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Off-Grid Empire:
Rural Energy Consumption in Britain and the British Empire, 1850-1960

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Edited by Abigail Harrison Moore (University of Leeds, UK), and R.W. Sandwell,
(University of Toronto, Canada)
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I. Introduction: Off-Grid Empire: Rural Energy Transitions across the British Empire

R. W. Sandwell (University of Toronto, Canada) and Abigail Harrison Moore (University of Leeds, UK)

Energy is in the news these days. As scientists argue with increasing urgency, burgeoning human dependence on fossil fuels has been changing the global climate to such an extent that we are now confronting 'the possibility that our economy is transgressing the planetary boundaries that provide a safe operating space for humanity'.[i] As individuals contemplate just how a low-carbon energy future might soon affect their own lives, historians have begun to focus more attention on the energy transitions that transformed just about every aspect of daily life over the past two hundred years, and with it, human societies. The essays in this collection contribute to a growing historical discussion about the intimate ties between energy consumption on the one hand, and the material and social practices of everyday life on the other.

Our particular focus in this international and multi-disciplinary Special Issue of The History of Retailing and Consumption is on energy in rural life across the British Empire from 1850 to 1960. Energy practices played a key role in dominant twentieth century narratives, defining and measuring the remarkable changes that were occurring in this era, changes that were commonly understood by the end of the nineteenth century within a progress-to-modernity narrative. Urban observers throughout this entire period were particularly struck by the uneven pace of change. Rural / urban differences stood out: most rural households in Britain and Canada, and almost all of rural Africa and India remained unconnected to centralized networks of power (first manufactured gas and then electricity) long after service reached urban middle class homes. Rural populations' continued reliance on coal, oil lamps, oxen, horses, human labour and other remnants of the organic energy regime became emblematic of rural societies' widely-perceived failure to progress. By the early twentieth century, indeed, rural societies across the British Empire had come to represent the absence or antithesis of a modernity that was increasingly identified with

new centralized and overwhelmingly urban networks of power, particularly the electrical grid.[ii]

Essays in this collection will challenge representations of rural energy use, and energy users, as simply backward, failing and/or lacking. They confirm that it was owners of elite country homes that were, in fact, the first to install electricity in their homes. But there is little doubt that poverty played a significant role in limiting the extension of capital-intensive modern networks in rural regions and entire countries just as surely as it had limited the poor's access to adequate food, heat and light within the organic energy regime throughout history. As increasingly cheap, modern, network energy became available in urban areas, it gave urban populations a boost in real wealth that was experienced not only in society-wide increases in standards of living and comfort, but in the widely-perceived relative impoverishment of rural communities.[iii] Reflecting both the technical problems of connecting rural and remote areas to modern grid networks, particularly electricity, and the increasing poverty of rural people compared to urban in the late nineteenth and twentieth centuries, rural/urban difference emerged as another indicator, and indeed predictor, of energy inequality under modernity. The 'off-grid' energy practices of rural populations were, in other words, both real and imagined sources of economic inequality and relative deprivation.

Essays in this collection will nevertheless challenge the idea that rural, predominantly off-grid energy use across the British Empire was either simple or unchanging. At the point of production, traditional forms of energy might have appeared as simple relative to the massive network complexity of an electrical grid or gasworks, but this was not the case at the point of consumption: it was much more difficult to start a fire than turn a gas stove on, more time consuming to tend a tallow candle than to flick a light switch. Organic energy (a mix of energy carriers including wood, wind, water and particularly muscle power) required considerable human skill and knowledge to be utilized effectively, and their use continued well into the 1850-1960 period. Furthermore, essays in this collection demonstrate that most rural populations successfully incorporated a variety of new but non-grid forms of energy in their homes, particularly petroleum lighting, and new kinds of heating and cooking fuels and the technologies to make use of them. Age-old rural practices co-existed and

interacted with the emerging new energy sources in various ways, and over the course of several generations. Rural energy modernization was not, therefore, an oxymoron: rural populations experienced a changing energy landscape in ways that distinguished, but did not exclude them from the profound energy-related transitions of their urban counterparts in Britain and across the British Empire.

With its more colloquial meaning of 'not quite on track', 'off-grid' also seems to sum up some of the more innovative methodologies, less well-known geographical, political and cultural frames of reference, and historiographical approaches adopted by authors in this collection. And as some of our authors hint, in quite practical terms the prevalence of off-grid energy within the homes of an earlier era and in other places just might have some important lessons for both rural and urban homes in the future.

Why a History of Energy Consumption in the Home?

Being invited to produce a special edition of the History of Retailing and Consumption enabled us to focus on the idea of consumption through the lens of the adoption of energy into the home. The idea of the 'everyday' is key. As the famous Mrs Beeton's Book of Household Management claimed in 1915, the world 'has travelled of late at electric speed, and far-reaching changes of time have touched household affairs from standpoints apparently far remote'.[iv] Energy historians are providing persuasive arguments that the transition to fossils fuels was the necessary, if not sufficient, cause of the vast array of changes that historians of earlier generations associated more generally with industrialization and urbanization.[v] Abundant, cheap, powerful and portable energy from underground stores of coal, oil and natural gas supplemented, and eventually almost entirely replaced the energies of the organic regime – wood, wind, water and muscle power. Fossil fuels, and later electricity, transformed energy into a readily available purchasable commodity, dramatically boosted energy consumption, and integrated households within huge, complex, and centralized network systems. Exploiting massive and concentrated energy stocks liberated human populations for the first time from dependence on local environments and daily or seasonal rhythms, creating sustained growth along with some now-familiar catastrophic environmental consequences at sites of production, distribution and consumption.

Economic and technological historians have long focused on the massive increase in industrial production set in motion by the new fossil fuels and new technologies of steam and steel. More recently, historians have been linking the transition to fossil fuels directly to a range of profound social and economic transformations they argue are characteristic of industrial societies, from urbanization to democracy.[vi] In an important sense, the growth of consumer society itself depended on new positive feedback loops characteristic of industrializing societies: in the later nineteenth century, coal powered trains and steamships lowered transportation costs, and increased the number of factories and workshops, creating new goods and more employment, thereby facilitating sustained economic growth for the first time in human history.[vii] The new energies affected consumer societies in other ways as well. Notwithstanding Ruth Schwartz Cowan's compelling evidence that new technologies tied women more tightly to home-based labour until the mid-twentieth century, other historians have linked women's later political and economic emancipation, crucial to their emerging role as leading consumers in the home, to the new era of energy abundance, arguing that labour saving appliances in the home eventually 'liberated' women from their time-consuming and physically exhausting domestic labour within the organic energy regime.[viii]

A focus on the household, and on domestic consumption, allows us to see the ways in which changing energy use was experienced at the level of everyday life. As essays in the collection demonstrate, where and how people obtain the energy they need has had a profound influence on the way people live. The choices that households made about how, when and even if to adopt changing forms of energy and new technologies played a significant role in the development of the new networks of power. Householders' demand for coal to heat their homes, for example, first stimulated the growth of the coal industry in the early decades of nineteenth century United States. The first oil industry was driven by a world-wide demand for a cheap and convenient home lighting from what was known as the coal oil, kerosene or paraffin lamp.[ix] A focus on the household, therefore, demonstrates the agency of energy consumers in facilitating the changes long associated with industrialization.

But the focus on energy use in the home does more than provide simple causal explanations about energy demand; a focus on energy consumers has the potential to complicate and disrupt teleological assumptions, challenging earlier triumphalist narratives of inevitable and painless 'progress to modernity', allowing historians to move beyond concepts of monolithic, homogeneous and one directional change. A growing body of research on energy transitions, including essays by Sandwell, Sayer, Hasenohrl and Chatterjee in this collection, is confirming that notwithstanding the big picture of the transition from the organic to the mineral regime, energy transitions have been highly variable, intermittent, overlapping, and, in some cases, strongly resisted.[x] A focus on the household helps to show this process in action. In this collection, Sayer demonstrates that farmers often chose not to follow the latest or even what was considered 'the best' technologies available. Sandwell and Sayer emphasize that rural people instead made a variety of energy-related decisions based on a range of considerations that took into account particular local geographies, the availability of energy alternatives, and familiar patterns of energy use. Gooday and Kay's history of home-made electricity at Harewood House, Yorkshire, uses disputes over electricity bills to reveal differing conceptions of and expectations for domestic electricity use even as nation-wide centralized supply became the norm. Hasenohrl and Chatterjee's work in India and Africa explores the ways that race and class were deeply embedded in who had access to electricity, and for what purposes. In short, a focus on the household brings into view the ways that people engage with energy at the scale of everyday life, not only making it possible to 'see' changes in energy use over time, but to better understand their larger causes, contexts and consequences, and at various scales of observation: personal, political, local, regional, national and, as this volume emphasizes, international.

Why focus on Rural Energy Consumption?

Energy history has not only tended to focus on industrial developments and usages, but also the urban, and for some good reasons. The dramatic role that the new energies played in shaping human societies was first visible in urban areas.[xi] Arguably one of the most novel aspects of the new energy from the consumer's point of view was its delivery through a centralized, specialized network or grid system. Gas, manufactured by the scientific process of distilling coal and distributing it from a centralized source (the gasworks) through a network of underground pipes

revolutionized energy supply from the early nineteenth century. [xii] In the United States, Edison explicitly modelled his first network system for providing home electrification on gas lighting.[xiii] Centralized networks of power around the world were, however, poorly adapted to areas of low population density – that is, to most rural areas. The economies of scale needed to support such large, expensive centralized systems required large numbers of people in a condensed area – i.e. cities or towns – to be financially and technologically viable. Widespread electrification did not occur in most rural places until the middle of the twentieth century. As Harrison Moore, Gooday and Kay demonstrate, only the very wealthy had access to rural electricity in the late nineteenth century England, and only when they were able to overcome cultural as well as technological barriers to create their own self-sustaining mini-systems of energy provisioning. And as Hasenohrl and Chatterjee argue in their respective chapters, a basic minimum of disposable income was required by urban and rural households alike before they could join grid systems. Across Africa and India barriers of class, race and gender effectively restricted access to these systems to an elite minority. 'Off-grid energy', defined as not being connected to a centralized grid system, was a defining element in material cultures of energy outside of urban areas in both 'developed' and 'under-developed' worlds in the nineteenth and much of twentieth centuries, and these material cultures had a significant effect on the social and cultural contours of everyday life.

While not disputing that the rural was eventually changed as dramatically as the urban by modern systems of energy, this collection of essays draws attention to the long duration and idiosyncratic nature of the transition to energy modernity across the British Empire. We can look to the pages of the lighting catalogues discussed in Harrison Moore's work to see a literal iteration of this, where candle-sticks are promoted alongside oil lamps, gas lights and electric lighting systems. As well as documenting the different energy choices available in rural and urban areas, these essays argue against the supposition that because most rural areas were 'off-grid', they were therefore immune to the changes associated with new energy systems and modernity more generally. Instead, they argue that rural households often changed significantly, if in different ways than their urban 'networked' counterparts. Patterns of daily life within rural households were affected, often quite dramatically, by new non-grid energies. Kerosene lighting, for example, provided a cheap and plentiful

petroleum-based form of high-quality lighting available for the first time to most rural people across the British empire, in large part because of its low cost, portability within the home and farm, and easy transportability along non-specialized routes of power.[xiv] Sandwell's article in this collection also documents the rapid adoption of the coal-and-wood stove, arguing that it became the country's first fully integrated consumer durable in mid-nineteenth century rural Canada. Its success can be explained by the continuity it provided with practices of the organic regime - decentralized, non-commodified, locally-focused, household-based and, in a word, vernacular – while taking full advantage of newly available technologies and materials provided through emerging networks of steel and steam, thereby providing a cheaper and more effective source of heat. In Harrison Moore's example of the architecture of Philip Webb, we see the wealthy deliberately choosing to commission a designer who offered an Arts and Crafts celebration of the rural, local and vernacular. When we focus on how people are involved in the production of their own and others' energy, we expand our thinking on consumption patterns and provide different perspectives to those traditionally taken in energy history, history of the family, rural history, or the history of consumption.

And as essays by Sayer and Sandwell argue, if rural people did not have access to the grid, it was in part because the grid system of energy delivery was not considered 'worth the cost' of complexity or cash compared to other energy alternatives with which rural households were familiar, and to which they had easier access, such as peat, wood or bottled gas. Hasenohrl and Chatterjee further complicate our understanding of 'off grid' by showing how belonging to the grid was emblematic of, and reiterated in a variety of material ways, relations of power and politics in many areas of Africa and India. Harrison Moore's study demonstrates the ways in which relations of power within electrified English country houses were also sketched out in relation to access to energy, and particularly around questions of whether or not to electrify servants' quarters.

Historiography and the Challenges of Writing about Energy

As a whole, these essays examine various kinds of off-grid energy use in the home, including energy used for lighting, heating, communication and water supply. Focusing our energy lens on different kinds of rural homes in different countries, this

collection therefore emphasises the diversity of energy experience in the late-nineteenth and twentieth century countryside, while highlighting rural/urban difference as a central access of power. The international essays presented here consider the scaling of energy decisions, exploring the links between locally-specific practices 'on the ground', and global networks of knowledge and power. Looking beyond the European/Canadian experiences, the essays consider transnational rural consumption practices, mainly from the vantage point of the household, in the British Empire, examining in the process transnational and transcultural dialogues that took place around socially and politically mediated practices and access.

Each of the essays documents the episodic, highly variable and non-linear nature of rural energy transitions and consumption practices, and explores the multiple factors involved in the energy decisions of rural people in our respective countries, and studies just how they adopted (or as Graeme Gooday has termed the process 'domesticated'), rejected, and were sometimes denied access to, modern energy carriers in their homes and farms before the mid-twentieth century. The collection as a whole urges the centrality of 'rural' as a category of analysis in understanding the energy transitions that the industrializing world was experiencing in the late nineteenth and twentieth centuries. The essays bring together different disciplinary perspectives, including history, art history, the history and philosophy of science, environmental history, economics and social policy, from academics exploring different global locations. We hope that this volume facilitates more transnational comparisons of the decision processes that drove energy transitions in rural locations. and in the process, might point towards sustainable solutions for energy consumers of the future.

We have left it to Ute Hasenohrl to explore the broad topic of energy with her overview of electrification across the British Empire, directing our audience away from the more familiar focus on the white English experience of energy transitions as the defining one. Her essay, immediately following this general introduction to the collection, provides an introduction to the subject as a whole, beautifully drawing together and critically exploring the key literature on our subject. As she eloquently says, 'the history of electrification [and consequently energy supply more broadly] is a topic at once extremely well and under-researched'. In her tracing of the

historiography of our subject from Thomas Hughes' seminal work, Networks of Power (1983) to today, we can see that scholars have aimed to investigate the large patterns of technical, economic and institutional development in energy supply and consumption. Likewise, as the literature on environmental issues and histories has grown, and the pressure has increased to look back to locate potential solutions to today's social, political and economic concerns, we have tended to look at the macro, urban and largescale. Rural energy histories have long been in the shadow of urban developments, both in terms of history and historiography. As Hasenohrl demonstrates, the 'cultural dimension of the introduction of new forms of energy and their effects on everyday life have received little attention'. This volume aims to pick up this challenge, helping to usher in a new phase of scholarship that explores energy from the point of view of people, focusing on the rural home, to explore local solutions and responses as a way of producing 'on the ground' studies that challenge 'the homogeneity of energy transitions worldwide and even within individual countries and regions'.[xv]

[i] Astrid Kander, Paolo Malanima and Paul Warde, Power to the People: Energy in Europe over the Last Five Centuries, (Princeton University Press, 2014), 2.

[ii] For a discussion of the close relationship between energy and modernity, see for example Ronald C. Tobey, Technology as Progress, The New Deal and the Electrical Modernization of the American Home (Berkeley: University of California Press, 1996); Ronald Kline, 'Agents of Modernity: Home Economics and Rural Electrification, 1925-1950', Sarah Stage and Virginia Vincenti eds., Rethinking Home Economics: Women and the History of a Profession (Ithaca: Cornell University Press, 1997), 237-252; Katherine Jellison, Entitled To Power: Farm Women and Technology, 1913-63 (Chapel Hill: University of North Carolina Press, 1993); Wolfgang Schivelbusch, Disenchanted Night : the industrialization of light in the nineteenth century; translated from the German by Angela Davies.(Berkeley: University of California Press, 1988); Kirstin Ross, Fast Car, Clean Bodies: Decolonization and the Reordering of French Culture (Cambridge: MIT Press, 1996).

[iii] For a discussion of poverty and rural electrification in Canada, and the social reform movements this association stimulated, see R. W. Sandwell,, 'People, Place and Power: Rural Electrification in Canada, 1890-1950', in Paul Brassley, Jeremy Burchardt and Karen Sayer, eds. Transforming the Countryside: the Electrification of Rural Britain, (London and New York: Routledge, 2017), 178-204; Keith Fleming, Power at Cost: Ontario Hydro and Rural Electrification, 1911-58 (Montreal and Kingston: McGill Queen's University Press, 1992).

[iv] Mrs. Beeton's Book of Household Management, Preface to the New Edition, vi, (London: 1915), quoted in Clive Aslet, The Last Country Houses (New Haven and London: Yale, 1982), 87.
[v] This argument has been made most forcefully from the late 1980s by A. E. Wrigley. See for example E. A. Wrigley's, Continuity, Chance and Change: The Character of the Industrial Revolution in England (Cambridge: Cambridge University Press, 1988) which first urged a re-evaluation of the Industrial Revolution from the perspective of energy use. See as well Wrigley, 'Reflections on the History of Energy Supply, Living Standards and Economic Growth,' Australian Economic History Review, 33 (1), 1993, 3-21, esp. 19-21. See Kander, Malanima and Warde, Power to the People, and Christopher Jones, Routes of Power: Energy and Modern America (Cambridge, Mass: Harvard University Press, 2014) for similar articulations. For this argument in the Canadian case, see R.W. Sandwell, 'Introduction', R.W. Sandwell, ed. Powering Up Canada: A History of Power, Fuel and Energy from 1600 (Montreal and Kingston: McGill-Queen's University Press, 2016).
[vi] The argument that the earliest use of fossil fuels, coal, created democracy is made by Timothy Mitchell, Carbon Democracy: Political Power in the Age of Oil (London, New York: Verso, 2011). For an exploration of other systemic changes created by new energy carriers, see See Kander, Malanima and Warde, Power to the People; Roger Fouquet, Heat, Power and Light: Revolutions in Energy Services (Cheltenham, UK and Northhampton, MA, USA: Edward Elgar Publishing Ltd., 2008); Bob Johnson, Carbon Nation: Fossil Fuels in the Making of Modern Culture (Lawrence: University of Kansas Press, 2014); Imre Szeman and Dominic Boyer, Energy Humanities: An Anthology (Baltimore: Johns Hopkins Press, 2016); Andreas Malm, Fossil Capital: The Rise of Steam Power and the Roots of Global Warming (London: Verso Press, 2016).
[vii] Christopher Jones does a particularly good job of describing the society-changing attributes of fossil fuels, particularly coal, in Christopher F. Jones, 'A Landscape of Energy Abundance: Anthracite Coal Canals and the Roots of American Fossil Fuel Dependence, 1820-1860', Environmental History, 15 (July 2010), 449-484.
[viii] Emanuela Cardia, 'Household Technology: Was it the Engine of Liberation?' provides the most convincing economic data to support this argument. https://ideas.repec.org/p/red/sed008/826.html The new emphasis on energy as a discrete historical factor has re-ignited interest in the 'classic' works in the history of women's work, such as Ruth Schwartz Cowan, More Work for Mother: The Ironies of Household Technologies from the Open Hearth to the Microwave (New York: Basic Books, 1983), and Caroline Davidson, A Woman's Work is Never Done: A History of Housework in the British Isles, 1650-1950 (London: Chatto and Windus, 1982), and promises some new and exciting directions for women's history as well as energy history. For a summary of some of the recent literature on domestic labour and energy, see R.W. Sandwell, 'Pedagogies of the Unimpressed: Re-Educating Ontario Women for the Modern Energy Regime, 1900-1940', Ontario History, Volume CVII, No. 1 / Spring. 2015, 36-59.
[ix] On the role of the household in stimulating the growth of new forms of energy, see Christopher Jones, 'The Carbon-Consuming Home: Residential Markets and Energy Transitions', Enterprise & Society, Vol.12, No.4 (December 2011), 790-823.
[x] Not only did later-industrializing countries tend to make the transition at different rates and sequences than the norm suggested by western and northern experiences, but evidence suggests that industrialized countries themselves varied considerably across

different energy services within their own national borders. See for example, M. D. Mar Rubio and Mauricio Folchi, 'Will small energy consumers be faster in transition? Evidence from the early shift from coal to oil in Latin America,' Energy Policy, (2012), 50, 50-61; Ben Gales, Astrid Kander, Paolo Malanima and M. d. Mar Rubio, 'North verses South: Energy transition and energy intensity in Europe over 200 Years,' European Review of Economic History, (2007), 11, 219-25.

[xi] The great classics of energy history reflect this urban bias, for example David Nye, Electrifying America: Social Meanings of a New Technology, 1880-1949 (Cambridge, Mass.: The MIT Press, 1990); Thomas Hughes' international study, Networks of Power : Electrification in Western Society, 1880-1930 (Baltimore: Johns Hopkins, 1983). While a number of excellent studies of Canadian hydro-electricity focus on the environmental rural contexts of energy production, energy consumption focuses almost exclusively on urban customers. H.V. Nelles, The Politics of Development: Forests, Mines and Hydro-electric Power in Ontario, 1849-1941 (Toronto: Macmillan of Canada, 1974), Matthew Evenden, Allied Power: Mobilizing *Hydroelectricity during Canada's* Second World War (Toronto: University of Toronto Press, 2015). There are some important exceptions to this, including Graeme Gooday, Domesticating Electricity: Technology, Uncertainty and Gender, 1880-1914 (London: Pickering and Chatto, 2008); Brassley, Burchardt and Sayer, eds. Transforming the Countryside; and in North America, Jellison, Entitled To Power: and Ronald Kline, Consumers in the Country: Technology and Social Change in Rural America (Baltimore and London: Johns Hopkins Press, 2000).

[xii] Leslie Tomory, Progressive Enlightenment: The Origins of the Gaslight Industry, 1780-1820 (Cambridge: MIT Press, 2011).

[xiii] Leslie Tomory, "Building the First Gas Network: 1812-1820" Technology and Culture, Volume 52, Number 1, (January 2011), pp. 75-102, 76.

[xiv] On the significance of petroleum lighting in rural Canada, see R.W. Sandwell, 'The Emergence of Modern Lighting in Canada: A Preliminary Reconnaissance', The Extractive Industries and Society: An International Journal Volume 3, Issue 3, 2016, 850-863.

[xv] Kander, Malanima, Warde, Power to the People; Roger Fouquet, 'The Slow Search for Solutions: Lessons from historical energy transitions by sector and service', Energy Policy, 38, (2010), 6586-6596; Rubio and Folchi, 'Will small energy consumers'; Sandwell 'The Emergence of Modern Lighting in Canada'.