



**QUEEN'S
UNIVERSITY
BELFAST**

Energy/Culture: A Reading Guide for Historical Literature

Shin, H. (2018). Energy/Culture: A Reading Guide for Historical Literature. *Science Museum Group Journal*.
<https://doi.org/10.15180/180912>

Published in:
Science Museum Group Journal

Document Version:
Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:
[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights

Copyright 2018 the authors.

This is an open access article published under a Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the author and source are cited.

General rights

Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Open Access

This research has been made openly available by Queen's academics and its Open Research team. We would love to hear how access to this research benefits you. – Share your feedback with us: <http://go.qub.ac.uk/oa-feedback>

Energy/Culture: a reading guide for historical literature

Journal ISSN number: 2054-5770

This article was written by [Hiroki Shin](#)

03-27-2018 Cite as 10.15180; 180912 Review

[Energy/Culture: a reading guide for historical literature](#)

Published in [Spring 2018, The Material Culture of Energy](#)

Article DOI: <http://dx.doi.org/10.15180/180912>



Keywords

energy history, energy research, energy culture, environmental history, energy consumption, energy reading guide, energy humanities

Introduction

Very few people living in today's energy-intensive society would doubt that our cultural and intellectual activities are deeply intertwined with – or even premised upon – energy use. This paper is a case in point, since, as it is appearing in an online publication, it cannot be read without a computer, internet access and an electricity supply. Since as early as the 1930s, scholars have commented on the relationship between energy and culture, though the definitions of culture have varied from narrow (e.g. high culture) to very broad, such as one that includes diverse senses of 'literary, visual, and other forms of poesis... and the broader forms of collective human experience' ([Wenzel, 2017, p 4](#)). One early commentator on the topic was Lewis Mumford, the author of *Technics and Civilization* ([1934](#)). On 11 September 1936, Mumford gave a speech entitled 'Power and Culture' at the special meeting of the World Power Conference, held at Constitution Hall, Washington, DC. In this speech, Mumford stated that 'Every society is characterized by the means it uses to convert energy into life and to convert life into those higher forms of energy that we call culture' ([Mumford, 1938, p 167](#)). This idea of energy being the precondition for the advancement of culture was implicit in his 1934 book, in which he described his contemporary age as being characterised by the harnessing of electric power to operate an expanding range of machinery. Mumford's formulation of a causal link between energy and culture was grounded on the optimistic idea of energy development, which was why his speech at the World Power Conference was so opportune.

His speech was a part of the ceremony marking the beginning of hydropower generation at Boulder Dam, better known by its official name: Hoover Dam. The event reached its climax when US President Franklin D Roosevelt, after describing how his

nation was coming of age with abundant natural energy resources, solemnly pushed a button and brought to life the first hydro-turbine generator of Boulder Dam, 'a symbol of greater things in the future' ([Roosevelt, 1938, p 184](#)). As this episode eloquently illustrates, in the early twentieth century, the connection between culture and energy hinged on the future promise of abundant energy.

Figure 1



© World Energy Council

World Power Conference Special Meeting, Constitution Hall, Washington DC, 11 September 1936. Merrill, O (ed), *Transactions: Third World Power Conference* (Washington: World Power Conference), vol. 1, p 168

DOI: <http://dx.doi.org/10.15180/180912/005>

Later periods have witnessed similar ideas of energy being the material basis of cultural progress, including that expressed in Leslie White's (1943) famous theorem: 'Other things being equal, the degree of cultural development varies directly as the amount of energy per capita per year harnessed and put to work' (p 338). Since the time of Mumford and White, the literature on energy and culture has vastly increased and diversified. Broadly speaking, there have been two major changes in how the subject is considered. Firstly, while early commentators separated culture and energy, more recent scholars often discuss cultures of energy, showing how deeply culture and energy have become entangled in the late twentieth and early twenty-first centuries. Secondly, early optimism about a plentiful energy future has been muted. Instead, today's discussion of energy is dominated by anticipation of a disturbing or uncertain future grounded in concerns about climate change and resource depletion. The shift in the general mood is not without positive signs, however, as scholars attempt to meet new challenges by mobilising culture to envisage alternative energy futures. This reading guide aims to map out (a small portion of) the vast and expanding literature in this broader shift.

Energy and its historical development

As Vaclav Smil (2017) wrote in *Energy and Civilization*, 'both prehistoric human evolution and the course of history can be seen as the quest for controlling greater stores and flows of more concentrated and more versatile forms of energy and converting them' (p 1). The long history of human society and its energy use is usually divided into different eras according to each era's primary energy source, punctuated by shifts from one dominant energy source to another through energy transitions ([Melosi, 2006](#); [Smil, 2010](#)). For the creation of the modern world, according to E A Wrigley (1988, 2010), the most significant change was the transition from the organic economy to the mineral economy. Indeed, the harnessing of coal in the 'subterranean forest' was the major contributor to Britain's Industrial Revolution and subsequent industrialisation of other nations ([Sieferle, 2001](#)).

Global historian Kenneth Pomeranz (2000) raised the same point when he attributed the diverging paths of modern economic development in the East and the West largely to different nations' geographic proximity to coal reserves and ability to exploit energy resources. The potential of energy resources was best realised when energy availability was accompanied by relevant technology to convert energy to serve human purposes. Such 'development blocks' of energy and other technologies could be seen in the close links between coal, the steam engine and the metallurgical process of iron-making during the Industrial Revolution, or, the linkage between oil and the internal combustion engine in the twentieth century (Kander, Malanima and Warde, 2013). These long-term perspectives are essential for understanding how energy and culture are connected. However, in works of energy history written from the macro perspective, culture is usually seen as secondary to other factors of economy, technology and resource availability. For this reason, the following survey takes a narrower historical perspective, focusing chiefly on the historical literature covering the long twentieth century.

In terms of the energy history of the twentieth century, the most widely discussed topic has been the energy development of America, reflecting the nation's leading role in technical advances and the diffusion of modern energy, notably electricity and oil. John Hammond's (1941) *Men and Volts* and Arthur Bright's (1949) *The Electric-Lamp Industry* were among the pioneering works investigating the origin and progress of electric technology. Historical research on energy saw significant strides in the 1980s, when several urban historians began to systematically analyse energy development in major cities, chiefly from the perspective of the competition between electricity and gas. Mark Rose (1988, 1995) studied the growth of the electricity and gas industries in Kansas, Denver and Detroit, and Harold Platt (1988, 1991) investigated Chicago, one of the heartlands of early twentieth-century electrification. In the systematic investigation of historical energy development, Thomas Hughes' (1983) *Networks of Power* has had a profound impact on subsequent studies. Hughes' work shifted the historical narrative of energy away from specific inventions, inventors or corporations and toward the assemblage of innovative technology, expertise and business operations. Together, these formed what he called large technological systems, the prime example of which was the electricity supply system (Hughes, 1989). In *Networks of Power*, Hughes illustrated how the socio-technical assemblage – through the work of system builders (e.g. inventors, engineers, business managers and financiers) – gradually gained 'technological momentum' in his selective case studies on major cities in the United States, Germany and England.

Figure 2



© Science Museum/Science & Society Picture Library

Longannet Power Station and Power Lines, Kincardineshire, Scotland

DOI: <http://dx.doi.org/10.15180/180912/006>

Hughes' work paved the way for writing the history of the expansion of electricity supply well beyond the United States, as his comparative analysis rested on the recognition of variations (in his words, 'styles') in how networks were built in different parts of the world. This approach made technological transfer a legitimate starting point for narrating the development of a nation's power network, a theme taken up by Edmund Todd's (1989) article on the German region of the Ruhr, Armstrong and Nelles' (1986) book on Canada, and Timo Myllyntaus' (1991) book on the electrification of Finland. The development of the power network in Europe has become a well-researched field that covers a wide range of topics, such as the electrification of inter-war Central European nations (Hallon, 2001) and the transnational aspects of Europe-wide grid development (Lagendijk, 2008; Van der Vleuten and Kaijser, 2006). One key factor in the development of national and regional variations was politics. Jonathan Coopersmith (1992) expanded the scope of Hughes' original discussion, which drew exclusively from cases of capitalist countries, by turning to 1920s Russia, where the Communist Party's political agenda and the technical visions of engineers were two wheels of electrification. Ronan Shamir (2013) examined 1920s Palestine and found that the country's power network during the period was not just an embodiment of colonialist economic interests, but that the electrical grid was also a socio-technical infrastructure that helped to create and consolidate the ethno-national division between the Jewish and Arab populations. In a similar vein, Rao and Lourdusamy (2010) and Sunila Kale (2014) discussed the formative influence of colonialism and regional politics in fostering distinctive variations within India's electrification.

Component DOI: <http://dx.doi.org/10.15180/180912/001>

Energy and consumers

As much as electric power has played a crucial role in global economic development, the supply of electricity can also be seen as a consumer service involving consumer technology. With a few exceptions (e.g. medical use), electricity cannot be seen or felt, and it can only be used through appliances. Thus, as the supply of electricity grew, a host of appliances appeared. While electric lamps, heaters and cookers replaced old fuels, innovations like washing machines, vacuum cleaners and cooking devices reduced human labour. Furthermore, radios, record players and televisions ushered in new activities made possible only through electricity use. Scholars have provided several good cultural and social histories of appliances like the refrigerator ([Peavitt, 2017](#); [Rees, 2013](#)), the lift/elevator ([Bernard, 2014](#)) and air conditioning ([Ackermann, 2002](#); [Cooper, 1998](#)). More theoretically-oriented science and technology studies have problematised a wider range of large and small technologies, including some mundane technical objects. Studies on gas and electricity meters, for example, have examined how these humble technical objects regulate and modify social relationship by visualising the flow of invisible energy ([Gooday, 2004](#)) and allocating responsibilities to suppliers and customers ([Ackrich, 1992](#)).

David Nye's ([1990](#)) *Electrifying America* demonstrated that electrification has been much more than the sum of technological innovation, infrastructure building, business strategy and appliance use. The book described electrification as a process in which technological, social and cultural changes are deeply intertwined. Nye's story of electrification depicted consumers as active partners of inventors and business managers, and this partnership was mediated by cultural symbols and discourses that appeared in advertisements, journalists' reports and cultural commentaries. Commercial advertisers and marketers self-consciously exploited signs and symbols and circulated them throughout American society to propagate the gospel of electrification. Thus, many historians saw commercial promoters as primary actors in bringing electrical life to modern homes. Andrew Feldman's ([1994](#)) study of 1920s America focused on the individuals who sold the 'electrical idea' for General Electric, Westinghouse and the National Electric Light Association. During the period between the First and Second World Wars, the electricity supply industries of industrialised nations intensified their efforts to cultivate the domestic demand for electricity. The industry's turning to the domestic energy market was initially prompted by the slackened industrial demand after the First World War; however, more generally, the growth of a supply infrastructure required additional demand from non-industry users to fill the gap during 'off-peak' hours (i.e. hours when industrial demand dropped) in order to make efficient use of generation capacity. Given the inherent issue of fluctuating electricity demand, it is no surprise that industrial nations mounted vigorous national campaigns to connect a greater number of customers with different consumption patterns to the grid, and encourage them to use greater amounts of electricity at different times of the day ([Forty, 1986](#)). In 1919, Britain's electricity supply industry and trade associations established the Electrical Development Association (EDA) to promote electrification and electrical appliances ([Carlsson-Hyslop, 2016](#); [Luckin, 1990](#)). While acting as the main voice for electrification, the EDA also funded a separate publicity organisation, the Electrical Association for Women, to edify female consumers as the main users of domestic electrical technology ([Pursell, 1999](#)). With respect to this focus on women, as Anne Clendinning ([2004](#)) showed, Britain's gas industry outstripped its rival, the electricity industry, until the 1920s. As early as the Edwardian period, female demonstrators, or 'lady demons', formed an important part of the gas industry's sales force, as they were believed to best understand women's needs and desires.

Figure 3



© Science Museum/Science & Society Picture Library

Demonstration kitchen at the Electrical Association for Women headquarters,
London, 2 January 1939

DOI: <http://dx.doi.org/10.15180/180912/007>

Figure 4



© Science Museum/Science & Society Picture Library

An advertisement promoting a gas cooker, c.1913

DOI: <http://dx.doi.org/10.15180/180912/008>

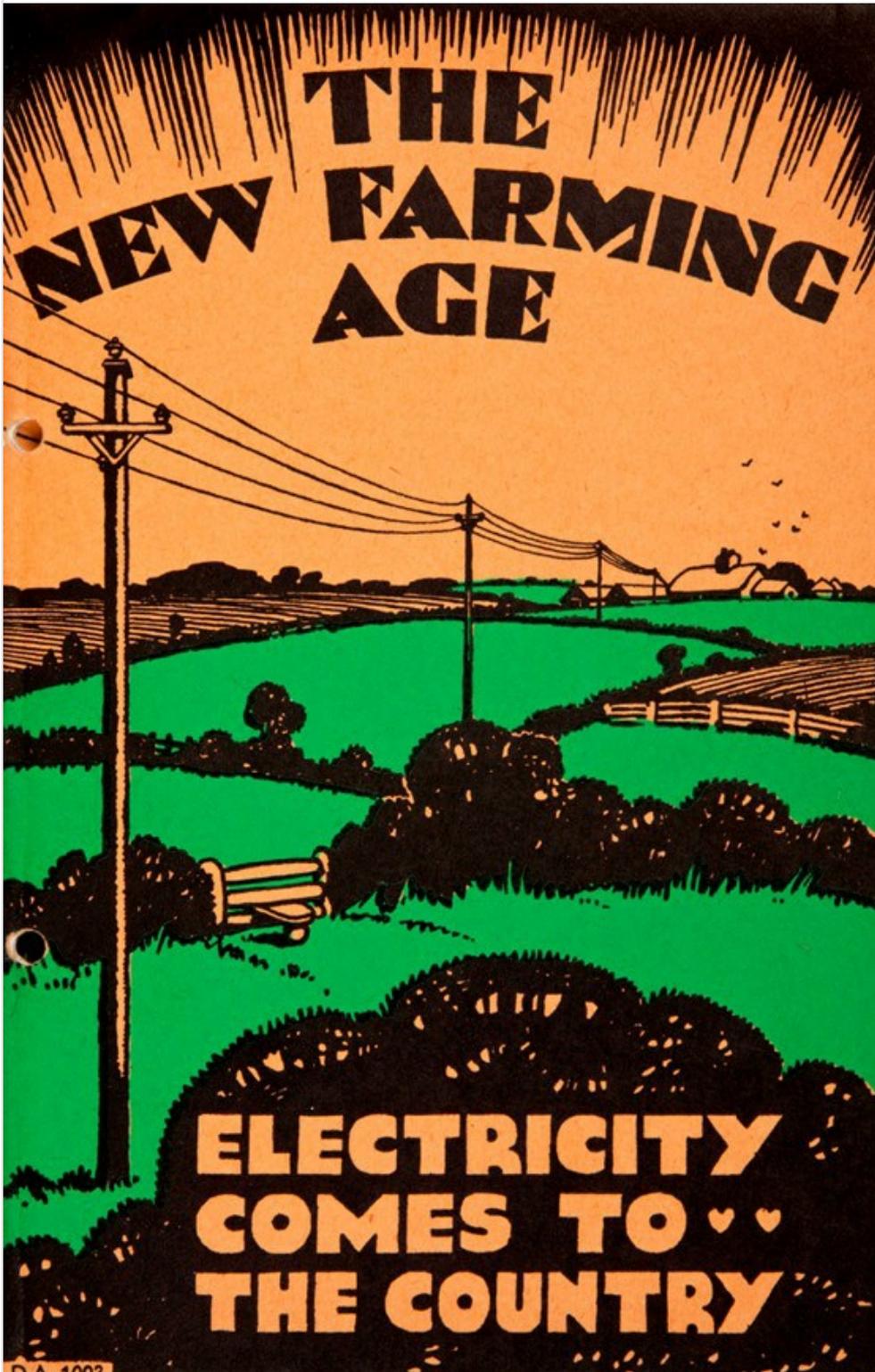
The recognition that consumers were an integral part of the electrification process led historians to grow more critical of the previously implicitly held assumption that electricity fulfilled the promise of its promoters. In other words, historians began to ask: To what extent did producers' visions of electrical modernity match users' actual experiences? The pioneering work in this literature was Ruth Cowan's (1983) *More Work for Mother*, which argued that new domestic technologies did little to alleviate American housewives' burdens. The redistribution of housework following the introduction of 'labour-saving' devices enforced a clear demarcation between housework, for which housewives were to be responsible, and other types of (paid) work. As the result, men were largely relieved from house chores, and domestic work fell firmly on housewives, who were expected to achieve the traditional tasks with a higher level of care and efficiency and, simultaneously, required to fulfil tasks associated with the use of new appliances. Cowan's discussion shed light on the fact that, from women users' perspectives, electrical modernity hardly became reality. Her critical revision of the diffusion process of modern domestic technology was further developed in her later formulation of the 'consumption junction', a heuristic device that posited a site where 'technologies begin to reorganize social structures'. At the centre of this socio-technical intersection was the consumer's choice of technology (Cowan, 1987, p 263).

The idea that consumers played a key role in technological choice sparked an investigation of rural electrification, since rural consumers were often confronted with different sets of technological choice than those usually available to urban consumers. In America, urban and non-urban electrification drew their support from separate sources. In urban areas, the organised promotion of electrification was carried out chiefly by commercial corporations. By contrast, in rural America, where potential customers were spread far and wide and there was comparatively little prospect of business profit, electrification was often led by public and semi-public organisations, such as the Agricultural Extension Service and the Rural Electrification Administration (Glaser, 2009). The distinction between private- and public-led electrification was often less clear in Western Europe, where both the state and the municipality were major actors in the development of the electricity supply system in both urban and

rural areas (Schott, 2008). Even in America's urban electrification, as Ronald Tobey (1996) pointed out, commercial corporations' early electrification initiatives could not have been sustained without wider social provisions, especially the housing initiatives institutionalised by the New Deal policies of the 1930s.

In practice, those who led America's urban and rural electrification often came from similar professional backgrounds. As illustrated by Carolyn Goldstein (2012), between the 1920s and the 1940s, home economists frequently crossed the boundary between public and private organisations. Even when they worked for commercial companies' customer service divisions, home economists' primary agenda was to propagate 'rational consumption' among domestic consumers, rather than to maximise profit for their business employers. Ronald Kline (1997) revealed that these self-proclaimed 'agents of modernity' who brought their urban ideas to the countryside rarely questioned the legitimacy of their mission to bring modern energy life to rural consumers. However, their aspiration to electrify America's farmsteads did not always find willing ears among rural consumers, who were often reluctant to adopt electrical modernity. As Katherine Jellison (1993) argued, in early twentieth-century Northwest America, there was a tension between the government policy of farm mechanisation and the visions held by rural consumers. Many farm women refused to take up electrical appliances despite electrification advocates' tantalising offer of liberation from housework. Jellison explained this disagreement in terms of farm women's desire to maintain their place in farm production, which had a direct bearing on their status in the patriarchal family structure, by refusing to accept any movement to confine their role to one of merely operating domestic technology. Sandwell (2015) scrutinised a similar case, examining Canadian consumers' reluctance to embrace electrical modernity. To understand this indifference, Sandwell suggested, one needed to consider the broader energy regime in which they operated. Prior to the Second World War, Canadian consumers' knowledge and skills were largely structured according to the old energy regime of coal and wood, and official and commercial indoctrination was not sufficient to persuade them to abandon long-established knowledge and lifestyles in favour of new technology.

Figure 5



© Science Museum/Science & Society Picture Library

'The New Farming Age: Electricity Comes to the Country', Electrical Development Association, n.d.

DOI: <http://dx.doi.org/10.15180/180912/009>

The chapters of the recently published volume *Transforming the Countryside* (Brassley, Burchardt and Sayer, 2016) compel us to examine past electrification in its multitude of forms. The book offers a kaleidoscopic view of rural energy situations in

England, Wales, Scotland, Sweden and Canada, showing that rural consumers were hardly passive 'marginal' users, but, rather, people who actively coordinated their energy lives, often using traditional and modern fuels side by side. Kline (2000) argued that the refusal to accept electrification was one of a variety of tactics rural consumers could employ in their reception of new technology, which included creative uses of appliances (e.g. listening to music via the telephone). The insight regarding technical appropriation also applied to urban consumers. In *Consumers, Tinkerers, Rebels*, Ruth Oldenziel and Mikael Hård (2013) explored historical cases of tinkering consumers, such as the residents of cooperative houses in 1920s Amsterdam, who fiddled with the central heating systems to warm up their rooms beyond what the cooperative board was willing to support. Pushing Cowan's (1987) argument of technological choice further, Oldenziel and Hård (2013) claimed that consumers co-produced technology by frequently challenging engineers' and designers' intentions concerning what constituted the 'proper' use of technical objects.

In his *Domesticating Electricity*, Graeme Gooday (2008) contended that the adoption of electricity was not an historically inevitable process, substantiating this claim by elucidating the process of how electric lighting was integrated – or domesticated – into British society between 1880 and 1914. Gooday departed from the early historical assumption that the success of electricity could be attributed to its inherent technological superiority to rivals, notably gas: an assumption held by such scholars as Wolfgang Schivelbusch (1988). On the contrary, Britons in the late nineteenth century were generally unconvinced of electricity's practical benefits. According to Gooday (2008), electricity was accepted in British society only through a range of cultural manoeuvrings. Advocates of electricity strove to sever the popular association between electricity and danger, while also inventing visions of an electricity-oriented future. Although these efforts bore fruit in British society, Gooday (2008) cautioned his readers, electricity's triumph was limited or incomplete, and gas and coal retained more than a small share of the country's household fuel (for a critical revision of historical electrification as a fluid and open-ended process, see Chappells and Shin's article in this volume).

Another major theme of Gooday's (2008) book was gender, which he addressed on two overlapping levels. At the level of cultural representation, the gendered personification of electricity spread the image of electricity as a harmless or even beneficial entrant to the domestic space. The early iconography of electricity often positioned electricity as female (also in *Wosk, 2001*). In the early twentieth century, however, electricity's gender identity became less clear-cut, as electricity was increasingly represented in diverse and often contradictory ways (e.g. as feminine, masculine, androgynous or sexually neutral). On one hand, de-sexualising electricity's image generally helped to minimise the cultural anxiety of female consumers, thereby boosting electricity's wider acceptability. On the other hand, by failing to give electricity a clear gender identity – unlike the country's gas industry, which had the iconic 'Mr Therm' – Britain failed to complete the cultural domestication of electricity. At the practical level of technological diffusion and business strategy, utility companies and appliance retailers could not deny the importance of gender. During the early period of electricity's introduction into British society, women's influence over purchasing decisions regarding domestic equipment and furnishings made them a crucial target of sales campaigns, as 'it was only by winning over such female consumers that electric light came to have a long term future at all in Britain' (*Gooday, 2008, p.34*). This comment brought Gooday's study in line with a strand of research on gendered aspects of technological development, pioneered by Ruth Cowan (1987) who described the introduction of new domestic technology as a process that carved out and consolidated women's role in domestic work according to the ideology of domesticity. As much as labour-saving technology may have reduced the time and effort required to complete a unit of a domestic task, it also confined women to the role of the housewife (*Jellison, 1993*): someone required to be an effective house manager and to oversee the health and safety of the domestic space (*Tarr and Tebeau, 1997*).

Figure 6



© Science Museum/Science & Society Picture Library

Cover to *Die Elektrizität im Dienste der Menschheit* ('Electricity in the Service of Mankind') by Alfred Ritter von Urbanitzky, 1885

DOI: <http://dx.doi.org/10.15180/180912/010>

While some female consumers resisted the new domestic machinery and accompanying gender ideology (as noted above), these shifts were successfully implanted in many other places. Susan Reid's (2009) study of Soviet Russia showed that the historical complicity between electrical technology and domestic ideology could be observed in the electrification processes of not only capitalist nations, but also non-capitalist nations. In his pioneering work on the social aspects of appliance design, Adrian

Forty (1986) argued that the (presumably masculine) idea of workplace efficiency was transplanted into the domestic space through the design of appliances. Similarly, Shelley Nickles (2002) showed that the process of refrigerator design in 1930s America involved negotiations between competing ideas about domestic life. In fact, the design of electrical appliances was an area in which some historical attempts were made to redress the male-dominated technological development; however, in most cases, these efforts eventually failed. The statist intervention to orchestrate this process, as discussed in Karin Zachmann's (2002) study of East Germany's Central Working Group on Household Technology, foundered in the face of more immediate concerns about resource shortages and production planning, which shut women out of the process of envisaging the future shape of domestic technology. A similar process of gender role assignment was described by Amy Bix (2009), who examined the act of repairing domestic equipment. When a growing number of domestic appliances began to enter American homes after the First World War, women were expected to acquire skills to fix domestic technical problems. The situation was transformed in the aftermath of the Second World War, when traditional gender roles reasserted themselves, and home repair was 'remasculinised'. Thus, studies on electrification have revealed the many gendered assumptions that are deeply entrenched in modern energy life.

Figure 7



© Science Museum/Science & Society Picture Library

Electric kitchen display at the *Daily Herald Modern Homes Exhibition*, London, 1946

DOI: <http://dx.doi.org/10.15180/180912/011>

Although electricity was the major focus of several studies from the 1980s, a growing focus on the variations of energy life has led historians to assign greater significance to electricity's competitors, such as wood, coal, kerosene and gas, thereby providing a more comprehensive view of the modern energy landscape. Various chapters of *Powering Up Canada* (Sandwell, 2016) draw readers' attention to the complexity and unevenness of Canada's energy development, in which traditional fuels (e.g. wood) remained an important source of heat long after power networks covered a large part of the country (for a similar approach, see Yaeger et al, 2011). In Britain, Scott and Walker's (2011) empirical study of household expenditures revealed that, in the nation's domestic energy market, gas and coal maintained their strong competitive position against electricity well into the 1930s, chiefly due to their role as the primary fuel for many working-class households. Trentmann and Carlsson-Hyslop's (2017) research article on Britain's council housing uncovered further complexities in residents' energy life. The study found that residents' individual energy choices produced significant variations in consumption patterns in a place where, one

might assume, standardised energy provisions would have created a degree of homogeneity in energy life.

History's neighbouring disciplines – notably, anthropology and sociology – have helped to fill the gap in the traditional energy history, which has long been preoccupied with developed societies. From the anthropological perspective, Harold Wilhite (2008) examined the diffusion of electrical appliances in South India as a major challenge to the society's pre-existing habitual practices, resulting in the creation of new or modified social practices (also see Wilhite in this volume). Tanja Winter (2008) produced a rich description of the interactions between electrification and indigenous social structures in Zanzibar, Tanzania, while Leslie Bank's (2011) ethnographical work elaborated the cultural significance of paraffin for female energy users in East London, South Africa. These investigations of energy development in the Global South, as summarised by Akhil Gupta (2015), raise such questions as 'What is it like to live in the dark?' and 'Why do people steal energy?'. Recent studies have attempted to answer these questions without falling back to the simplistic argument of 'backwardness' in the energy cultures of developing countries. The wide range of emerging questions was illustrated in *Cultures of Energy* (Strauss, Rupp and Love, 2013), a volume that brought together diverse anthropological approaches and their application to energy studies. Historians have also drawn inspiration for the examination of energy from the field of sociology. The 'Energy and Society' special issue of *Theory, Culture and Society* (2014) showcased several of the sophisticated theoretical perspectives and imaginative approaches of energy sociologists. Mimi Sheller's (2014a) contribution to the special issue interpreted modern society from the perspective of an energy-intensive material: aluminium, sometimes dubbed 'packaged electricity' (also in Sheller, 2014b). For a similar approach examining plastic, a petroleum product, see Meikle, 1995). In the same volume, Elizabeth Shove and Gordon Walker (2014) contended that everyday practice should be taken as the analytical focus when explaining the social and material development of domestic technology (see also Shove, 2003). Theoretical discussions like Shove's offer clearer expressions of what some historians of domestic technology have observed on such topics as machine washing (Parr, 1997). Overall, recent works in history, anthropology and sociology have important theoretical and topical overlaps and are breaking new ground in the geographic and thematic coverage of energy studies. What connects the increasingly multidisciplinary research of energy is the general departure from technological and economic determinism in favour of an acknowledgment of culture's greater significance as a factor in the shaping of modern energy society.

Component DOI: <http://dx.doi.org/10.15180/180912/002>

Public and popular cultures

The incorporation of local cultures into accounts of energy history highlights the diverse ways through which modern energy has been integrated into different societies and individual lives. This does not mean that energy cultures have been entirely fragmented. Indeed, historical studies show that local cultures have generally co-evolved with or operated in relation to wider public and popular cultures. The history of energy exhibitions is a good example of how an aspect of the co-evolution process unfolded in cultural media. Well before it was introduced to the domestic energy market, electricity appeared in expert and popular scientific demonstrations, such as those performed by Francis Watkins and Michael Faraday in early nineteenth-century Britain (Beauchamp, 1997; Morus, 1998). Toward the end of the same century, supported by commercial and state sponsorship, electricity became a recurrent feature in such high-profile exhibitions as the 1881 Paris International Exhibition of Electricity (Caron and Berthet, 1984) and the 1889 Chicago World's Fair (Platt, 1991). Electricity was as much an object of wonder as it was a constitutive part of exhibition machinery: the special effects created by floodlighting and other electrical illumination added glamour and a sense of spectacle to exhibitions. By the early twentieth century, electricity was still featured in major exhibitions, but the emphasis had shifted from illumination to more comprehensive visions of an electrical future (Nye 1990, 1994). From the 1930s, as Nina Möllers (2012) argued, exhibitions began to focus on the consumptive aspects of electricity, embedding electrical technology in the context of modern consumer society. We know much less about the gas industry's involvement in exhibitions. Möllers' (2013) short survey depicted the German gas industry as a major player in early energy exhibitions, but its presence was obscured by electricity's strong progress in the domestic market following the First World War. Similarly, Anne Clendinning (2004) described Britain's early gas industry as a major sponsor and organiser of exhibitions, noting that the industry employed the format of exhibition (on both large and small scales) as a chief tool for marketing their services and products.

Figure 8



Fig. 1. — Vue intérieure de la Salle des Illusions.

© Science Museum/Science & Society Picture Library

La Salle des Illusions, Paris, France, September 1900

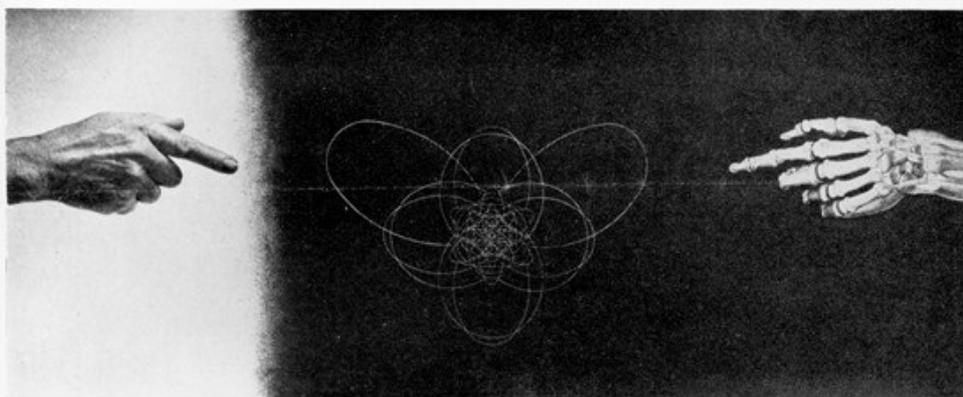
DOI: <http://dx.doi.org/10.15180/180912/012>

Advances in electrical technology in the early twentieth century entailed the encroachment of electrified cultural media into the strongholds of the conventional mass media consisting of print matters and exhibitions. Film, radio and television were all built on electrical technology and electricity supply, and they proved extremely powerful in informing public culture. The potential force of new media was clearly illustrated by its use in nationalistic and militaristic propaganda during the Second World War in countries like Russia, Germany and Japan (Taylor, 1983). To exploit new media to influence consumers, electricity, gas and oil corporations sponsored and created films (Brassley, Burchardt and Sayer, 2016; Bouvier, 2012; Clendinning, 2004; Russell, 2011; Swann, 1989). There is a significant volume of literature on radio and television and their cultural impacts as new communication media, but their impact on twentieth century energy development has yet to be fully gauged. On this topic, Bowden and Offer (1994) suggested that ‘time-using’ appliances, such as radio and television, saw faster diffusion than time-saving appliances, indicating that the cultural desire kindled by these new appliances may have precipitated electrification. This phenomenon may be more familiar to anthropologists and historians of recent electrification, such as the electrification movement in Bali, Indonesia, where the major factor that drove villagers to electrify their communities in the 1980s was the desire to have a television in the home (Mohsin, 2017).

Past exhibitions also offered historians a proving ground to examine how the seemingly dominant progressive culture of energy – of which electrical modernity was a prominent example – was often counterbalanced or contested by the public’s doubts, anxieties and fears about energy technology. This was especially true for nuclear energy, a popular scientific feature of international exhibitions after the Second World War. In the 1947–1948 *Atom Train* exhibitions and the 1951 *Festival of Britain*, the British public was encouraged to see nuclear power as a technology that would launch the nation’s industrial revival (Forgan, 2003; Jolivet, 2014; Laucht, 2012). One of the major exhibitions in the late 1950s was the 1958 *Brussels World Expo*, which promoted the idea of the peaceful use of atomic power – ‘atoms for peace’ – informed the public presentation of nuclear technology (Schroeder-Gudehus and Cloutier, 1994). However, despite attempts by technocrats, engineers and business leaders

to impart nuclear technology with a peaceful, positive and beneficial image, they failed to overcome the popular association of atomic power with military weapons and destruction. National contexts affected the degree of popular anxiety about nuclear power, as shown in the collection of essays in *Nuclear Age in Popular Media*, which examined situations in the US, Germany, Britain, the Netherlands, Japan, India and Soviet Russia (Van Lente, 2012). For a more comprehensive European-wide research project, see Butler's article in this volume). In France, nuclear technology was incorporated into the national identity, as it addressed widely-held public concerns about national decline (Hecht, 1998). A similar belief in nuclear power as a driving force of social progress in the context of Soviet Russia was discussed by Sonja Schmid (2014). In Japan, state and private corporations vigorously promoted nuclear power through exhibitions to turn the public's attention away from wartime memories of atomic bombs toward a vision of a prosperous future built upon the nearly unlimited supply of energy derived from the peaceful atom (Low, 2003). In the Netherlands, visitors to the kitchen display at the 1957 *Atom Exhibition* were encouraged to imagine how their domestic life would be improved by the development of nuclear energy (Cieraad, 2009). Such a cultural evocation of positive nuclear futures – what Paul Boyer (1985) called the 'Techno-atomic utopia' in his discussion of early American nuclear development – was only one aspect of the multifaceted nuclear culture. As Jonathan Hogg (2016) demonstrated in the context of Britain, in order to understand a nation's response to the nuclear age, with its 'constantly evolving set of understandings of knowledges', examining the unofficial nuclear narratives is as crucial as analysing the official narratives.

Figure 9



“Atomic Energy for Good or Evil”

© Science Museum/Science & Society Picture Library

‘Atomic Energy for Good or Evil’, *Atom Train Exhibition*, 1946

DOI: <http://dx.doi.org/10.15180/180912/013>

Anxieties about energy in public and popular culture existed well before the nuclear age: an important aspect of energy history shown in both past (and present) public concerns about coal smoke pollution. Although it is now considered a self-evident truth that burning fossil fuel creates harmful gas, it is worth remembering that this was hardly a common view in the early nineteenth century. As Peter Thorsheim wrote in his *Invention of Pollution* (2006), the emergence of the general consensus that coal use degrades air quality and human health was a protracted process involving changes in political, social, cultural and medical discourses. Even after coal smoke was identified as the main cause of some serious respiratory diseases (e.g. bronchitis, asthma and pneumonia) in late nineteenth-century Britain, it took another half century for legislation to begin to regulate coal pollution. The process was slowed by popular beliefs and attitudes, as the British population generally believed that an open fire was hygienic and were emotionally attached to fireplaces as the centrepieces of the home (Mosley, 2001, 2007). As shown by Lynda Nead (in this volume), culture was a potent factor that significantly prolonged the shelf life of coal as the primary household fuel in Britain after the Second World War. Modern energy created new sources of pollution. As Thorsheim (2006) noted, the gas industry in nineteenth-century Britain, which manufactured relatively clean but ‘far from pristine’ fuel, exploited the pollution issue to gain an upper hand in its competition with the coal industry. Around the same period, in the USA, neither gas nor coke manufacturers gave much regard to their own part in contaminating air and soil, and the industry's attitude

remained unchanged until well into the twentieth century ([Tarr, 2014](#)).

Figure 10



© Science Museum/Science & Society Picture Library

'A foggy Piccadilly partially lit by the light from a fruit seller's stall', London, 1952

DOI: <http://dx.doi.org/10.15180/180912/014>

Figure 11



© Science Museum/Science & Society Picture Library

Man and woman reading by the fireplace, Photographic Advertising Limited, 1951

DOI: <http://dx.doi.org/10.15180/180912/015>

Electricity, despite being touted as a 'clean' energy by its early promoters, has hardly been without problems. Bill Luckin's (1990) *Questions of Power* traced cases of local resistance to the extension of the national grid in 1920s to 1930s Britain. In the South Downs, the Lake District and other parts of the country, locals tried to protect natural landscapes from the intrusion of high tension wires and pylons. Around the 1990s, academic studies on energy history and environmental history saw signs of convergence, and an increasing number of historians started to reconsider past energy development in terms of its environmental consequences. In particular, the history of hydropower has attracted historians' renewed attention because historical projects to construct large dams and hydroplants have typically been accompanied by grand-scale remakings (or destructions) of the natural environment. In both of the pioneering works for this approach – Richard White's (1995) book on

the Columbia River and Patrick McCully's (1996) work on large dams – the environment and hydropower technology were seen not as isolated entities, but, rather, constituted parts of a larger system: what White called 'organic machines'. More recently, Sara Prichard (2011) expanded this idea by proposing the notion of an 'envirotechnical system' in her book on the Rhône River. The research field continues to grow, as shown by recent additions by Vincent Lagendijk's research article (2016) on the River Rhine, Dorothy Zeisler-Vralsted's (2014) comparative study of the Volga and Mississippi and Matthew Evenden's (2015) monograph on Canada's hydropower development during the Second World War.

The resurgence of research on hydropower's past has also led historians to re-examine the historical creation of technical modernity and its variety of forms. Erik Swyngedouw's (2015) critical investigation of 'liquid modernity' in Franco's Spain revealed the political and cultural process through which hydropower development became the symbol of the nation's modernisation project. His findings confirmed Christof Mauch and Thomas Zeller's (2008) claim in the edited volume *Rivers in History* that river dams were iconic structures that not only boosted electricity supply capacity, but also glorified the nation and assisted economic progress and nation building at the expense of forests and wildlife habitats. In Africa, as discussed by Heather Hoag (2013), the legacy of colonialism cast a long shadow on post-colonial hydropower development. African utility companies' and political leaders' continued belief in economic development via the expansion of hydropower was at odds with their condemnation of their colonial past because this policy virtually followed the blueprint created by administrators and entrepreneurs in the colonial era. Extending the time-frame of enquiry, Christopher Jones (2014) situated hydropower development within the American mid-Atlantic region's transition to a mineral energy regime of coal, oil and electricity. This transition, which took place between the 1820s and the 1930s, was driven by the construction of a transport infrastructure of roads, waterways, railways, pipelines and transmission lines. The expansion of these infrastructures helped American society gradually overcome the geographically situated nature of energy systems. However, the enhanced infrastructure for moving energy from one place to another with relative ease created a 'landscape of intensification', in which people were encouraged to consume ever greater volumes of energy in the face of a diminishing sense of place and environment. Some recent publications by the Rachel Carson Center show how strengthened scholarly commitment to environmental perspectives has enriched our understanding of past energy transitions (Unger, 2013; Mavhunga and Trischler, 2014).

Reflecting today's climate of environmental concerns, oil looms large in the recent literature on energy history. Although the social impact of oil use – a prime example being the American automobile culture – has long been recognised by both academics and non-academics, current historical research digs much deeper into oil culture's meanings and manifestations (Black, 2014). Literary scholars have been particularly active in examining oil culture, taking their initial cue from Amitav Ghosh's (1992) essay on 'petrofiction'. As Bob Johnson (2014) argued, American society has suppressed, mainly through cultural means, the trauma of 'the collateral human and environmental damage' created by fossil energy dependencies. This cultural suppression of energy trauma, once recognised by scholars as such, exploded into a flourishing research field that covers not only American culture but practically every culture in the modern world (Barrett and Worden, 2012, 2014; Macdonald, 2012; Walonen, 2012). Studies on petroculture, initially a branch of literary history, now investigate the multitude of ways in which oil has shaped popular imagination (Hitchcock, 2010). Stephanie LeMenager (2014), a leading scholar on petroculture, stated in *Living Oil* that the aesthetics of oil permeated through society and manifested in such diverse forms as '[f]ilms, books, cars, foods, museums, even towns'. In other words, 'compelling oil media are everywhere'.

Figure 12



© Science Museum/Science & Society Picture Library

Oil Rigs Silhouetted Against a Texas Sunrise

DOI: <http://dx.doi.org/10.15180/180912/016>

Component DOI: <http://dx.doi.org/10.15180/180912/003>

Culture for the future

Recent studies on oil culture have reinvigorated the wider cultural approach to energy history. The emergence of ‘Energy Humanities’, a term increasingly used to designate a large body of energy studies written (mainly) by arts and humanities scholars, shows that the cultural approach now informs a wide range of energy scholarship ([Buell, 2012](#); [Szeman, Wenzel and Yaeger, 2017](#)). More importantly, many recent scholarly contributions to the cultural aspects of energy history share the conviction that culture is not just an analytical framework, but has also become a point of intervention for the active creation of our energy future. In the introduction to *Energy Humanities: An Anthology*, Imre Szeman and Dominic Boyer ([2017](#)) suggested that energy humanities scholars should play a greater role in shaping our energy future. While acknowledging the crucial role of environmental scientists in identifying the causes and consequences of global warming, Szeman and Boyer claimed that ‘the next steps in addressing the environmental crisis will have to come from the humanities and social scientists – from those disciplines that have long attended to the intricacies of social processes, the nature and capacity of political change, and the circulation and organisation of symbolic meaning through culture’ (p 3). This recognition calls on humanities and social sciences scholars to take greater responsibility in today’s discussion about energy. Indeed, research councils across countries have started to substantially invest in energy history projects that connect energy, technology and culture throughout history and into the future. Some examples are the Euratom-funded HoNESt project (see Butler’s article in this volume), the UK ESRC/EPSRC-funded DEMAND Centre (Dynamics of Energy, Mobility and Demand) and several energy-related research projects funded by the UK Arts and Humanities Research Council’s ‘Care for the Future’ initiative.^[1] More fundamentally, Szeman and Boyer’s ([2017](#)) statement signals a reversal in the causal link between energy and culture. Early commentators on energy and culture, like Leslie White ([1943](#)), believed that cultural development was largely the effect of increased human command over energy resources. By contrast, the rise of energy humanities points to the growing scholarly conviction that cultural change can create alternative energy futures.

The reversal of causation in the relationship between energy and culture is not an entirely new idea. In his 1936 speech 'Power and Culture', Lewis Mumford stated: 'every increase in the power denominator imposes an ever graver duty to increase the cultural numerator... As machines become more powerful and automatic, their rulers must become more self-controlled and more humanized' ([Mumford, 1938, p 173](#)). The energy history of the twentieth century can be characterised as one of humans losing control over their desire to consume energy without engaging in commensurate efforts to nurture an awareness of the 'graver duty' to control energy use. So far, we have yet to succeed in humanising energy. However, collectively, the general trajectory of recent energy literature suggests that scholars are gradually awakening to the importance of Mumford's early exhortation.

Authors' note: This article forms a part of a larger research project on energy history, the 'Material Cultures of Energy: Transitions, Disruption and Everyday Life in the Twentieth Century' (UK AHRC, AH/K006088/1).

Component DOI: <http://dx.doi.org/10.15180/180912/004>

Tags

- [History of science](#)
- [History of technology](#)
- [Science and society](#)
- [Public history](#)
- [Energy](#)

Footnotes

1. These projects' websites offer useful insights and resources for exploring energy's past, present and future. HoNESt project (<http://www.honest2020.eu/>); the DEMAND Centre (<http://www.demand.ac.uk/>); The Power and the Water project (<http://powerwaterproject.net/>); Material Cultures of Energy project (<http://www.bbk.ac.uk/mce/>).

References

1. Ackermann, M, 2002, *Cool Comfort: America's Romance with Air-Conditioning* (Washington, DC: Smithsonian Books)
2. Ackrich, M, 1992, 'The De-Description of Technical Objects', in Bijker, W and Law, L (eds), *Shaping Technology/Building Society: Studies in Sociotechnical Change* (Cambridge, Mass: MIT Press), pp 205–224
3. Armstrong, C and Nelles, H, 1986, *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830–1930* (Philadelphia: Temple University Press)
4. Bank, L, 2011, *Home Spaces, Street Styles: Contesting Power and Identity in a South African City* (London: Pluto)
5. Barrett, R and Worden, D, 'Oil Culture: Guest Editors' Introduction', *Journal of American Studies*, 46.2, pp 269–272
6. Barrett, R and Worden, D (eds), 2014, *Oil Culture* (Minneapolis: University of Minnesota Press)
7. Beauchamp, K, 1997, *Exhibiting Electricity* (London: Institution of Electrical Engineers)
8. Bernard, A, 2014, *Lifted: A Cultural History of the Elevator* (New York: New York University Press)
9. Bix, A, 2009, 'Creating "Chicks Who Fix": Women, Tool Knowledge, and Home Repair, 1920–2007', *Women's Studies Quarterly*, 37.1&2, pp 38–60
10. Black, B, 2014, *Crude Reality: Petroleum in World History* (Lanham, Md: Rowman and Littlefield)
11. Bouvier, Y, 2012, 'Filming Electrical Consumption: EDF's Promotional Films', in Möllers, M and Zachmann, K (eds), *Past and Present Energy Societies: How Energy Connects Politics, Technologies and Cultures* (Bielefeld: Transcript), pp 109–133
12. Bowden, S and Offer, A, 1994, 'Household Appliances and the Use of Time: The United States and Britain since the 1920s', *Economic History Review*, n.s. 47.4, pp 725–748
13. Boyer, P, 1985, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age* (New York: Pantheon)
14. Brassley, P, Burchardt, J and Sayer, K (eds), 2016, *Transforming the Countryside: The Electrification of Rural Britain* (London: Routledge)
15. Bright, A, 1949, *The Electric-Lamp Industry: Technological Change and Economic Development from 1800 to 1947* (New York: Arno Press)
16. Buell, F, 2012, 'A Short History of Oil Cultures: Or, the Marriage of Catastrophe and Exuberance', *Journal of American Studies*, 46.2, pp 273–293
17. Carlsson-Hyslop, A, 2016, 'Past Management of Energy Demand: Promotion and Adoption of Electric Heating in Britain 1945–1964', *Environmental History*, 22, pp 75–102
18. Caron, F and Berthet, C, 'Electrical Innovation: State Initiative or Private Initiative? Observations on the 1881 Paris Exhibition', *History and Technology*, 1, pp 307–318
19. Cieraad, I, 2009, 'The Radiant American Kitchen: Domesticating Dutch Nuclear Energy', in Oldenziel, R and Zachmann, K (eds), *Cold War Kitchen: Americanization, Technology, and European Users* (Cambridge, Mass: MIT Press), pp 113–136
20. Clendinning, A, 2004, *Demons of Domesticity: Women and the English Gas Industry, 1889–1939* (Aldershot: Ashgate)
21. Cooper, G, 1998, *Air-Conditioning America: Engineers and the Controlled Environment, 1900–1960* (Baltimore: Johns Hopkins University Press)
22. Coopersmith, J, 1992, *The Electrification of Russia, 1880–1926* (Ithaca: Cornell University Press)
23. Cowan, R, 1983, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books)
24. Cowan, R, 1987, 'The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology', in Bijker, W, Hughes, T and Pinch, T (eds), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, Mass: MIT Press), pp 261–280
25. Evenden, M, 2015, *Allied Power: Mobilizing Hydro-Electricity during Canada's Second World War* (Toronto: Toronto University Press)
26. Feldman, A, 1994, 'Selling the "Electrical Idea": The Campaign to Electrify America in the 1920s', *Argumentation*, 8, pp 377–389

27. Forgan, S, 2003, 'Atoms in Wonderland', *History and Technology*, 19.3, pp 177–196
28. Forty, A, 1986, *Objects of Desire: Design and Society, 1750–1980* (London: Thames and Hudson)
29. Ghosh, A, 1992, 'Petrofiction', *New Republic*, 206, pp 29–34
30. Glaser, L, 2009, *Electrifying the Rural American West: Stories of Power, People, and Place* (Lincoln: University of Nebraska Press)
31. Goldstein, C, 2012, *Creating Consumers: Home Economists in Twentieth-Century America* (Chapel Hill: University of North Carolina Press)
32. Gooday, G, 2004, *The Morals of Measurement: Accuracy, Irony, and Trust in Late Victorian Electrical Practice* (Cambridge: Cambridge University Press)
33. Gooday, G, 2008, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880–1914* (London: Pickering & Chatto)
34. Gupta, A, 2015, 'An Anthropology of Electricity from the Global South', *Cultural Anthropology*, 30.4, pp 555–568
35. Hallon, L, 2001, 'Systematic Electrification in Germany and in Four Central Europe States in the Interwar Period', *ICON*, 7, pp 135–147
36. Hammond, J, 1941, *Men and Volts: The Story of General Electric* (New York: Lippincott)
37. Hecht, G, 1998, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, Mass: MIT Press)
38. Hitchcock, P, 2010, 'Oil in an American Imaginary', *New Formations*, 69.1, pp 81–97
39. Hoag, H, 2013, *Developing the Rivers of East and West Africa: An Environmental History* (London and New York: Bloomsbury Academic)
40. Hogg, J, 2016, *British Nuclear Culture: Official and Unofficial Narratives in the Long 20th Century* (London: Bloomsbury Academic)
41. Hughes, T, 1983, *Networks of Power: Electrification in Western Society 1880–1930* (Baltimore: Johns Hopkins University Press)
42. Hughes, T, 1989, 'The Evolution of Large Technological Systems', in Bijker, W, Hughes, T and Pinch, T (eds), *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, Mass: MIT Press), pp 51–82
43. Jellison, K, 1993, *Entitled to Power: Farm Women and Technology, 1913–1963* (Chapel Hill, NC: University of North Carolina Press)
44. Johnson, B, 2014, *Carbon Nation: Fossil Fuels in the Making of American Culture* (Lawrence: University Press of Kansas)
45. Jolivet, C, 2014, 'Representations of Atomic Power at the Festival of Britain', in Jolivet, C (ed), *British Art in the Nuclear Age* (Burlington: Ashgate)
46. Jones, C, 2014, *Routes of Power: Energy and Modern America* (Cambridge, Mass: Harvard University Press)
47. Kale, S, 2014, *Electrifying India: Regional Political Economies of Development* (Stanford: Stanford University Press)
48. Kander, A, Malanima, P and Warde, P, 2013, *Power to the People: Energy in Europe over the Last Five Centuries* (Princeton: Princeton University Press)
49. Kline, R, 1997, 'Agents of Modernity: Home Economists and Rural Electrification, 1925–1950', in Stage, S and Vincenti, B (eds), *Rethinking Home Economics: Women and the History of a Profession* (Ithaca: Cornell University Press)
50. Kline, R, 2000, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore: Johns Hopkins University Press)
51. Legendijk, V, 2008, *Electrifying Europe: The Power of Europe in the Construction of Electricity Networks* (Amsterdam: Aksant)
52. Legendijk, V, 2015, 'Europe's Rhine Power: Connections, Borders, and Flows', *Water History*, 8, pp 23–39
53. Laucht, C, 2012, 'Atoms for the People: The Atomic Scientists' Association, the British State and Nuclear Education in the Atom Train Exhibition, 1947–1948', *British Journal for the History of Science*, 45, pp 591–608
54. LeMenager, S, 2014, *Living Oil: Petroleum Culture in the American Century* (New York: Oxford University Press)
55. Low, M, 2010, 'Displaying the Future: Techno-Nationalism and the Rise of the Consumer in Postwar Japan', *History and Technology*, 19.3, pp 197–209
56. Luckin, B, 1990, *Questions of Power: Electricity and Environment in Inter-War Britain* (Manchester: Manchester University Press)
57. Macdonald, G, 2012, 'Oil and World Literature', *American Book Review*, 33.3, pp 7–31
58. Mauch, C and Zeller, T, 2008, 'Rivers in History and Historiography: An Introduction', in Mauch, C and Zeller, T (eds), *Rivers in History: Perspectives on Waterways in Europe and North America* (Pittsburgh: University of Pittsburgh Press), pp 1–10

59. Mavhunga, C and Trischler, H (eds), 2014, 'Energy (and) Colonialism, Energy (In)Dependence: Africa, Europe, Greenland, North America', *RCC Perspectives*, 5. doi.org/10.5282/rcc/6554
60. McCully, P, 1996, *Silenced Rivers: The Ecology and Politics of Large Dams* (New York: Blackwell)
61. Meikle, J, 1995, *American Plastic: A Cultural History* (New Brunswick: Rutgers University Press)
62. Melosi, M, 2006, 'Energy Transitions in Historical Perspective', in Dooley, B (ed), *Energy and Culture: Perspectives on the Power to Work* (Aldershot: Ashgate), pp 3–18
63. Mohsin, A, 2017, 'Lighting "Paradise": A Sociopolitical History of Electrification in Bali', *East Asian Science, Technology and Society*, 11.1, pp 9–34
64. Möllers, N, 2012, 'Electrifying the World: Representations of Energy and Modern Life at World's Fairs, 1893–1982', in Möllers, M and Zachmann, K (eds), *Past and Present Energy Societies: How Energy Connects Politics, Technologies and Cultures* (Bielefeld: Transcript), pp 45–78
65. Möllers, N, 2013, 'Telling by Showing: Early Twentieth Century Exhibitions as Advocates in Energy Transition Processes', in Unger, R (ed), *RCC Perspectives*, 2 'Energy Transitions in History', pp 51–6
66. Morus, I, 1998, *Frankenstein's Children: Electricity, Exhibition, and Experiment in Early-Nineteenth Century London* (Princeton: Princeton University Press)
67. Mosley, S, 2001, *The Chimney of the World: A History of Smoke Pollution in Victorian and Edwardian Manchester* (Cambridge: White Horse)
68. Mosley, S, 2007, 'The Home Fires: Heat, Health, and Atmospheric Pollution in Britain, 1900–45', in Jackson, M (ed), *Health and the Modern Home* (London: Routledge)
69. Mumford, L, 1934, *Technics and Civilization* (London: Routledge)
70. Mumford, L, 1938, 'Power and Culture', in Merrill, O (ed), *Transactions: Third World Power Conference* (Washington: World Power Conference), vol. 1, pp 167–174
71. Myllyntaus, T, 1991, *Electrifying Finland: The Transfer of a New Technology into a Late Industrialising Economy* (Helsinki: ETLA and Macmillan)
72. Nickles, S, 2002, "'Preserving Women": Refrigerator Design as Social Process in the 1930s', *Technology and Culture*, 43.4, pp 693–727
73. Nye, D, 1990, *Electrifying America: Social Meanings of a New Technology, 1880–1940* (Cambridge, Mass: MIT Press)
74. Nye, D, 1994, 'Electrifying Expositions, 1880–1939', in Rydell, R and Gwinn, N (eds), *Fair Representations: World's Fairs and the Modern World* (Amsterdam: VU University Press), pp 140–156
75. Oldenziel, R and Hård, M, 2013, *Consumers, Tinkerers, Rebels: The People Who Shaped Europe* (Basingstoke: Palgrave Macmillan)
76. Parr, J, 1997, 'What Makes Washday Less Blue? Gender, Nation, and Technology Choice in Postwar Canada', *Technology and Culture*, 38.1, pp 153–186
77. Peavitt, H, 2017, *Refrigerator: The Story of Cool in the Kitchen* (London: Science Museum)
78. Platt, H, 1988, 'City Lights: The Electrification of the Chicago Region, 1880–1930', in Tarr, J and Dupuy, G (eds), *Technology and the Rise of the Networked City in Europe and America* (Philadelphia: Temple University Press), pp 246–281
79. Platt, H, 1991, *The Electric City: Energy and the Growth of the Chicago Area, 1880–1930* (Chicago: University of Chicago Press)
80. Pomeranz, K, 2000, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton, NJ: Princeton University Press)
81. Pritchard, S, 2011, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge, Mass: Harvard University Press)
82. Pursell, C, 1999, 'Domesticating Modernity: The Electrical Association for Women, 1924–86', *The British Journal for the History of Science*, 32.1, p 47–67
83. Rao, S and Lourdasamy, J, 2010, 'Colonialism and the Development of Electricity: The Case of Madras Presidency', *Science, Technology & Society*, 15.1, pp 27–54
84. Rees, J, 2013, *Refrigeration Nation: A History of Ice, Appliances, and Enterprise in America* (Baltimore: Johns Hopkins University Press)
85. Reid, S, 2009, "'Our Kitchen is Just as Good": Soviet Responses to the American Kitchen', in Oldenziel R and Zachmann, K (eds), *Cold War Kitchen: Americanization, Technology, and European Users* (Cambridge, Mass: MIT Press), pp 83–112
86. Roosevelt, T, 1938, 'Greeting', in Merrill, O (ed), *Transactions: Third World Power Conference* (Washington: World Power Conference), vol. 1, pp 180–4

87. Rose, M, 1988, 'Urban Gas and Electric Systems and Social Change, 1900–1940', in Tarr, J and Dupuy, G (eds), *Technology and the Rise of the Networked City in Europe and America* (Philadelphia: Temple University Press)
88. Rose, M, 1995, *Cities of Light and Heat: Domesticating Gas and Electricity in Urban America* (University Park, Pa: Pennsylvania State University Press)
89. Russell, P, 2011, 'From Acorn to Oak: Industrial and Corporate Films in Britain', *Business Archives*, 103, pp 53–76
90. Sandwell, R, 2015, 'Pedagogies of the Unimpressed: Re-Educating Ontario Women for the Modern Energy Regime, 1900–1940', *Ontario History*, 107.1, pp 36–59
91. Sandwell, R (ed), 2016, *Powering Up Canada: The History of Power, Fuel and Energy from 1600* (Montreal and Kingston: McGill-Queen's University Press)
92. Schivelbusch, W, 1988, *Disenchanted Night: The Industrialisation of Light in the Nineteenth Century* (Berkeley: University of California Press), translated by A Davies, originally published in 1983
93. Schmid, S, 2015, *Producing Power: The Pre-Chernobyl History of the Soviet Nuclear Industry* (Cambridge, Mass: MIT Press)
94. Schott, D, 2008, 'Empowering European Cities: Gas and Electricity in the Urban Environment', in Hård, M and Misa, T (eds), *Urban Machinery: Inside Modern European Cities* (Cambridge, Mass: MIT Press), pp 165–186
95. Schroeder-Gudehus, B and Cloutier, D, 1994, 'Popularizing Science and Technology during the Cold War: Brussels 1958', in Rydell, R and Gwinn, N (eds), *Fair Representations: World's Fairs and the Modern World* (Amsterdam: VU University Press), pp 157–80
96. Scott, P and Walker, J, 2011, 'Power to the People: Working-Class Demand for Household Power in 1930s Britain', *Oxford Economic Papers*, 63, pp 598–624
97. Shamir, R, 2013, *Current Flow: The Electrification of Palestine* (Stanford: Stanford University Press)
98. Sheller, M, 2014a, 'Global Energy Cultures of Speed and Lightness: Materials, Mobilities and Transnational Power', *Theory, Culture & Society*, 31.5, Special Issue on Energy & Society, pp 127–154
99. Sheller, M, 2014b, *Aluminum Dreams: The Making of Light Modernity* (Cambridge, Mass: MIT Press)
100. Shove, E, 2003, *Comfort, Cleanliness and Convenience: The Social Organization of Normality* (Oxford: Berg)
101. Shove, E and Walker, G, 2014, 'What is Energy For? Social Practice and Energy Demand', *Theory, Culture & Society*, 31.5, Special Issue on Energy & Society, pp 41–58
102. Siefert, P, 2001, *The Subterranean Forest: Energy Systems and the Industrial Revolution* (Cambridge: White Horse Press)
103. Smil, V, 2010, *Energy Transitions: History, Requirements, Prospects* (Santa Barbara: Praeger)
104. Smil, V, 2017, *Energy and Civilization* (Cambridge, Mass: MIT Press)
105. Strauss, S, Rupp, R and Love, T (eds), 2013, *Cultures of Energy: Power, Practices, Technologies* (London: Routledge)
106. Swann, P, 1989, *The British Documentary Film Movement, 1926–1946* (Cambridge: Cambridge University Press)
107. Swyngedouw, E, 2015, *Liquid Power: Water and Contested Modernities in Spain, 1898–2010* (Cambridge, Mass: MIT Press)
108. Szeman, I and Boyer, D, 2017, 'Introduction: On the Energy Humanities', in Szeman, I and Boyer, D (eds), *Energy Humanities: An Anthology* (Baltimore: Johns Hopkins University Press), pp 1–13
109. Szeman, I, Wenzel, J and Yaeger, P (eds), *Fueling Culture: 101 Words for Energy and Environment* (New York: Fordham University Press)
110. Tarr, J, 2014, 'Toxic Legacy: The Environmental Impact of the Manufactured Gas Industry in the United States', *Technology and Culture*, 55.1, pp 107–147
111. Tarr, J and Tebeau, M, 1997, 'Housewives as Home Safety Managers: The Changing Perception of the Home as a Place of Hazard and Risk, 1870–1940', in Cooter, R and Luckin, B (eds), *Accidents in History: Injuries, Fatalities and Social Relations* (Amsterdam: Rodopi), pp 196–233
112. Taylor, P, 1983, 'Propaganda in International Politics, 1919–1939', in Short, K (ed), *Film & Radio Propaganda in World War II* (London: Croom Helm), pp 17–47
113. Thorsheim, P, 2006, *Inventing Pollution: Coal, Smoke, and Culture in Britain since 1800* (Athens, Ohio: Ohio University Press)
114. Tobey, R, 1996, *Technology as Freedom: The New Deal and the Electrical Modernization of the American Home* (Berkeley: University of California Press)
115. Todd, E, 1989, 'Industry, State, and Electrical Technology in the Ruhr circa 1900', *OSIRIS*, 5, pp 242–59
116. Trentmann, F and Carlsson-Hyslop, A, 2017, 'The Evolution of Energy Demand in Britain: Politics, Daily Life, and Public Housing, 1920s–1970s', *Historical Journal*. doi:10.1017/S0018246X17000255
117. Unger, R (ed), 2013, 'Energy Transitions in History: Global Cases of Continuity and Change', *RCC Perspectives*, 2. doi.org/10.5282/rcc/5602

118. Van der Vleuten, E and Kaijser, A, 2006, *Networking Europe: transnational infrastructures and the shaping of Europe, 1850–2000* (Sagamore Beach, Mass: Science History Publications)
119. Van Lente, N (ed), 2012, *The Nuclear Age in Popular Media: A Transnational History, 1945–1965* (New York: Palgrave Macmillan)
120. Walonen, M, 2012, ‘“The Black and Cruel Demon” and its Transformations of Space: Toward a Comparative Study of the World Literature of Oil and Place’, *Interdisciplinary Literary Studies*, 14.1, pp 56–78
121. Wenzel, J, 2017, ‘Introduction’, in Szeman, I, Wenzel, J and Yaeger, P (eds), *Fueling Culture: 101 Words for Energy and Environment* (New York: Fordham University Press), pp 1–16
122. White, L, 1943, ‘Energy and the Evolution of Culture’, *American Anthropologist*, 45.3, pp 335–356
123. White, R, 1995, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang)
124. Wilhite, H, 2008, *Consumption and the Transformation of Everyday Life: A View from South India* (Basingstoke: Palgrave Macmillan)
125. Winther, T, 2008, *The Impact of Electricity: Development, Desires and Dilemmas* (New York: Berghahn Books)
126. Wosk, J, 2001, *Women and the Machine: Representations from the Spinning Wheel to the Electronic Age* (Baltimore: Johns Hopkins University Press)
127. Wrigley, E, 1988, *Continuity, Chance and Change: The Character of the Industrial Revolution in England* (Cambridge: Cambridge University Press)
128. Wrigley, E, 2010, *Energy and the English Industrial Revolution* (Cambridge: Cambridge University Press)
129. Yaeger, P, Shannon, L, Nardizzi, V, Hiltner, K, Makdisi, S, Ziser, M and Szeman, I, 2011, ‘Editor’s Column Literature in the Ages of Wood, Tallow, Coal, Whale Oil, Gasoline, Atomic Power, and Other Energy Sources’, *PMLA*, 126.2, pp 305–326
130. Zachmann, K, 2002, ‘A Socialist Consumption Junction: Debating the Mechanization of Housework in East Germany, 1956–1957’, *Technology and Culture*, 43.1, pp 73–99
131. Zeisler-Vralsted, D, 2014, *Rivers, Memory, and Nation-Building: A History of the Volga and Mississippi Rivers* (New York: Berghahn Books)

Author information



Hiroki Shin

Research Fellow

[Contact this author >](#)

Dr Hiroki Shin is a socio-economic historian studying Britain and Japan in the modern period (c.1700 to the present). After completing his PhD at the University of Cambridge in 2009, he was a visiting fellow at Yale University (2008) and a research associate at the University of York (2008–2012) and the University of Manchester (2013–2014). Since January 2015, he has been a Research Fellow in History at Birkbeck College