institutional ideologies, which act together to govern technological development and pursue technopolitics." In conducting a technopolitical analysis of smart energy, we ask: What are the interests, logics, and goals that shape smart energy systems? What are the politics inscribed in these technologies and policies that structure society and space? How do smart energy technologies advance political goals? For whom?

Based on two in-depth case studies of the US and Australia, we show how smart energy regimes enact anti-politics. As we explain further below, we use these two places because they both represent emerging frontiers of smart energy with similar dynamics of how/why these systems

are being developed and rolled out. Our intention is not to draw comparison, but rather to use both cases to flesh out an overarching analysis of the technopolitical history, rationales, and motivations that contribute to the development of smart energy. In what follows, our theory is built inductively from our empirics, meaning it was grounded in what we discovered in the interviews and documents. We therefore seek to use empirical research in both places as a basis for theorising the politics that are driving the development of, and are embedded within, smart energy systems.

Our engagement with literature in science and technology studies (STS), political economy, and geography helps us theorize how smart technologies are deployed to purge politics from energy networks, to make the "state of affairs" devoid of debate. To expose this process of political erasure is to elucidate how anti-politics works. Here we offer a theorization that is distinct but related to discussions in political theory on anti-politics and post-politics. In these literatures post-politics refers to a limited debate over techno-managerial approaches to managing deeply political socio-environmental problems (Brown 2015; Bryant 2016; Swyngedouw 2010). Whereas anti-politics refers to the disengagement and disaffection with politics and political institutions in liberal democracies (Fawcett et al 2017). Beyond these approaches, we argue that anti-politics is produced as an outcome of technopolitical regimes in order to displace, or even eliminate, discussions of normativity and ethics in socio-technical change. In short, post-politics is a way of doing politics by denying it is political; whereas anti-politics is a way of doing politics by destroying the political.

Methodologically, this paper's empirics are based on semi-structured interviews conducted with a range of actors who are contributing to the design, development, and deployment of the smart energy sector in the US (35 interviews) and Australia (15 interviews). On average, interviews lasted 60 minutes and included representatives from electricity providers, energy service companies, energy tech startups, government agencies, consumer advocacy organizations, and engineering research centers. These interviews were supplemented with discourse analysis of an extensive corpus of documents related to the (smart) energy sector in both the US and Australia. These documents include government policies, regulatory rules, system standards, technical reports, and business materials. Interviews were conducted during 2016-2018, whereas documents were largely traced back 15 years, with older documents (e.g. legislation like the US Energy Policy Act of 1992) analyzed according to their particular relevance or importance). The interviews and documents were transcribed, read closely, memoed, and coded for themes, concepts, and categories related to the political economy and technological design of (smart) energy systems. Once the codes were developed, major materials were reanalyzed (e.g., policy agendas) to ensure useful data were not overlooked. We analyzed empirical materials using a grounded approach and we built our theory inductively.

To be sure, this paper does not aim to tell the only story about smart energy; nor is it meant to be deterministic by suggesting that these socio-technical systems can only develop in the way described here. For example, contrary to some of the conclusions we reach about anti-politics, recent research has also shown how smart home technologies, including those built around energy use, can be empowering for older people and people with disabilities by enhancing their autonomy and independence at home (Strengers et al. 2019). Our aim, instead, is to describe a major trend in this emerging area, which has received relatively little critical attention, yet is well-represented in the ideas and initiatives of those crafting smart energy technologies and policies. The version of smart energy we outline here is just one trajectory, which will likely coexist with others realities. But, we argue based on our research into current trends, that this particular possibility should be seen as a major model for how smart energy is being enacted.

The paper proceeds as follows: the second section outlines the framework of technopolitics—or, the process of embedding politics in technologies and infrastructures. We then explain one emergent form of technopolitics that is specific to smart technology that we call anti-politics. The third section builds on our empirical research to provide a technopolitical overview of how the smart energy sector is developing in the US and Australia. It starts by describing how the modernization of the energy sector has followed from historical dynamics of deregulation and marketization. It then argues that the logic of anti-politics is being enacted through the creation of policies and technologies that aim to reduce and remove human agency from energy systems. The conclusion discusses how smart energy is being driven less by ideals of sustainability, equity, or democracy, and more by principles of economics. We end by calling for a progressive political theory that can inform how energy systems are designed, developed, and deployed.

Infrastructures of/as political theory

Technological systems embed and enact politics. In this section, we describe recent theoretical work on technopolitics to structure our argument that a particular form of technopolitics is being enacted through smart energy systems, one that we call anti-politics. Anti-politics, in short, is a process of political disengagement that coincides with depoliticization and the elimination of political participation, debate, or contestation. Anti-politics is never fully realized, but is a dominant trend. We see this trend in the proliferation of smart technological systems wherein the possibilities to see the world otherwise, without ubiquitous “smartness” mandated from tech companies and powerful states, is quickly moving out of sight.

Embedding technopolitics

In foundational work on the politics of technology, Langdon Winner (1978: 323; 1986) argued that “technology is itself a political phenomenon,” a way of constructing politics, thus making it

akin to a form of *legislation* in society because of the way "technical forms do, to a large extent, shape the basic pattern and content of human activity in our time" (Winner 1978: 323). Technical systems influence our behaviours and mediate our relationships. They structure and organize the kind of society we live in. Moreover, when we're talking about large-scale, complex, and consequential socio-technical systems, such as electricity networks, it is analytically useful to think about them as "regimes" in much the same way we would discuss a politico-legal system. As Winner (1991:20) explains, "sociotechnical systems comprise regimes with features that can be described in a political way. It makes perfect sense to talk about freedom or its absence, equality or inequality, justice or injustice, authoritarianism or democracy, and the kinds of power relationships contained in technological instruments and systems."

The concept of technopolitics builds and extends Winner's discussions. Technopolitics pays attention to the strategic practice of "using technology to constitute, embody, or enact political goals" (Hecht 2009: 15). Scholars writing on technopolitics show how technological systems create socio-spatial arrangements that often advance elite interests and goals (Mitchell 2002; Easterling 2014; Sadowski forthcoming). For example, Easterling (2014: 4) describes infrastructure as "the secret weapon of the most powerful people in the world precisely because it orchestrates activities that can remain unstated but are nevertheless consequential. [...] the most radical changes to the globalizing world are being written, not in the language of law and diplomacy, but in these spatial, infrastructural technologies—often because market promotions or prevailing political ideologies lubricate their movement through the world." Broadly speaking, technopolitics is a terrain of political struggle structured by systems of power that emanate from, but also expand beyond, the nation-state.

Technopolitics thus has two primary elements that we explore in the case of smart energy systems: embedding of political rationalities in technological systems, as discussed above, and the reciprocal production of subjectivities (or enactment of politics). Recent debates on the transformations, intersections, and extensions of biopower with infrastructure (Appel 2015, Bakker 2013; Collier and Lakoff 2015; Larkin 2013; Schnitzler 2015), smart technology (Braun 2014; Gabrys 2014; Levenda et al 2015; Luque-Ayala and Marvin 2016; Ho 2017; Sadowski and Pasquale 2015), and energy (Boyer 2014; Gunel 2014; Summerton 2004; Szeman 2014) provide a basis for analyzing the orchestration of society through (smart) infrastructure, technology, and energy in particular political regimes. We build on Foucault's concept of biopower, which focused on how power is exercised over life and population, with technopolitical analyses that extend these concerns towards the role technologies play in embedding and stabilizing these power relations.

Of particular salience is the production of subject positions. Embedded within technologies are "specific tastes, competences, motives, aspirations, political prejudices, and the rest [...]. A large part of the work of innovators is that of 'inscribing' this vision of (or prediction about) the world

in the technical content of the new object" (Akrich 1992: 208). The process of designing and deploying technology entails producing certain kinds of subjects and social relations expected to fit the scripts embedded in technological systems (Levenda et al. 2018; Sadowski and Bendor 2018). Therefore, to understand technopolitics, we have to unpack the ideas, practices, and politics of engineers, designers, and economists behind these systems: What kind of world do these experts envision? Who belongs or does not? What kinds of practices are deemed acceptable or optimal? Attention to these questions of the embedding of politics into our material world builds on recent work in political geography exploring the material politics of relevant technologies, including agency in autonomous vehicle accidents (Bissell 2018), socio-technical transitions toward decarbonization (Stripple and Bulkeley 2019), and the development of smart building energy management systems (McGuirk et al. 2019). We expand on this work to consider emergent forms of technopolitics of smart electricity systems.

Increasingly, *smartness* has become mandatory, an organizing force for all manner of social-technical systems. Smart grids, smart cities, smart fill-in-the-blanks all imply the expansion of a computational logic of automated control and data-driven decisions (Sadowski forthcoming). No longer do we need to be concerned with if we *should* do something. Now we are only concerned with *how* we do things most efficiently. Imaginaries of smartness aim to displace conflict and disagreement in order to provide a holistic vision for intelligent futures. In this sense, they are depoliticized programs that do not require any real change to the existing political order. We argue, however, that analyses based on depoliticization do not fully encapsulate the extent to which politics—the continual process of disagreement and deliberation—has been purged from the ideologies and institutions that now govern society. In addition to the technocratic evolution beyond politics, we are also witnessing the neoliberal elimination of politics. We call this anti-politics, and show how it is embedded in and enacted by smart energy infrastructures.

Enacting anti-politics

Eliane Glaser (2018) argues that anti-politics is one possible outcome from populism that responds to a vicious cycle of depoliticization. She explains: "Politics feels moribund, useless, pointless, dead; so we feel the desire to kill it off [...] Post-politics leads to anti-politics, which in turn leads to more post-politics, and so on" (Glaser 2018: Chapter 2, n.p.). Andrew Barry points out that this cycle is enacted through certain political practices that "can often be profoundly anti-political in [their] effects: suppressing potential spaces of contestation; placing limits on the possibilities for debate and confrontation" (Barry 2002: 270). He argued these anti-political effects especially take hold in complex technical areas that rely on measurement and calculation like "the organization of economic activity" and "meteorological regimes" (Barry 2002: 274, 280). We explore how anti-politics—as a particular form of technopolitics—are embedded and enacted in smart energy systems and smart infrastructures more broadly.

The political rationality of anti-politics has its roots in the neoliberal economic theory of Friedrich Hayek (Mirowski 2009) and in the process of economization. Economization refers to the integration of economic rationalities into all areas of society and life. Architects of the intellectual and political project of neoliberalism have been much discussed (Mirowski 2009; Peck 2010), often focusing on Hayekian ideas. Hayek's theories were based in psychology and biology: cognitive darwinism applied to political economy (Wyly et al. 2019). In his essay "The Use of Knowledge in Society," Hayek (1945: 526) argued "in a system where the knowledge of the relevant facts is dispersed among many people, prices can act to coordinate the separate actions of different people in the same way as subjective values help the individual to coordinate parts of his plan." Neoliberalism is, therefore, largely based on the idea that individuals cannot process information efficiently, that "the market" is capable of omnipotent cognition, and that the main social problems we face is getting people to act in accordance with market dictates because this allows for greatest (political and economic) freedom. At the heart of the Hayekian formulation is the belief that the market is the "greatest information processor" (Mirowski and Nik-Khah 2017) and nothing else is capable of challenging its dictate.

Neoliberalism is often conflated with free-market capitalism, but it is something much more. The advocates and architects of neoliberalism recognize that markets are social constructs, not natural phenomenon. Neoliberalism doesn't shout, "Laissez faire!" It sets about creating markets and consumers. Institutions need to be built and policies need to be enacted that will nurture markets, protect profits, and spread economic logics into all facets of society (Harvey 2008; Lazzarato 2009). "More now than merely a deregulatory political mindset or a kind of ideological software, neoliberalism is increasingly concerned with the roll-out of new forms of institutional 'hardware'" (Peck and Tickell 2002: 389)—and, as we argue, infrastructural hardware. The neoliberal project does not eschew the state, but rather reengineers the state as a tool for imposing and maintaining economization.

Under the anti-politics of neoliberal governance, the world is colonized by an economic rationality: the *political* is hollowed and abolished; the *social* is reconfigured and atomized; the *ethical* is instrumentalized and calculated. These once differentiated areas are collapsed, becoming subordinate to the *economic*—the logic, values, and goals of the market. When humans, institutions, and governments are transformed into economic actors, the fundamental principles and purposes of their existence also change. As Wendy Brown (2015: 9) writes, neoliberalism is

> "a normative order of reason developed over three decades ago into a widely and deeply disseminated governing rationality, neoliberalism transmogrifies every human domain and endeavor, along with humans themselves, according to a specific image of the economic. All conduct is economic conduct; all spheres of existence are framed and

> measured by economic terms and metrics, even when those spheres are not directly monetized."

Therefore, neoliberal political rationality sees the world as purely economic, and people as economic subjects. The exercise of power through processes of embedding neoliberal rationality in technical systems and producing subjectivities are enacting anti-politics. This form of anti-politics is being enacted through the technopolitical regimes of smart technology. Smart energy infrastructures enable economization through the creation of more information about energy production, distribution, and consumption. This makes electricity flows more easily discussed in economic terms. As energy is tracked in finer-grained increments, as devices can begin to control and communicate about electricity flows, market logics of supply and demand come to dominate at smaller scales and within the space of engineers and technocrats building smart energy systems. Ozden-Schilling (2015: 586) explains, based on ethnographic analysis of smart grid researchers, grid operators, and electricity traders, "Neither the market quality of the smart grid nor the new electricity consumer as a homo economicus is taken for granted by smart grid researchers. What Hayek described as the market, these researchers take as a research agenda: a guiding ideal that can only be approximated, at best." Our research on the development of smart energy in the US and Australia unpacks the political rationality and subjectivities of anti-politics, and we illustrate the way anti-politics is enacted through the "re-programming" of energy infrastructures with smart technologies.

The smart energy sector in the US and Australia

Both the US and Australia are home to electrical networks that are large-scale, complex systems. As such, their operation requires and produces specialized experts like the "engineer-economists" who design energy markets and networks to maintain an optimal balance between supply and demand (Özden-Schilling 2016). The technocrats in the energy sector do more than grease the wheels of a giant machine; they also make decisions about infrastructure that is critical to society and everyday life. It is quite literally the production, distribution, and access to power. They are the technological legislators discussed above (Winner 1978). Yet, the politics involved in building and managing that system are hidden away, even as the smartification of the energy sector stokes familiar discourses of disruption and progress. Declarations of consensus—such as, "Everybody understands that this is the way forward" (interview, electrical engineer, March 2018)—are common when talking to engineers, companies, and government agencies in the energy sector. At times, the denunciation of ideology is explicit, as the communications specialist for an energy tech startup in Australia stated: "When you get past a lot of the ideological claptrap around that, it's pretty clear there has to be change. You have to have a more intelligent system to manage the new reality" (interview, energy tech startup, March 2018).

We show how the energy sectors in the US and Australia are progressing through a process of modernization. As we illustrate, the similarities between the ideologies, policies, and goals of the energy sectors in both countries can be striking due to the smart energy regime's high degree of mobility (McCann 2011; Lovell 2017). Policy is productive of particular kinds of social worlds, and reflective of them. Indeed, in this case, there are also striking similarities in how smart energy is developing in the UK, Europe, and Canada (e.g. Ballo 2015; Skjølsvold et al 2015); there are "strangely familiar" rationales and logics in these different places, which are likely underpinned by shared ideologies and mobile policies. Across these places, the processes of creating and implementing energy policy are thoroughly interwoven with engineering research, economic management, and industry-government relationships.

That said, to reiterate, our goal is not to conduct an in-depth comparative study, but rather to use empirical research from both places to inform our theorization of the politics of these smart energy regimes. To be sure, the energy sectors discussed here are vast and varied, however, we argue the process of modernization outlined below has had a strong hand in shaping the general development of smart energy, conceptually and materially. We see "modernization" used as both a motivation and justification behind these broad technopolitical changes to the energy sector. Just as the discourse around "smart" relies on an assumption that smarter is better (after all, nobody wants to be *dumb*), so too does "modern" rely on similiar associations with progress and innovation (after all, nobody wants to be *backwards*). In the next subsections, when we outline the impacts of marketization and economization in the energy sectors, these should be understood as ways of doing technopolitics — embedding and enacting political rationalities and subjectivities— and, more specifically, as practices of anti-politics (see Barry 2002). For us, this is where theory and empirics hit the road: the theoretical framework of technopolitics oriented how we analysed our empirical findings; the empirics then directed our argument about what kind of politics are embedded in and enacted by these technologies.

Economizing electricity: Deregulation and marketization

In this subsection we lay out how the historical dynamics of deregulation and marketization have fed into a project of modernization that is reshaping the energy sectors in both the US and Australia. After explaining how/why energy is being made smart, in the next subsection we argue that these three shifts—deregulation, marketization, and modernization—are now culminating in the creation of an anti-political smart energy regime that pushes the logic of an autonomous market even further.

Widespread support of deregulation, the first shift, was founded on the familiar—and mutually reinforcing—free-market principles of industry competition, consumer choice, and efficient outcomes. In the US, A key piece of legislation, the US Energy Policy Act of 1992 (EPAct 1992), opened the transmission networks to non-utility generators or independent power producers and facilitated the creation of a more competitive market for electricity. Whereas in

Australia, since at least 2004, the federal government has affirmed an ongoing commitment to establishing the political economic conditions for an energy sector that is open for business (Australian Government 2004).

Deregulation is about more than just cutting bureaucratic red-tape, it also clears the way for the second shift, marketization—or, the acknowledgement that markets, whether "free" or not, need to be created and maintained. Even with their strong commitments to deregulation, the US and Australian governments are far from absent in the energy sector. Their agencies and policies act more like stewards of the market. In both countries, deregulation is seen as a necessary step toward *designing* efficient and profitable markets (Breslau 2013). On one hand, according to the Chief Economist for the Energy Centre of the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Australian government has curtailed public investment in the energy sector lest it be construed as "picking winners." But, on the other hand, the government directs how the market operates: "It's been the same mantra every time: efficiency, efficiency, efficiency. The electricity market rules are really designed around efficiency" (Interview, CSIRO Chief Economist, May 2018).

It may appear that the problem of designing highly competitive and efficient energy markets calls for supply-side solutions. Yet, in both the US and Australia, the energy sector is captivated by discourses about "the power of choice" and "demand-side participation." For example, in 2012 the Australian Energy Market Commission (AEMC) released an agenda-setting report, titled "Power of Choice," which sought to identify key issues in the market and recommend reforms to address them. The report makes clear the AEMC's priorities for reforming, regulating, and rule-making in the energy sector: "Consumers require tools—information, education, and technology, and flexible pricing options—to make efficient consumption decisions. Recommendations presented in this report will support these conditions and enable consumers to have more control of their electricity expenditure" (AEMC 2012: i). In practice, the process of marketization goes beyond just opening up new markets and redesigning existing markets. It is also about creating new technologies, programs, and services meant to make energy consumers act like good market subjects. Indeed, the core issues in the market, as laid out by major policy agendas in the US and Australia, essentially boil down to the fact that consumers are unresponsive, uninformed, and unequipped, which then leads to intolerable inefficiency.

The third shift of modernization—and the accompanying discourse about technological change and consumer empowerment—is aimed at solving these myriad supply- and demand-side problems by transforming infrastructure to enable a free-market inspired electric power network and at making demand responsive to dynamic price signals. These aims are materialized and enacted through the assemblage of technological, social, economic, and political changes needed to move to an "advanced" grid.

The “smart grid” was brought forth as a national goal for modernization of the electricity grid in the US Energy Independence and Security Act of 2007 (EISA 2007). This Act explained that the smart grid would utilize “digital information and controls technology to improve reliability, security, and efficiency of the electric grid.” In 2009, the American Recovery and Reinvestment Act (ARRA) provided the funds to research, implement, and demonstrate smart grid technologies throughout the country. ARRA funded the Smart Grid Investment Grant and the Smart Grid Demonstration Project with $3.4 billion of federal funding for implementation of advanced metering infrastructure and another $600 million for demonstration projects (federal funding was matched or exceeded by industry funding amounting to over $8 billion).

An influential view of how/why the energy sector must become modernized is exemplified by a 2016 fact sheet from the White House Executive Council of Economic Advisers, which explains the role of “smart markets” and “new expanding opportunities for emerging technologies” in developing integrated solutions for managing the electrical grid and matching supply and demand:

> “Advances in smart markets and, in particular, *the smart end-user*, hold promise to help flatten the net load curve, allowing for *demand to respond* to spikes in wholesale prices due to the intermittency of VERs [variable energy resources] or the higher costs of ramping to meet demand increases. [...] New enabling technologies, including communications technologies, smart meters, smart inverters, and other smart grid technologies [...] have the potential to greatly facilitate *the response of electricity demand to changes in price* (i.e. demand response). […] Developments in smart appliances may eventually lead to a “smart home” that *allows consumers to shape energy consumption patterns—and adjust them during times of higher prices*” (White House Council of Economic Advisors 2016: 26-29, italics added).

The smart energy regime in Australia is built on a very similar foundation of creating and catering to “smart end-users” and “smart markets” as a way of “tackling the energy trilemma” that confronts Australia's energy sector: affordability, reliability, and emissions. (ADEE 2017: 3). According to the Australian Energy Security Board (2018: 13), “consumers are becoming better-equipped than ever to manage and control their energy use and contribute to reliability and this will only improve in the future. The demand-side is a key factor in driving the transformation of the energy sector.” Indeed, the development of smart energy technologies in Australia has largely focused on the consumer end. These updates include smarter ways to use and manage energy, such as services offered by a growing ecosystem of startups that collect and analyse a household’s energy consumption data and then provide data portals, visualizations, and recommendations that are meant to help consumers save money on energy use.

Increasingly, there is a trend towards developing automated, set-and-forget systems where a device is installed behind the meter to monitor and manage energy use in a more precise, automatic way. For example, the company Reposit Power has built a "smart controller," which "can control loads like hot water and it learns the customer's energy patterns. With all that [data] in mind it can optimize the best way for that consumer to use energy each particular day, such that their bill is the lowest" (Interview, company executive, May 2018). While policy agendas focused on the "power of choice" were largely intended to induce behavioural changes in consumers through information (e.g. educational websites) and incentives (e.g. price signals), as the energy sector gets smarter we can already see a shift toward consumers outsourcing energy management decisions to third-parties and technologies.

These energy management technologies require smart meters and many of them are designed for people with solar photovoltaic (PV) panels on their roofs. Australia has the highest penetration of rooftop solar in the world, with an average of 21% of households—and over 30% in some states—having PV panels installed (Parkinson 2017). There have been large increases in rooftop solar in just the past few years, due to a combination of abundant solar resources, tremendously high electricity prices, and rapidly falling costs of rooftop PV and battery storage. Moreover, in a precedent that could be followed by other states, California recently mandated that starting in 2020 all new houses will have to be built with solar panels (Penn 2018). The electrical engineers and energy startups we interviewed said the acceleration of consumer's generating and storing their own energy is not only becoming more "economically viable proposition," but is also a very real future for the smart grid in both the US and Australia.

As this section has shown, economization has been a central tenet of electricity grid operations through deregulation and marketization. The process/project of modernization has had a strong hand in shaping the development of the smart energy sector. Building from this overview of policy and technology in the US and Australia, the rest of the paper analyzes the technopolitics that are embedded in the design and deployment of this smart energy regime.

Automatic Electric

Based on our interviews with people actively involved in modernizing the energy sector, as well as our examination of materials about emerging smart energy technologies, we describe how a new theory of *anti-politics* is now taking hold in smart energy regimes. The logic of anti-politics is best represented by the creation of policies and technologies that aim to reduce and remove human agency from the energy market. Or, at the very least, minimize their active role as much as possible. As Hayek (1945) described, since no individual is capable of making optimal decisions, they shouldn't be burdened with such an impossible task: only the market can make humans do desirable things without so much as a thought. Humans are flawed and inefficient; our deficiencies stand as a barrier to transforming the energy system. The technocratic impulse—as exemplified by the "Power of Choice" agendas in both the US and Australia—is to implement

strategies for educating consumers, changing their behavior, and making them act rationally. The slogan is demand-side participation for supply-side problems. But engaging with the majority of consumers and activating them for sustained periods of time is difficult, even with the use of tools like data portals for households that collate and visualize information about (real-time) energy consumption (Naus et al. 2014). Many of these initiatives have proven to be largely ineffective (Hargreaves et al. 2010). Thus, the strategy of making "good" consumers, gives way to more severe solutions based on controlling, limiting, and/or eliminating the role of human decision-making.

In those cases where people do not have the ability or resources to participate effectively in the market—and where their presence could harm a healthy market—one solution offered is to "quarantine" them from it. According to a research director for an Australian energy consumer advocacy organization, "The Victorian government and the Queensland government have actually come out and said for the disengaged customer, for people who are on standing offers and who are low income, maybe we just quarantine them from the market altogether. I don't think we would see that as the best outcome. But in the current situation it's rational" (Interview, April 2018). When asked what quarantining looks like in practice, the options outlined include setting up a government run retailer or an auction where suppliers bid on selling energy at "safety net prices" to poor people. The biopolitical implications of this language run deep. While the laudable intention here is to help those who are struggling with energy hardship, the solution offered is not actually to take them out of the primary market, but to put them in a separate market. The dedication to "market-based solutions" and to maintaining optimal market conditions—not just in this case, but generally—subverts, if not outright combats, any other political, social, and ethical framings of energy.

Within the theory and praxis of anti-politics, key ideas like demand-side participation (DSP) may symbolically stick around, rather than be abandoned, but their meanings change. It only became apparent while talking to our informants that DSP has come to take on a different meaning than originally outlined in the policy reports. The AEMC defined it as, "a tool for consumers to actively participate in the market" (AEMC 2012: i). The framing of people primarily as consumers with choices rather than citizens as rights is a common feature of post-politics (Teachout 2014). But at least this framing recognizes that people have a place in the market as consumers with agency, who should have the ability to actively participate in the energy market, rather than it being something that just happens to them. In both the US and Australia, this was largely captured under campaigns for consumer sovereignty and retail deregulation.

Now, however, DSP means that consumers—or, rather, the devices installed in their homes—are expected to take on a multiplicity of new roles within the energy market. Thanks to technologies like smart meters, solar generation, battery storage, and blockchain, households will now also be generators of energy, service providers to distribution networks, regulators that hold companies

accountable, contributors to virtual power plants, and retailers conducting peer-to-peer electron trading. This conception of DSP goes beyond the figure of the "prosumer," or producer-consumer, who is a regular feature in visions of smart energy grids (Parag and Sovacool 2016). Instead, people become embodiments of the energy market, individually taking on its various roles and responsibilities and following the dictates of neoliberal logic (Rosenfeld 2017). Even the political echo of consumer choice and protection fades away as people become conduits for the continuous circulation of capital and commodities (see Özden-Schilling 2015).

Ultimately, though, the energy future that most actualizes anti-politics—as described to us by the engineers, economists, and startup executives designing and testing the technologies needed to manifest this future—is based on bypassing people altogether by building automated systems that replace human decision-making in the market. An energy market composed of algorithmic agents can be optimized and orchestrated in a way that the current regime, with only humans making choices, cannot be. Our analysis here is not only commenting on the degree of consumer choice available to energy users. Rather we are making a larger point about how the operation of smart energy systems reconfigures energy futures based on a particular market logic, thus foreclosing other alternative operations and logics. Put briefly, smart energy systems seek to automate the small-scale devices and decisions that constitute these systems as a way to administer the large-scale infrastructures and markets.

Regulators and engineers explicitly see "orchestration" as a central purpose of the emerging smart energy regime. As one behavioural economist who works on household battery pilots told us, "I think the term they use in the AEMO [Australian Energy Market Operator] at the moment, I've heard [the CEO of AEMO] saying, '*orchestrate*,' which I think is a nice way of saying we're not actually controlling you, we're just sort of waving the baton and getting you all to do the right thing at the right time" (interview, April 2018). When asked what role new smart technologies have in orchestrating the energy system—the network of infrastructure, flow of electrons, and behaviour of users—the interviewee replied, "They are essential. Without them we can't do it."

Along the same lines, the director of a company developing these automated management technology told us, "Demand-side typically works in units of kilowatt hours and kilowatts and it's not until you times those by a thousand or ten thousand, and you get into megawatts or tens of megawatts, that it's worth humans being involved. So let the humans be involved at the aggregated level. I think the algorithm based world is correct" (Interview, May 2018). People can only process information and make decisions so quickly; electrons move at lightning speed and so too must the market.

The most prominent example of automated demand response is called "transactive energy," developed in trials by the Pacific Northwest National Labs and their utility partners. "Transactive energy systems are systems of economic and control mechanisms that allows the dynamic

balance of supply and demand across the entire electrical infrastructure using value as a key operational parameter" (GridWise 2017: 5). In short, transactive energy systems attempt to take the wholesale electricity markets model (i.e. at the transmission level) to the individual consumer (i.e. at the distribution level and even device/end-use level) using real-time communications of price signals. Essentially, it is "an internet-enabled free market, where customer devices and grid systems can barter over the proper way to solve their mutual problems, and settle on the proper price for their services, in close to real time" (St John 2013: np). Here modernization of the grid leads to the creation of distributed markets facilitated by new digital platforms (Kok and Widergren 2016; Sijie and Chen-Ching 2017). The hype around platforms have led some to call transactive energy the "ebay of electricity," part of a trend in the "Uberization" of energy (Taneja 2016). Indeed, echoing this same language, the AEMC (2017: 133) has compared these new smart energy platforms to the "service offered by Uber or Airbnb where complexity is behind the scenes and consumers just get access to a tool that they value." At the center of these trends is a focus on hyper-marketization at the individual device level through smartification of the energy sector.

Conclusion

Trends in smart energy promise more integration of renewables, greater convenience, cheaper energy, and better reliability. While these motivations and outcomes appear to be pure—who could disagree with them?—we find that they are used to conceal or direct attention away from the troubling technopolitics at the heart of this smart energy regime. This is encapsulated by the move from consumer choice to technocratic demand-side participation to individualistic market subjectivity to the replacement of humans by algorithms. This regime is working to materialize an automated demand response that pushes the limits of price optimization in ways only achievable by algorithmic governance of humans who are incapable of optimal information processing.

Both in the US and Australia, the modernization of energy seems to be guided, at least in part, by the logic of anti-politics. The smart technology developed—along with the redesign and operation of electricity networks—is being driven less by ideals of sustainability, equity, or democracy, and more by principles of economics (cf. Burke and Stephens 2018). As the US National Institute of Standards and Technology (2017: np) explains, the transactive energy approach is about exploring new perspectives on energy, moving from "the laws of physics to the principles of economics, from the nitty-gritty details of electrical engineering to the underlying personal and societal values that drive consumers' daily decisions, and from the legalities of federal and state regulations to the measurement science that will help quantify and assess the many different aspects of grid operations." Hayek would be proud. We are caught in a political consensus governed by a "game of economic freedom," as Foucault (2008) called it. This translates into programs where infrastructures and technologies are solely about economic

optimization, and our role as human agents is superseded by an all-powerful information processor: The Market. Or, rather, the automated systems that participate in, and act as proxies for, The Market.

While our paper has demonstrated emerging trends in the anti-politics of smart energy, there is still considerable work to be done. For example, questions concerning the operation of anti-politics and its resistance can be expanded. Additional development of theory around anti-politics would be strengthened by more sustained engagement with the ways that anti-politics is constructed and enacted in the energy sector as well as different technological systems (e.g. smart policing). Here, further case studies and comparative analyses would be especially useful.

Moreover, as we stated in the introduction, this is not the only pathway for the development of smart energy. Our aim with this paper is to name and explain a model that we see, based on our empirical findings, as picking up momentum. Further work is needed about how anti-political smart energy interacts with other technopolitical approaches of energy. For instance, anti-politics seems to be the inverse of—perhaps even actively opposed to—calls for energy democracy that push for more distributed forms of power and participation in decisions about how/why energy infrastructures are built and governed (Burke and Stephens 2018). Do the trends we describe here potentially foreclose other alternatives? If so, how do we make space for different ways of creating different kinds of smart energy regimes? There is room here for further theoretical analyses and positive work that can point the way forward.

We have sketched a picture of a beast born from Hayekian neoliberal anti-politics. It seems far too easy for innovative smart energy projects to slip into a regime of discipline and control (Gunel 2014), inviting us to apply the same critique that Foucault (2008) laid forth. The smart energy regime has been subsumed by a neoliberal anti-politics eager to sacrifice human agency on the altar of market efficiency. But this transition towards anti-politics is not complete. It is still developing and being fostered. As smart energy transitions occur, critical analysis of the technopolitics should also be accompanied by mappings of alternatives and resistances (Boyer 2014; Szeman 2014). New logics for organizing electricity production, distribution, and use are essential. As we've argued, every socio-technical system is embedded with, and seeks to enact, a vision of the world it plugs into (and produces), a model of the users it is built for (and constructs), a rationality based on the values/goals it prioritizes (and spreads). What we need now is a progressive program of technopolitics that can inform how—and for whom—different energy systems are designed, developed, and deployed. In other words, we need to set about planning a socialist energy future. This will require us to appropriate those technologies that promote such a program, abandon those that do not, and assemble innovative systems designed for pro-social, not anti-political, purposes.

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