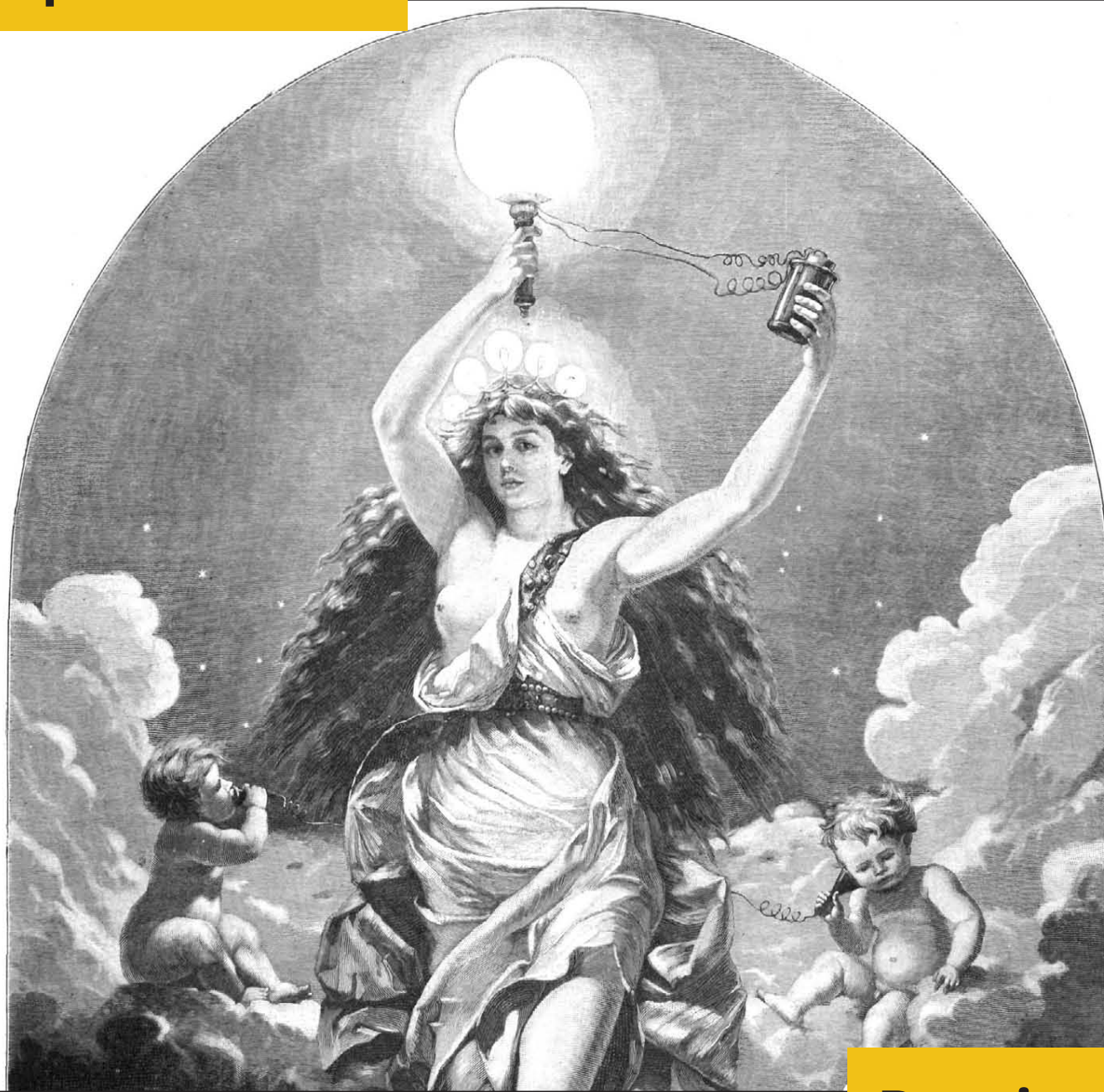


## Special issue

## Shifting Narratives of Electricity and Energy in Periods of Transition



Electricité et énergie en temps de  
transition: changer les récits

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**SPECIAL ISSUE**

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Periods of Transition**

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## Shifting Narratives of Electricity and Energy in Periods of Transition

### Abstract

This special issue aims at providing nuanced and multi-layered understandings of historical choices regarding, and perceptions of, electric supply and electrical technologies, by taking into consideration diverse groups, actors, agencies, and communities in distinct historical and regional settings. It also aims at rethinking energy systems, practices, and transitions through questions of gender, religion, race, design and architecture, material culture, colonialism, nationalism(s), and varied interpretations of tradition and modernity. It insists on reorienting our gaze from centring on electricity to examining electricity within existing energy regimes and sources, to historicise and problematise the place of electricity, electric supply and use within complex conceptions of energy transitions, thereby challenging linear narratives of progress and modernisation.

### Plan of the article

→ New Modes of Thinking: Beyond Electrification and Transitions



- 1 This special issue arises from ongoing dialogue within and between the fields of electrical history, energy humanities, and other historical sub-disciplines. The articles that comprise this volume are products of conference panels and workshops that involved papers providing nuanced and multi-layered understandings of historical choices regarding, and perceptions of, electric supply and electrical technologies, especially taking into consideration diverse groups, actors, agencies, and communities in distinct historical and regional settings. Much of the work also happened in reading groups organised by the Electrical History Research Group based at the Centre for History and Philosophy of Science, University of Leeds, as we sought to understand the consequences of our collaborations and think about transforming individual papers and research into a coherent volume of articles. What historiographical contributions could be drawn from all the workshops and seminars, and individual research? What analytical and/or methodological threads tied our studies that traversed broad geographical and chronological ranges? How could histories of electricity be written through analytical and theoretical frameworks defined by other fields of historical inquiry? In short, what might our volume add to current discussions around not simply histories of electricity, but to a rethinking of energy systems and practices through questions of gender, religion, race, design and architecture, material culture, colonialism, nationalism(s), and varied interpretations of tradition and modernity?
- 2 Although the empirical research and historical analyses in these articles contribute to electrical historiography in their own right, this special issue has been conceptualised primarily in terms of how electrical histories can engage with, elaborate and contribute to energy histories. As such, in organising this special issue we sought to engage with a central concern in both energy and electrical histories and scholarships: concepts of energy systems and transitions. Our volume starts from the premise that electrical history can offer a more subtle approach to energy transitions by challenging and unsettling a traditional narrative in both energy and electrical scholarship — and in public debate more broadly — dominated by technocratic debates and agencies, system-centred thinking, and notions of (Western) modernity as the outcome of the spread of large technological systems. Together, the studies in this volume insists that instead of seeking a framework that examines transitions — both energy and electrical — as processes of startling modernisation, we need to reorient our gaze from centring on electricity to examining electricity within existing energy regimes and sources that existed before, alongside and competed with electricity. As such, while recognising the ways in which historians of technology and electricity, and energy scholars have rooted themselves in analyses that complicate the positivist, technocratic and teleological connotations of terms such as “electrification” and “energy transition”, this special issue asks (and answers) a more pertinent and pressing question: how can we historicise and problematise the place of electricity, electric supply and use within complex conceptions of energy transitions, broadly understood as processes of crisis, change and uncertainty, beyond “phasi-st-style” thinking? Each of the detailed studies in this volume provide their own answers to this question.
- 3 Discussing, and even questioning the place of electricity within energy regimes makes our volume relevant to discussions normally located well within the separate disciplinary realms of electrical histories and energy humanities. In challenging the perversely linear, teleological, and positivist models that continue to define much of the “modernist” scholarship, this volume requires that we first understand and problematise what energy and electrical systems are the centre of. As such, canonical literature in both energy and electricity history has for so long reflected epistemological centres that are not aware of how many contingently situated factors mattered in the past when “electrifying” societies and will matter in the energy transitions of the present. The articles in this volume, therefore, while studying histories of electric supply and technologies, are more focused on the specific sites and energy regimes within

which they were introduced and, hence, produced. The approach we take to electrical histories in this volume takes into consideration the factors that drive individual and collective energy choices, the socio-political frameworks within which these choices were made, the evolving social roles in energy systems, and the values of everyday practices and beliefs. Our approach displaces the centrality of electricity and electrical systems by introducing material, social, cultural, and political nuances into historical examinations of how communities and social groups understood, imagined, responded to, or engaged with electricity, electric supply and use, and other sources of energy from within their existing practices, experiences, and distinct outlooks. Only by acknowledging new and diverse agencies (social, cultural, political, material), introducing localised socio-cultural concerns and needs, as well as situating electricity within complex, plural and evolving contexts and environments can we form the most socially inclusive and culturally differentiated account of non-consensual and heterogeneous “electrification” and, by extension, of energy transitions. This allows for a reinterpretation of ideas of transition and energy shifts as a move towards a more positive and utopian future.

- 4 The dominant theoretical frameworks in existing literature on electrical and energy histories have arrived at junctures that provide an instructive starting point for the kinds of historiographical interventions in this volume. Electrical histories have had a complex relationship with the concept of transition. There is a long tradition within electrical historiography that has been concerned with the ways in which electrical and energy systems “developed,” broadly defining these processes through lenses of industrialisation and modernisation. Questions about transitions to industrial and electrified societies, the relations between the state, market and experts, and the gradual modernisation of societies and lives have revealed “transition” as a technocratic idea. Since Thomas P. Hughes’s *Networks of Power* (1983), historians have examined the development of electric supply as a top-down and almost unavoidable process of evolution and

growth influenced by economic, regulatory, managerial, legislative, and governmental principles and institutions. Hughes focused on the hegemony of engineers and entrepreneurs, and their interactions with the state and other political agents, thereby making these “system builders” the main, even unique, actors within historical narratives. The Hughesian narrative, with its assumption of an engineering (and masculine) prerogative, conveys the image of consumers as passive and acquiescent actors whose only behaviour is to respond to external pressures and learn how to use new electrical technologies. Although historians inspired by Hughes have attempted to complicate the narrative by being more sensitive to social dimensions of electric production and supply, they tend to centre on the technocratic premise that political, economic, and technological contexts mainly define the processes central to the growth of electrical systems. Since Hughes, other studies, for instance David E. Nye’s *Electrifying America* (1992), have offered nuanced accounts of electrification as a symbiosis of technology, society, and culture. Nevertheless, even such complex narratives are weakened through situating “electrification” — understood as the unfolding of electric supply and use — within the conceptual, ideological, and cultural caging of “modernisation”.<sup>1</sup> Since “modernity” was a desirable and unavoidable outcome of the spread of electrical technologies, the development of electricity harmonised with society’s demands for new sources of energy, while rejections and anxieties are treated as relatively marginal phenomena.

System-centred accounts in electrical history 5  
have oftentimes converged with phasist-centred accounts in energy history, thus affecting ideas on both energy and electricity transitions. Based on grand historical narratives of the development of energy resources and technologies, discussions on transitions have focused on the ways in which economic growth has

<sup>1</sup> Suvobrata Sarkar’s works on the history of electricity in colonial Bengal, for instance, follow Nye’s analytical framework. See: Sarkar Suvobrata, “Electrification of Colonial Calcutta: A Social Perspective”, *Indian Journal of History of Science*, vol. 53, n° 4, 2018, 211-216.

been dependent on access to ever-increasing amounts of new energy resources<sup>2</sup> The technocratic and innovation-centric determinism in these approaches has produced historical insights that have widespread implications for public debate on climate change and the depletion of resources, including assumptions about the necessity, legitimacy and sustainability of current energy regimes, practices, and ideas of unlimited growth. Reducing carbon emissions and choosing between alternative energy resources and technologies would require complex and multi-layered modifications to the organisation and operation of energy systems. Such processes would also involve disentangling the different forms of social, political, cultural, and economic assemblages that, in combination with energy systems and resources, have institutionalised certain energy regimes, energy-related lifestyles and cultural understandings of energy.<sup>3</sup> Yet, energy planning overlooks the broader social and cultural dimensions of energy change, including the meanings and consequences of energy systems for human societies through history. Technocratic approaches and systems-centred thinking oftentimes consider energy transitions as unproblematic processes that can be accomplished without interrogating current energy regimes, and their implications for social and environmental justice. By placing energy as the main driver of economic and social change and arguing that social or political organisation was unthinkable without the utilisation of energy resources, both historical and current discussions have, therefore, privileged the large-scale, macro-social and institutional aspects of energy production and provision. Likewise, they take incumbent energy practices for granted as

unquestioned “standards”. The end point of such histories is also self-evident — an introduction of modernity characterised by “transitions” to new and varied sources of energy and related technologies.

Systems-centred accounts, however, remain 6  
influential for understanding the role of inventors, engineers, utilities’ managers, financiers, and infrastructures in the development of energy systems and their capacity to evolve in distinct national and regional settings. In addition, more recent LTS authors are developing more refined approaches by conceptualising system building “as a distributed, highly contested, and open-ended multi actor game that cannot be adequately captured from a single theoretical or actor perspective and should be studied empirically at multiple sites and scales”.<sup>4</sup> Furthermore, historians have in recent years convincingly attempted to reorient disciplines and methodologies within histories of electricity and energy humanities by recognising the limitations of terms that have defined both disciplines: “electrification” and “transitions”. “Electrification”, according to recent historical critique, is a simplistic and problematic representation of electricity as an autonomous force capable of triggering broad social, cultural, and political changes, and modernisation. In *Domesticating Electricity* (2008), Graeme Gooday has warned us of the teleological and deterministic historical narratives that such approaches entail, maintaining that historians must instead re-evaluate and historicise the contested nature and meanings of electricity itself. As historians have shown, the cultural problems generated by the arrival of electrical power and communications were not merely transitory inconveniences, but opportunities to meld electrical hardware into culturally agreeable forms — including aesthetic and environmental cultures — and amplify

<sup>2</sup> Fred Cottrell, *Energy and Society: The Relation Between Energy, Social Change and Economic Development* (Westport, CT: Greenwood Press, 1970); Alfred Crosby, *Children of the Sun: A History of Humanity’s Unappeasable Appetite for Energy* (New York, NY: Norton, 2006); Allan Mazur, *Energy and Electricity in Industrial Nations: The Sociology and Technology of Energy* (Oxon and New York, NY: Routledge, 2013); Vaclav Smil, *Energy and Civilization: A History* (Cambridge, MA: MIT Press, 2017).

<sup>3</sup> Clark A. Miller, Illes Alastair, Christopher Jones, “The Social Dimensions of Energy Transitions”, *Science as Culture*, vol. 22, n° 2, 2013, 135–148 (at 135).

<sup>4</sup> Benjamin K. Sovacool et al., “Sociotechnical Agendas: Reviewing Future Directions for Energy and Climate Research”, *Energy Research & Social Science*, vol. 70, 2020, 1–35 (at 10); also, Mikael Hård, “Beyond Harmony and Consensus: A Social Conflict Approach to Technology”, *Science, Technology, & Human Values*, vol. 18, n° 4, 1993, 408–432.

cultural contours in new ways. Indeed, the eventual acceptance of electrical technologies in the 19<sup>th</sup> C. and early 20<sup>th</sup> C. was not inevitable but happened in different ways and places involving several actors and choices.<sup>5</sup> Moreover, rejections and negotiations meant that electricity was not always interpreted through the framework of modernity. Given the cultural problems derived from unresolved questions of electricity's origins and physical nature throughout the 19<sup>th</sup> C., discussions on electricity encompassed divergent threads beyond modernisation and industrialisation — from the romantic to the occult.<sup>6</sup>

- 7 A wealth of literature is now looking at the numerous settings which mattered, including mapping out the rich diversity of actors — both human and non-human — networks, meanings, and interpretations of electricity through social, political, and cultural engagements. Electricity, as opposed to an entity defining and, concurrently, being defined by interlocking economic and political systems, is now situated by historians as a socio-technical assemblage that

involves machines and material infrastructures, their social and institutional organisation, social groups, consumers and non-users — including their complex and diverse identities in flux during their encounter with electrical technologies — and perceptions and representations of electricity and other sources of energy. Discussing and engaging this diverse bundle of agents but also re-reading the role of conventional system builders as to highlight their complex interactions with other agencies and drivers, allows for a richer understanding of the factors and actors that shaped trajectories of electrical adoption, scepticism, resistance, non-use, and misuse. Placing such complexities at the centre of historical analyses, especially moving from “big histories” of large technological systems to specific, temporally, and spatially bounded sites or communities where energy debates occurred, has allowed historians to complicate notions of large-scale, centralised electric power as extensions of political and ideological power, and the advent of an electrical modernity as a straightforward consequence of “electrification”.<sup>7</sup> The historical entanglements between electricity and “modernity,” historians have shown, depended on the multifaceted ways in which different individuals and social groups imagined and employed electricity from within their diverse social, political, cultural, and ideological outlooks. Moreover, the variegated interpretations of electrical modernity were tied to the type of promises and challenges emerging from “modernisation” as a messy and complex process of societal and cultural change that was different everywhere.<sup>8</sup>

<sup>5</sup> Charles Bazerman, *The Languages of Edison's Light* (Cambridge, MA; London: MIT Press, 2002); Ronald Kline, “Resisting Consumer Technology in Rural America: The Telephone and Electrification”, in Nelly Oudshoorn, Trevor Pinch (eds.), *How Users Matter. The Co-construction of Users and Technology* (Cambridge, MA: MIT Press, 2003), 51–66; Chris Otter, *The Victorian Eye: A Political History of Light and Vision in Britain, 1800–1910* (Chicago, IL: University of Chicago Press, 2008), 173–214; Abigail Harrison-Moore, Graeme Gooday, “True Ornament? The Art and Industry of Electric Lighting in the Home, 1889–1902”, in Rebecca Wade, Gabriel Williams and Kate Nichols (eds.), *Art versus Industry? New Perspectives on Visual and Industrial Cultures in Nineteenth-Century Britain* (Manchester: Manchester University Press, 2016), 158–178; Karen Sayer, “Atkinson Grimshaw, Reflections on the Thames (1880). Explorations in the Cultural History of Light and Illumination”, *Annali di Ca' Foscari. Serie occidentale*, vol. 51, 2017, 129–147.

<sup>6</sup> Julie Wosk, “The Electric Eve”, in Julie Wosk, *Women and the Machine. Representations from the Spinning Wheel to the Electronic Age* (Baltimore, MD: JHU Press, 2001), 68–89; Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880–1914* (London: Pickering & Chatto, 2008), 197–219; Iwan Rhys Morus, “No Mere Dream: Material Culture and Electrical Imagination in Late Victorian Britain”, *Centaurus*, vol. 57, n° 3, 2015, 173–191; Koen Vermier, “Electricity and Imagination: Post-romantic Electrified Experience and the Gendered Body”, *Centaurus*, vol. 57, n° 3, 2015, 131–155.

<sup>7</sup> Paul Brassley, Jerney Burchardt, Karen Sayer (eds.), *Transforming the Countryside. The Electrification of Rural Britain* (London: Routledge, 2016); Diana Montañó, *Electrifying Mexico: Technology and the Transformation of a Modern City* (Austin, TX: University of Texas Press, 2021); Abigail Harrison-Moore, Ruth W, Sandwell (eds.), *In a New Light: Histories of Women and Energy* (Montreal; Kingston; London; Chicago, IL: McGill-Queen's University Press, 2021); Abby Spinak, “Not Quite So Freely as Air’: Electrical Statecraft in North America”, *Technology and Culture*, vol. 61, n° 1, 2020, 71–108; Ryan Driskell Tate, “Rural Revolt: Power Line Protests and the Alternative Technology Movement in the United States, 1970s”, *Technology and Culture*, vol. 62, n° 1, 2021, 1–26.

<sup>8</sup> Mikael Hard, Andrew Jamison (eds.), *The Intellectual Appropriation of Technology: Discourses on Modernity, 1900–1939* (Cambridge, MA: MIT Press, 1998).



Meanings and ideas about electricity evolved differently across different contexts and were adapted to distinctive cultural resources, traditions, historical backgrounds, and challenges. In short, using historical actors, groups, regions, and nations as points of focus has provided important ways to examine the place of electricity and electrical technologies in complex and historically contingent ideas of time and space, self, human and non-human bodies, class, race, gender, imperialism, capitalism, nationalism(s), and what it meant to be “modern”.

- 8 The place of the “intricacies of the social processes, the nature and capacity of political change, and the circulation and organisation of symbolic meaning through culture” in the ways our material infrastructure are shaped and built, and our cultural, social, and political engagements with energy are defined is rightly a crucial theme in electrical histories as well as energy humanities.<sup>9</sup> Energy scholars, much compelled by the urgency of examining climate change, and the social and environmental consequences of energy production and use, are trying to illuminate the limits of current public and policy discourses on energy transitions. Most of these efforts are trying to bring together scientific knowledge about the causes and consequences of climate change along with social and cultural insights into the origins of our current energy regimes and their social and environmental consequences. Energy history has emerged as a blossoming field with methodologies and frameworks that are providing more detailed and critical understandings of past and present energy societies and their capacities of transition. This includes a re-evaluation of how energy systems emerged or the particularities of distinct energy histories. Changes between energy and society or the assessment of energy consumption practices as the outcome of cultural traditions and societal contracts at a given time have also figured as recent avenues of inquiry, along with an analysis of the uneven distribution of energy resources throughout history, the

variety of energy choices available, the interrelations between newer and older forms of energy or the creation of energy landscapes.<sup>10</sup>

- 9 Energy historians have long pointed to the incomplete nature of “energy transitions.” Recent scholarship has raised social, cultural, and political issues embedded in, or affected by, energy transitions. However, while these approaches have challenged the notion of energy transitions as linear and teleological processes of technological change related to unproblematic concepts of “modernity”, “development”, and economic or market “growth”, they have remained silent on differences of opinions in energy politics.<sup>11</sup> Energy scholars are also complicating conventional approaches to energy in social theory as to avoid the risk of affirming the agency of energy.<sup>12</sup> This implies more nuanced renderings of energy supply and demand that situate energies within the continual reproduction of evolving social practices. Energies, then, emerge from and are defined by social practices that are enacted, produced, and transformed in any given society, and by which social orders and societies emerge.<sup>13</sup> Questions about how and why energy are adopted and diffused

<sup>10</sup> David E. Nye, *Consuming Power: A Social History of American Energies* (Cambridge, MA: MIT Press, 1999); Nina Möllers Nina, Karin Zachmann (eds.), *Past and Present Energy Societies: How Energy Connects Politics, Technologies and Cultures* (Bielefeld: Transcript Verlag, 2012); Ruth Sandwell, *Powering Up Canada: The History of Power, Fuel, and Energy from 1600* (Montreal: McGill-Queen's Press-MQUP, 2016); Cara New Daggett, *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work* (Durham, NC: Duke University Press, 2019); Ute Hasenöhl, Jan-Henrik Meyer, “The Energy Challenge in Historical Perspective”, *Technology and Culture*, vol. 61, n° 1, 2020, 295-306.

<sup>11</sup> Frank N. Laird, “Against Transitions? Uncovering Conflicts in Changing Energy Systems”, *Science as Culture*, vol. 22, n° 2, 2013, 149-156; Kathleen Araújo, “The Emerging Field of Energy Transitions: Progress, Challenges, and Opportunities”, *Energy Research & Social Science*, vol. 1, 2014, 112-121.

<sup>12</sup> On energy as an “inter-dependent historical agent” and the need to avoid over- and under- determinations, see Thomas Turnbull, “Energy, History, and the Humanities: Against a New Determinism”, *History and Technology*, vol. 37, n° 2, 2021, 247-292 (at 273).

<sup>13</sup> Elizabeth Shove, Gordon Walker, “What is Energy for? Social Practice and Energy Demand”, *Theory, Culture & Society*, vol. 31, n° 5, 2014, 41-58.

<sup>9</sup> Imre Szeman, Dominic Boyer (eds.), *Energy Humanities: An Anthology* (Baltimore, MD: JHU Press, 2017), 13-14.



pertain to the socio-technical assemblages in which energy resources and technologies are inserted, and the complexities inherent in these processes shape and produce both their meanings and use. Another fruitful line of inquiry involves discussing the wider entanglements of politics, energy, and culture as ways of unravelling the routines, social norms, values, and representations of energies that can underpin or compromise the stability and consistency of energy practices. Additionally, and as energy scholars point out today, energy systems are informed by largely unexamined cultural values to the point that, at least partially, they have determined our material and symbolic cultures.<sup>14</sup> In the past decade, energy humanities have indeed emerged as an inter- and multi- disciplinary field trying to disentangle the ways in which we have built and shaped our material infrastructures, our social, economic, political, and institutional assemblages, but also our cultural practices and systems of belief, around energy.<sup>15</sup> Some anthropologists and social scientists are addressing electricity along these lines, therefore contributing to criticising the teleological and deterministic tradition of “electrification,” arguing instead for a reconsideration of the different ways in which electricity manifested in social, cultural, and political life. Electricity, they argue, is not a single or stable object but produced, enacted, or re-enacted “through specific articulations of concepts, practices, meanings, materials and infrastructure” and that implicates “people in diverse forms of subjectification and objectification that reflect and reconfigure the lives of those involved, including concerns with identity, emotion, ideology, language, ethics and knowledge”.<sup>16</sup>

<sup>14</sup> Stephanie LeMenager, *Living Oil: Petroleum and Culture in the American Century* (Oxford: Oxford University Press, 2013); Frederick Buell, “A Short History of Oil Cultures: Or, the Marriage of Catastrophe and Exuberance”, *Journal of American Studies*, vol. 46, n° 2, 2012, 286–287.

<sup>15</sup> Imre Szeman, Dominic Boyer (eds.), *Energy Humanities: An Anthology* (Baltimore, MD: JHU Press, 2017).

<sup>16</sup> Simone Abram, Brit Ross Winthereik, Thomas Yarrow (eds.), *Electrifying Anthropology: Exploring Electrical Practices and Infrastructures* (London: Bloomsbury Publishing, 2019), 5–6.

## NEW MODES OF THINKING: BEYOND ELECTRIFICATION AND TRANSITIONS

The articles in this volume introduce us to sites and activities that range from rural Ireland, Britain, post-imperial Spain and colonial Calcutta. We find here, despite the political, geographical, temporal, and historical range, important commonalities among discussions of electricity through material culture, energy imaginaries, everyday practices, and existing forms of energy, highlighting the complexities of articulating and using electricity. As such, our contributors reflect a new phase in electrical histories in which international comparative studies will bring us much deeper and rigorous approaches to understanding the heterogeneity and diversity of electrical systems, their emergence and transitions in multiple sites and spaces. This will help historians to map out contingencies, disruptions, discontinuities, variations, and differences as to stress the oftentimes localised nature of energy transitions, its non-homogeneous, non-consensual, evolving and partially unfinished nature, but also the presence of entanglements and transnational trajectories that transcended cultural, political, national, and even historical boundaries.

The first two studies take us to sites outside the normally urban-centric narratives of energy and electrical histories — the countryside. SORCHA O'BRIEN tackles reactions to energy transitions by analysing the introduction of electricity in rural Ireland's domestic spaces in the 1950s and 60s. Here, we learn of rural housewives' agency, and their multi-layered and emotional engagements with newly introduced electrical appliances. Studying the archives of ESB advertising companies and oral histories, O'Brien shows us that incorporating electrical technologies in the rural countryside implied developing new social practices and cultural meanings around the electric cooker, the iron, and the electric Sacred Heart Lamp. Thinking about material culture, design history and everyday practices highlights the ways in which rural women interpreted and actually used electrical technologies from within their prescribed and restricted

social roles. As such, one central concern of both the ESB but also the Irish Countrywomen's Association (ICA) was to combine modern fitted kitchen within traditional spaces, layouts and means of living. O'Brien also complicates the notion of national styles in domestic kitchens by using Geertzian notions of "essentialism" and "epochalism" to study how electrical technologies were negotiated in the context of the traditional farm kitchen and within Irish interpretations of "electrical modernity".

- 12 The entanglements of electricity with concepts of "modernity," "prosperity," efficiency and convenience are also central to Karen Sayer's study of the rhetorics of rural "electrification" in British advisory and official literature aimed at post-War (1947-1973) agricultural improvement. Processes of energy transitions were framed within the broader project of agricultural modernisation and increasing food production supported by a national network of agricultural advisory services. The knowledge and discursive productions brought human and other physiologies into energy debates in the British countryside. Sayer's study examines livestock bodies as boundary objects across which a wide range of ideas about the value and use of electricity in farming were tested by different human actors — farmers, livestock handlers, policy makers, advisors, and even the general public. Non-human animal subjectivities and responses to technologies on farms, nevertheless, helped shape those technologies and energies, contributing to specific social and economic scenarios where different meanings of electricity were articulated and adopted within different parts of the industry. The study acknowledges the importance of infrastructures and material culture, including the role of topography and the environment in dictating what could be put in place. Stressing the diversity and regional variations within rural British "electrification," Sayer presents a complex picture of the ways electricity in the countryside was negotiated through aesthetics, the prevalence of existing forms of energy, alternative sources of electricity, and "modern," effective and affordable energy competitors.

That existing forms of energy and ideologies 13 entangled with electrical transitions is further demonstrated in Animesh Chatterjee's study of the visualisations of an "electrical Calcutta" in the late- 19<sup>th</sup> C. and early 20<sup>th</sup> C. Promoters' and the electrical fraternity's idea of a successful "electrical Calcutta" depended on how easily what they considered unreliable and inefficient human and manual energy could be replaced by more convenient and efficient electrical power. The transition from human/manual energy — especially in the form of servants in elite and middle-class domestic spaces — to electrical power was however linked to the multiple practices and interpretations of discipline, energy, work, and labour. At the centre of promoters' visions of a successful "electrical Calcutta" were servants and lower classes, especially those employed to pull fans or trim oil lamps. Chatterjee, however, extends the history of energy use and transitions beyond a consideration of a simplistic conflict between manual labour and electrically mechanised power. The promotion of the supposed conveniences of electricity did not merely involve electrical technologies, but also replayed and replicated pre-existing racial and class ideologies and perspectives. Electrical technologies were not just means of replacing servants' manual labour, but also disciplining the behaviours of those servants that could not be replaced in accordance with existing notions of morality, class and social hierarchy as defined by the Anglo-Indian and Bengali intelligentsia. The servant-centric concept of an "electrical Calcutta" was, however, unsettled by the middle-class's construction of class identities based on consumption, thrift, and the presence of the lower classes within domestic spaces, resulting in existing methods of lighting and ventilation, and servant labour being used often in close proximity to electric lighting and fans. In approaching energy — both manual and electrical — as ideological figurations, the study argues that "electrical Calcutta" was not a case of a smooth transition from manual energy to electrical power, but rather a struggle over how such a transition could be justified and constituted.

14 Transitions to new energy regimes involve intimate collaboration and strife between social disparate groups and their interpretations of the dynamic and complex landscapes they inhabit. The introduction of hydroelectricity in early 20<sup>th</sup> C. Spain, Daniel Pérez-Zapico's study shows, galvanised much of the collective desires and hopes for a national "regeneration", particularly given Spain's traditional lack of good energy resources and poor coal endowment. The study follows the ways in which transnational understandings of electricity as a socio-technical transformative force — integral to notions of development, economic growth, and civilisation in a growing nationalist European context — were adapted to fit Spanish needs, especially after the loss of the last remnants of its overseas empire in 1898. Pérez-Zapico historicises and interrogates fantasies around energy resources and ideologies of energy abundance, and their relations to the reconfiguration of political power and subjectivities within the context of self-perceived imperial and national decline. As such, most controversies around electricity in Spain revolved around notions separated from energy sources and technologies, and were aimed at addressing wider societal, cultural, and national challenges in a neither electrified nor (evenly) industrialised country. Within an increasingly polarised society where different modernising (even nationalising) schemes came to the fore, different actors and political groups — Spanish engineering communities, the Catholic Church, and the radical left — mobilised electricity within their specific and evolving political agendas and imaginaries, thereby infusing electricity (but also system-building) with distinct values that gave rise to divergent and non-consensual energy scenarios. Highlighting the highly politicised and divergent social constructs of electricity, the study argues that energy imaginaries and other cultural aspects are critical for historical and contemporary discussions around energy transitions.

15 The articles in this volume illustrate how specific historical analyses can enrich both electrical and energy histories. They also show how joining historical studies with energy humanities

yields several broader insights. Collectively, the contributors historicise and contextualise electricity and energy. This complicates the place of electrical systems and technologies in pre-existing energy regimes and, therefore, ideas of energy transitions. Looking at the many settings and times where electricity converged with other energy resources, technologies, uses, but also wider social, cultural, economic, or political processes allows for a better understanding of the contested socio-cultural, or socio-material, identity of "electricity", and how it was constituted and produced within multiple and evolving scenarios and contexts, according to different instigators, drivers, and logics.<sup>17</sup> Reflecting upon the historical importance of electricity as the outcome of a blend of applications, infrastructures, knowledge, expectations, political decisions, agencies, and practices points to a "cultural turn" in electrical and energy histories particularly useful to move beyond teleological narratives of "electrification" as pertaining to engineering languages and practices. This helps to enrich perspectives on energy transitions as the outcome of micro-level and localised socio-political concerns but permeated by macro-scale debates and transferences. Moreover, by looking at who has control over such processes, the articles also highlight the conflicts and uneven power relations in the unfolding of "electrification" and the vital role of marginalised and under-studied groups as complex actors in complex situations. In sum, by revealing the processes and complexities of these energy interactions — between humans, non-humans, infrastructure, technologies, meanings, interpretations, and energy sources — the articles in this volume also exemplify the fruitfulness of inter- and multi-disciplinary thinking.

This volume also speaks to current debates within electrical histories and energy humanities. While the articles in this volume are mainly historical in nature, they advance potential for

<sup>17</sup> Arjun Appadurai, *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge: Cambridge University Press, 2013); Lynn Hunt (ed.), *The New Cultural History* (Berkeley and Los Angeles, CA: University of California Press, 1989).

further dialogue between the methods, insights, and contributions of both the disciplines. Given many pressing issues in the contemporary world, historians, we believe, can help energy scholars and policy makers understand the complex historical meanings and interpretations of concepts of “electricity” and “energy” themselves. Such theoretical tools help challenge the utopian assumptions of current energy debates that maintain the idea of unproblematic and positive

energy transitions despite historical evidence to the contrary. These tools are not therefore just means of explaining resistance to changing energy systems but understanding the persistence and even maintenance of pre-existing energy sources and practices. In this sense, the title of this special issue, *Shifting Narratives of Electricity and Energy in Periods of Transition*, alludes to extended dialogue about the present and the future through the lens of history.

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## A Way out of Darkness: Thinking about the Future of Spain through the Promises of Electricity and Energy Abundance, 1898–1931

**Abstract**

This article historicizes electricity and energy abundance and their relation to the reconfiguration of political power in a context of (self-perceived) national decline. It analyses how electricity was used to generate a whole series of social narratives on national modernization and, most importantly, it highlights the contested ways in which electricity was interpreted along some of the lines that divided Spain's ideological landscape of early 20<sup>th</sup> C. As such, the article addresses “electricity” and “electrification” as sites of controversy that denoted opposing preferences, visions, and ideals about how to organize the future Spanish nation and community and, crucially, how to cope with the challenges of the moment.

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**Plan of the article**

- Introduction
- Engineering the Nation
- Electrifying Spanish Catholicism
- Libertarian Electricity
- Conclusions

## INTRODUCTION

- 1 In 1927, the Spanish lawyer and author Emilio Zurano Muñoz (1857–1943) published the book *Las corrientes del estrecho de Gibraltar como fuentes de energía eléctrica* (The Sea Currents of the Strait of Gibraltar as a Source of Electric Power). The work discussed the possibility of exploiting the Mediterranean and Atlantic's tidal currents converging at the strait of Gibraltar to boost the country's overdue industrialization, as Zurano estimated the amount of electricity to be produced in 30.7 billion horsepower (HP):

At the point where the Mediterranean Sea and Atlantic Ocean meet, Spain has an endless treasure of billions of electric HP that can be used according to the solid principles of Science ... Such electric power could reach the pitheads in such quantities that would melt the most resistant metals; national transportation could also take advantage of electricity beyond need at lower prices and without any competition; nitrogen fertilizers may be also extracted [via electricity] ... in higher quantities for the needs of our agriculture; all industries could profit from it beyond any limit up to the high of convenience.<sup>1</sup>

- 2 Zurano, a strong supporter of the monarchy, inserted this energy-utopia within a clear nationalistic narrative, given the importance that claims over the British overseas territory of Gibraltar traditionally had within Spanish ultranationalist circles. Although Zurano was not able to describe the technical procedure to store and transport such an incredible amount of power, energy production, he contended, would compensate Spain's decline so that the country would regain its "rightful place" amongst other well-developed and industrialized nations.<sup>2</sup> These claims

occurred at a key moment in Spanish history, during the crisis of the Bourbon Restoration era (1874–1931) and when memories of the so-called "Disaster" (the loss of the last remnants of the overseas empire after the Spanish-American War of 1898) lingered on.

Overall, Zurano's work echoed widespread transnational understandings of electricity and energy abundance as the key to attain a better future in early 20<sup>th</sup> C. A great deal of literature has discussed how electricity, once it got industrialized in the West during the last third of the 19<sup>th</sup> C., began to be represented as a socio-technical transformative force infused with collective values and integral to notions of development, economic growth, and civilization.<sup>3</sup> These culturally constructed perceptions of electricity as a progressive cultural agent usually revolved around narratives of energy abundance. In a European context of growing colonialism, nationalism, and capitalist competition, different cultural sources participated in shaping energy-based visions of human society whereby endless energy provision would facilitate industrial, urban, and economic flourish without material limits. I argue that the articulation of these collective visions about a brighter "electrical future" acquired an unprecedented urgency in a country such as Spain, where collective cravings for an ever-growing supply of electricity during the first third of the 20<sup>th</sup> C. were shaped by perceptions of national (and imperial) decline.<sup>4</sup> Debates around

of Science and work. This is how our industrial activities will flourish" (Ibid., 11).

<sup>3</sup> Benjamin K. Sovacool, Brent Brossmann, "Fantastic Futures and Three American Energy Transitions", *Science as Culture*, vol. 22, nº 2, 2013, 204–205. Utopic but also dystopic technological fictions were almost omnipresent in scientific, political, and public discourses in 19<sup>th</sup> C., and became an integral part of popular culture. On the limits of those electrical dreams Iwan Rhys Morus, "The Nervous System of Britain: Space, Time and the Electric Telegraph in the Victorian Age", *British Journal for the History of Science*, vol. 33, nº 4, 2000, 455–475; on the practicalities of those visions, see Graeme Gooday, "Electrical Futures Past", *Endeavour*, vol. 29, nº 4, 2005, 150–155.

<sup>4</sup> See David Edgerton, *The Rise and Fall of the British Nation: A Twentieth-Century History* (London: Allen Lane, 2018). On the energy basis of nationalism, see Sorcha O'Brien, *Powering the Nation: Images of the Shannon*

<sup>1</sup> Emilio Zurano Muñoz, *Las corrientes del estrecho de Gibraltar como fuentes de energía eléctrica* (Madrid: Imprenta de Juan Pueyo, 1927), 7–8. All original quotations from Spanish translated by the author unless otherwise stated.

<sup>2</sup> Energy production was therefore described as "a way for Spain to look victorious and with haughty superiority over the wounds inflicted on us by History. This is how our triumph will be great and glorious, rising from the pedestal

technology and nation in Spain were certainly not new. For example, Spanish engineers had already tried to articulate a technological national culture through canals, railways, and urban developments in the 19<sup>th</sup> C.<sup>5</sup> Hence, electricity was appropriated through an already existent technological nationalist narrative. Nevertheless, its reception was inseparable from end-of-the-century discussions of decadence and national disaster. Within this framework, the transition to a new energy regime represented by (hydro)electricity galvanized much of the collective hopes for national regeneration, especially given Spain's traditional lack of good energy resources and poor coal endowment.<sup>6</sup>

- 4 This article therefore historicizes the hope for electricity and energy abundance and their relation to the reconfiguration of political power in a context of national decline. It analyses how electricity was used to generate a whole series of social narratives on national modernization and, most importantly, it highlights the contested ways in which it was interpreted along some of the lines that divided the country's ideological landscape at the beginning of the 20<sup>th</sup> C. Within a period of national uncertainty, political and social crisis, in which different industrializing, modernizing — even nationalizing — schemes coexisted, I examine encounters with electricity involving three different social, technical, and ideological actors: members of the Spanish engineering community, the Catholic Church, and the libertarian labour movement. Therefore, this essay offers a re-reading of engineers as “system-builders” in canonical Hughesian narratives by looking at their engagements with wider and

differentiated socio-political and national concerns, while at the same time introducing other influential actors in the Spanish political and public life of early 20<sup>th</sup> C. Although, as I will later show, narratives around energy abundance as the key to a brighter future found ample support among the public and were shared by different branches of the political spectrum — thus providing a potential common script — these different groups mobilized electricity within their specific and evolving political, social, and economic agendas and imaginaries, resulting in non-consensual energy futures and divergent energy scenarios. Therefore, this article addresses “electricity” and “electrification” — including the national grid — as sites of controversy that denoted opposing preferences, visions, and ideals about how to organize the future Spanish nation and community and, crucially, how to cope with the challenges of the moment. Hence, this text aims at contributing to current literature on past energy futures and energy imaginaries, specifically by showing what type of information they bring up about the open agendas that energy entails in relation to the discussion and projection of their role in shaping our future.

Inquiries on past energy futures and energy imaginaries constitute a recent and fruitful avenue for energy historians. Historical research indicates that not only economic and technological factors mattered in the advent of energy regimes. There is a growing focus on the study of the overlap between energy-related technologies and sources but also actors' discourses and cultural perceptions of energy. In particular, current research endeavours to understand how fantasies around energy sources were historically formed, evolved and which role they played in energy transitions. Energy imaginaries and other cultural aspects of energy are indeed critical for contemporary discussions about energy.<sup>7</sup> In fact, scholars in Energy Humanities

*Scheme and Electricity in Ireland* (Kildare: Irish Academic Press, 2017); Fredrik Meiton, *Electrical Palestine: Capital and Technology from Empire to Nation* (Oakland, CA: University of California Press, 2019).

<sup>5</sup> Tiago Saraiva, *Ciencia y ciudad: Madrid y Lisboa, 1851-1900* (Madrid: Ayuntamiento, Área de Gobierno de las Artes, 2006).

<sup>6</sup> On resource shortages and crisis — real or perceived — see Paul Warde, “Early Modern ‘Resource Crisis’: the Wood Shortage Debates in Europe”, in A.T. Brown, Andy Burn, Rob Doherty (eds.), *Crises in Economic and Social History: A Comparative Perspective* (Martlesham: Boydell Press, 2015), 137-160.

<sup>7</sup> Energy utopias and imaginaries have had an instrumental role in providing compelling narratives about the desirable future, allowing or blocking innovation, or allocating the risks and opportunities of new energy technologies differently, thus perpetuating or enabling energy transitions.



are using insights from Science and Technology Studies to show how powerful energy imaginaries can shape how nation-states and the public understand energy sources and transitions, thus affecting energy choices and policies.<sup>8</sup> This article identifies the mechanisms and functions of past energy futures and shows a more complex picture of the approach to national energy imaginaries. Most of the literature tend to give the impression of coherent and homogeneous energy imaginaries at the national level, even if they are the outcome of negotiations and conflicts among several historical actors. By contrast, my contribution here emphasises the diversity of ideas and values that could result in alternative and discordant perspectives about energy transitions as embedded within larger and evolving processes of social and political change. In early 20<sup>th</sup> C. Spain, energy imaginaries mattered since most conversations around energy revolved around notions separated from energy sources or technologies and were aimed at addressing wider social, cultural, economic, and political challenges in a country that lacked electrification and an even industrialization. Although historian Thomas F. Glick has convincingly proved how the '98 defeat prompted the emergence of a "civic" public discourse around the importance of science and technology in Spain's modernization after decades of polemics, agitations and controversies, my perspective, nevertheless, emphasizes the contested nature of electrification, even though it certainly opened up potentially new avenues for cooperation.<sup>9</sup> It is certainly true that technology did not have to

be, in principle, as polemic as certain scientific discoveries, as, for instance, was the case with Darwinism, since it posed a direct threat to the Church's cultural hegemony. Nevertheless, technology, and, notably, the possibilities of industrializing the country had their own controversies. After all, industrial modernization contained vastly different worldviews and notions about what type of society could emerge. Hence, the patterns of reception of electricity in Spain were determined in large part by the specific profiles of the different ideological sectors involved and their political cultures.

Furthermore, this article addresses representations and cultural perceptions of electricity as a way of challenging the political and cultural promises of narratives of energy surplus as associated with civilizational advancements. The literature on electrical and energy history has for some time accepted the tacit assumption that society's ever-growing longing for energy was some sort of implicit precondition for the uptake of energy infrastructures, as they would simply accommodate the "natural" growing desire for more energy.<sup>10</sup> Current scholarship is questioning these teleological narratives by asking how that "need" for energy historically arose and evolved. This includes elucidating where, why, and how a social narrative promising energy abundance developed and perpetuated, and how it shaped social and cultural perceptions as well as expectations around energy in the past and in our current high-energy societies.<sup>11</sup> A genealogy of energy abundance (in a Foucauldian sense) is needed given that our current energy dependence goes beyond strict technical or economic rationality. As such, energy scholars are trying to address energy abundance within the inquiry of our current "energy epistemologies", that is to say, our

See, for instance, Ute Hasenöhl, Jan-Henrik Meyer, "The Energy Challenge in Historical Perspective", *Technology and Culture*, vol. 61, n° 1, 2020, 300-301.

<sup>8</sup> Sheila Jasanoff, Sang-Hyun Kim, "Sociotechnical Imaginaries and National Energy Policies", *Science as Culture*, vol. 22, n° 2, 2013, 189-196.

<sup>9</sup> Glick describes a Spanish political community sharply polarized over the goals, meanings, and contents of science and technology throughout the 19<sup>th</sup> C. amidst a problematic process of both nation building and setting up the modern liberal state. However, around 1900 a new consensus was reached, albeit tacit and informal, so that ideological enemies would participate "in the common task of modernization in a climate of civil discourse" (Thomas F. Glick, *Einstein in Spain: Relativity and the Recovery of Science* (Princeton, NJ: Princeton University Press, 1988), 8-9).

<sup>10</sup> A critique of this idea by exploring the central role of energy transport infrastructure in shaping supply and demand in Christopher Jones, *Routes of Power: Energy and Modern America* (Cambridge, MA: Harvard University Press, 2014).

<sup>11</sup> Nina Möllers, Karin Zachmann (eds.), *Past and Present Energy Societies: How Energy Connects Politics, Technologies and Cultures* (Bielefeld: Transcript Verlag, 2012), 7-42.



ways of knowing, describing, and understanding our life with and without energies.<sup>12</sup> Along these lines, “energy abundance” emerges not only as the possible and tangible outcome of brand-new energy-technologies or infrastructures, but also as an ideological force that has historically connected ever-greater uses of energy with ideas of a self-sustained, persistent, and unlimited economic growth, national pride and societal wellbeing and progress. This “energy-civilisation equation” originated in a specific time and place, serving distinct purposes, and creating our current energy-intensive consumption patterns and landscapes.<sup>13</sup> As a result, our modern experience has been enabled and sustained by certain energy cultures that have historically included collective fantasies and expectations built around the fictions of cheap and abundant energy surplus.<sup>14</sup> This article contributes to these debates by interrogating ideologies of energy abundance in contexts of self-perceived national decline, but also in moments of profound political and social upheaval.

- 7 The first section of the article addresses Spanish engineers’ encounters with electricity. Elite professionals were especially concerned with the

<sup>12</sup> For an elaboration of the idea of energy epistemologies, see Imre Szeman, “How to Know about Oil: Energy Epistemologies and Political Futures”, *Journal of Canadian Studies / Revue d’études canadiennes*, vol. 47, n° 3, 2013, 145–168; Imre Szeman, Dominic Boyer (eds.), *Energy Humanities: An Anthology* (Baltimore, MD: JHU Press, 2017), 11–12.

<sup>13</sup> On this (Western-dominated) energy epistemology that emerged in the factories of industrial Europe in early 19<sup>th</sup> C. and was propelled by the Global North, see Andreas Malm, *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming* (Brooklyn, NY: Verso Books, 2016), 12; Cara New Daggett, *The Birth of Energy: Fossil Fuels, Thermodynamics, and the Politics of Work* (Durham, NC: Duke University Press, 2019), 1–12; an approach from the Global South in Elizabeth Chatterjee, “The Asian Anthropocene: Electricity and Fossil Developmentalism”, *Journal of Asian Studies*, vol. 79, n° 1, 2020, 3–24; on the sort of energy determinism these historical narratives entail, see Thomas Turnbull, “Energy, History, and the Humanities: Against a New Determinism”, *History and Technology*, vol. 37, n° 2, 2021, 247–292.

<sup>14</sup> Bob Johnson, *Carbon Nation: Fossil Fuels in the Making of American Culture* (Lawrence, KS: University Press of Kansas, 2014); Frederick Buell, “A Short History of Oil Cultures: Or, the Marriage of Catastrophe and Exuberance”, *Journal of American Studies*, vol. 46, n° 2, 2012, 286–287.

role that cheap and abundant (hydro)electricity would have in powering up a decaying nation, revitalizing economy and creating and industrial break-through through the systematic exploitation of the country’s energy assets via large technological systems. However, despite the general desire for increasing the output of energy, debates over the possibility of a “national grid” in the 1910s and 1920s would be shaped by the diversity of Spain’s engineering communities and their oftentimes opposite outlooks. The second section discusses Catholic confrontations with electricity. Although Spanish Catholics overall coincided in promoting an ever-growing supply of energy to reinvigorate the country, some practitioners and religious authorities — in particular, the clerical Right and militant conservative Catholics — thought of electrification as a disruptive element in a traditional and idealized agrarian country. Their discussions on the possibility of an energy transition would then revolve around how to ascribe identifiable Catholic values to electricity and how to promote a specific industrializing scheme able to fulfil a certain retro-modern utopia. Finally, Spanish anarchists shared the same energy-intensive visions, although they emphasized the need for a radical change in the ways of socially organizing energy resources and technologies. Moreover, since energy infrastructures materialized certain forms of social and political hegemony — mostly corporate and state power —, controlling the electrical network (or, at least, parts of it) would become a precondition to subvert the capitalist order and attain the dream of an egalitarian and libertarian Spain. From a much more pragmatic perspective, however, energy strikes in the 1910s were essential not in radically transforming the country, but in achieving labour improvements, such as the eight hour-day.

## ENGINEERING THE NATION

After the democratic experience of the Six Revolutionary Years (1868–1874), the Bourbon Monarchy was restored in 1874. The Restoration regime (1874–1931) represented a conservative reaction that sanctioned the triumph of a political and economic oligarchy consisting in the

old agrarian aristocracy and a new bourgeoisie, whose wealth was mostly based on land ownership and public debt investments.<sup>15</sup> In that context, Spain lost the last remnants of its overseas empire (Cuba, Guam, Puerto Rico, and the Philippines) during the Spanish–American War of 1898. Due to the humiliating defeat of a technically obsolete navy, Spain could not sustain anymore the fiction of being a world superpower.<sup>16</sup> The '98 events were not simply identified with the weaknesses of the state or the political class but with the failure of Spain as a national project and the culmination of its decline throughout the 19<sup>th</sup> C.<sup>17</sup> The identity crisis that followed gave rise to all manner of opposition movements at the regional and national level, which included democrats and republican groups, socialist and anarchist labour unions, along with other political nationalisms in industrial areas such as Catalonia and the Basque Country.<sup>18</sup> In sum, the coexistence of different proposals to “regenerate” and (re)nationalize the country made visible the tensions among divergent political and social

groups with deep and passionate disagreements about the nation’s present and future.<sup>19</sup>

Spanish engineers eagerly participated in the debates prompted by the '98 defeat; some of them would even become key figures within the “regenerationism” intellectual movement.<sup>20</sup> Engineers constituted a group of elite professionals whose position was consolidated in the second half of the 19<sup>th</sup> C. as member of the emerging social groups organized around profession. Their social position was not only based on individual merit, but also on techno-scientific “useful-knowledge” acquired through formalized education, placing them in a privileged position. It is true, however, that they exhibited a huge variety of profiles regarding their training, practices, social and regional backgrounds, and political allegiances.<sup>21</sup> Yet, they shared the same positivistic views that brought together their scientific ethos and a program for social and national improvements as quintessential feature of their professional ideology. This was certainly a common disposition among European engineers

**15** Industrial development was thus relegated to a secondary role in Spanish modernization, although the 1874–1918 period saw some industrial flourishing through extreme protectionist measures in some regions such as Catalonia, the Basque Country, Andalusia, or Asturias.

**16** Sebastian Balfour, “The Loss of Empire, Regenerationism, and the Forging of a Myth of national Identity”, in Jo Labanyi, Helen Graham (eds.), *Spanish Cultural Studies: An Introduction* (Oxford: Oxford University Press, 1995), 25–31. The “Disaster” — as the defeat was popularly known — has been considered a turning-point in Spanish history, albeit historians have recently reasserted its meanings; see, for instance, Juan Pan-Montojo, “Introducción. ¿98 o fin de siglo?”, in Juan Pan-Montojo (ed.), *Más se perdió en Cuba España, 1898 y la crisis de fin de siglo* (Madrid: Alianza Editorial, 1998), 9–30.

**17** Javier Álvarez-Junco, “La nación en duda”, in Juan Pan-Montojo (ed.), *Más se perdió en Cuba España, 1898 y la crisis de fin de siglo* (Madrid: Alianza Editorial, 1998), 405–476; Joseph Harrison, Alan Hoyle (eds.), *Spain’s 1898 Crisis: Regenerationism, Modernism, Postcolonialism* (Manchester: Manchester University Press, 2000). However, the “Disaster” should also be framed within a wider international (at least, European) end-of-the-century context marked by lingering anxieties about national decadence even in the “early-industrialized” countries.

**18** Eric Storm, “The Problems of the Spanish Nation–Building Process around 1900”, *National Identities*, vol. 6, nº 2, 2004, 143–156.

**19** “Regenerationism” — an intellectual and political movement which predated 1898 — gained momentum as a deliberately vague and ambiguous concept with all sorts of schemes to “regenerate” Spain. Clare Mar-Molinero, Angel Smith (eds.), *Nationalism and the Nation in the Iberian Peninsula: Competing and Conflicting Identities* (Oxford: Berg, 1996); Javier Álvarez-Junco, *Spanish Identity in the Age of Nations* (Manchester: Manchester University Press, 2011).

**20** For example, the civil engineer Pablo de Alzola y Minondo (1857–1912) published *Las obras públicas en España* (1892) (Public Works in Spain) where he argued for the invigorating effect of infrastructures as the carriers of the socio-political regeneration of the country. Leoncio López-Ocón, “Los científicos en la esfera pública en torno a 1898: el caso de las actitudes regeneracionistas de Lucas Mallada”, in Octavio Ruiz Manjón Cabeza, María Alicia Langa Laorga (eds.), *Los significados del 98: la sociedad española en la génesis del siglo XX* (Madrid: Biblioteca Nueva, 1999), 683–692.

**21** Manuel Silva Suárez, Guillermo Lusa Monforte, “Cuerpos facultativos del Estado versus profesión liberal”, in Manuel Silva Suárez (ed.), *Técnica e ingeniería en España*, vol. 4, *El Ochocientos: pensamiento, profesiones y Sociedad* (Zaragoza: Prensas Universitarias de Zaragoza, 2007), 323–386.; Antoni Roca-Rosell et al., “Industrial Engineering in Spain in the First Half of the Twentieth Century: From Renewal to Crisis”, *History of Technology*, vol. 27, 2007, 147–162.

in the late 19<sup>th</sup> C., but the “Disaster” encouraged a common historical perspective according to which the decadence of Spain was the result of the abandonment of science and technology. Hence, since a new model of industrial development to revive the country was needed, engineers could easily become activists within “regenerationism”. As a matter of fact, technological imperatives arising from speedy attempts at industrial modernization together with the rise of nationalism introduced a common set of goals among Spanish engineering communities.<sup>22</sup> These ideas were constantly reiterated in engineering societies and through popular engineering journals. Through these platforms engineers created a public attitude favourable to science and technology while strengthening a sense of community by praising industrial development and engineering skills. Engineer’s ultimate goal was to enhance their social status and advance their political influence while strategically adopting a language of strictly scientific apoliticism.

- 10 At any rate, the advent of electrical technologies in Spain — which predated the ’98 defeat — coincided with their adjustment to national (and nationalistic) demands. As a matter of fact, discoveries in the newer field of electricity had received considerable attention from the Spanish specialized press since mid-19<sup>th</sup> C. The pace of publication of monographic magazines, nevertheless, accelerated in the last third of the century, a moment when the first electrical technologies were received without any considerable delay compared to other pioneering countries.<sup>23</sup> Despite this early reception,

<sup>22</sup> Nationalism, as a cross-cutting ideology able to bring together engineers despite the disparity of their political agendas has been studied in Jaume Valentines-Álvarez, “Seeing Like a Factory: Technocratic Nationalism in Catalonia, 1930–1939”, *History and Technology*, vol. 34, n° 3–4, 2018, 235–258. Also, Irina Gouzevitch, Ian Inkster, “Introduction: Identifying Engineers in History”, *History of Technology*, vol. 27, 2007, 101–106.

<sup>23</sup> Joan Carles Alayo Manubens, Jesús Sánchez Miñana, “La introducción de la técnica eléctrica”, in Manuel Silva Suárez (ed.), *Técnica e ingeniería en España*, vol. 6, *El Ochocientos: de los lenguajes al patrimonio* (Zaragoza: Prensas Universitarias de Zaragoza, 2007), 649–696. Some propagandists saw in this prompt and enthusiastic reception an example of the possibility of achieving industrial maturity and excellence, proving that the gap with the other

the debates around the role of electricity in the modernization of the country acquired a renewed urgency after 1898. A case in point was the reorganization of the specialized, prestigious journal *La Energía Eléctrica* (The Electrical Energy) (1899–1936) in 1900, just two years after the “Disaster”. The journal had been initially launched in July 1899 by Gumersindo Villegas Ortega, a senior officer of the Telegraph Corps in Madrid. However, from November 1900 onwards, important reforms were introduced, and the scientist and General Inspector of Civil Engineers, José de Echegaray (1832–1916) became its new editor. In this new period, the journal endeavoured to become the flagship of the Spanish nascent electricity sector, and its editorial office included remarkable engineers such as José García Benítez (who later assumed its direction), Eduardo Gallego Ramos (who would become editor-in-chief), as well as the most important members of the Restoration’s technical and scientific establishment.

Quite tellingly, in 1902 — on the occasion of King Alfonso the XIII’s coronation — the journal went on to edit the book *La ciencia y la industria eléctrica en España al subir al trono S.M. el Rey Don Alfonso XIII* (The Electrical Science and Industry in Spain by the time of His Majesty the King Alfonso XIII’s Enthronement). The publication was a memorandum addressed to the so-called “regenerationist” monarch, who was then 16 years old, and aimed at encouraging the promising applications of electricity. The desire to improve an electrical agenda for a regenerated country seemed to have catalysed the efforts of part of the Restoration’s technological establishment, with members of different corps of engineers contributing to the book. Thus, despite their heterogeneous social, professional, and political identities, this group of elite professionals infused electricity with a sense of collective purpose. Indeed, engineers writing in the book regarded electricity as the defining energy of a new age that was about to start and, subsequently, some chapters reified electricity as an

nations could close soon. Isolation, with the subsequent intellectual stagnation and delays in the incorporation of new ideas, had indeed pervaded end-of-the century public perceptions of Spanish science and industry.

autonomous force for cultural and social change. The military engineer Francisco Del Río defined this energy in these terms:

She [electricity] has assumed the sovereignty of the Universe, and with the insolence of a parvenu, imposes its subordination to other sciences. ... It seems as if her very nature, subtle and untouchable, has allowed her to leak everywhere: in the wire that carries the news and in the van that brings us food; in the vehicle that give us movement and in the bulb that gives us light; also, in the cautery that heals and in the discharge that kills.<sup>24</sup>

12 Military engineer Eduardo Marquerie, along similar lines, defined electricity as the “soul of modern civilization”:

In the immense sea of modern industry, where different forms of *energy* [emphasis added] agitate and fight for the dominion of matter, the subtlest and unknown *force* [emphasis added], electricity, is the one that achieves ever greater triumphs, the one that extends from day to day the sphere of its applications and which constitutes, in short, the huge wave that invades everything, but not to destroy, like those that furiously crash on the shores, but on the contrary, giving new life and greater development to industries.<sup>25</sup>

13 Hence, Marquerie reasserted the role that electricity should play in bringing back “its lost *energy*, its *virility* to the industry and its former splendour to our beloved Spain”.<sup>26</sup> These examples prove Spanish engineers’ engagements with wider transnational and transcultural debates on electricity’s cultural identity in early 20<sup>th</sup> C. As Graeme Gooday (2008) has shown, the unresolved question of electricity’s causes and nature allowed for a variegated way of approaching this phenomenon at the end of

the 19<sup>th</sup> C.<sup>27</sup> Gooday contends that invoking electromagnetism, thus defining electricity as an “energy”, helped spread a notion of electricity that served engineers’ interests and their technocratic agenda; after all, as the chief-bearers of technical knowledge, male elite experts presented themselves as the only “masters” capable of “taming” this force of nature by producing, storing and transporting it. Moreover, defining electricity as a “force” or “energy” — as Del Río, Marquerie and others writing in *La ciencia y la industria eléctrica* were doing — portrayed male elite professionals as well-positioned to fulfil the social transformations associated with electricity in Spain. It is no surprise therefore that this group of engineers saw electricity as a way of restoring “virility” to the country. Gender identities — in this case, industrially-aligned masculinities — shaped engineers’ collective desires under the form of energy-masculinities that lead to several energy fantasies and electrical futures. As such, harnessing female electricity and increasing the output of energy could act as a compensatory utopia and a performance of (post-imperial) masculinities in a context of national decline.<sup>28</sup>

Furthermore, throughout the pages of the book, 14 Spanish engineers elaborated upon a transnational narrative whereby the development of nations was to be measured on the amount of energy produced and consumed. However, these dreams of a “high-energy society” were adapted to fit local needs. Spanish economic historians have traditionally considered the shortage of energy resources as one of the main hindrances for Spain’s industrialization, in part owing to the irregular quality and the geographical location of coal resources that resulted in high extraction

<sup>24</sup> *La ciencia y la industria eléctrica en España al subir al trono S.M. el Rey Don Alfonso XIII* (Madrid: La Energía Eléctrica, 1902), 13.

<sup>25</sup> *Ibid.*, 184.

<sup>26</sup> *Id.*, emphasis added.

<sup>27</sup> These included its definition in terms of fluids during the first half of the 19<sup>th</sup> C., Maxwellians’ attempts at hegemonizing its definition as a mode of ether in the 1880s and 1890s, and engineers’ efforts to categorize electricity as a form of energy; see Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880-1914* (London: Pickering & Chatto, 2008), 37-61.

<sup>28</sup> Cara New Daggett, “Petro-masculinity: Fossil Fuels and Authoritarian Desire”, *Millennium*, vol. 47, nº 1, 2018, 25-44.



and transport costs.<sup>29</sup> Some Spanish engineers in early 20<sup>th</sup> C. indeed defined power shortages and, fundamentally, coal dependence as “the iron circle” within which Spain’s industrial potential development was trapped: the national industry lacked a cheap energy supply to support self-sustained growth, and power plants were not installed since industrial demand was lacking.

15 Hence, by the time the exploitation of electricity was at its initial stages, the “coal question” arose in the public debate to describe socio-technical concerns about the capacities of national coals to trigger Spanish economic and industrial resurgence.<sup>30</sup> These anxieties involved engineers with broader worries about the role that energies should play in regaining national strength. For example, chapters such as “Rational Uses of Coal” (authored by the mining engineer Luis de la Peña) expressed not only cultural anxieties about high coal prices in Spain, but also transnational fears about the possibilities of resource depletion.<sup>31</sup> Hence, if national coals were poor and scarce, engineers were developing a variety of socio-technical imaginaries of a future not dependent on coal, envisioning a culture of self-sufficiency and limitless power supply through hydroelectricity as the secure path to modernization. Accordingly, some chapters explored the promises of cheap and abundant energy supply via the systematic exploitation of the country’s hydraulic assets, as in “Spanish Electricity Industries in 1902”, wrote by José Benito Ortega, military engineer and director of the Madrid-based companies, *Mediodía* and *Castellana*:

The shortage of coal, especially in regions where transport difficulties are high, has resulted in obtaining energy at such a price that industry cannot accept. Derived from this is the real fever that in Spain has spawned to report waterfalls (so abundant, fortunately, because of our mountainous terrain) that would allow us to take advantage of our natural forces to give exuberant livelihoods to the nation’s industry.<sup>32</sup>

Consequently, Spanish engineers (re)discovered 16 water at the beginning of 20<sup>th</sup> C. and its industrial potentialities. Even before the 1898 “Disaster”, some thinkers articulated Spain’s modernization around water policy and hydro-technical imaginaries, particularly the Aragonian politician Joaquín Costa (1846–1911).<sup>33</sup> “Hydraulic regenerationism” would thus become a recurrent feature dominating national modernizing debates for decades, and it would relevantly impact the way in which natural resources were represented in the public imagination.<sup>34</sup>

Engineers writing in *La ciencia y la industria eléctrica* (1902), but, more broadly, through 17 the pages of *La Energía Eléctrica* in the forthcoming decades, would borrow from “hydraulic regenerationism” the idea of shifting the gaze to the country’s “latent energies” and use them to transform the nation, both literally and figuratively. For example, an article published in January 1901, written by the military engineer and geographer Severo Gómez Núñez, was devoted to these energy utopias. Gómez stated that the “improvement of the national spirit” would be

29 Carles Sudrià, “La restricción energética al desarrollo económico de España”, *Papeles de Economía Española*, n° 73, 1997, 165–188.

30 Nathan Kapoor, “‘Who Has Seen the Wind’: Imagining Wind Power for the Generation of Electricity in Victorian Britain”, *Technology and Culture*, vol. 60, n° 2, 2019, 474.

31 The chapter measured the years left for England to completely exhaust its coal reserves by calculating the nation’s consumption rates. Alarming, England only had 250 years left (*La ciencia y la industria eléctrica*, 45. (cf. note 24)).

32 Ibid., 191.

33 Costa’s “hydraulic regenerationism” relied on a techno-utopia where national rebirth would come from the efficient management of water supplies through a vast programme of public works including dams and irrigation. Costa’s project however was fundamentally agrarian — even anti-industrialist. See Eric Swyngedouw, “‘Regeneracionismo’ and the Emergence of Hydraulic Modernization, 1898–1930”, in Eric Swyngedouw, *Liquid Power: Contested Hydro-Modernities in Twentieth-Century Spain* (Cambridge, MA: MIT Press, 2015), 39–66; Marina Frolova, “Landscapes, Water Policy and the Evolution of Discourses on Hydropower in Spain”, *Landscape Research*, vol. 35, n° 2, 2010, 235–257.

34 Erik Swyngedouw, “‘Not a Drop of Water...’: State, Modernity and the Production of Nature in Spain, 1898–2010”, *Environment and History*, vol. 20, n° 1, 2014, 67–92.



attained by mobilizing “countless non-listed waterfalls” that would provide energy to endless brand-new industries owned by “Spanish capitals and Spanish workers and directors”.<sup>35</sup> Since Spain had generous water resources, some engineers even foresaw surpassing coal-dependent European countries in a matter of time:

Our hydraulic power is much higher than that of England and Germany; the industrial supremacy of these nations, based on the wealth of their coal basins, must inevitably be replaced by the new electrical industries created on the basis of the “white coal” ... ; the thousands of HP produced by these mines will be eternal, and when the coals of Cardiff or Newcastle have thrown away their last tons, electricity, the prodigy of our century, will continue to exist in the whole world.<sup>36</sup>

- 18 Specially during World War I, coal shortages reasserted engineers’ energy utopia for an industrialized and economically independent nation relying on an unlimited power supply through hydroelectricity.<sup>37</sup> In October 1917, engineer

G. J. de Guillén García published the article, “The Hydraulic Power that Can Be Used in Spain is Greater than Ten Million Horsepower. Could It Be Used?”, pointing to the limitless possibilities of electricity and the need to transition to a non-coal dependent energy scheme:

Today, all waterfalls can be exploited with the help of electricity; with a simple wire, their force is transported hundreds of kilometres where it is wanted. So much so that in Barcelona part of the machines, looms, and so on, are moved with the energy produced by the immense waterfalls situated on the peaks of the upper Pyrenees, in the province of Lleida.<sup>38</sup>

- García illustrated his energy dreams with Catalonia, one of the leading regions in Spain regarding energy production, and with emergent “national” companies which were mobilizing large amounts of capital, for instance, *La Canadenca* (865 million of pesetas), *La Energía Eléctrica* (40 millions), and *La Catalana* (50 millions).<sup>39</sup> 19

Yet, if the key to transform Spain into an industrial nation depended on the systematic exploitation of the country’s energy assets, the possibility of setting a national grid gave raise to engineers’ hopes for an accelerated modernization. At the institutional political level, discussions over the grid began in December 1918, when a Royal Order from the Ministry of Public Works asked the Permanent Electrical Committee — a consulting body created in 1911–1912 and dependent on said Ministry — to provide a draft for such infrastructure. In parallel, the twelfth panel of the First Congress of Spanish Engineering of 1919 — under the name “National Reconstitution” — appointed a subcommittee composed of engineers from different corps to outline a programme for a self-sustained industrialization that would include the grid. 20

<sup>35</sup> Severo Gómez Núñez, “Las pequeñas industrias”, *La Energía Eléctrica*, nº 5, 10 January 1901, 241. This article coincided with a campaign aimed at adapting the existing legislation to the improvements on long-distance power transmission in order to promote the industrial usage of Spanish rivers. *La Energía Eléctrica* particularly strived for the enactment of a new water act “aimed at preventing these resources and elements for industrial life to pass into foreign hands”, given the “too liberal” nature of prior legislation (Id.).

<sup>36</sup> “Boletín de la Unión Eléctrica Española. Nuestra potencia hidráulica (conclusión)”, *La Energía Eléctrica*, nº 21, 10 November 1908, 101–102. Spanish electricity industry was not lagging behind other European nations. For example, the 1901 statistics of the Ministry of Public Works showed an annual increase in the national production of 7,317 kW in average between 1893–1901. See Francesca Antolín, “Iniciativa privada y política pública en el desarrollo de la industria eléctrica en España. La hegemonía de la gestión privada, 1875–1950”, *Revista de Historia Económica*, nº 2, 1999, 417.

<sup>37</sup> In fact, the transition from thermoelectricity to hydroelectricity in Spain occurred between 1910 and 1920. From then until the 1960s the hegemony of water as the main source for electricity supply spread. See, Isabel Bartolomé Rodríguez, “¿Fue el sector eléctrico un gran beneficiario de ‘la política hidráulica’ anterior a la Guerra Civil? (1911–1936)”, *Hispania*, vol. 71, nº 239, 2011, 792.

<sup>38</sup> G. J. de Guillén García, “La fuerza hidráulica que puede utilizarse en España es mayor de diez millones de caballos útiles. ¿Podrán emplearse?”, *La Energía Eléctrica*, nº 20, 25 October 1917, 229.

<sup>39</sup> Those companies had, however, a significant foreign participation. “Crónica e información”, *La Energía Eléctrica*, nº 15, 10 August 1922, 200–201.

21 According to those who supported the project, the national grid would facilitate the entire reorganization of the country's energy sector to solve both the low performance of Spanish electricity markets, and the scarce and disperse distribution of energy resources. As such, the grid would include an ambitious programme of big dams to regulate Spain's unpredictable rivers and large power plants to consume low-quality coals in the northern mining areas. By connecting those hydroelectric and thermoelectric complementary systems, some engineers argued that the resulting unlimited and constant energy supply would immediately drag wider industrial demand. At the same time, the grid would promote other electricity-intensive industries — basically a fully-national electro-metallurgical and electro-chemical sector — and even the electrification of Spanish railroads. Nevertheless, not all agreed on that optimistic vision around energy abundance as the trigger for an industrial breakthrough. In the pages of *La Energía Eléctrica*, some engineers such as Sánchez Cuervo denounced in 1926 the “evil of electrification that is seemingly haunting Europe”, criticizing the naïve assumption that industrial development should rely almost uniquely on an unlimited increase in electricity supply.<sup>40</sup> As a matter of fact, businessmen were also moving away from those energy dreams, as they feared overproduction.<sup>41</sup> Moreover, given the diversity of identities within Spanish engineering communities, different views necessarily arose when discussing how the nation was to be produced through the grid.

22 Nationalistic energy imaginaries and dreams of energy abundance were instrumental to embed politics into energy infrastructures.<sup>42</sup> In fact,

some engineers conceived the national territory and its energy resources as essential inputs that could be centrally managed. However, choosing an over-centralized scheme for electrifying Spain had obvious political implications beyond strictly technological choices, including particular conceptualizations of the nation. In fact, territorial integration and the relationship between the different Spanish regions was a hot topic when defining the institutional organization of the Spanish Electricity Industry Association (SEIA). For instance, in 1903, Santiago Corella (the SEIA's president) supported a centralist strategy as he imagined the nation as a large electric network emerging from Madrid.<sup>43</sup> Consequently, some of the drafts for a national grid — three during the Restoration — were legitimizing a political view of the nation through the energy imaginaries that some engineers were creating in the midst of the Restoration political elites' attempts at re-nationalizing the country from the centre, particularly after the “Disaster”.<sup>44</sup>

By contrast, other engineers, especially those 23 with regional ties, were more prone to decentralization and, as a matter of fact, the dynamics of Spain's electrification would impose the logic of a grid growing from different local subsystems. This process was more consistent with the diversity and cultural significance of the different Spanish regions, given the country's multiple industrial and technological cultures and their diverse social and political actors. Indeed, some examples from the period show how electrical subsystems were even shaping regional or

<sup>40</sup> See, Bartolomé, “¿Fue el sector eléctrico un gran beneficiario de ‘la política hidráulica’?”, 812–813 (cf. note 37).

<sup>41</sup> Indeed, electrical companies worried about the absorption capacity of Spanish markets, which explains why they did not lobby for a coherent state-led hydroelectric policy during the Restoration (Id.)

<sup>42</sup> Johan Schot, Vincent Lagendijk, “Technocratic Internationalism in the Interwar Years: Building Europe on Motorways and Electricity Networks”, *Journal of Modern European History*, vol. 6, nº 2, 2008, 196–217; Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity*

*after World War II* (Cambridge, MA: MIT Press, 1998); Dominic Boyer, *Energopolitics: Wind and Power in the Anthropocene* (Durham, NC: Duke University Press, 2019).

<sup>43</sup> “Madrid will therefore be our central power-station...; regional associations will be transformer stations, from where through large feeders and power lines energy will be taken to the production or consumption centres”. “Suplemento. La Unión Eléctrica Española”, *La Energía Eléctrica*, nº 11, 10 December 1903, 17–18.

<sup>44</sup> Xosé Núñez, “Nation-Building and Regional Integration: The Case of the Spanish Empire, 1700–1914”, in Stefan Berger, Alexei Miller (eds.), *Nationalizing Empires* (Budapest and New York, NY: Central European University Press, 2015), 195–245.

subnational developments.<sup>45</sup> The same would occur with the development of the Spanish electricity sector, as the spread of hydroelectric production would consolidate provincial markets.<sup>46</sup> These examples ultimately prove the contested nature of system-building and how complex the transformation of engineers' energy imaginaries into material assemblages could result.

### ELECTRIFYING SPANISH CATHOLICISM

- 24 One of the most outspoken supporters of the national grid was the engineer and Jesuit priest, José Agustín Pérez del Pulgar (1875–1939). Indeed, his articles originally published in the Jesuit scientific journal *Ibérica* (Iberian) sparked a debate within Spanish technological circles that remained alive for the next two decades.<sup>47</sup> In December 1915, his “Electric Power in Modern

<sup>45</sup> For example, the “Mancomunitat de Catalunya” (1914–1924) — a confederation of the four provinces of Catalonia — tried to delineate the contours of this new nation through technological policies, especially via large electrical, hydraulic, road, rail, and telephone networks. See Antoni Roca-Rosell, “Ciencia y sociedad en la época de la Mancomunitat de Catalunya (1914–1923)”, in José Manuel Sánchez Ron (ed.), *Ciencia y sociedad en España* (Madrid: El Arquero-Consejo Superior de Investigaciones Científicas, 1988), 223–252.

<sup>46</sup> The territorial concentration of electricity production in Spain resulted in deep local and regional asymmetries. Before the Civil War of 1936–1939, Spanish electrification was unevenly distributed with markets such as Catalonia and the Basque Country (400 kWh per capita) as main consumer areas, followed by Madrid, Valencia, Asturias, Cantabria, or Aragon (200 kWh per capita on average). Other regions such as Andalusia or Galicia were coordinated autonomously, and both Castiles and Extremadura constituted seemingly electric deserts. See Sudriá, “La restricción energética”, 174–175 (cf. note 29); Isabel Bartolomé Rodríguez, “La red nacional y la integración de los mercados eléctricos españoles durante los años de entreguerras: ¿otra oportunidad perdida?”, *Revista de Historia Económica*, nº 2, 2005, 269–298.

<sup>47</sup> The links between the Jesuits and the Spanish electricity sector were indeed strong. Pérez del Pulgar himself participated in the foundation in 1908 of the Catholic Institute of Arts and Industries (*Instituto Católico de Artes e Industrias*; henceforth ICAI) as part of the growing Catholic interest in expanding the pre-existing network of private educational institutions and to adapt them to the needs of a modern and industrialized society. As a matter of fact, it specialized in electrical engineering, a newer field not adequately covered in the older engineering schools. Furthermore, ICAI's teachers and technicians appeared to work closely with lay industrial promoters, electrical

Industrial Life” appeared; in it, Pulgar discussed the electrification of various European countries, including the initiatives carried out in Sweden and the works of Rathenau in Prussia. His aim was to demonstrate the “invigorating effects” of a “free or almost free” energy supply through a national grid.<sup>48</sup> Pulgar shared the ideas of some of his peers on the fundamental role of electricity “in modern industrial life”, thus promoting the same nationalistic energy intensive dreams.<sup>49</sup> As in other cases, Pulgar was concerned with solving the “coal question” by finding alternative energy assets and, in an international context of strong economic nationalism and interventionism, he supported a determined intervention of the state that should efficiently plan the use of national power sources. Therefore, his electrification scheme was aimed at taking advantage of all Spanish “coals” — black, white, green, blue:

The whole country would be then covered by a kind of spider web or net, whose threads would pass through the most suitable points for a convenient distribution, .... Thus, for example, it would pass through the most salient waterfalls, to take advantage of our white coal; through the grasslands, to use the green coal of the banks of the rivers ...; along the seashores, to consume the blue coal, supplied by tides and waves; through the coal mines ... to avoid coal transport by rail, and so on.<sup>50</sup>

companies, and official bodies such as the Permanent Commission of Electricity.

<sup>48</sup> José A. Pérez del Pulgar, “La energía eléctrica en la vida industrial moderna”, *Ibérica*, vol. 4, nº 104, 25 December 1915, 409–411; José A. Pérez del Pulgar, “La nacionalización de la energía eléctrica”, *Ibérica*, vol. 8, nº 196, 6 October 1917, 218–219.

<sup>49</sup> “One of the peculiar features of modern life is the use of increasing amounts of energy. Just as one cannot conceive a city without water or food supply in proportion to the number of its inhabitants, so today one cannot conceive a prosperous city and, moreover, a nation, without an adequate amount of HP available in one form or another, so that energy has become a necessity, even in social terms” (José A. Pérez del Pulgar, “Producción y distribución nacional de energía eléctrica”, *La Energía Eléctrica*, nº 1, 10 January 1921, 2).

<sup>50</sup> Id. Pulgar calculated in 1 million Kw the amount of energy that the national grid would distribute, namely, only a third of the country's 10 million HP of hydraulic wealth according to his estimations.

25 Although Pulgar envisioned an energy provision from big and centralized production areas, this unlimited power supply was however aimed at ensuring the survival of small industry, particularly in remote and isolated rural areas. Some of Pulgar's colleagues would further expand these ideas as they drew upon the same repertoire of shared (Catholic) ideas and values. Gervasio de Artiñano (1873–1938), a Basque industrial engineer closely connected to the Jesuit ICAI and an MP as independent Catholic candidate in 1918–1919, reasserted the same energy-intensive visions in an article from April 1921 published in *La Energía Eléctrica*. From his point of view, low energy prices should benefit “small industries, crafts, and especially, the rural exploitations”, hence establishing a “common, popular, and truly national supply”.<sup>51</sup> Furthermore, energy supply should be link to “a kind of industrial and agricultural credit bank” based on the “cooperation and unionisation of small farmers”.<sup>52</sup> Therefore, the social consequences of electrifying Spain were as important as economic or industrial prowess, and this is how electricity was inserted into a precise Catholic agenda.

26 These views were indeed consistent with wider concerns within Spanish Catholicism at the beginning of the 20<sup>th</sup> C. The '98 “Disaster” radicalized positions on the role of the Catholic Church in the development of the country. Given that industrial and scientific underperformance were blamed for the 1898 defeat, liberals and secularizing sectors were thoroughly convinced that the Church's political influence was blocking the breakthrough into a modern and industrialized society. These beliefs, along with the recovery of the Church's cultural influence with the restoration of the Bourbon monarchy, explain the extreme virulence of secular-religious clashes in Spain during the first third of the 20<sup>th</sup> C. It is certainly true that some Catholic apologists — mostly clerical — inherited from 19<sup>th</sup> C. polemics their conservative ideas on the nature of science

and its opposition to traditional values. In particular, the clerical Right identified science with positivism, rationalism, materialism, and liberalism; and these positions were associated with the denial of absolute truth.

However, Spanish Catholicism was far from being 27 monolithic and even some priests saw themselves as genuine practitioners of science and technology.<sup>53</sup> As a matter of fact, some Catholic authorities did consider industrialization as the driver for national regeneration, even borrowing some ideas from “regenerationist” thinkers. Hence, the fundamental question was not whether to industrialize Spain or not, but how to achieve this according to Catholic expectations on how an industrial nation should look like. These ideas were disseminated and discussed in widely read Catholic-oriented journals and ecclesiastical publications. In 1911, for example, the magazine *La Lectura Dominical* (The Sunday Reading) — which gather lay Catholics of different tendencies (predominantly conservatives) and members of religious orders (mostly Jesuits) — included a telling piece wrote by an unnamed engineer. In there, the author opposed the “Europeanization” of the country defended by progressive sectors to a true “national regeneration” that should combine modern techno-scientific developments, Christian ethics, and Catholic traditions:<sup>54</sup>

Not just the current positivist or materialistic civilization — if you want to call it that way — is to be hoped for, but another more perfect, the Christian one ... which has always met

<sup>51</sup> Gervasio de Artiñano, “España puede y debe ser la primera nación que establezca la red nacional de distribución de energía eléctrica”, *La Energía Eléctrica*, nº 8, 25 April 1921, 92.

<sup>52</sup> Id.

<sup>53</sup> Jaume Navarro, “Promising Redemption. Science at the Service of Secular and Religious Agendas”, *Centaurus*, vol. 59, nº 3, 2017, 173–188. Indeed, Spanish Catholics were profoundly divided at the beginning of the Restoration between the Carlists (members of a traditionalist political movement which aimed at establishing an alternative branch of the Bourbon dynasty), intransigent and ultra-montane circles (the so-called “integralists”) and the moderate and liberal sectors, often vilified under the brand *mestizos* (half-breed).

<sup>54</sup> “Europeanizing” the country was a somewhat widespread cliché in early 20<sup>th</sup> C. public debates which supposedly aimed at “redeeming” backward Spain through “European” values mostly identified with science, technology, and the secularizing agenda they allegedly incarnate.



the demands of the spirit as well as material advances. ... The flag that we must display as an emblem of our regeneration is therefore that of the Christian civilization, Faith and Reason, Science and morality, virtue, and work.<sup>55</sup>

28 Therefore, against the anti-industrial intransigence of reactionary anti-modern Catholic ultras — more rhetorical than real — even conservative practitioners and authorities did consider that the Church should not abandon industrial entrepreneurship for moral and spiritual reasons. Moreover, the Church was deemed as the only institution capable of preventing the evils of the modern industrial world, as seen in other well-industrialized European nations. An article published in 1918 in the traditionalist newspaper *La Hormiga de Oro* (The Golden Ant) explored many of these ideas. The author of the piece titled “Black Coal and White Coal”, Leonardo Lorenzo — a member of the Claretian order — expressed his concerns with regards to the “coal crisis”, which was particularly intense around the Great War years. Coal shortages were not only causing an acute “industrial problem”, but also aggravating the “social question” posed by an increasingly numerous and organized working-class movement. Hence, he considered mandatory to “emancipate ourselves from coal”, given its nefarious economic and social consequences. Luckily, according to Lorenzo, God had bestowed hydroelectricity as an abundant energy resource upon the Spanish nation, as prove of His predilection:

We have in Spain, for our joy, an element that, if well used, can make us forget the blackness of the current situation. God foreseeing that the Spaniards ... would not enjoy staining their hands with black coal, has placed on the very surface of our soil immeasurable amounts of white coal, ... here we have our treasure, our great national wealth. Few nations have been as favoured by Providence as our Fatherland.<sup>56</sup>

Spain’s industrial resurgence could thus be 29 achieved through a “purely national” and unlimited energy resource “since Providence is responsible for continuously renewing hydraulic energy through that wonderful circulation of waters that will end only with the Earth’s final cataclysm”.<sup>57</sup> Lorenzo ended his article reifying electricity; however, it was not represented as an “energy” seized by the hand of the engineer, but as a subtle force that emanated directly from God sharing some of His ubiquity and immensity.<sup>58</sup>

Industrial renaissance was therefore import- 30 ant. Yet, as these extracts show, the social consequences of establishing the foundations of Spanish industrial flourishing upon electricity did not escape Spanish (and European) Catholics, even from an early date.<sup>59</sup> In 1889, the ultra-conservative journal *La Ilustración Católica* (The Catholic Illustration) included a piece titled “Electric Light and Power in the House” within its science popularization section authored by the Catalan civil engineer Melchor de Palau (1843–1910). In there, Palau pondered on the implications that the subdivision of power supply could have in solving “an extremely important problem in home economics as well as in our social customs”.<sup>60</sup> The Church had indeed equated centralized energy supply with big industry and its “nefarious” consequences, including the dramatic segregation of households and factory workshops, women and child labour, alcoholism, criminality, and the spread of socialist ideas. These evils could be summed up in the disintegration of the family as the perfect nucleus of society, as Palau put it:

The need to concentrate large numbers of people along with engines, so that force was

<sup>57</sup> Id.

<sup>58</sup> Electricity itself ended up being used to praise the glories of God Almighty: “How much will the Creator — who made me — be worth, when I, His creature, am worth so much!” (Id.).

<sup>59</sup> Michel Lagrée, *La bénédiction de Prométhée : religion et technologie, XIXe-XXe siècles* (Paris : Fayard, 1999), 86–87, 141–143.

<sup>60</sup> Melchor de Palau, “Progresos científicos. Luz y fuerzas eléctricas en casa”, *La Ilustración Católica. Seminario religioso científico-artístico-literario*, n° 3, 25 January 1889, 28.

<sup>55</sup> Ludovico, “Sección de polémica”, *La Lectura Dominical*, n° 908, 27 May 1911, 327–328.

<sup>56</sup> Leocadio Lorenzo, “Científica. Hulla Negra y Hulla Blanca”, *La Hormiga de Oro*, n° 7, 16 February 1918, 39.

not wasted, has been a very powerful cause, albeit not the only one, for the dismemberment of families and the spread of social corruption caused by contact, ... Down with factories, down with casinos and clubs, down with everything that tends to create a fictitious and materialistic life with the pretension of permanence and the aim of annihilating the family system with its charming poetry and its perfume of inherited and transmissible virtues.<sup>61</sup>

- 31 What Palau proposed instead, quite in tune with the Church's own views, was "to go back to the old within the modern, to reconstitute the family but without dispossessing it of the advantages of the new technical advancements".<sup>62</sup> Indeed, Catholic congresses held periodically in Spain in the last decades of the 19<sup>th</sup> C. and early 20<sup>th</sup> C. — which tried to articulate unified responses within Spanish Catholicism in the face of the social and political climate of the Restoration — frequently included entire panels dedicated to the "social question" and tended to constantly address the inconvenience of "collective work". These events usually included lay experts from the civil sphere in an attempt to give greater legitimacy to the conclusions reached. The Fourth Catholic National Congress of Tarragona (1894), for example, introduced a report from Fernando Díaz Guzmán (professor of Physics and Chemistry at the Institute of Logroño) aimed at mitigating the spread of large industry and which contemplated "the distribution of power to the different workers' households, ... — This goal, the author believes, could be achieved through electricity".<sup>63</sup>

- 32 As such, electricity was seen as a way of reversing the inevitable process of concentration of energy and machines in large units. According to these views, decentralized energy provision would make it possible for women to work at home taking care of children and for men to be more independent, happier, but, most

importantly, easier to educate in Catholic morality. In the first decades of the 20<sup>th</sup> C., the Catholic conservative press continued to stress the moral aspects of distributed electricity to the point that *La Hormiga de Oro* would define this energy as a "social agent" in an article issued in its outreach section of February 1916. According to that piece, electric power would cooperate in creating a climate of cordial understanding between employers and workers and revive craftsmanship as a vector upon which society was to be organized: "This wonderful force, whose use spreads every day, can be by its easy transmission, a moralizing agent and a social factor, contributing somehow to restoring home life along with the organization of family workshops".<sup>64</sup>

Spanish Catholic authorities were also concerned 33 about another threat posed by a modern industrialism that was starting to take hold in Spain: the alleged imbalances between urban and rural developments and the subsequent marginalization of the countryside.<sup>65</sup> This was, of course, a widespread ideological cliché shared across European Catholicism that tended to idealize the countryside as a peaceful haven thanks to its religiousness. This imaginary focused on the harmony between the old rural upper classes, the skilled craftsmen, small farmers, and rural

<sup>64</sup> "La electricidad como agente social", *La Hormiga de Oro*, nº 7, 14 February 1914, 95. *Rerum Novarum* (1891) and Pope Leo XIII (1810–1903) defended a social Catholicism based on family and corporate doctrine as an alternative to class struggle within a mythical exaltation of the social organization of the Ancient Régime.

<sup>65</sup> An article originally published in March 1905 in *La Lectura Dominical* considered this asymmetry, particularly the dominance of big industry, as the main cause of the Russian revolution of January: "England, Germany and the United States, emporiums of industry, what have they become, in large part, but nations subjected with a chain of servitude to the despotic will of the working-class multitude? ... Without the abandonment of the fields, without the prevalence of industries, without the proud chimney of the factory dominating farms, cottages, and farmyards, would there exist, perhaps, the so-called social question? Would those who yesterday cultivated the field or tended the cattle have become factory workers, urban labourers, that have finally come to hear not the voice of the priest at the village's mass, but that of the fellow speaker in the political rally, ...?" (Christian, "Desequilibrio", *La Lectura Dominical*, nº 583, 4 March 1905, 132).

<sup>61</sup> Id.

<sup>62</sup> Id.

<sup>63</sup> "Memoria de los trabajos presentados a la sección cuarta del Congreso Católico de Tarragona", *Revista Católica de las Cuestiones Sociales*, nº 16, April 1896, 92–93.

petty owners as the social basis for a return to a preindustrial society filled with Christian values.<sup>66</sup> However, in Spain, particularly after the '98 defeat, these narratives acquired more visibility. This process coincided with a re-reading of the Spanish ethos in a national-Catholic way at the turn of the 20<sup>th</sup> C., so that the countryside — especially that of the central plateau — was conceived as the spiritual reserve of the nation in the face of the threatening outside world represented by liberal and, again, “Europeanizing” ideas identified with secularization, materialism, and bourgeois ethics.

- 34 The Catholic press then propelled the narrative of the “Levitical cities” to describe the kind of provincial towns completely isolated from the hostile modern civilization and whose collective life had remained untouched and was still arranged according to the patterns established by the Church. These towns, however, could benefit from some elements of the modern industrial world. In 1906, for example, *La Lectura Dominical* presented an unspecified small town in Aragon “stranded from the railway lines and withdrawn into itself” which enjoyed “exemplary customs” and a social harmony that contrasted with big cities.<sup>67</sup> However, this did not impede the town from enjoying “all the advancements of mechanics and industry”, including electric lights on the streets. According to the author, this proved not just the compatibility between modernization and Catholicism but, crucially, that material progress without religion could lead to savagery. As such, the columnist considered this type of small villages as the embodiment of Spanishness against the “plague of faithlessness and moral misery that invades cities, fields and workshops, and that is finishing off the last remains of the pure and genuine Spain that have given Europe and America its true theological and literary culture”.<sup>68</sup>

<sup>66</sup> Julio de la Cueva Merino, “The assault on the city of the Levites: Spain”, in Christopher Clark, Wolfram Kaiser (eds.), *Culture Wars: Secular-Catholic Conflict in Nineteenth-Century Europe* (Cambridge: Cambridge University Press, 2009), 182–183.

<sup>67</sup> Christian, “La lepra”, *La Lectura Dominical*, nº 657, 4 August 1906, 485.

<sup>68</sup> Id.

Ideological narratives aside, the reality of the Spanish countryside remained in a conspicuous state of backwardness. In this context, and since the decline of agriculture was assimilated to the decline of the nation, Catholic attempts at regenerating the country in early 20<sup>th</sup> C. focused on the mechanization of agriculture as an alternative to the thorny question of the agrarian reform, which would have implied a stark shift in power relations in the countryside and the redistribution of land. Catholic narratives would then combine the depiction of a pristine and pre-modern countryside with the technical elements borrowed from the modern world. Overall, Catholic social action concentrated on sanitation, and providing services and infrastructure to the rural areas while developing a new conception of agriculture that should evolve from a merely extractive enterprise to a modernized and modernizing industry. The goal was to not just solve the problem of subsistence by increasing production, but also maintaining the population and thus reversing urban exodus.<sup>69</sup>

Electricity would perfectly fit these purposes as it would set in motion “more scientific farming procedures” through intensive agricultural methods and the acquisition of fertilizers.<sup>70</sup> In addition to this, electricity was instrumental to the industrial transformation of products including the mechanization of dairy industries, mills, bakeries, distilleries, and weaving factories. And, although the possibility of buying energy from external companies was contemplated, self-consumption was preferred through Catholic farmers’ unions and rural cooperatives. This would lead to villages based on a cooperative society that would fulfil the Catholic aspiration of a rural autarky. Of course, this scheme could not be easily extrapolated to the whole country

<sup>69</sup> For similar concerns in a later period, in particular, how electricity boosters in the United States hoped that electrical modernity in the countryside would stop rural exodus, see Ronald R. Kline, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore, MD: JHU Press, 2000), 131–215.

<sup>70</sup> In fact, the national grid and its massive energy supply contemplated the possibility of establishing a national phosphate industry to replace imports.

given the great geographical diversity and the variations in land ownership. Northern Spanish regions could, however, become a paradigm of this new energy and industrial landscape given the abundance of “green coal” in some areas. There, farmers could exploit modest water-courses to mechanize and illuminate villages, transforming old mills into small power plants, ultimately proving the feasibility of Catholic industrial designs.<sup>71</sup>

### LIBERTARIAN ELECTRICITY

37 Spanish anarchists also connected their social views to the availability of electricity.<sup>72</sup> The numerous applications of electricity generated fascination and images of utopia and hope, permeating the social rhetoric of Iberian anarchism in early 20<sup>th</sup> C.<sup>73</sup> For the anarchists — and the Left in general — science and technology were fetishized as the only way to cure all social ills; moreover, they were utilized in the struggles against the Church’s cultural dominance, and the erosion of dogmatism and traditional social values. It is true, however, that the general take on electricity contained the same ambiguities

as those generally associated with science and technology.<sup>74</sup> Yet, since the last third of the 19<sup>th</sup> C., the instrumental role of technology in setting the foundations for a new society was repeatedly stressed. Above all, machines appeared in narratives ensuring productivity and, most importantly, superabundance in a future where the new ownership of the means of production would allow for a more equitable distribution of the fruits of nature. The Spanish anarchist and intellectual Anselmo Lorenzo (1841–1914) had reflected on how modern technologies made Malthusian theories useless before the assembly of the First International, held in London in 1871, as representative of the Spanish Regional Federation:

The proletariat counts for its benefit that production, favoured by scientific advances, is three times higher than necessary. There is incalculable production capacity. There is a surplus for everyone. There are conditions to continue producing so that no one lacks what needs and that there is still enough to sustain any sensible reserve. ... The obstacle for this abundance to favour everyone is the proprietary usurpation defended by Churches, States and Armies.<sup>75</sup>

The Spanish libertarian movement, however, 38 shared the same transnational anxieties of the turn of the 20<sup>th</sup> C. regarding the possibilities of the depletion of energy resources — especially coal. However, these fears were overcome by a disproportionate faith in modern technologies, particularly electricity.<sup>76</sup> Coal had, in fact,

<sup>71</sup> In 1912, for example, the Sixth Social Catholic Week, which was held in Navarre, contemplated a visit to the small village of Olite to examine “the state of prosperity of our social initiatives in that population”, including the flour factory, the cooperative and the electricity factory, all owned by the Catholic union (“VI Semana social en Pamplona. A los católicos sociales”, *Revista Católica de las Cuestiones Sociales*, nº 208, June 1912, 465–473 (at 471)). In fact, the specialized press of the time placed the Olite initiative as a pioneer in the implementation of rural electric cooperatives in Spain. See, for instance, José María de Guillén, “Las cooperativas agríco-eléctricas”, *La Energía Eléctrica* (Madrid), nº 11, 10 June 1915, 1–3 (at 3).

<sup>72</sup> The role of electricity as an ally of progressive and revolutionary forces had, in fact, a long tradition in European intellectual history, at least since the French Revolution. See Alain Beltran, Patrice A. Carré, *La fée et la servante. La société française face à l’électricité, XIX-XXe siècles* (Paris: Belin, 1991), 23; Paul R. Josephson, *Would Trotsky Wear a Bluetooth? Technological Utopianism under Socialism, 1917–1989* (Baltimore, MD: JHU Press, 2009).

<sup>73</sup> The prestige of electricity amongst Spanish anarchists makes the name “Electricia” appear in almanacs and secular calendars since early 20<sup>th</sup> C. along with other popular names such as “Germinal”, “Prometheus”, “Future” or “Redemption”. “Calendario Laico para 1903”, *Almanaque de La Revista Blanca para 1903*, n.p.

<sup>74</sup> The controversial role of the machine in modern capitalist societies gave rise to passionate outreach talks as the one held at the Workers’ Association of San Martín (Barcelona) in 1910: “Is the machine convenient or not for progress?” (“Movimiento Sindicalista. España”, *Solidaridad Obrera*, nº 8, 02 April 1910, 4).

<sup>75</sup> Anselmo Lorenzo, “Al Congreso Sindicalista Internacional de Londres”, *Solidaridad Obrera*, nº 20, 2 October 1913, 1.

<sup>76</sup> The scientific column of *La Revista Blanca* — the leading anarchist magazine of early 20<sup>th</sup> C. — published on 15 January 1901 contained the following text: “What will become of us when coal and anthracite are exhausted? To which is generally answered with optimistic confidence: when that time comes, we will have had plenty of time to find a substitute, using chemical reactions, electricity, or



a bad reputation within anarchist intellectual circles, being associated (as in Karl Marx) with great industrial capitalism, the centralization of production in large factories and the concentration of money and power.<sup>77</sup> In 1905, an article authored by Fernando Tarrida del Mármol (1861–1915), a Cuban anarchist in charge of the scientific outreach section of the influential and widely-read *La Revista Blanca* (The White Journal), defined hydroelectricity as the “incalculable energy stored in waterfalls” destined “for its use more or less close to transform the face of our globe”.<sup>78</sup> In a piece eloquently titled “White Coal and Its Miracles”, Tarrida stressed the greater convenience of hydroelectricity — thanks to its high-voltage distribution to the consumption areas — but, most importantly, its cleanliness. In this way, he expressed an environmental sensitivity not common among Spanish libertarian circles of early 20<sup>th</sup> C. In particular, he decried “the need for tall chimneys that vomit streams of black smoke that tarnish the beauty of landscape and pollute the air of regions”.<sup>79</sup> These ecological considerations extended to urban transport:

All kinds of carriages, from trucks to light carts, will run on electricity; the oil from the automobile and its nauseating smell will disappear, at the same time as the horses, which litter our streets, depositing hundreds of tons of manure on them. Thus, we will reach the golden age of hygiene, cleanliness, and purity of the atmosphere.<sup>80</sup>

39 However, the social transformations linked to the new, virtually unlimited energy supply went farther. As with Spanish Catholicism, Tarrida celebrated the decentralization of energy production

and provision, as would facilitate the return of home-based work: “Workers in many industries will be freed from the factory; home trades will flourish as in the past, with the difference that the working tools will be improved and activated by small electric motors”.<sup>81</sup> Tarrida expanded much of these ideas in another article of 1905 in which he discussed the recent discovery of radium by Marie Curie, speculating about the social consequences of an unlimited supply, this time from the energy contained in the atom. Most remarkably, Tarrida considered that this massive supply of force, impossible to be monopolized, would put an end to the “ridiculous” capitalist property system:

Calculate what such amount of energy can become, transformed into electricity for lighting, heating of rooms and for cooking food; to power factories, railways, ships, trams, and so on; that is, all the living conditions of everyday existence and those of industry transformed overnight! The costly facilities of today’s large industry, one of the excuses of modern capitalism, will be rendered useless; universal energy can no longer be monopolized in favour of the privileged, ... millions of miners, instantly freed from the obligation to extract from the bowels of Earth the enormous quantities of coal currently requested by bourgeois industry, which will come to increase the groups of producers of the needs and even of the superfluities of all in a society in which capitalism will become impossible.<sup>82</sup>

natural forces” (Tarrida del Mármol, “Crónica científica”, *La Revista Blanca*, nº 62, 15 January 1901, 430). The article went on to cover different sources of electricity production: from waterfalls, to the “movement of waves and the force of the wind”, “solar heat”, or “telluric currents” (Id.).

<sup>77</sup> Sebastián Fauré, “La concentración capitalista”, *Solidaridad Obrera*, nº 60, 4 June 1909, 1–2.

<sup>78</sup> Tarrida del Mármol, “Crónica científica”, *La Revista Blanca*, nº 166, 15 May 1905, 700.

<sup>79</sup> Id.

<sup>80</sup> Id.

<sup>81</sup> Id. Even from an early date, anarchist theorists understood the opportunities that decentralized energy supply offered in designing a future society relying on free and local administrations, in contrast to the socialist (later communist) model dependent on centralized production. In *Fields, Factories, and Workshops* (1899), the Russian anarchist Piotr Kropotkin (1842–1921) pondered on the flexibility and adaptability of electricity and its role in redefining the city-countryside divide. This process would result in a completely scattered and autonomous urban development, with federated clusters where the social bond would be richer. Moreover, the new means of transport and communication, along with the networked supply of energy, would provide the small rural community with technical infrastructure until then only available in big cities.

<sup>82</sup> Tarrida del Mármol, “Crónica científica”, *La Revista Blanca*, nº 160, 15 February 1905, 501.

40 In short, electricity (thanks to the wonders of modern technology) could bring humanity to the dreamed land of superabundance as the precondition for universal emancipation. The causes for incumbent social inequalities were not to be sought in nature, but in the capitalist ownership system, in which land, raw materials (including energy) and the instruments of labour (for instance, machines) belonged to a narrow minority. The alternative, of course, was to collectivize those means of production — including energy resources and technologies — after a period of social revolution. Moreover, anarchists pointed to the greater efficiency and productivity that those assets would have in the future society as managed under the “scientific” principles of revolutionary syndicalism.<sup>83</sup> These narratives converge in early 20<sup>th</sup> C. with a certain anarchist or libertarian “regenerationism”, with tropes directly borrowed from “Costismo” — that is to say, the historical extension of certain features of Joaquín Costa’s social and economic doctrine; in particular, his stance on radically modifying the public management of Spain’s practically boundless raw natural resources and latent national energies. These ideas also included a particular reinterpretation of nationalism. For example, articles originally published at the turn of the century in *Solidaridad Obrera* (Workers’ Solidarity) — the official newsletter of the anarcho-syndicalist union CNT — repeated the same rhetoric about the presence of “untapped sources of wealth” in the Spanish soil and subsoil.<sup>84</sup> During the Great War years, a great deal

of articles denounced Spain’s political class and its capitalist plutocracy, which lacked any initiative or industrial mentality, unable or unwilling to exploit natural resources.<sup>85</sup> Consequently, only the libertarian revolution would put all the latent energies of the country to work.<sup>86</sup>

41 However, the rhetoric of superabundance thanks to the distribution of hydroelectricity after an inevitable anarchist revolution stood in stark contrast with the dire reality of a squalid energy supply, particularly of coal, during the continental conflict. Spanish neutrality during the European war was indeed followed by huge profits for those exporting coal and other raw materials. This left domestic supply with limited inputs that could not be properly distributed due to the disorganization of rail transport,<sup>87</sup> but also external imports by sea because of the constant torpedoing of Spanish ships. Above all, the period 1916–1918 saw Spain close to default, with the price of coal skyrocketing from 1.5 pesetas in 1914 to 3 in 1918, provoking a stark increase in prices of all essential goods.<sup>88</sup> To this, it must be added the action of profiteers and hoarders in the face of a state unwilling to adopt any measure to curve inflation. As a result, the energy situation in Spain around 1916–1918 created a serious economic and social crisis, soon turned into a political one, that initiated the downfall of an entire

<sup>83</sup> Anarchists and, specifically, anarcho-syndicalists devised a new society where economy was to be organized by “technical experts” derived from horizontal groups of workers and consumers (as opposed to vertical socialist or state bodies) and integrated within federations of specific industry branches. These would appoint especial committees to manage large, medium, and small factories, infrastructures, and public services (including hospitals, sewers, railways, electricity, mines) in coordination with local, regional, and national confederations of workers.

<sup>84</sup> “Much more than half of Spain is in a position to promote and develop its cropping, to extract from its bosom the mineral wealth that it contains and that with wise measures, sound policy, and successful use of the Public Treasury would result in water fertilizing our fields, roads facilitating the transport of our products, and the pickaxe bringing to light the coal, iron, lead, and so on,

which are so abundant in our subsoil. ... This is how we understand true patriotism” (“Contra la intervención”, *Solidaridad Obrera*, nº 560, 15 May 1917, 1).

<sup>85</sup> Libertarians thus confronted foreign “intelligent, daring, and bold capitalism” — credited for its capacity of generating a certain amount of wealth — with the Spanish version defined as “a capitalism without entrepreneurial spirit” (“El capitalismo y nuestro mejoramiento”, *Solidaridad Obrera*, nº 292, 14 August 1916, 1). According to this, Spanish entrepreneurs would only increase their profits at the expense of poverty wages or by opening the country and its natural resources to foreign companies.

<sup>86</sup> “This is the revolution that Spain lacks and that only the anarchists can bring about” (Ernesto Bark, “El problema de España”, *Solidaridad Obrera*, nº 628, 4 August 1917, 1).

<sup>87</sup> The “railway crisis”, that is to say, the need to renew all the railroad equipment after almost half a century of operation accentuated during the European war.

<sup>88</sup> Providencio, “Postal no. 1”, *Solidaridad Obrera*, nº 774, 31 May 1918, 1.

regime closed to any reformist solution.<sup>89</sup> It is not a surprise, therefore, that both Spanish engineers and conservative Catholics supported the imperative of transitioning to hydroelectricity as a way of avoiding the collapse of the monarchy and alleviating the social and political tensions emerging from coal dependency.

- 42 As for the Spanish libertarian movement, the Great War marked a moment of clear awareness of the importance of energy infrastructures and of the workers who controlled the extraction and transport of energy resources (fundamentally, railway workers and miners) as a way of exercising pressure in the struggle to achieve labour improvements — even in unleashing a revolution capable of subverting the social relations of class and production.<sup>90</sup> Moreover, it is just before the continental conflict, in 1910, when the National Labour Confederation (*Confederación Nacional del Trabajo*) (CNT) was founded in Barcelona after a careful reflection on the new characteristics that industry was acquiring. The CNT was a confederation of anarchist or libertarian-oriented unions that did not want to join the dominant union, namely, the socialist General Union of Workers (UGT), founded in 1888 and affiliated with the Spanish Socialist Workers' Party (PSOE).<sup>91</sup> Taking the most industrialized countries as the reference, the CNT analysed

the change of scope in the strikes: from that moment on, they would be on a national scale and would affect strategic sectors, namely energy production and distribution.<sup>92</sup> Conflicts such as those of the American railroad workers of 1916 — which resulted in obtaining the eight-hour day — were followed with great enthusiasm.<sup>93</sup> In fact, a year later, the country experienced its first general strike, from 13 to 18 August, with the participation of 28,000 railway workers in charge of moving coal throughout Spain, who demanded improvements in job conditions and wages. The protest lasted longer than expected and acquired special virulence precisely in the northern Asturian mining basin, due to the solidarity of coal-miners.<sup>94</sup> Although Spanish railroad workers and coal-miners (mostly close to the UGT) would oscillate between the radicalism derived from their everyday working conditions and the reformism advocated by their political leaders, the CNT considered the conflict as a prove of the effectiveness of their anarcho-sindicalist strategy — namely direct action from workers' organizations. Most importantly, the 1917 strike proved the vulnerability of energy networks and their potential use as pressure points around which the labour movement could establish their demands, especially given the weaknesses of carbon-statecraft in Spain.<sup>95</sup>

<sup>89</sup> Since 1917, national unity governments and emergency measures taken by decree were the only means to alleviate the crisis of the Restoration political regime, leading to a gradual authoritarian drift. For an overview, see Francisco J. Romero Salvadó, "The Great War and the Crisis of Liberalism in Spain, 1916–1917", *The Historical Journal*, vol. 46, n° 4, 2003, 893–914.

<sup>90</sup> See Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London and New York, NY: Verso, 2013), 12–43.

<sup>91</sup> The new confederation was the result of a change in mentality in sectors of Iberian anarchism, especially those who began to deem convenient the use of unions as a tool of resistance and struggle, taking as an inspiration French revolutionary syndicalism. Consequently, Spanish anarchism was able to overcome the individualist and terrorist phase, that had characterized late 19<sup>th</sup> C. anarchism, to become a mass movement in early 20<sup>th</sup> C., by contrast to its overall marginalization in much of the European labour movement. See Murray Bookchin, *The Spanish Anarchists: The Heroic Years, 1868–1936* (New York, NY: Harper Colophon Books, 1977).

<sup>92</sup> Around 1916 some CNT leaders began to point to the necessary reorganization of the CNT into single industry-branches unions, finally adopted in the Sants Congress in June 1918.

<sup>93</sup> "Del Extranjero". *Solidaridad Obrera*, n° 299, 21 August 1916, 4.

<sup>94</sup> The strike was the outcome of the national campaign of agitation initiated in October 1916 by the UGT and CNT calling for government measures to deal with the energy crisis and the rising cost of essential goods. The lack of a unitary conception around the nature of the strike (revolutionary or not) and the non-convergence with the so-called Assembly of Parliaments (created in July 1917 by those political sectors repeatedly alienated by the Restoration's establishment and willing to democratize the regime) prevented any significant political change. See Gerald H. Meaker, *The Revolutionary Left in Spain, 1914–1923* (Stanford, CA: Stanford University Press, 1974), 62–99.

<sup>95</sup> On carbon statecraft, or the embeddedness of modern statecraft, political economy, and carbon-based fuels, see Mitchell, *Carbon Democracy* (cf. note 90).

- 43 In February 1919, a new conflict started at the power plant of *Avenida del Paralelo*, in Barcelona, belonging to Barcelona Traction, Light and Power Company Ltd, popularly known as *La Canadenca* — “The Canadian” in Catalan because the Canadian Bank of Commerce of Toronto was the major stakeholder. The mobilization took a radical tone, with strikes, boycotts, civil disobedience, sabotage, and seizure of electrical infrastructures. What triggered the protest was the dismissal of eight office staff workers, since it was interpreted as a direct retaliation against the CNT — which Catalan businessmen refused to recognize — since workers were affiliated to the Water, Gas and Electricity CNT Union. In fact, the strike occurred in an atmosphere of growing influence of the anarchists and of perceptions of imminent revolution and the collapse of capitalism.<sup>96</sup>
- 44 Following the threats from the electricity company, the CNT responded by extending the conflict to the entire firm and promoting sympathy strikes in the sector. By 8 February, the movement was uniformly followed in *La Canadenca* and, on 21 February, workers interrupted the power supply to the trams and Barcelona’s industry.<sup>97</sup> On 27 February, tram workers, the Barcelona General Water Company, the Catalan Gas and Electricity Company and the Lebón Gas Company also paralyzed their activity in solidarity.
- 45 Without electricity, water, and energy, Barcelona’s factories were completely at the mercy of the decisions taken by the CNT in a protest that lasted 44 days. With more than 100,000 participants in the strike, the government had to pressure employers to accept worker’s demands by
- mid-March, including the recognition of unions, better wages, the reinstatement of dismissed workers, the release of thousands of workers arrested during the conflict, and the official decree of the eight-hour day (issued on 5 April). The fight between the unions and the electricity company was therefore settled with a landslide victory for the CNT, while the government and the Catalan business community obtained clear evidence of the danger posed by a well-organized and structured libertarian unionism. And although *La Canadenca* strike did not result in a revolutionary movement — despite the revolution being part of the ideological repertoire of the anarchists — more immediate objectives were achieved such as the eight-hour day and the affirmation of the CNT as a direct interlocutor with employers.
- La Canadenca* strike seemed to contradict 46 some of what engineers like Pérez del Pulgar had argued for regarding the social consequences of a virtually unlimited energy supply through a national grid. On this point, Pulgar was wrong when he highlighted the higher reliability of hydroelectric power supply as it required less workers than other energy infrastructures — notably coal — therefore, less susceptible to being paralyzed.<sup>98</sup> At a time when the barricades in Barcelona were still burning, Juan de Urrutia y Zulueta (1866–1925), a Basque businessman and an essential figure in the development of the Spanish electricity sector gave a lecture at the ICAI in March 1919.<sup>99</sup> He discussed how setting

<sup>96</sup> The Russian revolution of 1917, but particularly the pre-revolutionary conditions in countries of the extinct central empires (notably Germany) after 11 November 1918, were seen as the sign that the time had come “to seize the instruments of production, fields, factories and workshops” (Félix Monteagudo, “Excursión Regional de Propaganda y Organización”, *Solidaridad Obrera*, nº 979, 19 December 1918, 2).

<sup>97</sup> The Government temporarily confiscated *La Canadenca*, with the prior authorization of the British Embassy, assigning military engineers to restore electric supply to the city. For an overview, see Angel Smith, *Anarchism, Revolution and Reaction: Catalan Labour and the Crisis of the Spanish State, 1898–1923* (New York, NY: Berghahn Books, 2007), 290–323.

<sup>98</sup> “One could, therefore, chose its location [electricity production] without paying attention to anything other than the comfort and safety of the waterfalls, differing in this from all other industries, and even from coal mines, which demand numerous workers and previous routes of transportation” (José A. Pérez del Pulgar, “La nacionalización de la energía eléctrica”, *La Energía Eléctrica*, nº 22, 25 November 1917, 258). In this sense, Pulgar’s definition of hydroelectricity is related to Mitchell’s take on modern oil industry. See Mitchell, *Carbon Democracy* (cf. note 90).

<sup>99</sup> Juan Urrutia was one of the greatest advocates of the grid and founder of the most prominent Spanish electrical enterprises: *Hidroeléctrica Ibérica* and *Hidroeléctrica Española*. He became later director of the Official Chamber of Electricity Producers and Distributors and led the corporate organization of the Spanish energy industry until his death.



up the national grid (defined as an “energy ring” around the country) would entail a great deal of cooperation and solidarity between producers and consumers, individuals and the state, so much so that the grid encapsulated his desires for social harmony in a moment of labour strife:

we are living in a century of great integrations, great socializations, great cooperation, great trade-unionism: workers’ unions, energy unions, unionism of capitals; and the state, acting as an intermediary, welding these great activities of all sort ... won’t this energy ring become a symbol of that unity?<sup>100</sup>

- 47 Spanish anarchists, of course, thought differently about the kind of aspirational scenarios the material assemblages of electrification could accomplish, even though they shared with engineers and Spanish Catholics the same optimistic take on energy abundance.

## CONCLUSIONS

- 48 Expectations and cultural representations of electricity in early 20<sup>th</sup> C. Spain were partially shaped by perceptions of coal scarcity, in particular the incapacity of domestic coals to fulfil the nation’s industrial revive in a context of national (and imperial) decline, but also economic, social, and political unrest. The transition to a new energy regime represented by (hydro) electricity therefore encapsulated many communal hopes for a brighter future. However, a complex blend of actors, their evolving agendas, expectations, and their distinctive social, religious, professional, political, national, and sub-national outlooks, also provided a context for a particular interpretation of electricity and gave rise to different energy imaginaries and scenarios. As such, electricity contained multiple, even contradictory and overlapping fantasies and no homogeneous national energy imaginary could emerge, due to the diversity, complexity, fragmentation, and polarization of Spanish society. “Electrification” would then emerge as

a highly politicized social construct connected to divergent modes of organizing social life and the future Spanish nation and community. These considerations are clearly relevant to historical analyses and beg for further inquiries on the historical importance and changing meanings of electricity over time — and energies in general — as a set of technologies, infrastructures, natural resources, but also of the values and ideas embedded within their mobilizations and use in several social, cultural, political and rhetoric contexts. Furthermore, these conclusions prove that energy history must be contextualized within wider frameworks of social and political change, since energies are adapted to or developed within existing socio-technological environments specific to place and time.

In Spain, energy utopias were aimed at fulfilling strategic goals with several ideological groups and clienteles trying to capitalize on the alleged transformational power of electricity to accomplish their social and political aspirations. For example, some of the engineers’ desires to reaffirm the nation’s industrial superiority through hydroelectricity would also shape certain forms of governance, including shifting power relations within the Restoration’s political establishment and gave more prominence to elite experts in the management of a strong and, eventually, centralized state. Energy abundance through the national grid also offered an opportunistic narrative to sublimate the many conflicts of the period (class struggle, unemployment, lack of democracy) focusing merely on techno-managerial solutions, hence avoiding deep political reform. Catholic authorities or Catholic-inspired engineers also wanted to embed traditional values into electricity networks as to promote the image of a nation of rural and independent small-property farmers. These visions had, of course, their limitations and, as a matter of fact, energy imaginaries in Spain did not serve the purposes of making the transition to hydroelectricity easier (which occurred in a localized and spontaneous manner according to several local conditions), or to obtain state support in the development of the national grid. Moreover, despite those energy-intensive visions, the

<sup>100</sup> J.G.B., “Utilización de la energía hidroeléctrica en España”, *La Energía Eléctrica*, nº 6, 25 March 1919, 73-74.

material infrastructures of energy and, in particular, their vulnerabilities could endanger the whole regime by constricting the energy flows upon which the Bourbon Restoration depended.

50 In any case, energy imaginaries, through the scenarios they created, served the purposes of coping with fear of uncertainty in times of crisis. As such, electricity was mobilized by several political forces to respond to the many challenges of “modernization” as a process of rapid social and political change, and it was instrumental in creating competing programmes for the management of them. Some of the promises of electrical modernity were radical, even revolutionary, yet others were grounded on undemocratic, even reactionary and illiberal principles. Decentralized energy provision, for example, would deliver divergent social and national outcomes in both Catholic and anarchists’ agendas.

51 Finally, it is interesting to look at these historical examples from the perspective of contemporary energy debates. First of all, hydroelectricity being cleaner than coal was not a factor that mattered in early 20<sup>th</sup> C. debates, despite pastoral ideas of a pre-modern Spain being so widespread within conservative Catholics. The same would be true of concerns about the lack of cleanliness and healthiness in big factories of certain libertarian intellectuals. However, the legitimization strategies on the use of hydroelectricity rarely revolved around environmental issues but were mostly framed around notions of national or societal development, political independence (even energy autarky) and, ultimately, self-sufficiency. Interestingly, despite their differences, the political groups and programmes analysed in this article had in common a delusively and misleading approach to electricity’s capacity to

overcome any number of natural limitations and provide communal well-being through an energy narrative promising abundance.

Given the widely accepted objective of reducing 52 global energy use as means to reduce human impact on Earth’s systems, energy historians are tasked with appropriately dissect and explain how connections between resources, politics, technologies, society, and ideas — including epistemologies or ways of contemplating energies — have been arranged over the past centuries, especially considering that the future of energy policy will not be determined exclusively by shifts in energy resources or technologies. Even if we have started to worry about the implications of our current energy use, societies continue to indulge in a triumphalist narrative of growth without material limits (or consequences) and the modernist fiction of cheap and abundant energy surplus via “renewable” energies or “greener” technologies. It seems that we are reaching a post-abundance epoch and, maybe, energy abundance and the limitless horizon of growth has been a contingent and unrepeatable historical event. However, changing our current beliefs and ideas around energy and its social significance constitutes a challenge as important as transforming our carbon-based infrastructures. If historians start to understand how the idea of energy abundance and its relationship with civilizing advances originated in early-industrialized countries, we need more comparative research — probably based upon localized studies in other periods and locations. Only in this way we will understand better how these ideas were appropriated and reworked according to the characteristics of particular industrial cultures and political circumstances, whether in the Global South or in the many margins of the Global North.

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## PÉREZ-ZAPICO | A WAY OUT OF DARKNESS:

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## Electricity, Modernity and Tradition during Irish Rural Electrification 1940-70

### Abstract

The arrival of widespread domestic electricity in rural Ireland was spread over two decades in the 1950s and 1960s, where the Electricity Supply Board (ESB) rolled out an electrical grid across the State. This energy transition was warmly welcomed by the women of rural Ireland, particularly for the relief it afforded for the continual drudgery of cooking on turf and coal fires, washing and cleaning by hand and using well or hand-pumped water. The poor economic situation of the state in the 1950s meant that only a restricted range of appliances were sold by the ESB or commercial shops, but initial fears about electricity were overcome by ESB advertising, however it made a real physical difference to women's lives in a country with very prescribed and restricted social roles available to women. Coming from the discipline of design history, this article will look at the tangible evidence of appliances and kitchens changed by this energy transition. It will make use of oral history testimony gathered from a group of older women who were rural housewives in 1950s and 1960s Ireland, using this to consider the multi-layered meanings and emotions associated with these domestic electrical appliances, as well as considering what we can learn from women who have lived through a major energy transition.

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### Plan of the article

- Introduction
- Materiality, Design and Oral History
- Rural Electrification in Ireland
- ESB pamphlet promotion of rural electrification
- ESB television advertisements
- The Irish Countrywomen's Association
- ESB/ICA model kitchen at the 1957 Spring Show
- Electricity and Religion: The Sacred Heart Lamp
- The Electrification of the Sacred Heart
- Conclusion

## INTRODUCTION

MO: Well, I suppose looking back on it, it made things a lot easier, right? But at the time you were used to the life you had. Do you know what I mean?

SO: Yes.

MO: And everything was new and a lot of the things, like, it took you a while to get used to them, do you know? But gradually, you know, you got into it and it did, it did improve things an awful lot, you know, yes.<sup>1</sup>

- 1 The introduction of widespread electricity to rural Ireland in the 1950s and 1960s was a slow, arduous process, which involved promoting a new technology to a largely conservative rural population. The construction of the Ardnacrusha hydro-electric power station in the 1920s had been successfully positioned as an Irish post-colonial project, despite being constructed by the German company Siemens, and the intervening years had involved the development of further power stations and a cadre of native Irish engineering staff.<sup>2</sup>
- 2 To look at how the Electricity Supply Board (ESB) positioned their offerings to this rural population, it is important not to just look at the official narrative of the ESB itself, but also the broader social and cultural forces at play. This article will look at the material traces of both the ESB publicity campaign itself and at the role that electricity played in 'upgrading' pre-existing religious traditions and rituals. It frames these using object focused approaches from within design history, which consider the surviving material traces of objects from this time period, as well as their two dimensional representations. These design history approaches are useful for understanding the effect that physical and visual experiences can have on people, both in terms of buying

decisions, everyday life and cultural attitudes. Historiographically, overlaps between design history and technology history go back to Siegfried Giedion's *Mechanization Takes Command*, which is claimed by both disciplines as a foundational text.<sup>3</sup> Throughout dialogue with material culture and other social sciences in recent decades, analysis of the physical object has remained central to the discipline, picking up on visual and material cues often glossed over by more traditional historical scholarship. This emphasis on the physical is complemented by the use of oral history, itself a non-physical discipline, but one which also works outside official narratives and which offers insights into emotions and meanings which may not be accessible otherwise. The article combines these two very different approaches, physical and spoken, into an analysis of rural electrification which complements the broader systems-based approaches to the study of Irish rural electrification and to energy history itself. The consideration of religious artefacts such as the Sacred Heart lamp provides a particularly appropriate case study, as both methods are used to analyse the meanings attached to physical objects, and how people used them to navigate their world, physically, but also in terms of meanings, values and aspirations.

## MATERIALITY, DESIGN AND ORAL HISTORY

Design history, broadly defined, has focussed on the object since the development of the discipline from art history in the 1970s. This focus has historically been broadened by engagement with ideas from social sciences such as anthropology, archaeology and ethnography, with material culture a particularly strong influence. Methodologically, this expansion has been balanced by influences from critical and cultural theory, but retained its grounding in the physicality of real things and how they come to be made, dispersed and used.<sup>4</sup> It specialises in the

<sup>1</sup> Mary O'Mahoney, "Interview," interview by Sorcha O'Brien, *Electric Irish Homes*, November 20th, 2017.

<sup>2</sup> Sorcha O'Brien, *Powering the Nation: Images of the Shannon Scheme and Electricity in Ireland* (Newbridge: Irish Academic Press, 2017).

<sup>3</sup> Siegfried Giedion, *Mechanization Takes Command: A Contribution to Anonymous History* (Oxford: Oxford University Press, 1948).

<sup>4</sup> Grace Lees-Maffei, "The Production–Consumption–Mediation Paradigm," *Journal of Design History* 22, no. 4 (2009): 351–76.



material traces of the more recent past, where is it often possible to talk to, read the writings of or look at the drawings of the people who designed these objects, as well as those who promoted or used them. Because of the political nature of most of the world in recent centuries, much of this focuses on objects created within the capitalist system, but the expansion of thinking effected by material culture has meant that it includes objects from pre-capitalist as well as socialist and communist systems, as well as utopian attempts to create new systems. While the traditional focus within the discipline has been on the agency of the designer, this cross-disciplinary dialogue has meant that this focus was first expanded out to other categories of humans (such as users) and then to the object and other elements of the system. The continued focus on the object, its properties and interactions, has meant that the intractability of matter and the difficulties of encouraging it into physical form have continued to play a role in the consideration of design as an activity that is embedded into systems of making, economics, politics, promotion, use and re-use, but also value, meaning and emotion. This is also not just a quality of the singular object, but the 'gathering' of objects, whether planned as a cohesive whole or accumulating due to less obvious forces.<sup>5</sup>

- 4 The role of culture and cultural specificity has been a theme throughout much design history writing, with the nation-state playing a particular role in the analysis, from overt displays such as flags and stamps, to the subtler manifestations in the everyday rhythms of street, workplace and home of a particular time and place.<sup>6</sup> These 'gatherings' of objects work as agents in their own rights, sometimes pushing events in a cohesive manner, but as often not, with the inert nature of physical form exerting drag on the world of ideas and aspirations. This paper considers two such 'gatherings' of objects, both of which struggle to negotiate the ideas

of 'modernity' in a mid-century Irish context, particularly where attempts to design a model kitchen that is still recognisable 'Irish' negotiate a heritage and traditional forms that are resistant to change and outside influence. Irish design history, in particular, has employed the ideas of Clifford Geertz on the process of nation-building to theorise the interplay between ideas of 'essentialism', concerned with tradition, heritage, religion, language and ethnicity; and 'epochalism', the 'spirit of the age', universalism, science and technology, the future and modernity.<sup>7</sup> How these ideas are balanced within the imagining of any particular nation play out through their physical manifestations. This is particularly important in the Irish case, where designed objects are created both as materialisations of a desired or imagined Irish identity, but also in reaction to the colonial experience. They inherit a binary opposition where the universal, the urban and the technological were still considered to be 'British' and problematic, thirty years after the messy and partial independence of part of the island. The shifts in economic and social policy as the Irish Free State become a Republic in 1949 and faced the shortages and challenges of the post-war period, both internal and external, meant that the particular dialogue between essentialism and epochalism gave the products of Irish society and culture their specific national characteristics. This influenced the materials and tools available for manufacturing in the State, as well as the distribution mechanisms available, and the meanings and associations of electrical appliances. This is particularly important when 'being modern' was seen as both desirable and slightly worrying at the same time.

These meanings and associations have often been researched through surviving written documents, often through archives and libraries. While this remains an important historical record, it only represents the part of the written record that was deemed suitable for preservation, and

<sup>5</sup> Sarah A Lichtman and Jilly Traganou, "Introduction to Material Displacements," *Journal of Design History* 34, no. 3 (2021): 195-211.

<sup>6</sup> Michael Billig, *Banal Nationalism* (London: SAGE Publications, 1995).

<sup>7</sup> Clifford Geertz, *The Interpretation of Cultures*, 2nd ed. (New York, NY: Basic Books, 2000); Paul Caffrey, "Ireland, Design and Visual Culture: Negotiating Modernity 1922-1992," ed. Linda King and Elaine Sisson (Cork: Cork University Press, 2011); O'Brien, *Powering the Nation*.

is heavily biased towards official sources as a result. In terms of design history, it is extremely useful for documenting official government policies, organisational structures and decision-making, and other political and economic factors. However, it is much more difficult to get a sense of the ideas and opinions of ordinary people through this route, although they may be approximated through newspaper and magazine articles.<sup>8</sup> Oral history, as a method, is better placed to try and disinter some of these ideas and opinions, value judgements and approaches, at least within living memory. While it is intrinsically a human-centric approach, it is one that can tell us much about the subtle interplay between official systems and individual reactions, spreading the location of agency out from official organisations to a broader spread of society. It is, of course, not the same as 'being there', of the historical desire to understand some kind of 'truth', as the ideas and opinions are still filtered through the perceptions of individuals who may or may not be representative of a social group. In addition, the passage of time must be taken into account, as both memory and the construction of narratives play a transformative role in how the past is understood by the individual, as well as the historian.<sup>9</sup> This focus on the intangible histories plays a complementary role to that of design history/ material culture and more traditional historical archival approaches, widening out the focus of the discussion.

## RURAL ELECTRIFICATION IN IRELAND

- 6 The archival histories of rural electrification in Ireland tell a story about organisational and governmental triumph over adversity, in order to bring light to the nation.<sup>10</sup> They locate this

<sup>8</sup> Grace Lees-Maffei, *Design at Home: Domestic Advice Books in Britain and the USA since 1945* (Abingdon: Routledge, 2013); Caitriona Clear, *Women's Voices in Ireland: Women's Magazines in the 1950s and 1960s* (London: Bloomsbury Academic, 2016).

<sup>9</sup> Joanna Bornat and Hanna Diamond, "Women's History and Oral History: developments and debates," *Women's History Review* 16, no. 1 (2007): 19-39; Robert Perks, *The Oral History Reader*, 3rd ed. (London: Routledge, 2015).

<sup>10</sup> Maurice Manning and Moore McDowell, *Electricity Supply in Ireland: The History of the E.S.B.* (Dublin: Gill & Macmillan,

project in post-war Ireland, where the pressures of post-colonial independence from Britain meant that exploiting any native power sources was desirable from both economic and ideological standpoints. The Electricity Supply Board (ESB) had been formed in the 1920s to run the first Irish hydro-electric power station Ardnacrusha, but their long-term plan to increase generation capacity had been interrupted by 'The Emergency', as World War II was called in neutral Ireland. This was to be complemented by the electrification of Irish homes and places of work, a project that was complicated by the high percentage of isolated rural dwellings and a population uneducated about science, let alone electricity, with many still cooking and heating their homes with open turf fires. Supported by both conservative party Fianna Fáil and more left-wing inter-party governments as a way of reducing emigration, especially amongst young women, the main electrification project ran from the late 1940s until the mid-1960s, with a smaller post-development infill project running into the mid-1970s. It also coincided with a move from the protectionist fiscal policies of the de Valera era towards the more outward looking and modernising approach promoted by Seán Lemass, which are credited with the gradual economic expansion of the 1960s and Ireland's eventual accession into the European Economic Community in 1973.<sup>11</sup>

In addition to the actual infrastructural work of building hydroelectric and peat or gas-fuelled power stations and running power cables out to remote townlands, the ESB were also heavily involved with promoting electricity as a positive force in Irish life. The organisation had pioneered 'American' publicity methods in Ireland from the very start, appointing a PR director and forming a Publicity Department as early as 1927.<sup>12</sup> The

1984); Michael Shiel, *The Quiet Revolution: The Electrification of Rural Ireland* (Dublin: The O'Brien Press, 1984).

<sup>11</sup> Diarmuid Ferriter, *The Transformation of Modern Ireland 1900-2000* (London: Profile Books, 2004); Terence Brown, *Ireland: A Social and Cultural History 1922-2002*, 2nd ed. (London: Harper Perennial, 2004); Tom Garvin, *Preventing the Future: Why Was Ireland So Poor For So Long?* (Dublin: Gill & Macmillan, 2004).

<sup>12</sup> O'Brien, *Powering the Nation*.

process of individually canvassing houses within an area for sign-ups to 'the light' meant that its staff had an in-depth appreciation for the lack of understanding amongst the rural Irish population of this new technology, given that the majority of the population left education by 14, without any teaching of science. This led to a number of strategies being developed, both ad hoc and institutional, in order to convince the average Irish farmer that his house would be brighter and warmer, his work easier and that electrical efficiencies would make the financial outlay worth it. It is notable that the *bean an tí* or 'woman of the house' rarely needed much convincing, given the back-breaking drudgery involved in running large farm households on well water, gas or oil lamps, open peat fires or possibly an Aga stove for the better off. Despite the best efforts of the women of the revolutionary period, the highly gendered roles of the late 19<sup>th</sup> century had survived in Irish society, having never been seriously threatened by war work, as in other European countries. The dominant influence of Catholic morality meant that 'women's place in the home' had been written directly into the 1937 Constitution, conflating the role of 'woman' and 'mother' to produce an aspiration that *all* women would be mothers and not work outside the home unless forced to by 'economic necessity'.<sup>13</sup> As a result, rural Irish women were much more enthusiastic about electricity than their husbands, needing much less convincing that consistent bright light, electrical cookers and irons, as well as electrically pumped running water, would make their lives easier and reduce the numbers of their daughters emigrating to Britain or America.

### ESB PAMPHLET PROMOTION OF RURAL ELECTRIFICATION

- 8 Part of the ESB's efforts to educate and inform the Irish public included a number of informational pamphlets that were published throughout

the 1950s and 1960s on topics such as heating the home and the benefits of hot water and electric kettles, as well as electric grain grinding and infra-red lamps for raising poultry.<sup>14</sup> One type of pamphlet focused on the concept of electrical units, and the 1954 publication *How Units Can Help* demonstrates how the practical benefits of using a variety of electrical appliances around the home and farm. It breaks down the concept of the unit charge on top of the basic Fixed Charge and how the economic use of unit charges could enable financial savings and even profits. It divides its attention between a male and female audience, who are very clearly coded into separate pages on farm and home domains (see Fig 1), with the female figure shown in conjunction with the home, mirroring the male figure in the farmyard. The text says that "no housewife will need much propaganda to convince her that its labour-saving value in the domestic sphere is unchallengeable", but goes on to talk about the financial value of the time saved in terms of home businesses such as poultry-rearing (which was traditionally a female enterprise) in addition to the main farm income. The two-colour illustration of 'Electricity in the Home' shows a neatly dressed woman looking towards a large two-storey farmhouse of the type found in better off areas around the country, with multiple chimneys as well as an connection from an overhead power line running outside the garden wall. This implies that the electricity had been retrofitted into an existing farmhouse, previously heated using fireplaces, although the appliances themselves are here left to the imagination. The double doors beside the main house could be to a garage, or more likely to a poultry shed, separating the smelly business of rearing poultry out from the daily work of domestic kitchen. Another view of presumably the same premises is shown in the 'Electricity in the Farmyard' image, where a suited pipe-smoking farmer surveys a tidy set of outbuildings and barns, which combine a horse cart, chickens and a water butt with an electric light and a set of pylons disappearing into the distance. Both

<sup>13</sup> *Bunreacht na hÉireann: Constitution of Ireland*, (Dublin: The Stationary Office, 2015), 41.2. This article is still in force today, as moves to remove it or make it gender neutral were halted by the Covid-19 pandemic. At the time of writing a referendum on the subject has been announced for November 2023.

<sup>14</sup> "Pamphlet library: 1940s-60s," 2021, accessed January 9, 2021, <https://esbarchives.ie/rural-electrification-pamphlets/>.



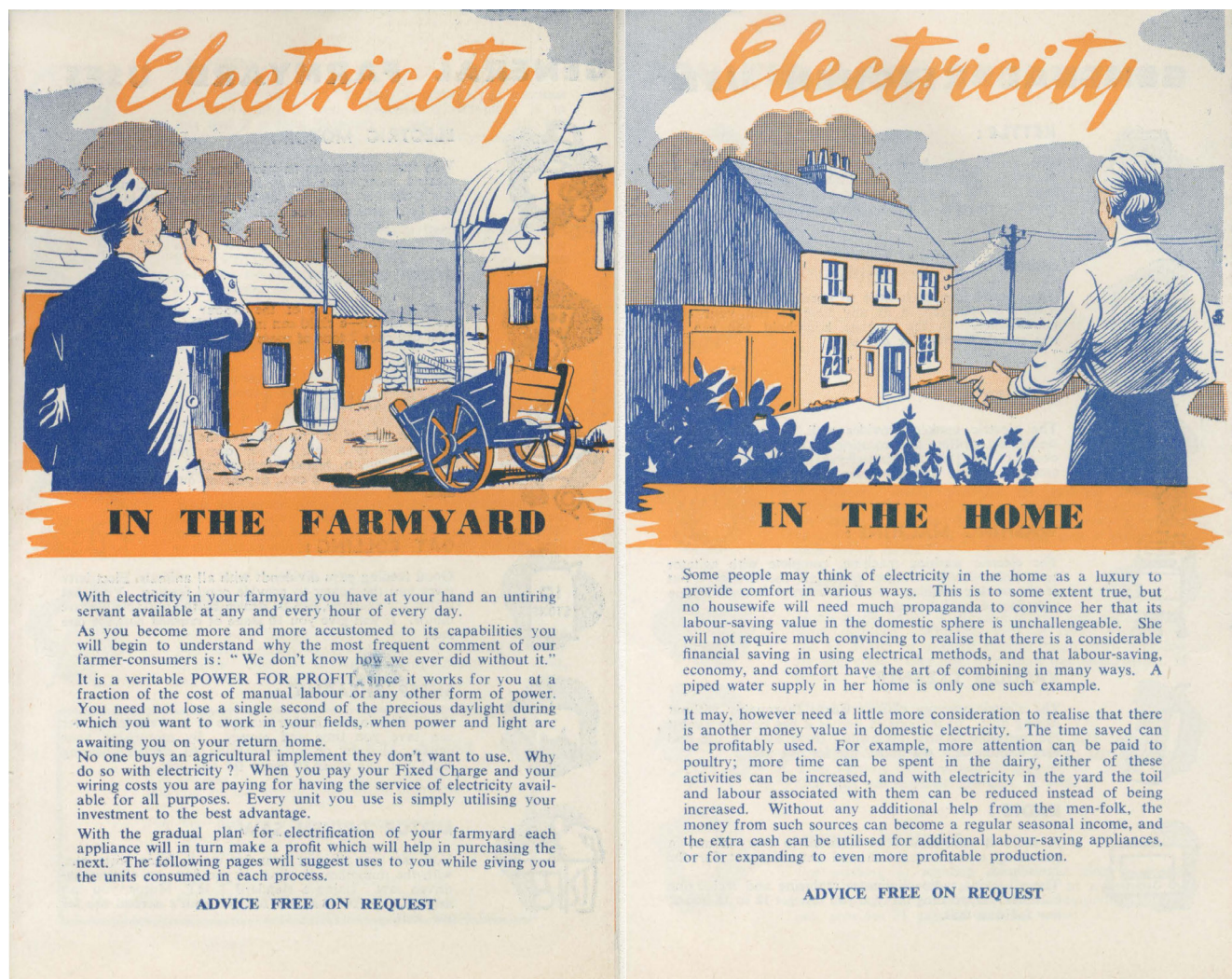


Figure 1: *How Units Can Help*, ESB pamphlet, pages 1 and 2, 1954 (Courtesy of the ESB Archives).

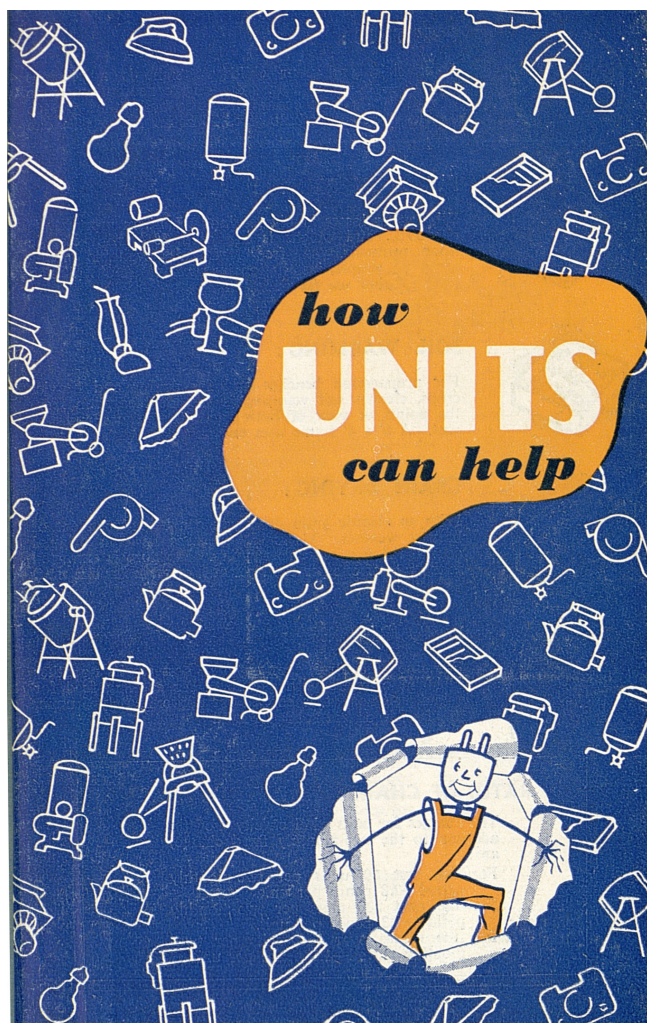
of these depictions of exteriors include obvious signifiers of electricity like the pylons, poles and outdoor lights, but when they are combined with the highest quality farm settings, they provide an aspirational view into a world where electricity can elevate your home farm to the highest recognisable standards.

- 9 A wide set of appliances is shown on the cover of the pamphlet as line-drawn icons, alongside 'Johnny Hotfoot', a cartoon figure with a plug for a head that was used throughout ESB promotional literature of this period.<sup>15</sup> Johnny is shown in a set of electricians' overalls, 'bursting' out of the sheet of icons, and can be read as a personification of both the ESB and electricity itself, come to help the couple understand

the economics behind upgrading their home and work (see Fig. 2). The appliances appear again in later pages of the pamphlet, with an individual breakdown of how long each one can be run for one unit of electricity. This includes two pages of 'General Farm Uses', one covering 'Poultry & Egg Production' and 'Dairy', another on 'Water Pumping'. The page on 'General Kitchen Use' promotes the upgrading of appliances such as kettle, iron and the radio, as well as new appliances such as the electric cooker and vacuum cleaner (see Fig. 3). Each of these is showcased with a line-drawn icon, which recognisably include the upright Hoover vacuum cleaner, a GEC cooker and a round three legged washing machine, all of which were on sale through the ESB in the early 1950s. It explains the amount of work the appliance does for one unit, several of which are set up to emphasise the economic value of

<sup>15</sup> "A Camera and a Question," *Prospect*, 1966, 8.





**Figure 2:** *How Units Can Help*, ESB pamphlet, front cover, 1954 (Courtesy of the ESB Archives).

one unit of electricity, for example, boiling 18 pints of water or doing 4 weeks' washing. The discussion emphasises cheapness and economy as much as it does speed and convenience, and this is emphasised by the spare monochrome drawings, which present the appliances with an economy of line.

- 10 The use of printed pamphlets as a marketing tool in the Irish context is an example of very culturally aware promotion tactics. In addition to public meetings, a fixture of Irish political life, the pamphlet has played an important role in disseminating official information to the Irish people.<sup>16</sup> While the majority of the Irish popu-

<sup>16</sup> Nina Holmes, "A Picture of Health: Visual Representation of the Subject in Irish Government Health Ephemera, 1970–1996" (PhD Kingston University, 2017).



**Figure 3:** *How Units Can Help*, ESB pamphlet, page 6, 1954 (Courtesy of the ESB Archives).

lation had left formal schooling at 14 and sometimes earlier, Irish culture retained a reverence for the written word that manifested itself in a public that read voraciously about public affairs, especially in the newspapers, ranging from national to local. The ESB themselves noted the success of their pamphlets in informing people about the rural electrification scheme, and initial black and white trials were expanded into two colours and distributed throughout the country.<sup>17</sup>

### ESB TELEVISION ADVERTISEMENTS

By the mid-1960s, the improving economic situation in the Republic of Ireland and the rural electrification scheme meant that the majority of households in the State now had electricity.

<sup>17</sup> "Kitchen Planning," *REO News*, 1957, 3.



Many of the better off also availed of more exotic appliances and electrical goods, including the purchase of a television. While television signal had previously been confined to the east coast and Border areas where BBC could be picked up, the establishment of Radio Telefís Éireann (RTÉ) in 1960 meant that a home grown schedule of news and entertainment was now available across the country. By 1964, the ESB was also producing home-made television advertisements in order to stimulate demand amongst this growing demographic. Alongside advertisements entitled *Electricity Helps in so Many Ways* and *Cleanest Cooking, A Penny Buys a Lot of Comfort* was produced to continue the emphasis on the cost effectiveness of electricity in the home. The advertisement was bookended by a spinning Irish penny, which was designed in the 1920s to show a hen with a brood of chickens, intentionally associating the coin with women's work in the house, both in terms of the raising of poultry and of the hen's maternal instincts (see Fig. 4).<sup>18</sup> It then works through a set of tasks that can be carried out using a penny's worth of electricity, all of which are carried out by a fashionably dressed housewife with an adoring husband and four children (see Fig. 5). It ranges from a week's washing and spin drying for 'an average family' to a running a fridge for an entire day, and illustrates this with the housewife moving clothes into a spin dryer with tongs and stocking up a fridge, etc. The continuing emphasis on cost effective labour appears in the form of '7 hours lighting', which is illustrated by the housewife turning on a lamp to light her knitting. The fact that this advertisement is aimed at the better off consumer is highlighted by the presence of an electric blanket at the end of the advertisement, a more sophisticated, if not expensive product, which required a socket in the bedroom for operation.<sup>19</sup> Again, the home and family represented would be familiar to Irish viewers, in terms of the gender roles where the woman does all the domestic work and the father is only seen at the breakfast table in his dressing

gown. Also, the furnishings range from electrical appliances like the under counter refrigerator to familiar traditional objects such as the handmade quilted bedspread and blue and white striped Carrigaline ceramics. Again, this is presented to the viewer as an aspiration, and while it is not explicitly framed as 'modern', the modernist design of all the appliances shown and the continued emphasis on efficiency places it firmly on the 'epochal' end of the scale discussed earlier. The fact that electricity enables this 'modern' household to be run so efficiently positions it as an improving force in Irish society, one that will allow increased comfort within the home, but also one that allows traditional



**Figure 4:** Still of an Irish penny from *A Penny Buys a Lot of Comfort*, ESB television advertisement, 1964 (Courtesy of the ESB Archives).



**Figure 5:** Still of housewife serving breakfast in an electric kitchen from *A Penny Buys a Lot of Comfort*, ESB television advertisement, 1964 (Courtesy of the ESB Archives).

<sup>18</sup> Caffrey, "Ireland, Design and Visual Culture: Negotiating Modernity 1922-1992," 74-89.

<sup>19</sup> "A Camera and a Question," 21.

Catholic structures like large patriarchal families to flourish. This is a significant shift in the rhetoric surrounding electricity from both the early days of its promotion in Ireland, as well as how it was presented in several other European countries.<sup>20</sup> It is particularly careful to position it as an 'Irish' aspiration in a recognisably Irish context, carefully blocking off any possible lingering post-colonial associations of 'Britishness'.

### THE IRISH COUNTRYWOMEN'S ASSOCIATION

- 12 From a systemic point of view, the ESB were not the only organisation with a vested interest in promoting electricity to Irish users. Several voluntary organisations in the Irish countryside played such roles, but it is the Irish Countrywomen's Association (ICA) that played the most notable, influential and sustained part in promoting electrical power amongst its many members. A very flatly-structured organisation, the ICA operated largely at the local guild level, although the early 1950s saw the purchase of An Grianán, a former 'big house' and hotel premises in County Louth, funded by a Marshall Aid grant from the Kellogg Foundation. This was used as a training centre for members, with residential courses ranging from week-long sessions focusing on a range of topics from arts and crafts and public speaking to running a B&B, as well as six-week domestic science course for teenage girls. The ICA's mission was to improve the living conditions of its members and while it was avowedly 'not feminist' during this time period, the range and scope of its activities was an important force in improving both social and practical aspects of living in the Irish countryside.<sup>21</sup> The ICA worked closely with the ESB in a number of ways, including the sponsorship of the six-week courses at An Grianán and the regular appearance of ESB demonstrators at ICA meetings, as well as a number of larger promotional projects, one of which will be considered here.

<sup>20</sup> O'Brien, *Powering the Nation*.

<sup>21</sup> Aileen Heverin, *ICA: The Irish Countrywomen's Association A History 1910-2000* (Dublin: Wolfhound Press, 2000); Diarmuid Ferriter, *Mothers, Maidens and Myths: A History of the Irish Countrywomen's Association* (Dublin: FÁS, 1995).

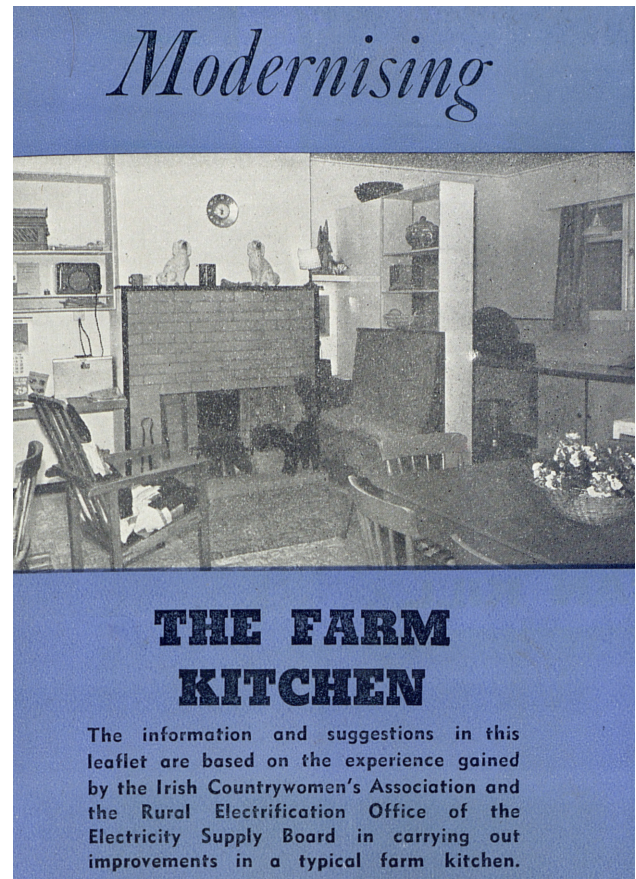


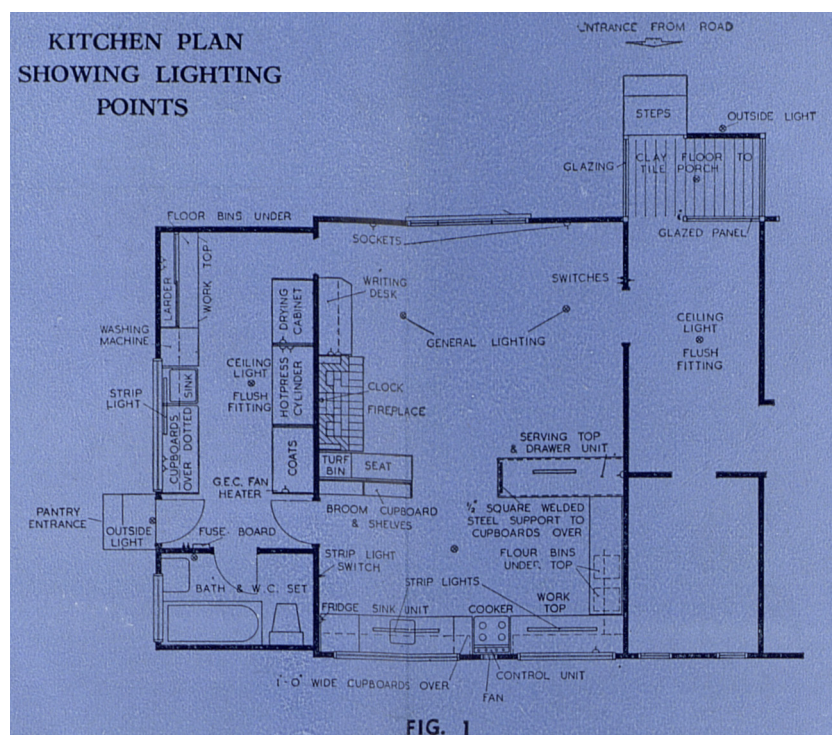
Figure 6: *Modernising the Farm Kitchen*, ESB pamphlet, cover, c. 1957 (Courtesy of the ESB Archive).

### ESB/ICA MODEL KITCHEN AT THE 1957 SPRING SHOW

The ESB constructed a number of model electrical kitchens and houses during the 1950s and 1960s, the most popular of which was the ESB/ICA kitchen designed by architect and ICA Home Planning advisor Eleanor Butler in 1957, in conjunction with the Royal Institute of the Architects of Ireland. This kitchen was initially displayed at the Royal Dublin Society Spring Show in May of that year, as part of the ESB's regular yearly display, and it excited such interest from visitors to the agricultural show that subsequent versions were later installed into demonstration vans, which were driven around the country for several years.<sup>22</sup> In addition, photographs of the kitchen display were used in an ESB pamphlet *Modernising the Farm Kitchen*, which clearly explained the layout and purpose of all the design decisions in the model kitchen (see Fig. 6).

<sup>22</sup> "Kitchen Planning," 4.





**Figure 7:** *Modernising the Farm Kitchen*, ESB pamphlet, plan of model kitchen installation at the RDS Spring Show, pages 2 and 3, c. 1957 (Courtesy of the ESB Archives).

14 The model kitchen took existing models of vernacular farm kitchens as its base model, with the plan divided into a sitting area near an open hearth, a dining area with a large farmhouse kitchen table and two ‘work’ areas for cooking and laundry (see Fig. 7). In a traditional farm kitchen, these functions would have been combined within one room, but the influence of modernist planning ideas mean that this kitchen was divided into open plan ‘zones’ divided by shelving or kitchen cabinets, if at all. Rather than the mostly portable furniture of the traditional Irish farm kitchen, the model kitchen is structured around built-in furniture such as kitchen cabinets and shelving, as well as a built-in version of a traditional wooden settle (high backed wooden seating, which often opened out to provide an extra bed).<sup>23</sup> The cooking and laundry areas were surrounded by fashionable green and cream fitted cupboards under a Formica worktop, with both open and closed shelving and strip lighting overhead. One section of this shelving

is notable for its intentional integration of traditional furniture forms, mimicking the traditional dresser format in proportions, and fulfilling the same role of display of ceramics on top and storage underneath. The open fire in the sitting room area was fitted with a back boiler, to provide hot water, as well as an early appearance of the infamous ‘immersion’ system for electrically heating hot water.<sup>24</sup> The electrical ‘labour-saving devices’ were provided by the ESB and included an electric cooker, washing machine and rotary ironer, and the layout of the working areas was heavily influenced by Modernist developments in domestic kitchen design, particularly the concept of using a triangular layout to reduce the number of steps taken by the housewife during the course of the day.<sup>25</sup>

<sup>24</sup> Irish immersion systems were retrofitted into many houses in this time period, and continue to be installed in new builds into the 21<sup>st</sup> century. Their notoriety stems from their high cost when heating water electrically, necessitating eagle eyed watchfulness to prevent extremely high electricity bills if left on overnight, etc.

<sup>25</sup> “Electricity in Farmhouse and Farmyard: ESB Exhibit for Spring Show,” *Irish Examiner*, May 3 1957; “Electricity on the Farm and in the Kitchen: An Eye Opener at Ballsbridge: ESB Exhibit at the Show,” *Meath Chronicle*, May 4 1957, 6.

<sup>23</sup> Claudia Kinmonth, *Irish Country Furniture and Furnishings 1700-2000* (Cork: Cork University Press, 2020), 150-66.



15 The model kitchen was written about in glowing terms in several Irish newspapers, including the *Irish Press*, which noted that ‘The old and new are beautifully combined with the traditional furnishings by the ICA and the electrical fitments by the ESB.’<sup>26</sup> This combination of traditional and modern, or essentialist and epochal, is particularly noticeable in the sitting room area, where the wooden settle and armchair surround the open turf fire, watched over by a pair of Staffordshire dogs, but these recognisable components were complimented by the back boiler and a plugged-in radio, which could bring both RTÉ and Radio Luxembourg into the mix. Indeed, the inclusion of communications technology represented by the kitchen radio demonstrates that while the main focus in the model kitchen might be aspirations for more efficient ways of dealing with the mundane domestic tasks of cooking, washing and eating, there was less effort put into keeping the outside world at bay than in previous decades. The voracious reading habits of the Irish public are represented by the inclusion of a reading lamp for doing farm accounts or children’s homework, although this could also be used for the more feminised work of knitting, as in the television advertisement previously discussed. The media habits displayed here demonstrated an ongoing connection to the wider networks developed in Western Europe in the 19<sup>th</sup> century, where newspapers and radio combined with transport technologies such as the railway network to open the horizons of Europeans.

16 The model kitchen itself was part of a system of promotion, PR and advertising that was very much part of the same modernisation that had not avoided Ireland, contrary to some popular opinions.<sup>27</sup> They were part of Ireland’s biggest agricultural show, which was held yearly in the extensive Dublin showgrounds of the Royal Dublin Society (RDS), and regularly attracted thousands of daily visitors, eager to survey the latest agricultural equipment and was described

as an “invaluable shop window” that would “enable country people to keep in touch with the very latest developments in the rapidly changing pattern of rural life all over the world.”<sup>28</sup> Model kitchens were intended to promote and inspire, by presenting to their main audience of Irish farm women a vision of a clean, modern efficient interior, which combined recognisable elements of their own domestic experience. This negotiation of epochal, modern electrical technology by the Irish housewife was framed in an unchallenging way that reinforced their existing lifestyles and thus gender roles, introducing elements of modernity surrounded by traditional signifiers and forms. As a result, this incremental approach was highly successful, with long queues at the Spring Show and the continuing popularity of the two mobile versions into 1961.<sup>29</sup>

### ELECTRICITY AND RELIGION: THE SACRED HEART LAMP

The integration of electricity into the daily life of Irish country people can be seen in the development of a particularly Irish type of object, that of the Sacred Heart lamp. This small domestic shrine dated back to the 19<sup>th</sup> century and consisted of a mass produced image of the Sacred Heart of Jesus above a perpetual oil lamp mounted in a red glass holder. While the image and oil lamp were mass produced objects, the exact configuration of the shrine differed from household to household, with some oil lamps mounted within an elaborate shrine, while others sat on a small shelf.<sup>30</sup> These shrines were part of Ireland’s late 19<sup>th</sup> century devotional revolution, which involved intense and regular devotional rituals, centred around the Sacraments and figures such as Mary and the Sacred Heart of Jesus. This devotional

<sup>26</sup> “Around the Show,” *Irish Press*, May 8 1957, 3.

<sup>27</sup> Éamon De Valera, *On Language & the Irish Nation* (Raidió Éireann, 1943).

<sup>28</sup> “The Spring Show,” *Irish Press*, May 8 1957, 8.

<sup>29</sup> “Dublin Spring Show,” *Irish Examiner*, May 10 1957, 10; Electricity Supply Board, Thirty-Fourth Annual Report of the Electricity Supply Board Ireland for the Year Ended March 31st 1961, 11 (Dublin: Electricity Supply Board, 1961); Electricity Supply Board, Thirty-First Annual Report of the Electricity Supply Board Ireland for the Year Ended March 31st 1958, 18 (Dublin: Electricity Supply Board, 1958).

<sup>30</sup> Kinmonth, *Irish Country Furniture and Furnishings 1700-2000*, 409-15.

revolution, which developed in the wake of Catholic Emancipation in the 1820s, had the effect of embedding Catholic religious practice into everyday life, rather than something fugitive and outlawed as previously, and domestic shrines were decorated with constantly changing devotional displays, often of seasonal flowers, linen cloths and additional small statues and images. They were the focus of regular devotional practice within the household, particularly the daily recitation of the Rosary, and as such were carefully considered within the kitchen as a secondary focal point to the hearth.<sup>31</sup> Devotion to the Sacred Heart dates back to 17<sup>th</sup> century France, but was popularised in the 1870s by the Archconfraternity of the Sacred Heart, was enthusiastically taken up in Ireland. Indeed, the entire nation was consecrated by the bishopric to the Sacred Heart in 1873, and promoted by Fr. James Cullen SJ in the 1880s. Fr. Cullen was also the founder of the Pioneer Total Abstinence Association, which campaigned against alcoholism and whose members took a pledge of total abstinence, as well as the founder of the *Irish Messenger of the Sacred Heart*, a monthly religious magazine, which is still in circulation. This use of modern communication methods worked in conjunction with the much older confraternity organisation to promote the specific rituals and devotions of the Sacred Heart within Ireland, making the Sacred Heart lamp a very common sight in Catholic domestic interiors. It was often given to a newly wedded couple, and the initial 'enthronement' ceremony dedicated the household to the Sacred Heart and situated it as the spiritual head of the household. It positioned the spiritual and moral authority of Jesus and by implication, the Catholic hierarchy, above that of the default 'father' of the household, who normally held the vast majority of the decision-making power within the household, certainly legally and socially, if not always practically, given that actually running the household was considered to be woman's work.<sup>32</sup>

## THE ELECTRIFICATION OF THE SACRED HEART

The coming of electricity to rural Ireland meant that the Sacred Heart lamp was included in the modernisation of the domestic interior. The devotion to the Sacred Heart continued throughout the 1950s and 1960s, only starting to wane after the liberalisation of Catholic teaching in the wake of the Second Vatican Ecumenical Council in the early 1960s. The wave of houses being upgraded throughout the country from the early 1950s onwards included the Sacred Heart lamp as just another element of the kitchen to be upgraded, albeit with more reverence than an iron or kettle. They do somewhat fly under the radar in the official literature - the ESB, as a secular organisation, did not sell or promote the upgrading of the lamps, and the only mention of them in their official publications is a quote from an enthusiastic housewife, Mrs. Nellie Long of Cahirfelane in County Kerry (see Fig. 8) who had wired her house in advance of electricity supply arriving in her area: "You might mention we think poorly of not getting the electricity and the Lord feels the same as we wired the Sacred Heart lamp at the same time."<sup>33</sup> This attribution of enthusiastic divine support for rural electrification was mostly echoed by the clergy themselves, with much practical support supplied at a local level. This support was mostly implicit, rather than overt preaching or speeches, and ranged from the use of parish and school halls for electrical demonstrations to turning a blind eye to church gate canvassing. The main endorsement of rural electrification, however, came through the official 'switching-on' ceremony conducted in each of the 756 areas in the state as they were slowly completed. This ceremony, again usually in a parish or school hall, was generally officiated over by a triumvirate of male officials, usually the highest ranking officials available from the ESB, local or national politics and the Catholic hierarchy. For more remote areas, this may have been an engineer, a local councillor and the parish priest, but for the switching-on of the 100,000<sup>th</sup> rural consumer at Ballinamult Creamery in County Waterford, the parish priest

<sup>31</sup> Edward Crosby, "The Stations," *The Furrow* 20, no. 8 (August 1969): 408-10.

<sup>32</sup> "One Hundred and Thirty Years of the Sacred Heart Messenger," *Ireland's Own*, February 2, 2018, 4-8.

<sup>33</sup> "A Camera and a Question," 11.



**Figure 8:** Mrs Nellie Long of Cahirfelane lighting a gas lamp, with a Sacred Heart lamp in the background, *Prospect* January 1966 (Courtesy of the ESB Archive).

Fr. Walsh was considered sufficiently high status to share a stage with Seán Lemass, then Minister for Industry and Commerce, and R.F. Browne, the Chairman of the ESB.<sup>34</sup>

- 19 The majority of electrical Sacred Heart altars did not differ greatly from their oil predecessors in many ways. The red glass oil holder was replaced by a small angled light socket, which was often wired directly into the mains. A specially shaped tall red light bulb was then inserted, which had an electrical filament formed into the shape of a cross, as an additional sign of devotion. This was often installed over an existing shelf used as an altar, so that the seasonal range of

additional devotional elements could be continued. Sometimes, however, the Sacred Heart picture and the lighting element were left alone on the wall, especially if other ‘holy pictures’ were also hung – these could range from images of the Blessed Virgin and the Pope to rather more secular images of Irish-American President John F. Kennedy. The importance of the Sacred Heart lamp at a social and cultural level could be seen in its inclusion in the basic electrification set-up, alongside one light in each room and a single socket in the kitchen. Hannah Mai Allman points out the importance of this practice to her family and particularly her grandmother, who would have been born at the height of the devotional revolution in the late 19<sup>th</sup> century:

HA: That’s all, they were only putting the one plug and the Sacred Heart Lamp (laughs).

EC: Did they have the Sacred Heart Lamp back then?

HA: How did they get the Sacred Heart Lamp... now they would come with, that would be the first things back then that they were looking for.

EC: Yes?

HA: And my grandmother said, “Oh, I would love to see the Sacred Heart” and sure, she was dead before she saw it.<sup>35</sup>

This interview reinforces the broader respectful attitude towards the practice as a centrally important part of wiring the home, but it also foregrounds the wistful longing of Hannah Mai’s grandmother, emphasising the emotional importance of the Sacred Heart lamp to this older generation in particular. 20

The Sacred Heart altars continued to take a wide range of forms, albeit with new concerns about the electrical safety of such installations. The ESB were only responsible for providing an electrical connection to the junction box in the 21

<sup>34</sup> “The 100,000th Consumer,” *REO News*, 1954, 12.

<sup>35</sup> Hannah Mai Allman, “Interview,” interview by Eleanor Calnan, *Electric Irish Homes*, April 11th, 2018.

house, usually just inside the back door, and the actual internal wiring of houses was done by local contractors, with varying degrees of expertise, skill or qualifications. The devotional imperative to keep the Sacred Heart lamp burning in perpetuity meant that it was common practice to wire it directly into the mains, rather than provide a switch, and both this and the possible flammability of the surrounding arrangements caused some concern, as Rosemary Connolly explains:

RC: A little oil lamp, so, we all got these electric ones when the electricity came and we, our neighbour had had TB [tuberculosis] some years before and he had been in Peamount [Sanitorium] and he had made my mother a beautiful fretwork it was called, it was a fine wood and you cut it out with the little jigsaw and it was little crosses and the picture of the Sacred Heart in it and the man who wired the house had brought around the new-fangled Sacred Heart light and had it attached to it and the man came that day to switch it on, he said he wasn't too sure about the safety of this, but seeing it was up on the wall and that we wouldn't be touching it, but he warned my mother when she'd be painting or cleaning it or anything to make sure and stick out the fuse out of it.<sup>36</sup>

- 22 This quote provides an insight into a cross section of mid-century Irish society – in addition to Rosemary's mother's religious devotion and the safety concerns of the electrical installer, it also highlights the pre-antibiotic prevalence of tuberculosis in 1950s Ireland, where the main recourse for patients was isolation, fresh air and rest in a purpose built sanatorium. These patients were encouraged to take up light hobbies as a psychological support during treatment and a non-taxing way of supporting themselves upon discharge, and the small scale woodwork involved in making a fretwork altar with a jigsaw fits easily into this category of work. It also meant that the obviously mass produced



**Figure 9:** Electrified Sacred Heart lamp, manufacturer unknown, 1960s (Courtesy of the National Museum of Ireland).

light bulb and the printed devotional image were surrounded and enclosed by hand crafted Irish work, which fit ideologically with the association of Irishness with the handmade, as well as the concept of devotion through physical labour.<sup>37</sup>

A later example of a Sacred Heart lamp takes a different, rather more modern approach to combining electrical light with devotional practice (see Fig. 9). The print of the Sacred Heart is mounted onto a wood-grain effect laminate backboard, above a small semi-circular shelf which the light fitting is mounted into. The print is covered with a sheet of transparent plastic (although this has not prevented the subsequent fading of the colours) and the combination of both picture and light on the one board ensures

<sup>36</sup> Rosemary Connolly, "Interview," interview by Geraldine O'Connor, *Electric Irish Homes*, February 22nd, 2017.

<sup>37</sup> Alan McCarthy, "The treatment of tuberculosis in Ireland from the 1890s to the 1970s: A case study of medical care in Leinster" (PhD Maynooth University, 2015), 296.



that they stay in the same relationship with each other, regardless of where the assemblage is hung. The horizontal wood grain pattern is printed onto the backboard and both backboard and shelf are edged with gold and black edging, not dissimilar to the edging used to protect 1950s café tables from wear. There is no manufacturers mark or stamp included anywhere on the assemblage, but the three examples found are all from houses around the Portlaoise area, making it likely that these were small scale local manufactures, possibly of a similar scale to the efforts of Peamount Sanatorium. This example, however, demonstrates a use of 'modern' materials and shape, with laminate and gold-coloured edging as well as the use of lines and arcs to create both the shape of the backboard and shelf. This lamp is also rather different from the usual assemblage in that it has survived with a plug at the end of the cabling, which indicates that it may have been sold as a commercial product, rather than assembled on a craft making basis or in the home itself.

## CONCLUSION

24 The role played by rural electrification in mid-century Ireland was influenced partly by the existing technical and organisational infrastructure of the post-colonial state, but also by the cultural specificities of that state. The poor economic performance of the 1950s, prior to the introduction of free market policies, and the lack of education amongst the population meant that widespread electrification was treated with some trepidation in many rural areas. The lack of understanding and shortage of money were both hurdles that were surmounted by the ESB in their attempts to covert as much of the population as possible to this new technology. The ESB focus on routes for promoting electricity such as pamphlets and model kitchens meant that they could extoll the virtues of this power source in a multiplicity of ways – written, visual and physical. This multi-modal approach meant that the Spring Show model kitchen was a fully immersive physical experience, but one restricted to the better-off farmer couple who could afford to visit Dublin and pay to attend the Spring Show.

However, this experience was photographed and written about in the national and local newspapers, as well as forming the basis of a subsequent ESB pamphlet, moving the persuasion into visual and textual form.

25 The overt combination of tradition and modernity in this model kitchen is typical of the ESB approach in this period, especially when working in conjunction with the women's organisation of the ICA. The combination of both forces in the kitchen, through the guidance of Eleanor Butler, meant that it managed to present electrical appliances and lighting to quite a conservative audience in a way that did not startle or shock them. On the other hand, she managed to achieve a balance between epochalism and essentialism that could be easily presented as a new and exciting version of a traditional kitchen, combining modernist zoning, appliances and materials with traditional colour schemes and furniture.

26 Outside of the official promotion and narrative of the ESB, we see this mixing of tradition and modernity continuing with the widespread electrification of the domestic Sacred Heart lamp. The existing mass produced devotional prints were joined by mass produced light bulbs and fittings, but continued to be presented within the handmade and small batch production economy of the Irish countryside, particularly that of the products of charity workshops. This represented a very successful integration of electricity into an existing cultural narrative, managing to strip it of its associations of Britishness and urbanity and make it into something Irish and local. This is the advantages of a design historical approach when considering electricity, not just as an abstract force, but as one that made real physical changes to the landscape, workplace and home. It is through the negotiation of physical objects and space that we can see how electricity was intended to change people's lifestyles and some of the humble, everyday ways in which it actually did.

27 The rural electrification project in Ireland represents a significant energy transition for most of the population, moving from the exclusive

burning of fossil fuels in situ to the installation of infrastructural power into the home. While this electrical power was partly generated by water and partly by fossil fuel, and sustainability was not yet a consideration, it is important to consider the objects of the past and their meanings, and what they can tell us about how such a transition might work at a domestic level. In this case, the desire to 'be modern' ultimately outweighed the comfort of familiar tradition, especially when the familiar involved a good deal of

manual labour. The oral histories complement the design historical object analysis to tease out emotions and attitudes on the ground, which demonstrate that this enthusiasm for domestic electrical technology was not just present in the official narrative. However, a move away from official, written narrative gives space for insights into the importance of cultural and social specificity when considering such an energy transition and the changes it brings.

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## Manual and Electrical Energies in the Visualisation of "Electrical Calcutta", c.1890-1925

### Abstract

Through examinations of domestic servants in electrical advertisements and writings this article looks at the imaginations and realities of visions of an "Electrical Calcutta" at the turn of the twentieth century. It argues that the diverse conceptions of an "Electrical Calcutta" were intimately linked to not just the technological and mechanical benefits of electrical technologies, but also the centrality of servants to societal notions of morality, class and social hierarchy, and cultures and discourses of human bodies, labour and energy within the domestic sphere.

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### Plan of the article

- Introduction
- Electrical Technologies and the Management of Manual Labour and Energy
- Electrical and Manual Energies, Violence and Morality
- "Electrical Calcutta" and Consumers' Realities
- Conclusion

## INTRODUCTION

Electrical Calcutta is still in embryo; indeed for that matter so is electrical India. [...] the coolie whose duty it is to pull the punkah o' nights, or see that the cocoanut-oil lamp is properly trimmed, or to take messages with somewhat more rapidity than an A.D.T. boy displays — slowly but surely this individual is working out his own condemnation by his infernal stupidity and laziness, and electrical appliances are taking his place.<sup>1</sup>

- 1 Writing a little more than a year after Calcutta Electric Supply Corporation's power plant began its operations in April 1899, R. W. Ashcroft, a member of the American Institute of Electrical Engineers, preached his beliefs in the foreseeable and eventual growth of the nascent electrical enterprise in Calcutta. Although the successful installation and operation of the power plant not far from the colonial centre of Calcutta marked the moment when a new electrical future became possible, for Ashcroft the future of an “electrical Calcutta” depended on educating future consumers to the conveniences and efficiencies of electricity for the most ordinary everyday purposes. While residents of Calcutta still used technologies like hand-pulled punkahs (cloth or feather fans that were either hand-held or attached to frames suspended from ceilings) or oil and gas lamps, Ashcroft envisioned a generally favourable acceptance of electric supply and appliances in public and domestic spheres. Calcutta Electric Supply Corporation, he predicted, “will pay handsome dividends, at least from that department appertaining to supplying power for electric fans.”<sup>2</sup> Yet ultimately, the success of the electrical enterprise depended on replacing servants, especially those employed to pull punkahs or trim oil lamps, with electrical power and technologies. Too often, he lamented, servants, and their energies and labour were unreliable, inefficient, unacceptable and far removed the conveniences

that defined a hygienic, disciplined and modern domestic life. Ashcroft insisted that electrical technologies were far more convenient and efficient and, importantly, did not require constant interventions from householders to keep them working. Servants such as punkah pullers or coolies, he argued, while employed to keep their employers comfortable, were known to fall asleep, resulting in admonitions or even violence: “in India, a boot-jack is used nocturnally to create activity rather than to suppress it; and, even if your aim is good, the punkah coolie will be off to sleep again in the next 15 minutes.”<sup>3</sup> Evidently, Ashcroft surmised, householders in Calcutta would soon replace the coolies under their employ with “Western methods of breeze-manufacturing” through electric fans.<sup>4</sup>

- 2 As Ashcroft's commentary illustrates, the possibilities of an “electrical Calcutta” were entangled with new ways of approaching questions of efficiency, servants' bodies and labour, and violence against domestic servants. Starting in the early 1890s, traders of electrical appliances and electrical experts were responding similarly to domestic servants in their progressive advertising projects and commentaries on the outlooks of the nascent electrical enterprise in Calcutta. Such efforts were mainly directed towards elite and middle-class British and Bengali residents of Calcutta who also primarily employed servants in their households. Changing patterns of elite and middle-class consumption were also integral to the growing commercial electrical market, including both well-established organisations such as the General Electric Company and local traders, which used advertising and article spaces in newspapers and periodicals to promote domestic electrical devices in innovative ways. The electrical industry was not the first, however, to explore the commercial possibilities of shaping discourses with the elite and middle classes in mind. Recent studies of consumption in late-nineteenth and early twentieth century India have also highlighted the ways in which advertisements and writings that appeared in

<sup>1</sup> R. W. Ashcroft, “Electrical Calcutta”, *The Electrical World and Engineer*, 7 July 1900, 14.

<sup>2</sup> Id.

<sup>3</sup> Id.

<sup>4</sup> Id.

print and other media shaped, and were shaped by, the burgeoning British and Indian elite and middle-class consumer society. They argue that advertisers modified their themes around the buying powers and anxieties of the elite and middle classes.<sup>5</sup>

- 3 This article concentrates on particular moments in electrical writings and advertisements which registered or responded to the presence of servants in domestic and public spaces in colonial Calcutta. By exploring these moments and looking specifically for servants in visualisations of “electrical Calcutta”, this article reveals the ways in which representations, meanings, actions and politics of employer-servant relationships, class and social relations and domestic labour were irretrievably bound up with discussions about energy sources and transitions. On first glance, this article might seem to make arguments that scholars of energy and electrical histories are familiar with. For instance, an examination of the political and ethical stakes involved in promoters of domestic electrical technologies in late-nineteenth and early twentieth century Britain building their discourses around the difficulties faced by a bourgeois society failing to recruit and discipline servants is central to Graeme Gooday’s theme of “domestication” of electricity.<sup>6</sup> A study of the ways in which advertisers and promoters both deployed and contributed to racial and class politics, and Mexicans’ sense of self by selling the idea of an “electric life” through the “so-called maid problem” can be seen in Diana J.

Montaño’s *Electrifying Mexico*.<sup>7</sup> Both Gooday and Montaño show that the visibility and presence of servants in the marketing of electrical futures in Britain and Mexico, respectively, went beyond simply the technological and practical values of electricity.<sup>8</sup> Indeed, the ways in which elite and middle-class societies conceptualised the shortage of servants and the decline of domestic service were central to representations of domestic electrification during its early years. Yet, in the case of late-nineteenth and early twentieth century Calcutta (and India), electrical promoters needed to place their arguments in a social and cultural environment that was witnessing a phenomenal increase in domestic service and the number of domestic servants.<sup>9</sup>

Social histories have documented the ways in which servants’ energy-intensive labour was increasingly embedded in their British and Bengali middle-class gentlemanly, or *bhadralok*, employers’ notions of domestic health, well-being and social identities. Historians have elaborated a rich picture of British and *bhadralok* investment in the moral, social and political implications of employing native servants. In British discussions, the native servant figured as a surrogate for the colonised population, occupying a symbolic position in affirming British residents’ positions as rulers in the colonised world.<sup>10</sup> Colonial notions of empire,

<sup>5</sup> Douglas E. Haynes, “Creating the consumer? Advertising, Capitalism, and the Middle Class in Urban Western India”, in Douglas E. Haynes, Abigail McGowan, Tirthankar Roy and Haruka Yanagisawa (eds.), *Towards a History of Consumption in South Asia* (New Delhi: Oxford University Press, 2010), 185-223. David Arnold, *Everyday Technology: Machines and the Making of India’s Modernity* (Chicago and London: The University of Chicago Press, 2013), 122-126, 146. In *Everyday Technology*, David Arnold has shown that mass advertising campaigns and their portrayal of technologies such as sewing machines, bicycles and typewriters as means to a healthy and rewarding life were crucial to their acceptance by the Indian public.

<sup>6</sup> Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880-1914* (London: Pickering & Chatto, 2008), 33-35.

<sup>7</sup> Diana J. Montaño, *Electrifying Mexico: Technology and the Transformation of a Modern City* (Austin: University of Texas Press, 2021), 194-195, 215-232.

<sup>8</sup> For a detailed review of other discussions on domestic service in energy histories, see Ruth W. Sandwell, “Changing the Plot: Including Women in Energy History (and Explaining Why They Were Missing)”, in Abigail Harrison Moore and Ruth W. Sandwell (eds.), *In a New Light: Histories of Women and Energy* (London: McGill-Queen’s University Press, 2021), 16-45.

<sup>9</sup> Satyasikha Chakraborty, “Technologies of domestic labour” <https://servantspasts.wordpress.com/2017/10/16/domestic-gadgets-and-domestic-servants-in-late-colonial-british-households/comment-page-1/>. Accessed 17 February 2021. Also see: Nitin Sinha and Nitin Varma (eds.), *Servants’ Pasts: Late-Eighteenth to Twentieth-Century South Asia, Vol. II* (New Delhi: Orient Blackswan, 2019)

<sup>10</sup> Fae Dussart, “The Servant/Employee Relationship in Nineteenth Century England and India” (Ph.D diss., University of London, 2005), 87. Available from ProQuest Dissertations and Theses database, UMI NO. U591979. Also

order and domesticity, therefore, converged in the “Anglo-Indian” interior, offering comparisons with the administration of a colonial empire.<sup>11</sup> For the literate *bhadralok* intelligentsia, native servants and the urban poor were understood and interpreted from within reformist discourses that centred around the creation of an “autonomous” and “spiritual” domain of the “home”.<sup>12</sup> As the rich and growing literature on employer-servant relationships in the context of colonial India has shown, the growth of the Indian middle class, with a focus on gender and class hierarchies within the home, came with pressures to consume and manage domestic labour — especially that of women and servants — in a way that reflected the construction of new ideas of domesticity, self-identity and respectability. Domestic servants were central to the creation of the moral universe around the home and family. Middle-class hegemony and paternalism was usually established and maintained through analysing the housewife’s character and status in terms of the discipline and behaviours of the servants under her charge. Any acts of subordination or dishonesty committed by servants were considered to be reflections of the failures of the employers — especially the housewife — to

maintain cultural values and morality within their households.<sup>13</sup>

In this article, I examine the ways in which both British and Indian electrical marketers understood British and *bhadralok* pursuits of identities based on definitions and differences of class and anxieties about domestic morality. I show how the place of servants in employers’ definitions of their self and class identities proliferated into diverse approaches to promote transitions from the manual labour of servants and the seemingly problematic consumption of oil and gas to electrical technologies. In doing so, this article pursues two related lines of inquiry. The first is suggested in electrical promoters’ recognition of the ubiquity and importance of employing servants and domestic service in British and *bhadralok* households. Within that context, they adapted, reinforced and even exacerbated the symbolic language associated with managing and shaping domestic labour and energy by equating the use of electrical technologies alongside domestic servants with visions of efficient, orderly and moral domestic spaces.

In the first section, I will examine advertisements for, and writings on electric bells and lighting that highlighted the physical limitations of human bodies and behaviours in providing efficient domestic service, and mapped human virtues of discipline and morality on to electrical technologies. Promoters and advertisers foreground electric bells and lighting as both means of economising employers’ mental and physical energies, and as tools that could appropriately

see: Dussart, “That unit of civilisation and the talent peculiar to women: British employers and their servants in the nineteenth-century Indian empire”, *Identities*, vol. 22/6, 2015, 706–721. Robin D. Jones, *Interiors of Empire: Objects, Space and Identity Within the Indian Subcontinent, c. 1800–1947* (Manchester: Manchester University Press, 2007), 2.

<sup>11</sup> Flora Annie Steel and Grace Gardiner, *The Complete Indian Housekeeper and Cook*, 5th edition (London: Heinemann, 1907, first published in 1877), 7–9. Nupur Chaudhuri, “Memsahibs and Motherhood in Nineteenth-Century Colonial India”, *Victorian Studies*, vol. 31/4, 1988, 517–535.

<sup>12</sup> Partha Chatterjee, “The Nationalist Resolution of the Women Question”, in Kumkum Sangari and Sudesh Vaid (eds.), *Recasting Women: Essays in Colonial History* (Delhi: Kali for Women, 1989), 233–253. For a critical view on Chatterjee’s formulation of the place of women in *bhadralok* discourses on “home” and the “outside”, see: Tanika Sarkar, “The Hindu Wife and the Hindu Nation: Domesticity and Nationalism in Nineteenth Century Bengali”, *Studies in History*, vol. 8/2, 1992, 213–235.

<sup>13</sup> Swapna M. Banerjee, “Debates on Domesticity and the Position of Women in Late Colonial India”, *History Compass*, vol. 8/6, 2010, 455–473. “Subverting the Moral Universe: ‘Narratives of Transgression’ in the Construction of Middle-class Identity in Colonial Bengal”, in Crispin Bates (ed.), *Beyond Representation: Colonial and Postcolonial Construction of Indian Identity* (New Delhi: Oxford University Press, 2006), 77–99. *Men, Women, and Domesticity: Articulating Middle-Class Identity in Colonial Bengal* (New York: Oxford University Press, 2004).

Also see: Swati Chattopadhyay, “Blurring Boundaries: The Limits of ‘White Town’ in Colonial Calcutta”, *Journal of the Society of Architectural Historians*, vol. 59/2, June 2000, 154–179.



shape the manner in which servants functioned and behaved in domestic spaces, ensuring that servants were productive, honest and disciplined in their service. New electrical technologies were, therefore, not simply labour-saving, but also centred around labour management.

7 The second line of inquiry addresses promoters' adoption of racist and classist conceptions of domestic servants, their bodies and labour as standards by which to present the advantage of electrical technologies. Servants and their bodies were compared to machines that required constant interventions from employers to keep them working efficiently. As we have seen in Ashcroft's article discussed in the opening of this study, the punkah-wallah encapsulated these concerns: the punkah required constant inputs from the punkah-wallah in order to function efficiently, but the punkah-wallah's efficiency was ultimately predicated on the employer's capacity to keep the punkah-wallah infinitely productive.

8 In the second section of this article, I examine discussions on the removal of punkah-wallahs and the electrification of punkah-pulling systems, especially against the colonial and nationalist politics surrounding the tragically commonplace violence on punkah-wallahs at the hands of their European and British employers. Here, I build upon recent studies in the history of labour in colonial India that have evinced a new and welcome focus to the politics surrounding the profession of punkah-pulling. I pursue some of the implications of Jordanna Bailkin's examination of the medico-legal, racist and bodily politics engendered in cases of violence by looking at punkah-wallahs as both victims of racial violence and expendable components of ventilation systems.<sup>14</sup> The discussion of the politicisation of the punkah-pulling “system”, which included both the machinery and the operator, also broadens the terms of discussions in Ritam Sengupta's recent work that focuses “upon the role of regulation and law”, and localised,

embodied and embedded practices that became increasingly vital to defining punkah-pulling as a regime of service work in colonial India. For Sengupta, the framing of the relations between punkah-pullers, their employers and the colonial government through the conflicts between control mechanisms of the colonial state, and the caste and social hierarchies within domestic service was crucial in moulding the nature of the initial formalisation and eventual demise of punkah-pulling through the nineteenth and twentieth centuries.<sup>15</sup> In this article, however, I examine how, through the late-nineteenth and early twentieth centuries, the protracted reevaluation and redefinition of punkah-pulling systems evolved into detailed scientific and technological programmes for transforming and deploying both human labour and liberal social agenda. I show that reducing punkah-wallahs as labouring bodies and revealing them only as components in systems of ventilation, the language of promoters' writings and advertisements contributed significantly to social and technological ideology and debates on interracial violence.

9 As the first two sections of this article show, discourses on electricity and servants forwarded visions of functional domestic spaces consisting of both servant labour and electrical technologies that required little to almost no intervention from employers and householders. In an immediate sense, promoters' discourses, though far-reaching, were contradictory. Despite the introduction of electrical technologies in homes and public spaces domestic service was still on the rise. Some forms of domestic service such as child-minding or cooking could obviously not be replaced by electrical technologies. As discussed above, the importance of servants to their employers' social and cultural identities might also explain the persistence of servants in domestic spaces. However, I offer an alternative explanation based on the actualities of “electrical Calcutta” through the early twentieth century. Electrical technologies could enhance everyday

<sup>14</sup> Jordanna Bailkin, “The Boot and the Spleen: When Was Murder Possible in British India?”, *Society for Comparative Study of Society and History*, vol. 48/2, 2006, 462-493.

<sup>15</sup> Ritam Sengupta, “Keeping the master cool, every day, all day: Punkah-pulling in colonial India”, *The Indian Economic and Social History Review*, 2021, 1-37, quote from 4.

life by bringing with themselves a sense of discipline and morality within domestic spaces. Yet ultimately, the point of using electricity to discipline servants and their labour unsettled the very notion of social and class identities that domestic lives were shaped around. While the use of electrical technologies in the home provided a kind of ordered domestic life, it also implied a failure of the employer to control and discipline servant labour and, therefore, determine their own identities based on differences of class.

10 In the third section of this article, I shift focus to early electrical consumers who were placed within energy regimes, sources and practices that existed before, alongside and competed for the same spaces and consumers. Of course, there was no single “type of consumer,” and no doubt the ways in which they understood and used electric supply and technologies were highly diverse. But it is possible to identify shared attitudes, practices and ideas that defined the interactions between the electrical enterprise and domestic consumption. One such set of ideas and practices surrounded middle-class domestic ideology based on consumption and thrift in the economic downturn of the early twentieth century; an approach that had a significant impact on the ways middle-class consumers discussed the incorporation of goods, services and electrical technologies into the home. Prospective consumers also had to contend with delayed connections, resulting in existing methods of lighting and ventilation, and servant labour being used often in close proximity to electric lighting and fans.

11 An important caveat is in order here. The use of predominantly technocratic archives and British and Bengali elite and middle-class writings raises the obvious issue of silencing subaltern voices. The technocratic archive does not speak much about the complex questions of caste and other social divisions prevalent in Indian society.<sup>16</sup> Promoters and engineers, as we will see,

tried to envisage an “electrical Calcutta” through broad categories of “servants” and “employers”, and interpret and bent the discussions and discourses on employer-servant relationships from wider contemporary literary, public and social circles in Calcutta to capitalist means.

### ELECTRICAL TECHNOLOGIES AND THE MANAGEMENT OF MANUAL LABOUR AND ENERGY

In one of the first print advertisements of a battery-operated electric bell that appeared in a Bengali periodical in 1890, the new technology is promoted as a means of disciplining servants. The advertisement read:

Electric Bell. **No longer will one need to call out to servants and murder them in anger.** An approximately 2-foot long cable, a stationery dry battery, and a hook mechanism to attach them will be sent out to your home by paid-for post for a mere 6 rupees. Additional wires, if required, can be acquired at a meagre additional cost. **This device, a must for every house, is very useful for people who regularly visit, and are visited by acquaintances, or to send out a message from one’s room in case of need.** Whether from the third floor or the underground, **this device can be used to call even deaf servants.**<sup>17</sup>  
[translation and emphases mine]

In its allusion to servants, the advertisement presents the electric bell’s function and position as an intermediary between the employer and the servant. The electric bell is depicted as a servant to the employer, enabling the employer to carry out his wishes when rung. But, in instructing servants to attend to the employer’s call when they hear the bell, the bell also

Vol.2 (New Delhi: Orient Blackswan, 2019). Also: Sengupta, “Keeping the master cool”, 1–37.

<sup>17</sup> *Citradarsana*, Vol. 1, 1890, 36. Online version of the journal hosted by CrossAsia-Repository and Heidelberg University Library, while microfilm and paper copies of the journal are held by the archives of the Centre for Studies in Social Sciences, Kolkata, and the Bangiya Sahitya Parishat in Kolkata, respectively.

<sup>16</sup> See: Tanika Sarkar, “Caste-ing Servants in Colonial Calcutta”, in Nitin Sinha and Nitin Varma (eds.), *Servants’ Pasts: Late Eighteenth to Twentieth-Century South Asia*,

becomes an extension of the employer's authority.<sup>18</sup> The advertisement also makes us think spatially about employer-servant relations within the household. The fact that servants needed to be called implies either the prevalence of, or the need for physical distance between servants and their employers.<sup>19</sup> Efforts by the British and Bengali elite in India to use domestic and public spaces to maintain their prestige and distance from the lower classes were usually undermined by the presence of native servants in the most private spaces of their households. The open plan layout of Anglo-Indian and native domestic spaces in the colonial Indian subcontinent allowed servants to move freely in and occupy the same spaces as their employers.<sup>20</sup> According to the advertisement, the electric bell allowed employers to enable and yet manage the physical distance between them and their servants. It suggests that at particular times, employers wished to occupy spaces away from their servants but needed them to be sufficiently close by to be able to answer the bell: “This device, a must for every house, is very useful...to send out a message from one's room in case of need.” The electric bell, according to contemporary writings, could also save employers the physical exertion of shouting or leaving their homes to call servants who had retreated to their living quarters. In an article on “Electric Bells” in *The Times of India* of 5 November 1894, the author wrote:

<sup>18</sup> For an analysis of the complex dynamics of material culture, the sensory dimensions of objects, and human relationships within the household, see Flora Dennis, “Material Culture and Sound: A Sixteenth Century Bell”, in Anne Gerritsen and Giorgio Riello (eds.), *Writing Material Culture History* (London: Bloomsbury, 2015), 151-156.

<sup>19</sup> In the homes of Bengali and Anglo-Indian elites, the living spaces of employers and servants were usually separate and distant from each other. Servants in elite households in colonial India usually lived with their families in huts within the compounds of their employers' bungalows. See: Fae Dussart, “The Servant/Employer Relationship in Nineteenth Century England and India” (Ph.D diss., University of London, 2005), 87. Available from ProQuest Dissertations and Theses database, UMI No.: U591979. Also see: Dussart, “That unit of civilisation and the talent peculiar to women : British employers and their servants in the nineteenth-century Indian empire”, *Identities*, vol. 22/6, 2015, 706-721. William J. Glover, “A Feeling of Absence from Old England: The Colonial Bungalow”, *Home Cultures*, vol. 1/1, 2004, 61-82.

<sup>20</sup> Jones, *The Interiors of Empire*, 81.

It is to be admitted that our domestic servants in India, despite their manifold virtues, furnish us with a fair share of the sum total of petty troubles in daily life, it is not going far wide of the mark to say that a difficulty in calling them — or rather making them hear — is one of the chief amongst them. The convenience of the bell is enormous, and I am convinced that a large number of headaches and touches of sun-stroke would be avoided if people used these bells instead of going outside themselves, in desperation, to call a servant who either does not or will not hear.<sup>21</sup>

The preoccupation with introducing electric bells to domestic spaces had less to do with replacing servants' labour than it did with disciplining it. While both the advertisement and the article exemplified the idea of the electric bell as an object with agency and function, especially as a sounding object to call servants, they also suggested its importance as a system for shaping the behaviours of both the employer and the servant. In presenting the electric bell as a device that could be used to call “even deaf servants,” or “a servant who either does not or will not hear,” the writings gesture at the ways in which the bell extended the employer's authority. While servants could until then choose to ignore their employers' shouts and calls, the electric bell imposed a certain discipline and ensured that servants acted upon their employers' commands.<sup>22</sup> In solving the simple issue of calling servants, nevertheless, the bell also ensured that employers did not need to expend any energy to either shout at, or even “murder” their servants in desperation or anger.

<sup>21</sup> “Electric Bells”, *The Times of India*, 5 November 1894, 4.

<sup>22</sup> Unfortunately, there are no studies on sounds and hearing as central to social, domestic and ritual life in colonial India. However, in their study of hearing loss in Britain c.1830-1930, Graeme Gooday and Karen Sayer have shown the ways in which the term “deaf” was an “unsympathetic representation of the hard of hearing” as those who “could in fact hear more effectively than they claimed, but simply ‘chose’ stubbornly not to hear.” Graeme Gooday and Karen Sayer, *Managing the Experience of Hearing Loss in Britain, 1830-1930* (London: Palgrave Macmillan, 2017), 19.

16 According to promoters, electrical technologies could help manage both employers' and servants' energies by ensuring that employers did not need to expend any mental or physical energy to keep their servants working as they wanted them to while keeping servants active and productive. I return to this theme in the following section when discussing employers' use of violence on punkah-wallahs who fell asleep during their work shifts.

17 Indeed, in claiming to enable productivity through disciplining, and sometimes even improving the behaviour of servants, electrical discourses also advanced classist and racial codes. English and Bengali domestic guidebooks warned employers, especially women, to inscribe dishonesty as a natural attribute of servants. These writings not only reflected hierarchical class systems further complicated by race, religion and gender issues as a result of the colonial encounter, but also influenced highly negative attitudes towards servants and the urban poor in general, thereby helping reinforce imperial and class discourses. For instance, Rabindranath Tagore, Swapna M. Banerjee has shown in her study of servants and theft in *bhadralok* households, regularly wrote about how servants in his household stole expensive yet regularly used items such as ghee (clarified butter) from the kitchen.<sup>23</sup> That servants stole at every opportunity was also an often-repeated account in Anglo-Indian literature. In the domestic guidebook, *The Englishwoman in India*, published in 1864, the unknown author — only mentioned in the book as “A Lady Resident” — suggested that British women should constantly supervise their native servants and expect them to steal food items: “native servants of all classes, good or bad, and indifferent, require the most incessant supervision. [...] It is but natural to expect them to pilfer small articles of food: rice, sugar, coffee, and every sort of oil are their specialties in this line.”<sup>24</sup> Discussing how the *Mussaul*, or the “man

of lamps,” stole most of the oil and butter he was given to fill the lamps with, Edward Hamilton Aitken, a civil servant and founding member of the Bombay Natural History Society (founded in 1883), wrote in his illustrated journal on life with Indian servants, *Behind the Bungalow* (1899):

The Mussaul's name is Mukkun, which means butter, and of this commodity I believe he absorbs as much as he can honestly or dishonestly come by. How else does the surface of him acquire that glossy, oleaginous appearance, as if he would take fire easily and burn well? I wish we could do without him!<sup>25</sup>

Electrical discourses reinforced these negative attributes by coding electrical appliances as technological solutions to issues of morality and discipline. Echoing prevalent British and *bhadralok* attitudes towards servants, John Willoughby Meares — then the Electrical Adviser to the Government of India — noted in his book *Electrical Engineering in India* (1914) that while oil was commonly available and could be easily transported, electricity had “the advantage that even if stolen it cannot usually be sold.”<sup>26</sup> To put Meares's views into perspective, the use of electric lighting in domestic and public spaces was not just for the benefit of electrical suppliers and producers, and the general public; it also served a moral purpose. Electricity took away oil and, according to Montague Massey, a businessman who lived extensively in Calcutta and Bombay from late-nineteenth century onwards, “the great temptation it afforded Gungadeen, the Hindu farash bearer, to annex for his own daily requirements a certain percentage of his master's [oil] supply.”<sup>27</sup>

<sup>25</sup> Edward Hamilton Aitken, *Behind the Bungalow* (Calcutta: Thacker, Spink and Co., 1889), 52.

<sup>26</sup> J.W. Meares, *Electrical Engineering in India - A Practical Treatise for Civil, Mechanical and Electrical Engineers* (Calcutta: Thacker, Spink and Co., 1914), 102 (hereafter *Electrical Engineering in India*). Archived in IOR: Asia, Pacific and Africa/T 3659.

<sup>27</sup> Montague Massey, *Recollections of Calcutta For Over Half a Century* (Calcutta: Thacker, Spink and Co., 1918), 64. Farash: “A menial servant whose proper business is to spread carpets, pitch tents, &c., and, in fact, in a house, to do housemaid's work”; definition from Henry Yule and

<sup>23</sup> Banerjee, *Men, Women, and Domesticity*, 166-175. Also see: Rabindranath Tagore, *Jiwansmriti* (Calcutta: Vishwa-Bharti Granthabibhag, 1912), 24.

<sup>24</sup> Anon. (A Lady Resident), *The Englishwoman in India* (London: Smith, Elder and Co., 1864), 58.



### ELECTRICAL AND MANUAL ENERGIES, VIOLENCE AND MORALITY

19 The promotion of electrical technologies were built on several complex layers of nature of work and employer-servant relationships being mapped onto one another, and centred around the operations of existing sources of energy and electrical technologies. Electrical promoters, nevertheless, planted ideas of certain kinds of service, systems and servants as rather problematic. Unlike the images of unruly and thieving servants that could be disciplined by an electric bell or by replacing oil lamps with electric bulbs, the punkah and punkah-wallah embodied all that was wrong with domestic service and ventilation systems in general.

20 An intrinsically simple cooling and ventilating device, the punkah was a common presence in domestic spaces, writings and images in the Indian subcontinent. While the origins of the punkah are unclear, what we do know is that the punkah appeared and existed in several different forms depending on the spaces and occasions in which they were used. These systems ranged from small hand-held fans — to be used in close proximity — to complex systems of ropes and pulleys that pulled large cloths attached to wooden beams hung from ceilings. The punkah and, most importantly, the punkah-wallah served as mediators between their employers and the natural elements — heat, humidity and mosquitoes. While punkahs and punkah-wallahs were both necessary for cooling and comfort, in late-nineteenth century discussions however, the mechanical systems were considered far more valuable than their human operators. Despite their centrality to the functioning of punkahs, punkah-wallahs were constantly criticised in journalistic writings, memoirs and domestic guidebooks as being inefficient and indolent. A 1901 article on the "question of ventilation" in *The Times of India* stated that "the chief drawback of the punkah is the punkahwalla.

He is dirty, unreliable, especially at night, and his work, counting day and night, costs twenty-four rupees per month for a single punkah."<sup>28</sup> Criticisms of the punkah-wallah were also intrinsically linked to the justification of British imperial rule over India. The punkah-wallah, presented in images and postcards as having a lazy and leisurely approach to his work was, according to colonial narratives, a representative of the "Oriental nature" of Indians who, due to their effeminacy, laziness and dishonesty were incapable of ruling over themselves.<sup>29</sup>

While employing a punkah-wallah was never 21 expensive, most elite and middle-class households, however, required four to six punkah-wallahs working in four to six-hour shifts in order to keep the punkahs operational throughout the day. This made employing punkah-wallahs an expensive proposition for even the wealthiest households. As Ritam Sengupta has shown in his explorations of punkah-pulling in colonial India, European employers, enabled by direct and indirect mediations of the colonial state, placed greater demands on their native servants' time and labour.<sup>30</sup> The long shifts and demands on their manual energies meant that punkah-wallahs often fell asleep while performing their duties. In his 1896 publication *Indian Sketches and Rambles*, the anglican clergyman John Bowles Daly wrote about how the punkah-wallah, after a few hours of efficient service, would gradually slow down and finally stop, resulting in complaints from his employer: "For the first hour or two the punkah goes on steadily ... Gradually the movement becomes intermittent, and finally ceases, while shouts, and angry complaints arise."<sup>31</sup> An additional cause for criticism was the fact that punkah-wallahs fell asleep during their shifts while their employers had to pay for their services, or lack of it.

<sup>28</sup> "Buildings in Bombay: The Question of Ventilation in the New Houses, An Excellent Suggestion", *The Times of India*, 2 November 1901, 7.

<sup>29</sup> Steven Patterson, "Postcards from the Raj", *Patterns of Prejudice*, vol. 40/2, 2006, 152-153.

<sup>30</sup> Sengupta, "Keeping the master cool", 2 and 24.

<sup>31</sup> John Bowles Daly, *Indian Sketches and Rambles* (Calcutta: Patrick Press, 1896), 64.

A.C. Burnell, *Hobson-Jobson: The Anglo-Indian Dictionary* (Ware, Hertfordshire: Wordsworth Reference, 1996, originally published in 1886), 350.

22 The immediate concerns of several writings on the subject of punkahs and punkah-wallahs through the latter half of the nineteenth century were with advancing arguments — some distinctly didactic — that would secure the acceptance of the idea of everyday life without the punkah-wallah. *The Times of India* of 11 June 1891 carried a column predicting that Calcutta would soon be witness to a new, but experimental installation that “will be for the working of punkah both in large offices and in private houses.” The significance of the new mechanism is clear when we consider the closing sentence of the article: “The abolition of the punkah-wallah in Calcutta would be an important public service.”<sup>32</sup> Efforts to “improve” the punkah were prevalent in colonial India well before the introduction of battery-operated or mains powered electric fans in the early twentieth century. This is evident in the persistent proliferation of patents granted by the Government of India to new forms of, or improvements to punkah-pulling systems through the latter half of the nineteenth century. A cursory glance at the list of patents granted between 1856 and 1887 shows that the term “improvement” was most commonly used to define what the list mentions as the “nature of invention”.<sup>33</sup> Such “improvements” were majorly directed towards automating punkah-pulling and, therefore, either reducing the number of or completely eliminating the need for punkah-pullers.

23 Despite the financial savings and convenience that some of these devices claimed to bring to the question of punkah-pulling, the systems were, nevertheless, unable to resolve the problem of the punkah-wallah and issues with ventilation in domestic spaces. Efforts to automate punkah-pulling failed on two levels. Firstly, automation required adding several mechanical elements to the rather simple punkah system, thereby increasing complexity and reducing efficiency. These complex systems could only be efficiently applied to a large number of punkahs,

which made them unsuitable for domestic use. Secondly, these mechanical systems, while reducing the number of punkah-wallahs, did not completely eliminate the need for the punkah-wallah.<sup>34</sup> The introduction of battery-operated punkah machines was, therefore, seen by many commentators and inventors as the only viable solution to the presence of the punkah-wallah within the domestic sphere. In 1890, in a paper presented to the American Institute of Electrical Engineering, Wilfrid H. Fleming, an American electrical engineer, wrote that manual punkahs were both noisy and caused gas or oil lamps to flicker. Tellingly, Fleming’s only solution to the problems of noise, the flickering of lamps, and the punkah-wallah was to replace both manual punkahs and oil lamps with “noiseless motor fans and steady incandescents [respectively], thus enabling the Anglo-Indian to read and rest in comfort.”<sup>35</sup> In early 1890, J. Agabeg, Manager of Messrs. Apcar & Co.’s Collieries at Churrunpore produced a portable electric fan which could be clamped to desks and chairs as per users’ choice. The mechanism “consisting of a motor, two geared wheels, a linked segment lever actuated by a crank and a small pinion, the whole fixed on a carved standard,” could be powered by a refillable copper sulphate battery for up to 14 hours. The fan, Agabeg claimed, could not only replace the punkah-wallah in its operation, but was also much more flexible and cheaper to run than employing a punkah-wallah to pull a punkah fixed permanently to the ceiling.<sup>36</sup>

While inventors and commentators presented 24 the electrification of punkah-pulling machines as the best means of supplanting manual labour and the punkah-wallah from punkah-pulling systems as well as from domestic spaces, they also deployed the electric punkah and fan to defend the prerogatives of the colonial

<sup>32</sup> *The Times of India*, 11 June 1891, 5.

<sup>33</sup> *List of Patents Granted / India* (Calcutta: Government Press, 1856-1887). Archived at the British Library: Asia Pacific & Africa IOR/V/25/600, Holdings: 1856-1887.

<sup>34</sup> *The Bombay Gazette*, 29 January 1862, 100. *The Pioneer*, 18 September 1875, 2.

<sup>35</sup> Wilfrid H. Fleming, “Electric Lighting in the Tropics”, *Transactions of the American Institute of Electrical Engineers*, vol. 7/1, November 1890, 168.

<sup>36</sup> “Automatic Portable Electric Fan”, *Amrita Bazar Patrika*, July 3, 1890, 8.

government in highly politicised issues in the late-nineteenth and early twentieth centuries. Through the late-nineteenth century, the deaths of punkah-wallahs at the hands of their British and European employers had become tragically commonplace. Newspapers and journals published reports — almost on a fortnightly basis — on the victimisation of punkah-wallahs who unfortunately fell asleep while working, much to the chagrin of those they served. *Amrita Bazar Patrika* of 6 August 1893 reported: "Hardly a hot season in this country passes, but we read of the death from violence of one or more of that much-abused, but useful, class of menial, the Punkha coolie."<sup>37</sup>

- 25 Such cases and their regular occurrence became a popular focal point of discussion for vernacular newspapers. What provoked the ire of the vernacular press, however, were not so much the deaths of punkah-wallahs and servants, but the rather lenient sentences handed to European offenders by European judges and juries. While the colonial government in the nineteenth century disavowed interracial white on native violence, the colonial judiciary also worked to reduce inquiries on and penalties for Britons. In colonial India, the declining murder charges against Britons in cases of interracial violence through the latter half of the nineteenth century was never simply a matter of racial inequity, but more a result of the continuing redefinition of factors such as agency and physical contact. Throughout the nineteenth century, British medical observers characterised the Indian body as a source of both legal and medical knowledge, focusing on, as Jordanna Bailkin has noted in her examination of the medico-legal complexities in such cases, "pathologies of the Indian spleen."<sup>38</sup> Reflecting colonial ideas of race, biology and sanitation, medico-legal scholars presented the diseased spleen as a characteristic of Indian bodies owing to malaria and high fevers due to a lack of sanitation. Any Indian person already weakened by an enlarged spleen, these scholars declared, could be killed by any assault that they

believed would otherwise be inconsequential. The enlarged spleen that ruptured on account of even the slightest force provided the judicial systems an argument to term such "boot and spleen" cases as accidents instead of murder. Bailkin writes: "The 'ruptured spleen' defence — a joint project of colonial law and medicine — provided a compelling judicial framework within which Britons could cause the deaths of Indians without being charged with murder."<sup>39</sup>

The colonial government in India, much concerned about the outrage over the "boot and spleen" cases, sought to be "instrumental in relieving the hardships" and reducing the risks to British lives, not the punkah-wallah, by reducing interracial contact. Bailkin explains: "if the impetus to violence was interracial contact, then Curzon saw the reduction of this contact as a humane policy."<sup>40</sup> On 30 March 1904, at the debate on the 1904-1905 budget by the Legislative Council at Government House, Calcutta, Lord Curzon, the Viceroy and Governor-General of India, ordered the removal of punkah-wallahs from all government offices and barracks to be replaced by electric punkahs and fans.<sup>41</sup> Electric punkahs and fans were, for the colonial government, a technological solution to a moral and political issue. While punkah-wallahs were victims, losing both lives and employment, it helped, at least for the promoters and inventors of automated punkah machines, to use the politics surrounding the punkah-wallah to their benefit. "Boot and spleen" cases opened up new possibilities for investments in promoting them. On 23 October 1895, *Amrita Bazar Patrika* published an interview with Babu Bihari Lal Rajak, an employee of the public Works Department in Calcutta who had invented an automatic punkah-pulling machine. Designed to work a clock-work principle using weights, axles and toothed gears, the machine, the inventor claimed, could also be attached to an electric motor to "work a

<sup>39</sup> Ibid., 481.

<sup>40</sup> Ibid., 486.

<sup>41</sup> George Nathaniel Curzon and T. Raleigh (eds.), *Lord Curzon in India; Being a Selection from His Speeches as Viceroy and Governor-General of India, 1898-1905* (London: Macmillan, 1906), 406.

<sup>37</sup> *Amrita Bazar Patrika*, 6 August 1893, 6.

<sup>38</sup> Bailkin, "The Boot and the Spleen", 477-478 and 483.

punkah or multiple punkahs from 8 to 9 hours at a time.”<sup>42</sup> When asked what motivated his decision to invent the machine, Rajak claimed it stemmed “from the treatment which many poor punkha-coolies received at the hands of their European masters.” Further, “if he could, he thought, invent a practical automatic machine, why, it would not only contribute to the necessary comforts of many people living in the plains of India, but would be the means of saving, in many instances, the lives of poor coolies.”<sup>43</sup>

- 27 Discussions in administrative circles in the early 1890s hinted at the introduction of public electric supply in Calcutta becoming a possibility in the near future. Several inventors saw this as an opportunity to promote their electric punkah machines both as a machine that could save the lives of punkah-wallahs and as a day load for the electric supply scheme. When speaking about his own patented electric punkah machine in 1895, R. J. Browne, an electrician in the British India Steam Navigation Company, saw his machine as a solution to the problems of punkah-pulling and the punkah-wallah “on which so many inventors have worked.”<sup>44</sup> Promoting the electric punkah as a replacement for the punkah-wallah, Browne also noted that his machine, once widely accepted by the public, could provide a day load to the upcoming power plant in Calcutta, stating: “On the Calcutta lighting station becoming an established fact this electric punkha-puller would be a boon to the Electric Supply Company as it would enable them to get a day load for their plant which otherwise would be lying idle all day.”<sup>45</sup> Brown’s interview also hinted at his belief in his machine as one that could prevent assaults on the punkah-wallah: “this machine should, we think, have a considerable future before it for use in barracks &c., where the punkha coolie is often the cause of much irritation to the men which infrequently leads to ill-treatment of the puller himself.”<sup>46</sup>

<sup>42</sup> *Amrita Bazar Patrika*, 23 October 1895, 5.

<sup>43</sup> Id.

<sup>44</sup> “An Electric Punkha Machine”, *The Pioneer*, 5 September 1895, 4.

<sup>45</sup> Id.

<sup>46</sup> Id.

## “ELECTRICAL CALCUTTA” AND CONSUMERS’ REALITIES

While the electric fan was promoted as an effective means of social and financial control over the punkah-wallah, it is a paradox that, despite ordering the installation of electric fans in all government buildings, Lord Curzon himself preferred what he called the “measured sweep” of the manual punkah to what he termed “the hideous anachronism of the revolving blades” of the electric fan.<sup>47</sup> While Lord Curzon allowed the installation of electric lifts and lighting in his residence, the Government House in 1900, he employed punkah-wallahs and hand-pulled fans in the Marble Hall and reception rooms in the building.<sup>48</sup> While neither contemporary histories of colonial buildings nor Curzon’s biographies elaborate on his decisions, the presence of punkah-wallahs in the public spaces of the building could well be a means of, as discussed in the opening sections of this article, reaffirming and maintaining imperial domesticity and colonial governmentality by presenting punkah-wallahs as surrogates for the colonised.

Advertisements in newspapers and journals can also be an entry point into understanding the changes within the electrical marketplace. Through the first half of the twentieth century, advertisers of electrical goods and services gradually moved away from textual advertisements that conformed to a vocabulary of technical details interspersed with electricity’s value to mundane everyday life. The introduction of public electric supply and the emergence of a domestic consumer market, nevertheless, caused advertisers to use the impersonal voice of middle-class aspirations accompanied by an increasingly sophisticated visual appeal. Through the advertisements, the electrical marketplace now addressed the middle-class, especially men, directly appealing to their sensibilities and definitions of respectability and consumption. An advertisement in *The Statesman* of May 1915

<sup>47</sup> N. V. H. Symons, *The Story of Government House* (Alipore: Bengal Government Press, 1935), 35-36.

<sup>48</sup> Id.



for the Swan Fan, manufactured by the General Electric Company, shows two seemingly British gentlemen enjoying what the advertisement claims to be the “cool breeze” of the fan in an elite setting. In its iconography, the advertisement depicted not just the kind of consumers who bought and used expensive electric fans — costing “Rs.95 each” — but also portrayed a certain middle-class lifestyle.<sup>49</sup>

30 While elites like Curzon could afford to employ both punkah-wallahs and electric fans, for the British and *bhadralok* middle classes, however, electric supply, lighting and fans were expensive and limited propositions. Even *The Electrician*, in its December 1903 issue, described the electric light as “not the poor man’s light” in India.<sup>50</sup> A battery-operated electric fan cost anywhere between Rs.55 and Rs.110, while a mains-connected overhead electric fan, introduced after 1905, cost between Rs.95 and Rs.125. There were additional costs as well. Electric fans were usually advertised with additional services like oiling, adjusting and repairs, which cost up to an extra Rs.36 per year.<sup>51</sup> Electric fans were costly, since British and *bhadralok* middle-class salaries in the early 1900s averaged between Rs.150 and 200 per month.<sup>52</sup> The costs of using electric supply and technologies were also constantly on the rise in the first three decades of the twentieth century, despite assurances by the Calcutta Electric Supply Corporation that growing demands would eventually lower prices. In 1920, in the midst of an economic downturn following the First World War, CESC advertised their inability to accommodate or allow any new installations or extensions by consumers, stating that they were “reluctantly compelled to make this announcement by reasons of the fact that plant on order from England has been held up owing to strikes and other post-War difficulties. If this

warning is disregarded it will be impossible for the Corporation to guard against possible breakdowns and interruptions of the supply.”<sup>53</sup> In 1922, the Supply Corporation announced an increase in its existing surcharge rates from 15 percent to 30 percent, owing to, as they explained, “the price of coal in Calcutta still remaining very high; and rent, freights, increased taxation in India, and low exchange all reacting unfavourably on the Company’s nett receipts.”<sup>54</sup>

Such bureaucratic and technological factors also affected consumers’ access to electric supply in their homes. What we can infer from some incidental primary sources is how long it actually took for some areas not far outside what historians have termed the “White Town” to gain access to electric supply.<sup>55</sup> On 1 November 1919, Ambu Nath Chatterjee, Deputy Magistrate at Midnapore, applied for an electric connection to his residence in Attabagan Street (now Chandibari Street), 3 miles north of the Government House in the colonial centre of Calcutta. After paying an initial deposit of Rs.100 on 22 September 1920 (Figure 1), the application was finally approved by the Electric Supply Corporation after four years when, on 1 July 1924, they demanded a payment of Rs.79 and 8 annas for “erecting suitable service” (Figure 2).

Personal archives such as these, in offering 32 fleeting glimpses of the everyday experiences of electrical consumers and their interactions with suppliers, foreground the ephemeral nature of materials with which we are left to construct stories of electrical consumers and their affective relations with electric supply and technologies.<sup>56</sup> They also help us think of the specific

49 “Advertisement for Swan Fan”, *The Statesman*, May 1915.

50 *The Electrician*, No. 1333, vol. 7/52, 4 December 1903, 245-247.

51 Advertisement for a battery-operated electric fan in *The Statesman*, November 1901 and Advertisement for electric punkah in *The Statesman*, February 1900.

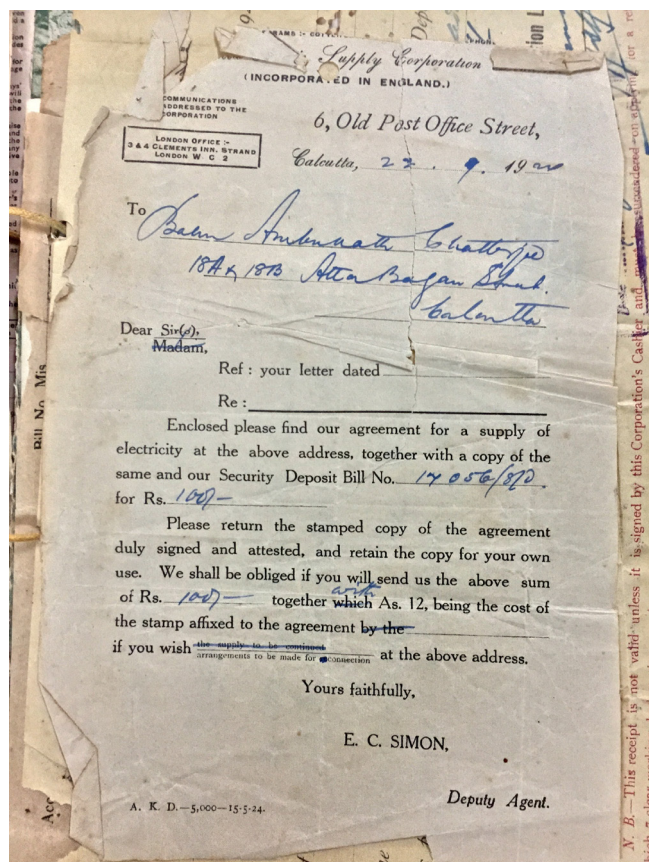
52 Massey, *Recollections of Calcutta*, 47-48.

53 *Amrita Bazar Patrika*, April 1920, 2.

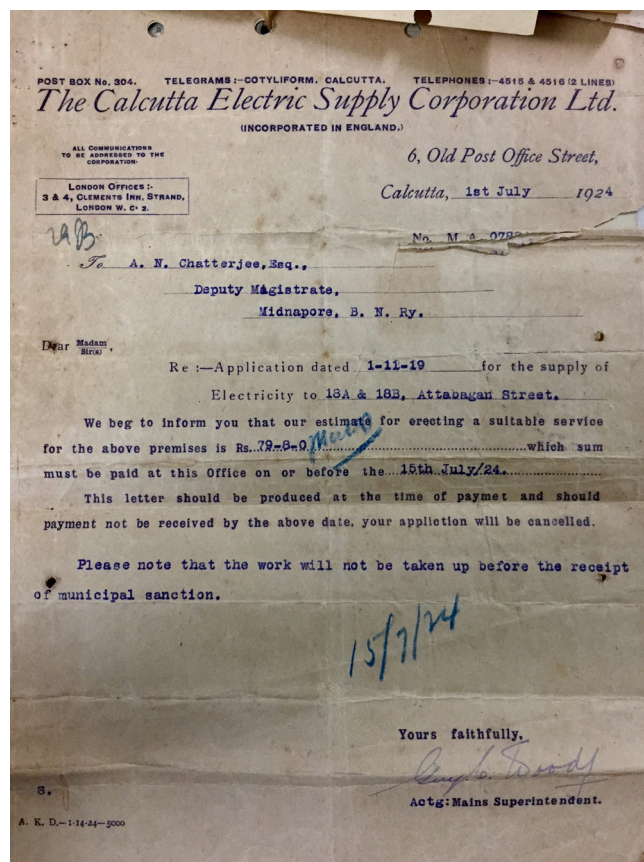
54 *Amrita Bazar Patrika*, 29 July 1922, 2.

55 I borrow my definition of the colonial centre and “White Town” from Partho Datta, *Planning the City: Urbanisation and Reform in Calcutta, c.1800 - c.1940* (New Delhi: Tulika Books, 2012), 13.

56 For a discussion on the transactional value of personal archives, see Catherine Hobbs, “The character of personal archives: Reflections on the value of records of individuals”, *Archivaria*, 2001, 126-135. For a discussion on bureaucratic record-keeping and the dominance of paper records in interactions with organisations, businesses or governments



**Figure 1:** Receipt for deposit, 22 September 1920. Used with permission from Mr Achintya Nath Chatterjee, 18B Chandi Bari Street, Kolkata.



**Figure 2:** Approval of application for electric supply, 15 July 1924. Used with permission from Mr Achintya Nath Chatterjee, 18B Chandi Bari Street, Kolkata.

sites of production, consumption and practice that create specific affective relationships between materials, bodies, people, spaces and institutions. In electrical advertisements and writings, the success of “electrical Calcutta” was for the most part a matter of disciplining or simply replacing the manual labour of servants with electrical power. Any consequent changes to existing ways of living were, however, dependent on the everyday realities of consumption, class identities, and the inherent limitations of electrical technologies. While the increasing availability of goods and services, including electrical technologies and appliances, to urban dwellers meant that consumption became an essential marker of status in an urban society

in colonial and postcolonial South Asia, see Bhavani Raman, *Document Raj: Writing and Scribes in Early Colonial South India* (Chicago: The University of Chicago Press, 2012) and Matthew S. Hull, *Government of Paper: The Materiality of Bureaucracy in Urban Pakistan* (Berkeley: University of California Press, 2012).

where caste no longer was an adequate measure of social standing, the uncertain economic and financial situations of early twentieth century resulted in the middle classes rethinking their quotidian spending. This resulted in the development of two “middle-class” viewpoints: firstly, a perception that the urban salaried classes were naturally more extravagant in their quotidian spending and consumption; and secondly, that living beyond one’s means was detrimental and thrift was, therefore, essential.<sup>57</sup>

<sup>57</sup> Prashant Kidambi, “Consumption, Domesticity and the Idea of the ‘Middle Class’ in Late Colonial Bombay”, in Sanjay Joshi (ed.), *The Middle Class in Colonial India* (Delhi: Oxford University Press, 2011), 132-155. Douglas Haynes, Abigail McGowan, Tirthankar Roy and Haruka Yanagisawa (eds.), *Towards a History of Consumption in South Asia* (New Delhi: Oxford University Press, 2010). Abigail McGowan, “Consuming Families: Negotiating women’s shopping in early twentieth century Western India”, in Haynes, McGowan et al. (eds.), *Towards a History of Consumption*, 161.



34 Discussions of class, thrift, and rising expenses were, nevertheless, placed squarely within a crowded marketplace where consumers could also choose to use other mechanisms to illuminate and ventilate their homes. Alongside advertisements for, and writings on electric lighting and fans, newspapers also carried advertisements for new and more efficient gas and oil lamps till well into the second half of the twentieth century. Some of these oil lamps, which used ordinary kerosene oil, and claimed to be “punkah and wind proof,” also boasted of safety measures that prevented the theft of oil. These lamps were also much cheaper to install and use than electric lighting. Such advertisements, through their explicit claims and portrayals of oil and gas lamps as being similar to electric bulbs in their design, sought to entice consumers away from electric supply and technologies.<sup>58</sup>

35 While many householders considered domestic electric technologies a financial burden, several others based their decisions to continue employing servants on what they considered to be the shortcomings of electrical technologies. At the simplest level, there were questions of spaces in which these technologies were installed. In the early 1900s, expenses entailed by gas supply, plumbing fixtures and electrical wiring were exacerbated by a reduction in domestic square footage while rents increased. The introduction of electric supply came at a time when Calcutta’s population grew exponentially, especially with migrants from villages searching for jobs and opportunities. As Sumit Chakrabarty has shown in *The Calcutta Kerani and the London Clerk in the Nineteenth Century*, the middle-class which emerged in the nineteenth century, mostly employed in government services and salaried jobs, added to the growing population and even greater demand for already scarce housing.<sup>59</sup> As electric supply and technologies in the home continued to be depicted as symbolic of class and social status, by the early 1910s, advertisements for rental properties

mentioned electric lighting and fans as staple fixtures, allowing several landlords to ask for higher rents.<sup>60</sup> This created economic conditions for the middle classes to continue to rely on non-electrical technologies and the increasing availability of domestic servants and their labour as means of maintaining their ideas of conspicuous consumption and class status. Those that still employed punkah-wallahs also argued that they preferred the non-uniformities of the punkah-wallah’s embodied labour to the mechanical, smooth and uniform motion of electric fans. As *The Pioneer* noted in an article on “The Punkah-wallah: A Threatened Occupation” published on 3 February 1908, while mechanised and electric fans had seemingly threatened the punkah-wallah’s livelihood over the past few years, the punkah-wallah had managed to, and will continue to survive mainly because all automated systems lacked one significant detail — the necessary “kick” in the punkah’s swing that the punkah-wallah provided with his wrist.<sup>61</sup>

## CONCLUSION

This article has traced the idea of an “Electrical Calcutta” centred on shifting discussions from the labour of human bodies to electrical technologies. This transition and its promotion was, however, a cultural process as much as a technical one. Discussions and visions of an “Electrical Calcutta” depended materially and discursively on the complexities and interconnectedness of employer-servant relationships, class and social identities, human bodies and labour, and sources of fuel and energy. By seeking out some of the concerns about the presence of servants within British and *bhadralok* lives and spaces that were articulated within and through writings and advertisements promoting electrical appliances, we find that such promotions did not simply depend on the efficiencies and comforts

<sup>58</sup> Advertisements for “Punkah and Wind Proof Lamp” in *The Statesman*, August 1878 and December 1925.

<sup>59</sup> Sumit Chakrabarty, *The Calcutta Kerani and the London Clerk in the Nineteenth Century* (New York: Routledge, 2021), 1-62.

<sup>60</sup> “To-Let Listings” from *The Statesman*, October 1903 and June 1915, collected in Ranabir Ray Choudhury, *Early Calcutta Advertisements, 1875-1925: A Selection from The Statesman* (Calcutta: The Statesman Commercial Press, 1992), 298 and 308.

<sup>61</sup> “The Punkah-wallah: A Threatened Occupation”, *The Pioneer*, 3 February 1908, 6.

of said technologies as compared to existing servant labour and means of lighting and ventilation. Instead, promoters and commentators relied on presenting electric power as rhetorical and technological solutions to social and moral issues of disciplining and shaping servant labour and energy, managing and reducing employers' efforts, and preventing interracial violence. Thus, notions of efficiency, morality, behaviour, hierarchy became central to promoters' visions of an electrical future.

- 37 While teleological and progressive historical accounts of “electrification” have presented

transitions to electrical power and appliances as moments of straightforward acceptance and dramatic move towards modernity, this article has instead also highlighted the continuities in the history of electricity and energy.<sup>62</sup> Looking closely at periods and visions of transition gives us a much better perspective of how actors, societies, industries and institutions responded to shifts in energy regimes and practices. And so the path to “Electrical Calcutta”, especially as promoters had envisioned, was fairly complex and seldom straightforward.

<sup>62</sup> This article is built on other examinations of “continuities” in electrical and energy histories, please see: Karen Sayer, “Atkinson Grimshaw, Reflections on the Thames (1880): Explorations in the Cultural History of Light and Illumination”, *Annali di Ca' Foscari Serie occidentale*, vol. 51, 2017, 131. Ute Hasenöhr, “Rural Electrification in the British Empire”, *History of Retailing and Consumption*, vol. 4/1, 2018, 14-15 and “Contested nightscapes: Illuminating colonial Bombay”, *Journal of Energy History / Revue d'Histoire de l'Energie*, vol. 2, June 2019. Animesh Chatterjee, “‘New wine in new bottle’: class politics and the ‘uneven electrification’ of colonial India”, *History of Retailing and Consumption*, vol. 4/1, 2018, 94-108. Ronald R. Kline, “Resisting Consumer Technology in Rural America: The Telephone and Electrification”, in Nelly Oudshoorn and Trevor Pinch (eds.), *How users matter: The co-construction of users and technologies* (Cambridge, MA: MIT Press, 2003), 51-66.



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## Out of the reach of cattle? Animal subjectivities shaping the electrical cultures of British livestock farming in the second half of the 20th C.

### Abstract

This paper explores the use of electricity in 20th-century British farming, as captured in the agricultural press, advisory literature, films and specialist publications intended for the farming community. Through the lens of livestock management, the article addresses the ways in which non-human animal physiologies and subjectivities were implicated in the emerging energy landscapes of the post-war British countryside. Land value at the time was framed by an emphasis on sector-wide efficiency gains, and drivers for increased productivity. By taking electric fencing within dairy production after the Agriculture Act (1947) as a case study, the article refocuses electrical history to consider non-human animal impacts on energy transformations. It argues, firstly, that in Britain during the 1940s-80s energy decisions impacting on the managed spaces of the farm were caught up in the experiences of livestock, and, secondly, that the energy decisions that moulded the specialities of agricultural practice in this period were shaped by livestock's responses to that experience.

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### Plan of the article

- Introduction
- Rural Electricity Supply and Demand
- Electricity as a Power for Good Management
- Electric Fences and Handling Cattle
- Conclusions

## INTRODUCTION

### Services

ALL ELECTRICAL INSTALLATIONS AT MAINS VOLTAGE MUST BE OUT OF REACH OF CATTLE AND PROPERLY EARTHED.

- Adequate lighting (flourescent is preferable)
- A power point for a hand inspection lamp or clippers; power for hand-held equipment should be supplied through a step-down transformer
- A clean water supply for treatment and washing down.<sup>1</sup>

- 1 The range of on-farm uses publicised for electricity in British livestock production after the second world war was vast. Portable equipment for rearing and health management, such as infra-red lamps and clippers, were powered by it. Electricity installed in livestock housing, powered ventilation, heat and light; timing systems and automation; water pumps, and pressure hoses to clean down stalls and holding pens; cooling, storage, and steam sterilizing. Electrical motors drove milking machines, chaff cutters, feed mixers, driers and lifting mechanisms. Promoters argued that electricity had the potential to help the farmer to avoid the impacts of adverse weather; advocates offered reliability, and readiness to be used day and night: post-war modernity seemed to equate with the ability to step outside annual cycles of season and climate. Electricity was being folded into the mix of on-farm power and used in novel technologies such as electric fencing to energise previously unpowered systems.<sup>2</sup>
- 2 The dairy sector was one of the earliest to experience the push to adopt electricity in agricultural production, and from the time of the

Electricity Act (1947), energy decisions favouring electrical infrastructure had been embedded into the farm's built environment. According to one Agricultural Electrification Adviser writing in the late 1950s, its adoption on farm "must, at times, amuse those who worked on this subject in the thirties, when the general apathy in farming affairs applied, above all, to electricity."<sup>3</sup> But, by the mid-1980s electricity had become sufficiently well managed and reliable in rural Britain for it to be treated as a commonplace, taken-for-granted service. On-farm familiarity with electricity had grown through the provision of Ministry of Agriculture Fisheries and Food (MAFF)'s advisory materials,<sup>4</sup> the agricultural press' articles on the topic, advertising of specialist equipment, and leading texts.<sup>5</sup> As the MAFF's booklet *Cattle Handling* suggests, by 1984 it had become so familiar, hidden and regularised that specific advice was needed to bring

<sup>3</sup> Cameron, "Electricity On The Farm", 58 (cf. note 2). By 31st March 1955, he said, the Central Electricity Authority had recorded 157,000 farms having a mains supply in England and Wales, with 12,000 being connected annually.

<sup>4</sup> E.g., Wolseley Sheep Shearing Machine Company Ltd. Witton, Birmingham, *Farmer And Stockbreeder*, 2nd Jan 1945, 12; John F. S. Steel, Clyde Mills Bingley, *Farmer And Stockbreeder*, 2nd Jan 1945, 35; Wolseley Electric Fencing, Wolseley Sheep Shearing Machine Company Ltd. Witton, Birmingham, *Farmers' Weekly*, 7th Jan 1955, 82; Alfa-Laval Co Ltd., Cwmbran, Monmouthshire, *Farmers' Weekly*, 7th Jan 1955, 15; *Cattle Handling*, MAFF Booklet 2495; Anon, "The Repair And Maintenance Of Farm Buildings", *Fixed Equipment On The Farm*, Leaflet N° 26, MAFF, (London: HMSO, 1965); *Electricity On The Farm*, (Electricity Council, Southern Electricity Board, MAF, Helen Wiggins' Films, 1969), Anon, *Electricity On The Farm*, (London: British Electrical Development Association, 1956) 3, 88; C. Robinson, "Advisory Work In Agriculture And Electricity" *Rural Electrification Conference 1962, Pt 1, Electricity Supply/Agricultural Advisory Services Sessions*, Nottingham, 11th April 1962; Brian Nicol, Producer, *Electricity—Power For Good* (North Eastern Electricity Board Turners Film Productions, 1961), Yorkshire Film Archive NEFA 19315, ELECTRICITY - POWER FOR GOOD | Yorkshire Film Archive ([Yfanefa.Com](http://Yfanefa.Com)) (accessed 7th Oct 2022).

<sup>5</sup> E.g., James A. S. Watson, James A. More, *Agriculture: The Science and Practice Of British Farming* (Edinburgh and London: Oliver and Boyd Ltd., 1944); Edwin Gunn, *Farm Buildings: New And Adapted* (London: Crosby Lockwood & Son Ltd., 1945); D. H. Robinson (ed.), *Fream's Elements Of Agriculture* (London: John Murray, 1962); C. A. Jewell, *Farming*, vol. 1, (London, New York, Melbourne, Toronto, Wellington: The Caxton Publishing Co., 1965).

<sup>1</sup> Anon, *ADAS Cattle Handling*, MAFF Booklet 2495 (Alnwick: MAFF, 1984).

<sup>2</sup> C. A. Cameron Brown, "Electricity On The Farm; The Power And The Price", *Agricultural Review; Selected Articles* (London: Hulton Press Ltd., C. 1956), 58-61; advertisement, British Electrical Development Association, London, *Agriculture*, vol. 63, n° 3, June 1956, vi; advertisement for British Thomson-Houston Company Ltd., Rugby, *Agriculture*, vol. 63, n° 3, June 1956, vi.

it back into sight. In MAFF's view, maintenance, and safety, rather than promotion, had become paramount. But where did the cattle, from whom electricity must apparently be kept out of reach, feature in this; what part, if any, did animal subjectivity play in the history of agricultural electrification, and how do we know? In answering this question, this article argues that the emerging familiarity of livestock with electrical appliances and the management practices resulting from their adoption into farming enabled the consumption of electricity on farm. The cows helped to make it work. In this way, non-human animals were not simply impacted by the results of the energy decisions made by farmers, they helped shape Britain's energy landscape and culture. This finding opens new avenues of research within energy, agricultural and environmental history.

- 3 As Harriet Ritvo has observed, from the nineteenth century animal husbandry was one of the "most tightly structured" examples of "the interactions" between humans and other animals, shaped by both "economics" and "by anatomy".<sup>6</sup> In 20th C. livestock farming, human decisions, including energy decisions, continued to shape what animal geographer Lewis Holloway has called the "spacialities of agriculture" and "built agricultural practice" of non-human animal experience. Livestock's experiences of farming were and are, he suggests constantly informed by "particular technologies, spacialities, knowledges and so on", across a range of farming practices seen at any particular time.<sup>7</sup> People's energy decisions on farm were therefore clearly implicated in livestock's experiences in Britain in the 1940s to 70s. But, more than this, human energy decisions were also impacted by the reactions, behaviours, and subjectivities of cattle. Though the whole agrifood system, farm to fork, was purposed to human consumption,

and the relations of power between humans and other animals in livestock production remained fundamentally uneven, non-human animals were not necessarily materially "at the complete disposal of human beings" in the mid 20th C.<sup>8</sup>

The case for an approach that adds the non-human animal to history has been proven by animal historians including Harriet Ritvo, and Erica Fudge. As Ritvo has noted, the "animal turn" brings other animals, always present in the humanities, into critical line of sight. As she observes, for example, "livestock has traditionally attracted the attention of economic historians who focus on agriculture", but the way in which the animal is to be understood has changed, taking into account the interests of the other animal, and the relationships between humans and other animals.<sup>9</sup> The value of this has been outlined by Fudge, who has argued that "introducing animals as actors and not just as objects into our work will ... broaden and deepen what we might know about the past". A cow, she posits, "is capable not only of being affected by, but also of affecting, its – our shared – world." And this will "challenge some assumptions as to what the focus of our discipline might be."<sup>10</sup> In this case, by taking up the challenge of de-centring the human focus of the discipline and writing "cows into history,"<sup>11</sup> shifting our focus within the history of electricity and the history of agriculture, we see that the eventual ubiquity of electrical power in UK agriculture depended on more than just the human actors' responses. It also depended on adjustments made in answer to livestock's subjectivity and agency.<sup>12</sup> It will help agricultural historians to better understand how and why some technologies were adopted when and at the speed that they were.

<sup>6</sup> Harriet Ritvo, *The Animal Estate: The English and Other Creatures in the Victorian Era* (Cambridge, MA: Harvard University Press, 1987), 5.

<sup>7</sup> Lewis Holloway, "Subjecting Cows to Robots: Farming Technologies and The Making Of Animal Subjects", *Environment And Planning D: Society And Space*, vol. 25, n° 6, 2007, 1055.

<sup>8</sup> NB Ritvo argued that both "material" and "rhetorical animals" were "at the complete disposal of human beings", Ritvo, *Animal Estate*, 5.

<sup>9</sup> Harriet Ritvo, *Animal Estate*, 5 (cf. note 6) (Charlottesville, VA and London: University of Virginia Press, 2010), 1-2.

<sup>10</sup> Ritvo, Id.; Erica Fudge, "Milking Other Men's Beasts", *History and Theory*, n° 4, 2013, 15, 17.

<sup>11</sup> Fudge, *Ibid.*, 15.

<sup>12</sup> Fudge, *Ibid.*, 21; see also Sandra Swart, *Riding High: Horses, Humans and History In South Africa*, (Johannesburg, Wits University Press, 2010).

- 5 As will be seen, livestock's passive and active responses to novel electrically powered practices generated knowledge about the value and use of electricity on the farm, both in the development of new equipment and in its use. Including cows, I therefore argue is crucial to understanding the history of the ways in which electrical power became entangled with the landscapes and processes of British dairy farming.
- 6 Split into three parts, the article will firstly set the scene on electricity supply in the British countryside for the decades immediately following the second world war; secondly, focus on the role accorded to electricity as a power for good in farming, its regulation and management at the time; and thirdly, argue for the value of considering non-human animals in energy history through the case study of electric fencing in dairy farming. Within this, the sub question "how do we know?" is perhaps the easiest to answer. The sources used here were created, and subsequently selected and maintained, by human actors. But, belonging to agricultural discourse founded on human interactions with livestock, they also contain incidental traces of other animal actors and their subjectivities in text, image, and (in the case of some films) sound.<sup>13</sup>
- 7 For consistency, this article draws on a 5-year sample for the month of January<sup>14</sup> from 1945-1980 of two widely-respected national farming journals published in the UK: *Farmer and Stockbreeder*, and *Farmers Weekly*.<sup>15</sup> The sample is supplemented, for corroboration and context, with: archival materials held at the Museum of English Rural Life (MERL), including unpublished research by the National Institute for Research in Dairying (NIRD); grey literature collected by a Regional MAFF office now held at

the Yorkshire Museum of Farming; Parliamentary Papers; and published standard texts. Together, these sources capture two modalities. Firstly the intent i.e., what should happen according to policy makers, researchers, and advisors motivated by the fundamental, utilitarian, economic framework of livestock production. Secondly: the experiential – what happened on the ground. The second includes evidence of non-human animal responses to electricity, and human reactions to these, and suggests that farmers, farm managers and stockmen were both aware of the risks attendant on livestock handling around electrical devices on farm and had to adjust their own conduct accordingly.

The history of electrification and electricity in the British countryside was demonstrably much messier and far less linear than the agricultural policy, financial interventions, education, advice and advocacy of the time envisioned.<sup>16</sup> But, while

<sup>16</sup> Foundational accounts of the history of the adoption and use of electricity within the British countryside include work by John Weller, *History Of The Farmstead: The Development Of Energy Sources* (London: Faber And Faber, 1982), Leslie Newman, *The Electrification Of Rural England And Wales* (Unpublished Thesis Submitted For The Degree Of Master Of Philosophy, Inst. Agricultural History & Museum Of English Rural Life; March 1991); John Sheail, *Power In Trust: The Environmental History Of The Central Electricity Generating Board* (Oxford: Oxford University Press, 1991); Richard J. Moore-Colyer, "Lighting The Landscape: Rural Electrification In Wales", *Welsh History Review*, vol. 23, n° 4, 2007, 72-92; Paul Brassley, "Electrifying Farms In South West England", Paper Delivered To BAHS Spring Conference, Askham Bryan, April 2013; Paul Brassley, Jeremy Burchardt, And Karen Sayer (eds.), *Transforming The Countryside The Electrification Of Rural Britain* (London and New York, NY: Routledge, 2017). The wider history of electricity and its supply in Britain before the second world war is outside the scope of this paper, but can found in the following classic accounts: Leslie Hannah, *Electricity Before Nationalisation: A Study Of The Development Of The Electricity Supply Industry In Britain To 1948* (London and Basingstoke: The Macmillan Press, 1979); Leslie Hannah, *Engineers, Managers And Politicians: The First Fifteen Years Of Nationalised Electricity Supply In Britain* (London: The Macmillan Press, 1982); Bill Luckin, *Questions Of Power: Electricity And Environment In Interwar Britain* (Manchester and New-York, Ny: Manchester University Press, 1990); Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty And Gender, 1880-1914* (London: Pickering & Chatto, 2008). These accounts are also increasing internationally, for example most recently Richard F. Hirsh, *Powering American Farms: The Overlooked*

<sup>13</sup> This methodology is foundational to animal history, e.g., see Ritvo, *Animal Estate*, 4-5 (cf. note 6).

<sup>14</sup> January was a higher-usage month for electricity in the UK due to its latitude.

<sup>15</sup> *Farmer And Stockbreeder* (F&S) was established in 1889, merged with National Farmers Union's Journal *British Farmer* 1971, and then published as *British Farmer and Stockbreeder* until closure 1984; *Farmer's Weekly* (FW) was established 1934.



rightly complicating the history of the adoption of scientific and technical innovations in agriculture, including electricity, and the meanings associated with both resistance and adoption for rural communities, none of these accounts have addressed the significant part that livestock also played in rural electrification.<sup>17</sup> If we do not take the non-human animal into account, we are missing a vital piece in the process of understanding how and why certain electrical technologies were made and adopted, and the process of how new ways of knowing and acting were constructed in agricultural discourse.

### RURAL ELECTRICITY SUPPLY AND DEMAND

- 9 As Ruth Sandwell has argued in *Powering up Canada* (2016), the story of “the interrelationships between old and new forms of energy,” of “tangled issues relating to changing human energy use, including cheapness and familiarity, adaptability..., as well as advertising, propaganda, and fear” all play a part in the entanglement of people, and environment, and the processes of producing, carrying and consuming energy’ including electricity.<sup>18</sup> The introduction of “the automobile ... telephones, electricity and farm machinery”, in rural areas of the USA, similarly all presented opportunities and challenges. As Deborah Fitzgerald has observed in *Every Farm a Factory* (2003), farm families addressed each in complex ways, looking to their “relationships with others in the community for guidance and support.” Assessing the emergence of a new, industrial paradigm there in the 1920s, electricity in rural America was one of “a new set of opportunities and constraints”, of “systems of production and consumption” functioning

“like grids” that farmers and rural communities were starting to engage with, adapt to or resist. Electrification was billed in the USA, as in the UK, as transformative, but so too were tractors, pesticides and other applications of science and technology. Each “was located within a matrix of technical, social, and ideological relationships that both constrained and sustained change”.<sup>19</sup> And this holds equally true of the UK.

British policymaking in the period 1945–80 was influenced by the United Nation’s nascent Food and Agriculture Organisation’s (FAO) drive to increase food production from the mid-1940s, in order to meet the fundamental need for improved nutrition and generate reserves of food.<sup>20</sup> We can see this at work across the financial levers at the disposal of the domestic government, which sought to give farmers preference where they could. The electricity boards for example could offer farmers a “Farm Tariff” or a “Contract Rate” with a “lower fixed charge and higher unit charge” for agricultural consumers “whose consumption of electricity was limited by the nature of their business”.<sup>21</sup> Agricultural historians, historians of science and environmental historians are currently tackling that policy history across the Global North, within critical assessments of its international legacies, impacts, and maps of High Modernism.<sup>22</sup> But, the UK’s determination to get

*Origins Of Rural Electrification* (Baltimore, MD: John Hopkins University Press, 2022).

<sup>17</sup> NB It was argued that most farms’ electricity demands only needed a single phase supply and did not justify the additional costs of three phase. George Sewell Director, *Your Electricity Supply*, EDA Film (Greenpark Production, Films Producers Guild, London, N.D.), Museum of English Rural Life, Watts Films, D WATT PH6\_33.

<sup>18</sup> Ruth W. Sandwell (ed.), *Powering Up Canada: A History of Power, Fuel, And Energy From 1600* (Montreal and Kingston, London, Chicago, IL: McGill-Queen’s University Press, 2016), 353–354.

<sup>19</sup> Deborah Fitzgerald, *Every Farm a Factory: the Industrial Ideal in American Agriculture* (New Haven, CT and London: Yale University Press, 2003), 3, 5.

<sup>20</sup> Footage reflecting the FAO’s 1945 founding mission is accessible via About FAO | Food and Agriculture Organization of the United Nations (03/04/2023).

<sup>21</sup> Committee Of The Privy Council For Agricultural Research, *Report Of The Agricultural Research Council For The Year 1958–59*, vol. 8., Cmnd. 1069, 1959–60, 110. *South Western Electricity Board. Report And Accounts And The Report Of The South Western Electricity Consultative Council For The Year Ended 31st March 1959 Together With The Report And Accounts Of The Board For The Fifteen Month Period From 1st January, 1958 To 31st March, 1959*, vol. 12, 1959–59, paper 303, 1163.

<sup>22</sup> Shane Hamilton, “Agribusiness, The Family Farm, And The Politics Of Technological Determinism In The Post-World War II United States”, *Technology And Culture*, vol. 55, n° 3, 2014, 560–590; David D. Vail, *Chemical Lands: Pesticides, Aerial Spraying, And Health In North America’s Grasslands since 1945*, (Tuscaloosa, AL: University Of Alabama Press, 2018); Venus Bivar, “Agricultural High Modernism And Land

mains electricity to farmers after the second world war was consistent with the larger FAO mission. As Mr Anthony Hurd MP moved in 1953, “this House, noting the benefits already brought to many villages and farms by main electricity, believes that the development of food production depends increasingly on the use of electric power”.<sup>23</sup> Harnessed to husbandry, it was suggested, electricity would result in raised production for the farmer and abundance for the consumer. We see this emphasis, pushing back against its still thriving alternatives, in the advisory leaflets published by MAFF and the Electricity Council, distributed at agricultural shows in the period.<sup>24</sup> Electricity was seen as a power for good in agriculture, and thus as a good for all. In fact, drawing on David Edgerton’s observations in *Shock of the Old* for a moment, it might be argued that mains electricity had a “high cultural” significance<sup>25</sup> whenever it was linked with British farming at this point.

- 11 Despite the net long-term trend of adoption, in practice there was a very mixed picture of access to and use of mains electricity on the farm throughout our period.<sup>26</sup> In 1892 chem-

ist Willian Crookes (1832-1919) had expected electricity to become a boon to agricultural production through the destruction of insect pests.<sup>27</sup> But, regardless of his, and then Borlase Matthews,’ enthusiasm,<sup>28</sup> the broad project of rural electrification in Britain was still a persistent and enormously complex problem long after the formation of the National Grid in 1926. Michael Kay and Graeme Gooday identify three phases of early electrification in Britain at the turn of the 19th C. and 20th C.: experimental (1870s-80s), fashionable (1890s), and normalized (1900s-1930s) in relation to many well-appointed country houses. But outside its ground-breaking, fashionable adoption via independent generation on rural estates, the third “normalised stage” of electrification<sup>29</sup> came much later to the British countryside than to its industrial and manufacturing regions.<sup>30</sup> Akin to Crookes, the British Electrical Development Association (BEDA) can be found promoting electricity in 1947 to control “flies and other pests” in “cowsheds, dairies, boxes, stables and piggeries”, within a suite of farm applications supposed to lead to “a prosperous agriculture and a happy and contented countryside”.<sup>31</sup>

Reform In Postwar France”, *Agricultural History*, vol. 93, n° 4, 2019, 636-655; Carin Martin, “Modernized Farming But Stagnated Production: Swedish Farming In The 1950s Emerging Welfare State”, *Agricultural History*, vol. 89, n°4, 2015, 559-583; Nicola Gaberllieri, “‘California Dreamin’: Rural Planning And Agricultural Development In Italy’s Grosseto Plain, 1949-1965” *Agricultural History*, vol. 94, n°2, 2020, 224-250; John Agar, Jacob Ward, (eds), *Histories Of Technology, The Environment and Modern Britain* (London: UCL Press, 2018); Fred Ekpe F., Ayokhai, Rufai Bwashi, “West African Women And The Development Question In The Post-World War II Economy: The Experience Of Nigeria’s Benin Province In The Oil Palm Industry”, *Journal Of Global South Studies*, vol. 34, n° 1, 2017, 72-95; Dominic Berry, “Agricultural Modernity As A Product Of The Great War: The Founding Of The Official Seed Testing Station For England And Wales, 1917-1921”, *War & Society*, vol. 34, n° 2, 2015, 121-139.

<sup>23</sup> Anthony Hurd, “Electricity Supplies to Rural Areas”, House Of Commons, *Hansard*, Fifth Series, vol. 516, Elizabeth II Year 2, 1351-1442.

<sup>24</sup> Advert For Electricity Council Leaflets, Stand D 34, Royal Show Stands and Exhibitors Catalogue, July 1965, 40.

<sup>25</sup> David Edgerton, *The Shock of The Old: Technology And Global History Since 1900* (London: Profile Books Ltd., 2008), 4, 212.

<sup>26</sup> *Historical Electricity Data 1921 To 2021, Electricity Supply, Availability And Consumption*, Department Of Business,

The journey in agriculture to the stage at which mains electrical installations and applications were normalised for farmers and stockmen, depended on a huge effort from Government, advisors, managers, promoters, engineers,

Energy And Industrial Strategy, *Electricity\_Since\_1920.Xls (Live.Com)* (accessed 13<sup>th</sup> Jan 2023).

<sup>27</sup> Gooday, *Domesticating Electricity*, 154 (cf. note 16).

<sup>28</sup> E.g., Richard Borlase Matthews, *Electro-Farming: Or the Application Of Electricity To Agriculture* (London: E. Benn Ltd., 1928); Richard Borlase Matthews “Electricity On The Poultry Farm”, in Miss O. Comyns Lewer (ed.) *Feathered World Year Book* (London: The Feathered World, 1932).

<sup>29</sup> Michael Kay, Graeme Gooday, “From Hydroelectricity to The National Grid: Harewood House and The History of Electrification In Britain, 1900-1940”, *History Of Retailing And Consumption*, vol. 4, n1, 2018, 43-63, 46.

<sup>30</sup> Abigail Harrison-Moore, Graeme Gooday, “Decorative Electricity: Standen and The Aesthetics Of New Lighting Technologies In The Nineteenth Century Home”, *Nineteenth-Century Contexts: An Interdisciplinary Journal*, vol. 35, n° 4, 2013, 363-83.

<sup>31</sup> Anon, *Electricity on The Farm* (London: British Electrical Development Association, 1956).

suppliers, and policy makers. This came in the form of advertisements, publications, broadcasts, films, conferences, and advice distributed at agricultural shows via mobile units and market-town showrooms. And, akin to the belief that success was based first and foremost upon a notion of “efficiency” already dominant in the USA’s agricultural advice,<sup>32</sup> it used the rhetorical tropes of progress, and increased productivity. Indeed, many of the themes that Gooday has identified in the early promotional campaigns, that focused on the facility of electricity for householders,<sup>33</sup> persisted in Britain long after 1945 within discussions of agriculture, farms, and food production. British advocates for the use of electricity in farmhouses and cottages for instance represented it as the most up-to-date energy, the most efficient and technologically best suited to the demands of the modern farmer at home and persuade the labourer to stay on the land.<sup>34</sup> However, it was not until after the Electricity Act 1957 that the proportion of farms supplied by the grid rose to 80% c. 1958–60.<sup>35</sup> The story of supply was complicated by: topography; the absence in rural areas of a pre-existing, standard infrastructure; legacies of the political, legislative and commercial frameworks within which electricity had already been generated and distributed; unreliable supplies; cost; the differences between rented, tied and owned property; and public responses to pylons situated in places deemed scenic, idyllic or picturesque.<sup>36</sup>

As the oral historical material captured in Brassley *et al.*’s *The Real Agricultural Revolution* (2021) suggests, however, there might be any number of reasons why a particular farmer didn’t invest straight after 1945 in technical innovations, including electrical plant and equipment: life stage, family decisions, prior investment in existing machinery, concerns about financial risk, or larger-scale long-term farm planning decisions.<sup>37</sup> What is therefore important, as Edgerton also suggests, “is the technology that counts: not only the famous spectacular technologies but the low and ubiquitous ones. The historical study of things in use, and the uses of things.”<sup>38</sup> In Britain, for those who wanted to use electrical power, there were utilitarian alternatives to the mains. Many farmers, as Brassley *et al.* have observed, accessed the BBC’s agricultural broadcasts via rechargeable battery-powered radios,<sup>39</sup> and sufficient farmers still ran their own generating plant in 1960 that one *Punch* author made a satirical claim that farm labourers’ perks included free electricity in their cottages, as well as free firewood.<sup>40</sup> Whether *Punch* might be considered authoritative or not, the frequency of power cuts in rural areas certainly necessitated the availability of backup generation even for those farms connected to the national grid. The issue of weak infrastructure remained challenging enough that the specialist monthly *Dairy Farmer* carried a feature on it in 1975 (between the fuel crisis of 1973 and before the national rolling power cuts of the later 1970s).<sup>41</sup> It was not therefore that farmers were necessarily against

<sup>32</sup> Fitzgerald, *Every Farm*, 5 (cf. note 19).

<sup>33</sup> Graeme Gooday, “Electrical Futures Past”, *Endeavour*, vol. 29, n° 4, 2005, 150.

<sup>34</sup> Karen Sayer, “Electrification and Its Alternatives in The Farmer’s and Labourer’s Home”, in Paul Brassley, Jeremy Burchardt and Karen Sayer (eds.), *Transforming the Countryside. The Electrification Of Rural Britain*, (London and New York, NY: Routledge, 2017), 117–134; Karen Sayer, “Electricity In The Country Cottage, 1920–1970”, in Paul Barnwell (ed.), *Working Class Housing* (Oxford: Rewley House Studies in The Historic Environment, Oxford University, 2019).

<sup>35</sup> Weller, *History Of The Farmstead*, 164, 169–71 (cf. note 16); N. Harvey, *A History Of Farm Buildings In England & Wales* (Newton Abbot, London: David & Charles, 1984), 211, 216; Newman, *The Electrification Of Rural England And Wales*, 200 (cf. note 16).

<sup>36</sup> Brassley, Burchardt and Sayer, *Transforming the Countryside* (Cf. note 16).

<sup>37</sup> Paul Brassley David Harvey, Matt Lobley, Michael Winter, *The Real Agricultural Revolution: The Transformation of English Farming 1939–1985* (Woodbridge: The Boydell Press, 2021), 203–210.

<sup>38</sup> Edgerton, *Shock of The Old*, 5–6, 212 (cf. note 25).

<sup>39</sup> Brassley, *et al.*, *Revolution*, 73 (cf. note 37); Paul Brassley, “Electrifying Farms In England”, in Paul Brassley, Jeremy Burchardt and Karen Sayer (eds.), *Transforming the Countryside. The Electrification Of Rural Britain* (London and New York, NY: Routledge, 2017), 83–115.

<sup>40</sup> Ronald Duncan, “The Lure of The City”, *Punch*, vol. 238, n° 6240, 27th Apr. 1960, 589.

<sup>41</sup> Frank Walsh, “Plan Standby Power Now”, *Dairy Farmer*, March 1975. Related marketing E.g., advertisement for N. J. Fromet & Co. Ltd., Stamford, Lincs, *Dairy Farmer*, March 1975, 43; advertisement for Godfreys, Branchley, Tonbridge, Kent, *Dairy Farmer*, March 1975, 43; advertisement for King



using electrical power, it was that the grid did not necessarily suite them. They had a questioning eye, and, if they were in animal husbandry, they had to pay attention to its usefulness with livestock.

### ELECTRICITY AS A POWER FOR GOOD MANAGEMENT

- 14 As Brassley *et al.* show, the most significant increases in funding for agricultural research took place in the twenty-five years after the second world war. Advice came from a range of independent agricultural research centres, State-sponsored research bodies, their commercial equivalents, educational centres, and experimental farms.<sup>42</sup> Government provided much of the funding as well as the organisational structures for agricultural research, education, and advice.<sup>43</sup> As they note, E. J. Russell, *A History of Agricultural Science* (1966) believed that a higher proportion of public funding was going to the agricultural sciences at that point than other key policy areas due to “its immense value for food production”.<sup>44</sup> This is in marked contrast to Julian Huxley’s assessment of research funding in the 1930s, when agriculture and agricultural sciences were receiving just ¾ of a million

pounds per annum compared to 2 ¼ millions for industry and its sciences.<sup>45</sup>

Efforts were made not only to develop and promote, but also to test, standardise, and make farm electrical equipment safe via the work of the Central Electricity Authority, the Area Boards, the British Standards Institution, and the British Electrical Development Association.<sup>46</sup> At the same time, electrical power and electrical systems were being woven into a range of practices, including legal-, institutional-, and material-control.<sup>47</sup> By the late 1960s, this landscape was still fundamental to the publicity for the Electro-Agricultural Centre at Stoneleigh. Established by the Electricity Council at the National Agricultural Centre (NAC) and owned by the Royal Agricultural Society of England (RASE), the Centre aimed to “display ... fundamental techniques in the use of electricity in agriculture”. It had, it stated, “a technical and product information library, and ... provision for demonstrating new equipment” and worked with the NAC to demonstrate “electrical methods ... as part of new farming techniques” and “electric farming”. It sought “to help all concerned keep up to date with the latest electrical developments in agriculture”. It was, it said, designed “to assist farmers in their efforts to increase productivity and cut costs”.<sup>48</sup>

In passing through the national regulatory structures, which shaped the products on the market and reassured consumers and operators alike, the electrically-powered equipment of the farm was no different to any other.<sup>49</sup> The safety of human

Engineering Ltd., Greenland Mills, Bradford-On-Avon, *Dairy Farmer*, March 1975, 44.

<sup>42</sup> Brassley *et al.*, *Revolution*, 24–87 (cf. note 37).

<sup>43</sup> The Agricultural Research Act, 1956 (4 & 5 Eliz. 2, C. 28), established an Agricultural Research Fund and The Agricultural Research Council (ARC), which took over responsibility for the independent research institutes from MAFF. funding for agricultural research increased steadily through the 1950s. in its first year, ARC spent £3,895,601. In 1957 it spent £3,895,601. In 1958 it spent £4,184,221. *Agricultural Research Fund Account 1956–57. Account Prepared Pursuant To Section 1 (5) Of The Agricultural Research Act, 1956, Of The Receipts Into And Issues Out Of The Agricultural Research Fund In The Year Ended 31st March 1957; Together With The Report Of The Comptroller And Auditor General Thereon.* 1957–58, BPP 130, vol. 20, 101; *Agricultural Research Fund Accounts 1957–58. Account Prepared Pursuant To Section 1 (5) Of The Agricultural Research Act, 1956, Of The Receipts Into And Issues Out Of The Agricultural Research Fund In The Year Ended 31st March 1958, Together With The Report Of The Comptroller And Auditor General Thereon.* (In Continuation Of House Of Commons Paper n° 130 Of 1957–58.), 1958–59, BPP 20, 101.

<sup>44</sup> Brassley *et al.*, *Revolution*, 44–45 (cf. note 37).

<sup>45</sup> David Edgerton, “Time, Money, And History”, *ISIS*, vol. 103, n° 2, 2012, 321–322.

<sup>46</sup> E.g., Central Electricity Authority. Eighth Report And Statement Of Accounts For The Year Ended 31st March 1956, vol. XVI.13, 1955–56, <https://Parlipapers.Proquest.Com/Parlipapers/Docview/T70.D75.1955-045484?Accountid=13651> (accessed 14th Dec 2022).

<sup>47</sup> Miriam R. Levin, “Contexts of Control”, in Miriam R. Levin (ed.), *Cultures Of Control* (London and New York, NY: Routledge, 2000), 24–26.

<sup>48</sup> Advert, *Agriculture*, vol. 75, n° 7, July 1968, iv; advert issued by The Electricity Council, England and Wales, and repeated publication in at least vol. 75, n° 8, August 1968; vol. 75, n° 9, September 1968.

<sup>49</sup> See Graeme Gooday, *Domesticating Electricity*, 61–89, 99–105, 115–119 (cf. note 16).



users for instance was covered by specific regulations on electrical installations that were in play at the start of our period. British Standards such as “Battery-operated electric fences B.S. 1222-1945”, were part of the regulatory, legal discourse that applied throughout Britain and its region of influence.<sup>50</sup> British Standard (B.S.) 1222-1945 for instance ensured that “the energy supplied to fencing livestock be so limited and controlled that under the most extreme conditions it shall not cause danger”. Other countries used mains powered fences, but this was “not recommended for use in this country”, at the time, therefore did not conform to this standard. Later in 1954 the NIRD carried out tests on mains-powered prototypes, including a Wolsey unit, against the International Commission on Rules for the Approval of Electrical Equipment (CEE) “Specification for Mains Operated Electric Fence Controllers” (1949),<sup>51</sup> and a committee “representing sixteen interested organisations” outlined the requirements for “Mains-operated Electric Fence Controllers” B.S.2632:1955, including the B.S. markings to be printed on safe devices that reassured the user.<sup>52</sup> And, there seems to have been a push in that part of the sector most connected to policy-making to adopt the mains-powered versions. Potential developments in all aspects of livestock farming worldwide were regularly researched and discussed after the second world war. “Never in

the history of agriculture was it more important to understand the problems present and future, and the achievements of the farmer overseas”, James Turner, the then President of the National Farmer’s Union, urged in the Foreword to Clyde Higgs’ *Continental Journey* (1945). And in Higgs’ view, the use of electricity in farming, drawing on developments in Europe, as well as America and New Zealand, was a key part of the planning for transformative change. Throughout *Continental Journey*, alongside the other practical developments and comparisons, there were constant references to electric light, electric motors, etc. and injunctions to “do more of this at home”. Reporting on developments in Denmark, Higgs recorded that electric fences “have been the subject of considerable research” and that there were “fifty thousand in use”, produced by twenty manufacturers. As a result, “the countryside is covered with electric fences – all connected directly to the mains”.<sup>53</sup> Similar observations about the reach of electricity and its value in farming persisted.<sup>54</sup>

Within the UK’s legal and advisory controls, 17 the producers and operators of the electrical equipment used on livestock farms thus had to address animal bodies and animal behaviours in the design, production, and safe use of electricity, whatever the rhetorics of the promoters. In the legal frameworks, it was soon recognised that care also had to be taken to ensure regular maintenance of electrical installations and connections within agricultural buildings to ensure that they were not exposed to weathering and damp,<sup>55</sup> and the industry was already aware of the implications of rearing animals near

<sup>50</sup> B.S.1222-1945 required the pulse of electricity in the output to be no more than 3.0 millicoulombs, at a peak of 500 milliamperes, at a duration of no more than 0.1 second and a period of no less than 0.75 seconds between pulses. dissemination was via test cases. E.g., A Study Carried Out By The NIRD Engineering Department, Test Report 560/4 For R. J. Fullwood And Bland Ltd., Fullwood Electric Fence Controller, Commercial Report, 2, MERL Catalogue Ref D NIRD ET1/93 – No 56C/4 : Fullwood Electric Fence Controller. Dissemination also took place through published reports, E.g., “New Standards”, “Appendix, New Zealand Standard Specifications Recommended During The Year For Declaration, Revision, Or Withdrawal”, New Zealand Standards Council (Department Of Industries And Commerce), *Annual Report For The Year 1948-49*, 15 Appendix To The Journals Of The House Of Representatives Of New Zealand ([Natlib.Govt.Nz](http://natlib.govt.nz)) (accessed 4th Jan 2023).

<sup>51</sup> Anon, “Electric Fences”, *Electrical Review* 6th July 1945, vol. CXXXVII, n° 3528, 38; Anon, “Wolseley Prototype Mains-Operated Electric Fence Controller”, MERL Catalogue Ref, D NIRD ET1/299 – N° 54D/3.

<sup>52</sup> Book Reviews, *Agriculture*, vol. 68, n° 3.

<sup>53</sup> E.g., Donald Vandeppeer, “The Story Of The F.A.O.”, *Agriculture*, vol. 62, n° 7, October 1955, 307-309; Clyde Higgs, “The Story Of The Agricultural Advisory Service”, *Agriculture*, vol. 62, n° 7, October 1955, 310-312; G. J. Ter Brugge, “Reallocation Of Farmland In The Netherlands”, *Agriculture*, vol. 62, n° 7, October 1955, 339-342; Clyde Higgs, *Continental Journey: An Account Of The State Of Agriculture In Germany And Denmark In The Autumn Of 1945. With Portrait And Illustrations* (Worcester: Littlebury and Co. Ltd., The Worcester Press, 1946), 7, 78, 83, 42, 44, 66.

<sup>54</sup> E.g., Anon., “Mains-Operated Electric Fence Controllers”, Book Reviews, *Agriculture*, vol. 63, n° 3, June 1956, 144.

<sup>55</sup> Anon, “The Repair And Maintenance Of Farm Buildings”, *Fixed Equipment On The Farm*, Leaflet n° 26, MAFF, (London: HMSO, 1965), 11.

electrical installations in the 1940s. In Gunn's *Farm Buildings* (1945) for example there is an advert for a wiring system that explicitly refers to "ammonia fumes" as one of several adverse conditions under which farm wiring systems had to function.<sup>56</sup> But, as can be seen in the Code of Recommendation for the Welfare of Livestock: Cattle (approved c. 1968), there were additional steps that needed to be taken about cattle inside farm buildings and around farmyards. The anticipated risks of animal actions, such as livestock reaching up and chewing cables, had to be mitigated by the farm manager ensuring installations were out of reach or covered, the animals thereby shaping installations, and influencing safety regulations.<sup>57</sup> The ongoing need to mandate the careful installation of electricity in the livestock industry for the benefit of both human handlers and animals can be seen in the epigraph.

- 18 Of course, it is important to recognise that the attention paid to the interaction between animals, humans and farm technology did not necessarily result in longevity for the cow. As Roche *et. al.* have suggested, in their industry-led study of the history of grazing, it sometimes resulted in the culling of specific individuals that failed to conform physiologically to the new electrically-powered management regimes linked to rising production demands, such as faster milking speeds. Those that were deemed to be "disruptive" behaviourally re a new "routine" could also be slaughtered, especially if that agency "increased the risk to [human] milker health and safety".<sup>58</sup> It is unclear how many animals may have been culled for this reason, as the use of slaughter to shape a herd, e.g., in terms of health, or breeding capability, was often recommended in our period, but the actual numbers not recorded. In 1950 W. K. Hunter advised farmers to "consign all unsuitable animals for

slaughter", for instance, and was consistent with his guidance on breeding, health, and disease control being designed to enable the farmer's "cows [to] live a normal life, which means a longer and more productive life".<sup>59</sup> This was a standard practice. A film about the rearing of bulls for Britain's artificial insemination (AI) programme noted that if a bull "failed" its rigorous scrutiny "he'll be slaughtered", and only one in four passed the whole "four-year testing period".<sup>60</sup> And, the normalisation of the "killability" of cattle in relation to disease control has been discussed by Lewis Holloway *et al.*. As they have argued, the practice both actively generated "populations of animals with certain characteristics," and closed other routes of development.<sup>61</sup> Culling curated on-farm norms around health and behaviour. But, from the practice of culling non-compliant animals we can also infer that some cattle could either not adapt physiologically to, or actively resisted electrically powered technologies, and this from the industry point of view took time and effort, and therefore human attention and resource, to address.

This matches the understanding in the period 19 itself that cattle had agency, and that influenced human decision-making. As R. R. Mercer phrased it, following a 1960s national study of cows' behaviour by the Agricultural Land Service (ALS), cows "sometimes do things simply because they feel like it and not because they are made to do them". Good stockmanship was, it therefore concluded, the ability to consider individual cows' behaviour, not just the herds' behaviour or hierarchical position.<sup>62</sup> Within the grazing sector new management practices were being developed that reshaped the layout of the farm to significantly reduce capital and human labour input,

<sup>56</sup> Gunn, *Farm Buildings*, 111-113, 136 (cf. note 5).

<sup>57</sup> Anon, *ADAS Cattle Handling*, 15 (cf. note 1).

<sup>58</sup> J.R. Roche, D.P. Berry, A.M. Bryant, C.R. Burke, S.T. Butler, P.G. Dillon, D.J. Donaghy, B. Horan, K.A. Macdonald, K.L. Macmillan, "A 100-Year Review: A Century of Change in Temperate Grazing Dairy Systems", *Journal Of Dairy Science*, vol. 100, n° 12, 2017, 10192.

<sup>59</sup> W. K. Hunter, "The Cow Is Also an Animal", *Farmers Weekly*, 6th Jan 1950, 41-43.

<sup>60</sup> Anon, "Bull Rearing Unit & Cattle Breeding Sub-Centre, Chippenham", (N.D.) MERL, D Watt, Ph6\_20, 8-9 Mins.

<sup>61</sup> Lewis Holloway, Niamh Mahon, Beth Clark, Amy Proctor, "Living With Cows, Sheep And Endemic Disease In The North Of England: Embodied Care, Biosocial Collectivities And Killability", *Environment And Planning E: Nature And Space*, vol. 6, n° 2, 2022, 14.

<sup>62</sup> R. R. Mercer, "Dairy Cows Are Individuals", *Agriculture*, Feb. 1967, 97.



Controlled grazing of Lucerne aids Beef production



**Figure 1:** Electric fencing made it easier to feed cattle flexibly for the short term by setting up multiple paddocks, temporary leys, seeded with lucerne, or a strip of land that had been seeded with kale (called “kale folding”). Plate VIII, *Electric Fencing Bulletin*, n° 47 MAFF (1966) © the Museum of English Rural Life

alongside investments in drainage, and grass.<sup>63</sup> But, as we can see with the ALS study, within this non-human animals’ indirect and direct interactions, behaviours and responses to new methods and their associated technologies, were being observed, written up and discussed by researchers who needed to recommend optimal, yet safe conditions for raised production.<sup>64</sup> This means that both non-human animals’ bodies and subjectivities were contributing to the formation of these systems, and that includes the energy decisions relating to them.

## ELECTRIC FENCES AND HANDLING CATTLE

Cow’s bodies co-produced the post second world war grazing landscape and its attendant technologies including electric fencing. In the UK,<sup>65</sup> as Roche *et al.* observe, the need to improve the quality of available feed within the cow’s reproductive cycle, to supplement or protect grass and manage its nutritive and calorific value, lead to the widespread adoption of electric fencing, alongside the seasonal effects of calving – the right grass had to be available at the right time, to suite the animals’ reproductive cycle.<sup>66</sup> Electric fencing made it easier to feed cattle flexibly for the short term by setting up multiple paddocks, temporary leys, or a strip of land that had been seeded with kale (called “kale folding”).<sup>67</sup> And by the mid-1960s, electric fencing had become sufficiently ubiquitous that an image of a cow trying to dodge it could be used in Britain quite wryly to catch the reader’s eye. Hence, in an article promoting well-managed, high-output grassland, entitled “The Extra Grass”, *Agriculture*, we catch a Jersey cow kneeling, stretching to the choicest blades. Her nose hidden, she is after the so-called “green gold” in the face of the wire running just above her shoulders.<sup>68</sup> It represents very well the way that electric fencing was depicted in Britain during our period, as an adaptable and important part of a suite of changes to post second world war grazing practice, that practice itself

<sup>65</sup> Solid fencing had come to firmly establish the legal boundaries and title of land in colonial North America, in part in the face of animals knocking it over, during the 1930s lightweight, flexible, electric fencing was initially developed in the USA. See William Cronon, *Changes In The Land: Indians, Colonists, And The Ecology Of New England* (New York, NY: Hill And Wang, 1983), 130–132, 134. For its use in New Zealand, see V. Jones, “50 Years Of Power Fencing”, *Proceedings Of The New Zealand Grassland Association* 49, (Hamilton, New Zealand, Gallagher Group, 1988), 145–149; Roche *et al.*, “A 100-Year Review”, 10191–10192, 10195–10196, 10199, 10221 (cf. note 58).

<sup>66</sup> Roche *et al.*, “A 100-Year Review”, 10221 (cf. note 58).

<sup>67</sup> A. S. Foot, J. F. Lovett, “Electric Fencing”, *Bulletin* n° 147, MAFF (London: HMSO, C. 1964); K. J. Richards, Director, *Profit From Experience* (ICI Film Unit, C. 1947), MERL D WATT PH6\_10.

<sup>68</sup> Anon., “Green Grass”, *Agriculture*, vol. 71, n° 4, April 1964, 149.

<sup>63</sup> Roche *et al.*, “A 100-Year Review”, (cf. note 58).

<sup>64</sup> E.g., Robert Davies, “‘Clock Hand’ Fencing Moves Flock Round The Grazing”, *Farmers Weekly*, 17th May, 1974.





**Figure 2:** Many images of electric fencing show cattle reaching under the wire to graze. “The Extra Grass” in “Green Grass”, *Agriculture*, vol. 71, n° 4, April 1964. © the Museum of English Rural Life.

characterised like this as advantageous from the cattle’s point of view, the fencing something that she would respect.

- 21 But, this was not a straightforward shift from one form of fencing to another. As the advisory literature implies, some persuasion was needed. In a letter to the local press, one farmer, J. C. Kidner, said he had increased his yield from 134 gallons per acre in 1951 to 338 gallons by 1955, for example, but “was not sure that electric fences for grazing were economic, and ... was inclined to try paddock fencing in future with less moving of the fences”.<sup>69</sup> Electric fencing wasn’t always the first thing that innovative farmers opted for to reduce labour costs. An advisory film, *Profit from Experience* (c. 1947) recognised this by including the conversational question “‘have you tried electric fencing?’ ‘No [the drawn-out hesitant response]. There might be something in it though’ before passing onto a textbook about grass. As the film is seeking to show that it ought to be cheaply installed alongside other grassland improvements, later the same man has added it to the upgrades he has been working on and is shown adapting scrap iron for wiring uprights. The narrator explains “the fence is moved each day, to give the ten cows a ration of about a

sixth of an acre”. The strip grazing has reportedly increased his use of grass by 40%, and got the cows out of store into the fields early. With the film focusing on the cattle grazing contentedly, the narrator asserts “the cows show their appreciation with an early flush of milk when the prices are still high”, before one cow suddenly steps back from the wire, shocked, and the film cuts to several cows chewing the cud alongside the fence.<sup>70</sup> Made by ICI, who didn’t manufacture electrical equipment, the viewer is nevertheless expected to adopt it as part of the system that enables ICI’s products to work, persuaded by what they have seen of the cow’s response, as well as the farmer’s experience.

This “paddock grazing system”, linked to the 22 season and cow’s physiological cycles, needed to be researched and promoted.<sup>71</sup> Wire and barbed wire fencing had already been used to alter the productive scope of the farm on large pastures, and electric fencing had been proven for sheep husbandry in Australia and New Zealand.<sup>72</sup> But electric fencing’s importance within the integrated system required a dedicated MAFF bulletin (Bulletin n° 147).<sup>73</sup> And, because new equipment such as the electric fence might contribute to productivity gains such as increased milk output, yet could also pose a risk to both human operators and animal subjects, organisations such as the NIRD tested the prototype designs being made by Wolsey and other companies.<sup>74</sup> As Abigail

<sup>70</sup> Richards, *Profit from Experience*, 3:01, 9:46, 12:00 (cf. note 67).

<sup>71</sup> E.g., A. D. Park, Principle of The Shropshire Farm Institute; A. D. Park “The Walford Smallholding”, *Agriculture*, vol. 75, n° 7, July 1968, 338–342.

<sup>72</sup> John Pickard, “Wire Fences in Colonial Australia: Technology Transfer and Adaptation, 1842–1900”, *Rural History*, vol. 21, n° 1, 2010, 27–58; Jones, “50 Years Of Power Fencing”, 145 (cf. note 65); for the ecological reading of fencing more generally, see A. McInturff, et al., “Fence Ecology: Frameworks for Understanding the Ecological Effects of Fences”, *Bioscience*, vol. 70, n° 11, 2020, 971–985.

<sup>73</sup> Bulletin n° 147 was revised periodically from 1950 throughout our period, according to the MERL catalogue: Electric Fencing 1950; 2nd ed. Feb. 1953; 3rd ed. June 1957; 4th ed. 1966 (Reprinted with minor corrections 1969), (3rd impression with amendments 1972); 5th ed. 1976.

<sup>74</sup> N° 52D/4: Wolseley Prototype Electric Fence Unit, National Institute for Research In Dairying, Technical Records, Records Of Experiments And Trials, Confidential

<sup>69</sup> J. C. Kidner, “Treat Grassland as A Crop”, *West Sussex Gazette & South of England Advertiser*, 30<sup>th</sup> Jan 1958, 5, Col. D.



Woods has observed, agricultural research findings were rarely disseminated, received or implemented straightforwardly.<sup>75</sup> But reports produced by NIRD show time was spent assessing different models' conformity with British Standards, especially of new prototypes, in the laboratory and the field. Undertaken by the engineering department, the bulk of each NIRD report focused on the technical aspects of the design, voltage and duration of the electrical pulse plus durability, robustness of the contacts etc. In this case, a 90-volt dry battery produced a 0.6 millicoulomb for a 500 Ohm load, with a peak output of 380 milliamperes for 0.8 millisecond with 1.6 seconds between pulses, and lasted about three to four months in field tests. But the utility of electric fencing being the integrated paddock grazing system, the period of field testing was a grazing season, and a key stated assumption was that "the cow is a satisfactory test animal". In other words, the responses of "milking cows"<sup>76</sup> (of unspecified breed) to the equipment were generalised across all cattle as an experimental model. The cows were thus a key part of the testing regime, and therefore key to generating knowledge about the effectiveness of the controllers.<sup>77</sup>

- 23 Once in use, a dialogue then also seemed to ensue between farmer and livestock through the medium of the fencing. Perhaps unsurprisingly if farmers were mocking up posts from scrap metal, as advocated in the ICE film, electric fencing was not always reliable beyond the bounds of NIRD. But, if fences fell slack, lost charge or a particular individual simply ignored the so-called "sting",<sup>78</sup> then grazing animals could push them

over, stretch them, and (like the cow seeking the best grass – a commonplace image) graze under them. In one article in *Agriculture* (1957) for instance it was suggested that a reason to adopt mains-powered electric fences was that "complaints that cows ignore the shock" from a battery-powered fenced "should be less frequent".<sup>79</sup> In other words, the effectiveness of any electric fence relied fundamentally on the animals' active compliance once shocked. It still relies on their continuing to learn about it and work with the knowledge down the generations. Advice today, provided by the Agriculture and Horticulture Development Board (ADHB), is that the level of (safe) shock from an electric fence "should be sufficient that the animal remembers it", and that animals should be able to "detect the electrical field around the wire before they make contact with the fence". Their predicting a shock based on prior experience means that the fence will work at lower voltages, and from their sensing the electrical field alone.<sup>80</sup>

In other words, according to sector-leading guidance, the usefulness of electric fencing depends at least in part on animals' familiarity with it and subsequent submission, i.e., on animal subjectivity and agency. This is not new guidance. To mitigate some of the risks, in the standard text on power farming, which outlined the technical specification of wires and heights for different stock,<sup>81</sup> writing in 1959, C. Culpin argued that the:

first point to observe about using fences effectively is that it is worthwhile to take care to introduce stock to the fence in a manner which

Reports (Typed Manuscript) On Dairy Equipment, 1952, MERL Catalogue Ref D NIRD ET1/297; N° 56D/1: Burgess Prototype Electric Fence Unit, MERL Reference Number D NIRD ET1/302, 1956.

<sup>75</sup> Abigail Woods, "Science, Disease and Dairy Production In Britain, c. 1927-80", *Agricultural History Review*, vol. 62, n° 2, 2014, 294-314.

<sup>76</sup> MERL Catalogue Ref D NIRD ET1/93 - N° 56C/4: Fullwood Electric Fence Controller, 2.

<sup>77</sup> Fullwood Electric Fence Controller. Electric fencing was also in use for other livestock, but NIRD were focused on cattle.

<sup>78</sup> Advert Wolseley Sheep Shearing Machine Company Ltd. Witton, Birmingham, *Farmer and Stockbreeder*, 2nd Jan 1945, 12.

<sup>79</sup> Clyde Higgs, "Milk at Lower Cost", *Agriculture*, vol. 62, n° 3, June 1955, 131-132.

<sup>80</sup> Anon, Agriculture And Horticulture Development Board, ADHB Knowledge Library, Electric Fencing For Livestock | AHDB (accessed 10th Jan 2023); ADHB recommend lower electric fence voltages where animals have been trained, E.g., "Calves Or Untrained Cattle Require 4,500-5,500V, You Can Use 3,500-4,500V For Trained Cattle". "Components Of an Electric Fence", ADHB, Components Of An Electric Fence | AHDB (accessed 10th Jan 2023).

<sup>81</sup> A. S. Foot, J. F. Lovett, "Electric Fencing", Bulletin n° 147, MAFF (London: HMSO, C. 1964); Advertised in *Agriculture*, vol. 71, n° 1, January 1964, 51; C. Culpin, *Farm Mechanization Management*, (London: Crosby Lockwood & Son, Ltd., 1959), 195-197.

enables them to be quite sure that it is touching the fence – however gently – that gives them the unpleasant shock. This must be done when the animals are quiet and unafraid. The worst possible method of introducing stock to the fence is to drive them on to it, since they will probably run straight through it and will still not understand what caused the pain. One method of training stock is to put them quietly into a small specially erected training fence and leave them to reach for tempting food placed just beyond the fence.<sup>82</sup>

- 25 In other words, it was already recognised by the late-1950s that the electric fence only worked if the cattle were trained and complied in its use. The technology relied on the cows' familiarity and consent, and therefore understanding, i.e., their subjectivity, which permitted them to establish that the "pain" they felt was due entirely to the fence. It is a striking additional detail in a textbook that focuses in the main on technical specifications, labour costs and comparative values of different mechanical appliances on farm, and continues with that focus in the rest of the chapter on "Mechanization of Livestock Handling". Culpin does not seem otherwise especially concerned with animal welfare. He states that the cattle will feel pain without compunction, and elsewhere in the section he obliquely refers to what is called the "electric dog" (an electrically power goad) being used to bring "any reluctant animas forward".<sup>83</sup> This passage therefore suggests that factoring in animal experience was absolutely essential to the successful operation of an electrically-powered (human) labour-saving tool. This is confirmed as an expectation across the sector's advisory publications, and the information provided directly by producers. Jewell for instance offers advice to farmers folding cattle on kale that "cattle will normally take one row from under the fence, and it should therefore be so placed so as to allow this to be easily eaten but to keep the next row out of reach".<sup>84</sup> In their own guidance, Wolseley,

the leading manufacturers of this equipment, set out like Culpin to explain how to train cattle to use the fence. "Remember", it states, "it is not the wire that holds them, but *their fear of the sting...* No animal should be turned out into the field until it has been trained". [my italics].<sup>85</sup> Animal subjectivity and agency enabled electric fencing to work and this was the focus of the advice provided to farmers through the period.

The MAFF cattle handling booklet reveals more 26 broadly the importance of human attentiveness and observation in relation to cattle behaviour, and the significance of this in designing appropriate and effective equipment and structures for their handling. If cattle subjectivity is ignored, the leaflet implies, this would result in a failure to manage the cattle at all. The advice is worth quoting at length:

An understanding of cattle behaviour leads to a design which will reduce stress on both animals and handlers. Behaviour is affected by breed, temperament and the way in which the animals have been reared – cattle raised on the open hill will be more lively than those accustomed to close confinement and human contact.

... Isolation (except when sick or giving birth) causes agitation and should be avoided. ...

Cattle ... are reluctant to enter darkened or shadowy areas and over-react to quite small things in their path, such as gullies or abrupt changes in floor material. ...

When cattle are rounded up a critical distance must be maintained between handler and cattle; this varies between breeds and according to rearing. If this "flight zone" or "circle of safety" is entered, the animals may break away and run.

.... There should be little need for sticks or electric goads. Goads cause less carcass bruising than sticks, but make cattle "jumpy" and apt to kick when approached from behind. Excessive noise and over-use of goads, sticks and dogs provoke alarm and unpredictable behaviour. Shouting, clashing of steel gates and the general

<sup>82</sup> *Ibid.*, 195–196.

<sup>83</sup> *Ibid.*, 197.

<sup>84</sup> Jewell, *Farming*, 258–59 (cf. note 5).

<sup>85</sup> Anon., *The Wolseley Electric Fencer*, (N.D.), Yorkshire Museum Of Farming, Murton Park Archival Source, L6067, Shelf 73, Acc. n° 2.693, 9.

commotion of barking dogs and bellowing cattle, is stressful to both operators and animals – leading to fatigue, mistakes and accidents. If quietly handled the cattle will settle and move calmly forward in the required direction.<sup>86</sup>

- 27 This commentary ends in a sharp contrast between what is an almost dystopian scene of clashing human and animals noise vs an ideal scene of quiet cooperation. The section addresses potential negative outcomes in terms of productive outputs (bruised carcasses would be less saleable/of lower value than unbruised), but there is also a clear sense that the handlers of cattle **must** adhere to cattle norms and be responsive to them for human safety, not simply commercial interests. They are also specifically tasked within this discussion to avoid the use of electric goads, which are represented as more troubling in the long run than sticks as they will result in the cattle becoming more “jumpy” and inclined to kick. Though farm buildings and equipment designed to handle cattle were in place to generate production gains,<sup>87</sup> cattle responses and subjectivity had to be addressed, and human behaviour changed (including reduced use of electric goads) for electricity to be effective in uses far beyond electric fencing. This is a relatively late publication in the range of this article, but its advice reflects the integration of ideas from the mid-1960s, and continuity with the ADHB’s current information in which electricity’s value in farming rests on livestock co-operation and learning.

## CONCLUSION

- 28 Livestock in the period after the second world war started to be hived off into specialist categories: animals for breeding, for rearing and for production; animals harnessed to production were increasingly divided between dairy and beef herds. In each case they were more and more the product of specialist breeding programmes

focused on increasing output or meeting other production needs. In this sense, they were treated as a technology on the farm. Bred to adhere to specific production requirements, to meet policy and market demands within particular legal frameworks, they (and the foods they produced) were also apparently subject to a rapidly changing environment of new and adapted technologies.<sup>88</sup> As part of this, a wide range of ideas about the value and use of electricity in British farming were tested and tried out across their bodies – by farmers, livestock handlers, policy makers, advisors – but none would risk the accidental loss of a valuable animal, and all had to hope that the cow had learned her lesson near the charged fence. Meanwhile, passively, the products and by-products of cows (milk, and ammonia) helped to determine the ways in which electricity could be installed safely within the fabric of the buildings designed to house and manage them.

Throughout our period there were legal duties 29 on the owner if their livestock crossed boundaries onto another’s land.<sup>89</sup> The fact of culling in livestock farming as an attempt to address what some farmers’ saw as poor temperament and resistance to increasing milking speeds as new electrically-powered technologies came in, conforms to this understanding of their position: it is another form of fencing. This supposed fact, that “modern livestock” seem to live “highly constrained lives”, has even led to a questioning of their role as paradigmatic for the definition and concept of domestication, as many species become domesticated without being quite so

<sup>86</sup> Anon, *ADAS Cattle Handling*, 2–3 (cf. note 1).

<sup>87</sup> J. F. Fisher, “Large Dairy Herds in New Zealand (2)”, *Agriculture*, vol. 75, n° 9, Sept 1968, 431–434; P. D. Friend And J. P. Harrison, “Farm Buildings Association 1971 Tour Of France”, *Agriculture*, vol. 79, 193–197.

<sup>88</sup> Dominic Berry, “Plants Are Technologies” in Jon Agar and Jacob Ward (eds.), *Histories of Technology, the Environment, and Modern Britain* (London: UCL, 2018), 161–185; at the time, livestock were also represented rhetorically as technological components of the modern farm as “Animal Machines”, by Ruth Harrison in her influential 1964 critique of nascent factory farming *Animal Machines*. Ruth Harrison, *Animal Machines: The New Factory Farming Industry* (London: Vincent Stuart, 1964).

<sup>89</sup> These laws were disseminated to farmers through the specialist press, e.g., Anon, “Rights and Wrongs Of Stock Trespass”, *Farmer And Stockbreeder*, 4th–5th Jan 1955, 57.

contained.<sup>90</sup> However, both observations suggest that for modern livestock there is no simple underlying constraint at work that is empty of their subjectivity, experience, and response. In the case of electric fencing, they were implicated fully in its development because livestock cross fences, and for electric fences to work livestock had to learn and conform.

- 30 If we look at livestock, we can see that the adoption of a novel energy and its practical, everyday use, regardless of progressivist promotion, therefore involves more than simple human decision-making, or human systems. Fudge argues her point using Early Modern English sources read through the lens of Temple Grandin's animal science research. The approach offers us the opportunity to reconsider, the "possibility of" non-human animals having a "truly constitutive role in making not only [their] own, but of a shared world". And, to explore new ways of "addressing and assessing the world" to better understand it, and the assumptions that we make about our own world.<sup>91</sup> That should include our energy decisions and the study of energy transitions. Applying that point to 20th C. agricultural sources tests its generalizability in terms of period, and subdiscipline. In the case of the equipment designed to cause an electric shock, then there was the need to consider both the impact of that physiologically, and animals' behavioural responses and actions following it. By the late 1960s, addressing livestock, not just human, interactions with electrical installations and equipment was built into research, legal and technological discourses. This has not

so far been addressed in the agricultural histories charting the roll out of mains electricity, but throws additional light on that history.

31 Aligned to the overarching theme of this collection, the history of the use of electricity in British livestock farming in the 1940s-1980s is best understood as multiple histories of successive adaptations to specific locales, social and economic scenarios where different meanings of electricity were articulated and adopted within different parts of the industry. By addressing this messiness through the case study of cattle management, and looking for the animal-human relationships within this, we can also see that the use of electricity in livestock farming was shaped not only by policy, legal requirements, expert advice or the economics of labour saving and efficiency – the watch words of the day – but additionally by the responses of subjective non-human animals. At the least discursively they may be read as subjects of study through which knowledge was generated, and human expertise formed; as components of the farm impacting materially through bodily products on its fabric and services they contributed to these multiple histories and the normalisation of electricity as an energy in the country. In Britain during the 1940s-80s energy decisions impacting on the managed spaces of the farm were caught up in the experiences of livestock. The energy decisions that moulded the specialities of agricultural practice in this period, and therefore the landscape of livestock farming were shaped by livestock's bodies, knowledges and subjectivities. In sum, cattle *enabled* electricity to be used on the livestock farm.

<sup>90</sup> Strother E. Roberts, "That's Not a Wolf: English Misconceptions And The Fate Of New England's Indigenous Dogs", *William And Mary Quarterly*, 3d Ser., vol. 79, n°3, 2022, 357-392, 361, 375-6.

<sup>91</sup> Fudge, "Milking Other Men's Beasts", 23, 27, 28 (cf. note 10).



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## Epilogue: Transnational comparisons of Shifting Electricity- Energy Narratives

**Abstract**

In contrast to Thomas Hughes' classic systems theory published as *Networks of Power* exactly 40 years ago, the collective import of this volume's assembled scholarship is to highlight the role of cultural contingency (vis-à-vis technological momentum) in the take-up of electricity. The acceptance, or rejection, of electricity was linked both to existing power structures and also to cultural needs for adapting to changing circumstances. Even across four countries (only one of which was addressed by Hughes in 1983) the success of electrical schemes was due more to the malleability of electrical ventures to adapt to shifting social needs than to the technocratic top-down schemes of entrepreneurs and electrical engineers.

- 1 The papers in this special volume on the theme of 'Shifting Narratives of Electricity and Energy in Periods of Transition' adeptly explore the cultural assimilation of electricity across four national-cultural contexts: India, Ireland, Spain, and the UK. In cutting across two centuries (19<sup>th</sup> C and 20<sup>th</sup> C) and between two continents (Europe and India) this collection extends beyond *Networks of Power* the late lamented Thomas Hughes' explicitly Western-focused comparative study of electrical power systems in several significant ways published forty years ago. His narrative argued for the leadership of the US as the exemplar for all nations to follow in the process that has rather awkwardly and teleologically been labelled "electrification". While we surely owe much to Hughes in moving electrical history beyond the narrow limits of nationally-limited economic- and or artefactual- histories, four decades after the publication of *Networks of Power* the multi-national historiography of electricity has manifestly moved on in quite extraordinary, subtle, and indeed powerful ways. What we can now do in the light of the scholarship of Chatterjee, O'Brien, Perez-Zapico, and Sayer is to ponder anew transnational and transhistorical comparisons of how and why electricity was ever taken up, eschewing the assumption that any of this was inevitable, let alone driven by the inexorable logic of growing technological systems.
  - 2 Among this volume's collection, for example, there is no suggestion that the US case was (even implicitly) relevant as a model or comparison points for developments in any of the nations or regions covered. Moreover, in contrast to Hughes' account, engineers and fellow technocrat-system builders were by no means fully in control of the processes of building electrical supply discussed by our four authors. The take-up or resistance to electricity as a motive power/cultural agency is seen instead through the operation of geographically localised or culturally-specific forces in selecting and shaping which domains were electrified and when, and why only certain electrical technologies come to be used, and only to at least some extent within the time periods chosen.
- Whatever technological systems – or indeed figurative anthropomorphisations – of electricity supply were to some extent successful, the historians writing here carefully construct their explanations by referring instead to assimilation to, and or co-evolution with their host cultures – not to a systems blueprint set by Thomas Edison or George Westinghouse (and their US employees). So to reiterate: the titular shifts and transitions highlighted in this collection's papers are not changes obviously geared to the growth or increased momentum of electrical supply systems: decisions were taken at a micro-level to accept or not accept specific electrical technologies. The era of grand system-centred narratives is surely now over if we are prepared to accept the implications of dropping the assumption of the inevitable success of "electrification".
- What then are the broader lessons of such post-Hughesian narrative? There are at several modalities of comparison – in chronological, cultural, and geopolitical forms – that can help us to draw out the implication of these four evocative papers, each of which show how in quite variegated ways electricity could facilitate social-infrastructure transformation but was not guaranteed to do so. First among these is the influence of religion, especially Roman Catholicism, on the take-up of electricity in Ireland and Spain – nations that came relatively late to the process of industrialisation, as documented by Perez-Zapico and O'Brien. In their papers we see that the rituals, precepts, and power relations embedded in traditional Catholic culture were not (uniformly) conservative. Instead, surprisingly to some, these theocracy of Catholicism could be positively enabling of electrical initiatives. In Spain, while engineers (including a coterie of anarchist practitioners) took on the challenge of building regional electricity networks after the post-imperial "disaster" of 1898, it was Catholic authorities that sanctioned the deployment of electrical technology to protect older forms of life. Tying the deployment of electricity to supporting craft activities in villages and the rejuvenation of traditional family life in the home turned it figuratively into

a counterforce to the corrupting secularising forces of industrial ascendancy that had been unleashed across so many Spanish cities by the early twentieth century.

- 4 Two generations later in rural 1950s-60s Ireland, O'Brien show how similar Catholic values prevailed in favour of electricity, but for very different reasons. In the cultural context of post-independent Eire, women's roles were circumscribed to motherhood and housework by the patriarchal authority of the priesthood; hence intense manual labour in home-making was the norm for the vast majority of Irish women, especially in rural areas. Nevertheless, the promotion and adoption of "labour-saving" electrical devices in the rural Irish home – especially for cleaning and laundry – made housework significantly less burdensome. So much so, O'Brien argues, that there was a marked and welcome decrease in the number of younger women emigrating to the UK or US for more congenial lives and careers beyond the domestic sphere. Far from being a force for enacting the alienating effects of soulless modernization, then, electricity installations in Ireland thus indirectly enabled cohesion and continuity in Irish country life even in times of great social upheaval. Catholic patriarchy thus not only survived but thrived with the adoption of electricity in Spain and Ireland.

- 5 To continue the study of the countryside between O'Brien and Sayer's accounts we can see how – again in contrast to Hughes – the non-metropolitan domains of traditional agricultural life were crucial forums for establishing the multifaceted legitimacy of electricity. After all, the modern nation-state has never been defined just by the boundaries of its biggest cities. Thus in order for the whole of Ireland and Britain to receive any benefit from electrical power grids, it was axiomatically necessary for farms and villages across the land to assent to the process of electrical cables being laid so that both domestic and agricultural consumption were facilitated. While in Hughes' account this would be a matter of the unstoppable "momentum" of electro-technological supply systems naturally and inevitably

extending beyond the civic domain, O'Brien and Sayer both point us to more subtle cultural phenomena. There were reasons for the success of rustic electricity pertaining in Ireland to solutions to the demographic problem of de-population (O'Brien), and in Britain to the needs for the cattle farm to recalibrate its efficiency and productivity by use of every usable artifice (Sayer). The message of Sayer's account is that we must not be as anthropocentric as Hughes in understanding where and when electricity was installed: cows mattered at least as much as humans in the transition to ubiquitous electricity.

- 6 And need it be said that completely absent from Hughes' US-centred study of electrical systems is the grim politics of colonial and post-colonial development. In Chatterjee's account we can see brutally laid bare the unhappy finding for electrical supply companies that even in some of the largest imperial metropolises, electricity did not by any means find a ready welcoming home. Chatterjee shows, for example, how one British-colonised Indian city of Calcutta/Kolkata did not embrace the opportunities of electricity with ready enthusiasm. The electrical gadgetry of air-conditioning could only be installed at the cost to the lives and livelihoods of Indian punkah-wallahs: their bodies and traditional labour had to be stigmatised to an extreme and often deadly degree to motivate any mass take-up of and installation of the automated "Electric Punkah". The brutal stories that Chatterjee relates not only illustrate the extreme violence that British colonial powers were prepared to use to effect some kind of some scale electrification, but also the resilience of an Asian culture that was already highly stable and successful without electricity. As a background to Chatterjee's account, we see how traditional forms of Indian life could be sustained quite effectively – and for politically/economically important reasons – by forms of traditional energy consumption that did not rely on an imposed infrastructure of electricity. In imperial India the cultural priority of indigenous populations was to maintain high levels of indigenous employment of punka-wallahs

rather than replacing that labour needlessly with the contrivances of electrified air-conditioning machinery. As we already seen however, in post-independence Ireland the opposite gender consideration was the case in accomplishing cultural continuity: in order to maintain anything like traditional forms of Irish rural life, the role of electricity was to *take away* some of the much-resented labour of constrained domestic female roles. Here we see a stark cultural contingency in the success of electrification schemes: electricity *only* became part of everyday life if it served the purposes not only of anonymous systems managers, but also of the majority ordinary hard-working people.

- 7 Overall, while the adoption of electrical techniques in each of the four countries was partly in line with existing power relationships, it nevertheless also clearly helped contribute to some shifts in those power relationships insofar electricity was available in more spaces to more people for more purposes. And thus, the tensions in the unsatisfactory term “electrification” are brought to the fore in this set of papers: if taken seriously at face value, that polysyllabic cliché implies both a process of increased adoption and usage of electricity without any necessity for human intervention, agency, or discretion, and indeed a process that seems an inevitable unfolding of technological necessity. We see from this volume’s papers, however, that the extent to which cultural and historical *happenstance* was involved entails that the assumptions embedded in a strong construal of “electrification” were not borne out in practice. We might instead seek to use the languages of “deployment of electricity” or “electrical reconfigurations” or “cultural engagements with electricity” to characterise the tentative, partial and (sometimes) reversible transitions involved. And perhaps by that kind of shift of terminology, we might better understand the shifting narratives of electricity and energy covered by our authors addressing multiple periods of transition in diverse cultural milieux. Therein lies something like a replacement narrative for the Hughesian culture-free deterministic growth of electrical supply systems.



Figure 1: *La Ilustración Artística*, Madrid (nº 139, 25 October 1884, 276).

- 8 Finally, to explore a less tangible transnational issue in electrical cultures, let us return to the Illustration of woman as electricity featured on the front cover of this issue. What is credited to *La Ilustración Artística*, Madrid (nº 139, 25 October 1884, 276) was actually drawn from a German source Ludwig Kandler’s *Das Elektrische Licht* (*The Electric Light*) published in the very same year. This feminised personification of electrification is both fascinating in itself, and yes also just one example of the multifarious cultural manifestations of anthropomorphised electricity. This image shows a female transcultural agency descending from the heavens, floating among the courses, enables both telephonic communication between cherubs and powering electric incandescent light above her head. This gesture of light held about the head is the classical iconography of truth (see Gooday, *Domesticating Electricity*) – as if somehow other forms of lighting (gas, candle, paraffin) lacked this classical epistemological credential of cultural integrity.



- 9 More importantly for our authors, this image of a feminized electrical agency is culturally quite specific: it captures in very traditional gendered ways a heavily gendered (perhaps Catholic?) image of a mother figure with bared breasts to show her capacity for maternal nurturing of all around her. Far from the secular masculine force of electrical engineering that preoccupied Thomas Hughes, we see here instead the figurative magical representation of electricity anthropomorphised as a benign feminine agency. It is in the fantastical imaginary of this female figure and her compliant cherubs that we find the allowance for contingent cultural variation and development in electricity to arise between national narratives with their diverse religions. Where was the flexibility to allow for cultural transition change to occur with electricity? Instead of relying on their narrative logic of inexorable system growth, technocratic promoters of electricity evidently found it more expedient to deploy the comforting image of a tamed transcendent force of electricity behaving benignly, as if a feminized hybrid goddess-servant-mother figure. The take-up of that most “modernizing” of energy technologies, electricity, thus looked back to ancient matriarchal icons of virtue, fertility and utility.

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**ENERGY SOURCES**

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## Documentary Sources on Hydrocarbon Exploitation in Franco’s Spain: The ENCASO Archives

### Abstract

The Empresa Nacional Calvo Sotelo de Combustibles Líquidos y Lubricantes (ENCASO) was a company created in 1942 within Spain’s National Institute of Industry (INI) by Minister Juan Antonio Suanzes, in an effort to control the country’s strategic energy sector. Established after the Spanish Civil War, it was created to produce hydrocarbons and energy-related products during the first phase of the Franco regime. Synthetic fuels and energy production became national political priorities during the postwar period due to Spain’s policies of economic and industrial autarchy. This paper focuses on the rediscovery of the ENCASO archives, which are conserved at the General Archive of the Administration (AGA), and have only recently begun to be examined. They have received very little attention from researchers, despite being central to studying the social, political, economic, and industrial production of hydrocarbons in Spain during the twentieth Century. The ENCASO archive has not yet been consulted mostly due to a lack of archival processing; until very recently, it was kept in the original office filing boxes, with generic descriptions of its content, and major conservation problems. It has now been appraised—its documentary series have been identified and assessed—and classified, thereby allowing for future access for the purpose of historical research.

### Plan of the article

- Origin of ENCASO
- Organisation of ENCASO
- The archival history of the documentary collection
- Appraisal and Identification of Documentary Series
  - Documentary series identified for possible conservation
  - Documentary series for possible destruction
- Sources for Research on the History of Hydrocarbons in Spain



## ORIGIN OF ENCASO

- 1 La Empresa Nacional Calvo Sotelo de Combustibles Líquidos y Lubricantes, s.a. (ENCASO) was created as a public limited company by notarial deed on 24 November 1942, in the context of the post-civil war period and the uncertainties of the Second World War<sup>1</sup>. The Franco government needed to revive the economy and rebuild the country after the armed conflict. However, it was isolated on the international scene, with this loss of confidence translating into an autarchic approach that lasted until 1959. ENCASO was created to cope with this challenge, in order to prospect for and exploit the mineral resources and hydrocarbons that the country could not import due to its international isolationism.
- 2 Energy production and the manufacture of synthetic fuels became national monopolies, and were controlled by another institution of the Franco regime, the Instituto Nacional de Industria (INI). The INI was created to provide institutional support for developing industrial activity in Spain; it operated between 1941 and 1980, and its functions were ultimately assumed by the Sociedad Española de Participaciones Industriales (SEPI) in 1995. The idea of making energy production an industrial priority and a national defence strategy—casting aside private initiative—arose during the civil war, and was carried out by the Minister Juan Antonio Suanzes, the director of the INI.
- 3 The company was launched through the National Plan for the Manufacture of Liquid Fuels and Lubricants and Related Industries,” which was approved on 26 May 1944. The initial infrastructure was created, and major contracts were awarded to build large complexes in Cartagena, Puertollano, Ebro, and As Pontes de García Rodríguez. A research centre was also created in Madrid to study shale oil distillation and fertilizer manufacturing. Facilities for manufacturing liquid fuels, lubricants, and nitrogen fertilizers from

resources extracted from national mines were put into operation in the 1950s. Self-sufficiency in raw materials drove growth in industrial production until the 1960s. The Cartagena branch split in 1958, creating its own group under the name of Refinería de Petróleos de Escombreras s.a. (REPESA), leaving distribution and sales to the company operating the concession, which at that time was the Compañía Arrendataria de Petroleos, s.a. (CAMPESA).

Up through the 1970s, ENCASO's structure was defined by three main production complexes specializing in mineral extraction and the manufacture of derived products, along with the Madrid Research Centre: 4

- The Ebro Complex (Zaragoza and Teruel) was built by Grupo Minero de Andorra, an important actor in lignite mining, and included a thermal power plant in Escatrón for coal-based energy production;



Figure 1: ENCASO. Ebro Industrial Complex.

- The As Pontes de García Rodríguez Complex (La Coruña) had an open-pit coal mine, now closed. Once extracted and gasified, the lignite was used to obtain ammonia and calcium ammonium nitrate to produce fertilizers and to produce energy in its thermal power plant;

<sup>1</sup> Paola Massa, *Los empresarios de Franco: política y economía en España, 1936-1957* (Barcelona : Crítica, 2003).



**Figure 2:** ENCASO. Coal from As Pontes de García Rodríguez.

- The Puertollano Industrial Complex (Ciudad Real) was built to exploit bituminous shale, from which nitrogen and hydrogen were obtained to manufacture ammonia and nitrogen fertilizers. This industrial centre was the main supplier of lubricants in Spain. It was reconverted in 1965 by order of the government, once autarchic policies came to an end. It expanded so widely that the area's shale mines were closed in order to focus on refining oil and its derivatives. Important engineering works were carried out, and a 264-kilometer pipeline was built from the complex to the port of Malaga to transport the oil. These engineering works made the Puertollano Complex one of the Spain's most important and modern industrial centres, a benchmark for its petrochemical industry. The Puertollano Petrochemical Complex specialized in the production of petrochemical products, gasoline, kerosene, and diesel, as well as the prestigious CS lubricants and to a lesser extent fertilizers. The group diversified into other related activities by integrating the subsidiaries Alcudia, Calatrava, Paular, Montoro, Oxyros, Plásticos Vanguardia, and Bioquímica Española, which specialized in manufacturing polyethylene, plastics, polypropylene, oxide, ethylene glycol, styrene, propylene oxide, and vinyl chloride. These subsidiaries and the refinery itself collaborated with large and prestigious national and international companies for the manufacture and distribution of their products;



**Figure 3:** ENCASO. Industrial Complex Puertollano.

- The Research Centre in Madrid was in charge of improving production processes and products, studying and solving the main problems that arose during the production and commercial processes.



**Figure 4:** ENCASO. Research Centre in Madrid.

The 1970s marked the end of ENCASO as an independent group. The final years of the Franco regime were characterised by the 1973 economic crisis and by a more liberal economy, with privatizations and the concentration of strategic industries, especially those related to energy. Two events marked the end of ENCASO as an independent group during this decade. The first was the merger of Empresa Nacional de Electricidad (ENDESA), also funded in the postwar years by the INI with Hidrogalicia; this created one of the most important electricity production groups in Spain, with the subsequent acquisition of numerous mining

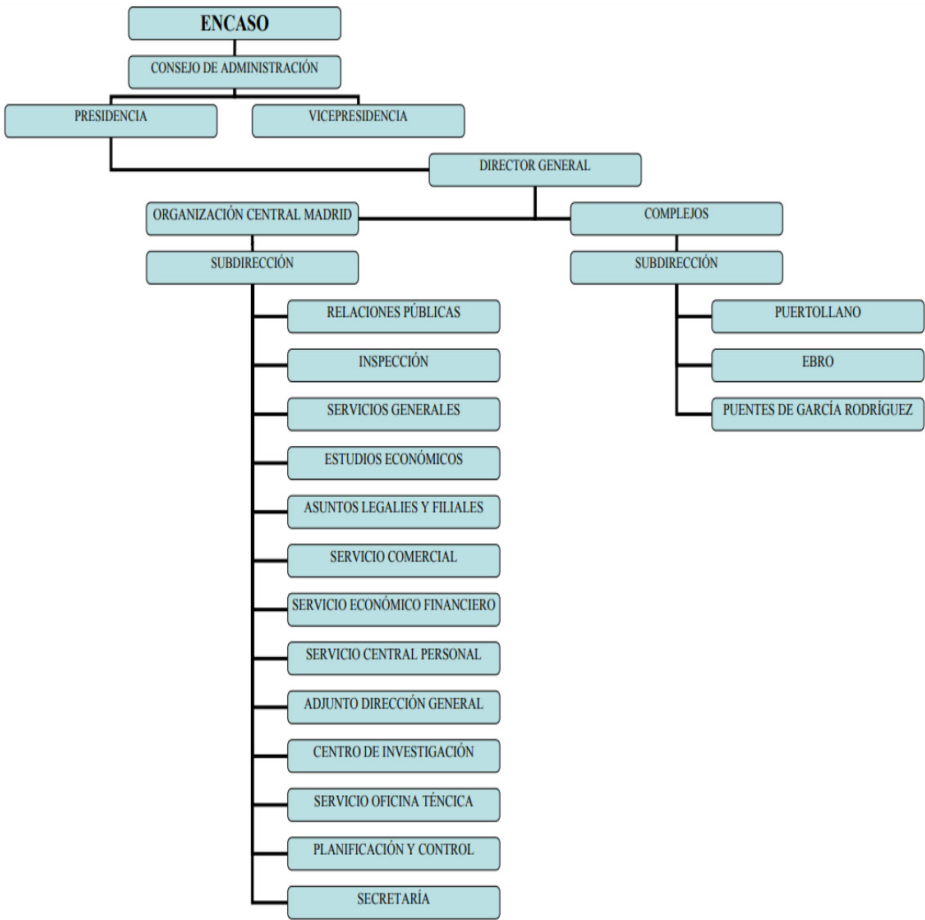


Figure 5: The ENCASO central organisation chart.

operations, and the creation of thermal power plants. This group acquired the Puertes Complexes by García Rodríguez and Ebro. The second was the merger on 28 November 1974 of ENCASO—specifically the Puertollano Petrochemical Complex—with Refinería de Petróleos de Escombreras SA (REPESA) and Empresa Nacional de Petróleos de Tarragona (ENTASA), creating the National Company of Petróleo group (ENPETRO). The entire petrochemical industry and related activities were thus merged into one large group, with the state owning 70% and the private sector 30%. This was the beginning of the liberalization process, which would continue with Spain’s accession to the European Union in 1986, as well as the creation of REPSOL in 1987 by the Spanish Hydrocarbons Institute. This later led to the complete privatization of the sector, and its division between the oil companies CAMPSA, CEPESA, REPSOL, and PETRONOR.

ORGANISATION OF ENCASO

The organisation of ENCASO mirrored the typical structure of any state company of the time. ENCASO’s document production was closely connected to its organisational structure. Article 15 of ENCASO’s by-laws indicated that its governance and administration would be entrusted to two bodies: the General Assembly and the Board of Directors. The General Assembly consisted of the shareholders, and was organized through ordinary and special meetings called by the Board of Directors. Ordinary meetings were held during the first six months of each fiscal year to review the company’s management, and to approve, where appropriate, the previous fiscal year’s accounts and balances. Special meetings could be called by the Board of Directors, or upon the request of partners representing at least one tenth of the capital. The General Assembly redistributed profits,



and was in control of appointing and removing directors. Other functions included decisions involving issuing bonds; increasing or decreasing capital; transforming, merging or dissolving the Company; and modifying its by-laws. The minutes, which detailed what occurred during the meetings and what resolutions were adopted, were signed by the President and the Secretary. Shareholders could request reports or information on the matters discussed during meetings, and some agreements were also recorded in the national Company Register.

- 7 The Board of Directors administered the company and represented it. It consisted of a minimum of 8 and a maximum of 16 directors, appointed by the General Assembly. The Board elected a President, Vice President, and Secretary, who may or may not be a director. The powers of the Board were, among others, to represent the Company in agreements and contracts; to appoint and remove the directors, managers, or administrators of the company's activities and facilities, as well as to determine their duties; to appoint staff and determine their duties; to organize, direct, and oversee the Company's progress and to propose internal regulations; to conduct an overview of the company's operations based on its by-laws; to agree to credit or loan operations; to establish budgets, authorize expenses, and appoint proxies and representatives of the Company; to present to the General Assembly the accounts, balance sheets, and explanatory reports of the Board's management; to schedule ordinary and special meetings; and to execute all agreements.

## THE ARCHIVAL HISTORY OF THE DOCUMENTARY COLLECTION

- 8 The General Archive of the Administration (AGA) is the records management institution of the Spanish state, created by decree in the 1970s. The original collections were those of the Franco government's administration, along with the collections of the Francoist institutions that were liquidated during the reorganisation that followed the arrival of democracy. As an intermediate archive, the AGA's functions included

identifying and appraising the documentary collections that entered its deposits. ENCASO was a company of Francoist origin that ceased to depend on the INI, passing into the hands of private capital in 1974. Funds from the Franco era were also sent to the AGA.

The ENCASO archive was delivered to the AGA in the 1980s by its successor company REPSOL. Although the state of conservation for the documentation is generally good, part of the archive was in a highly advanced state of deterioration. The documents were organised according to the company's internal records retention policy; they came in the original office boxes, each with a label containing a brief description of the contents. ENCASO had its own filing system and record retention policy, which regulated the life-cycle for the company's documents, as well as rules for appraisal and descriptions. According to these standards, ENCASO's documents had four main subdivisions:

- **Office Archive:** documents used very frequently by the job holder.
- **Workgroup Archive:** documents used by a group on a frequent basis, at least once a month.
- **Central Archive:** deposit site for documentation produced by the central offices, and subject to retention requirements; documents could be accessed frequently, but were not essential to have on site in the offices.
- **External archives:** documentation created and used outside of the central offices, and sent to headquarters when no longer used, in accordance with record retention requirements under law or internal guidelines.

ENCASO created a system of transfers from the offices to the Central Archive. A record was kept for any documents that were sent, including the following fields in an effort to keep track of the files sent to the Central Archive: subject number, subject, shipment date, service, employee, foreign shipment date, destruction date, and general observations. The Central Archive administrators who received the documents checked that the



description was duly completed, paying special attention to the destruction date or the shipment date to the external archive. The archive manager would then file the record by shipment date. The Central Archive also established a process for requesting records: an employee seeking to recover documents in the Central Archive had to fill in a request form with the following fields: subject number, subject, shipment date, service, observations, employee name, and request date. Once this was done, the archive administrator located the record, noted the name of the employee's service and the request date on the envelope, and then sent it to the requester, ensuring to always be aware of what records were outside the the Central Archive, and periodically requesting their return. When the documents were returned, request forms were also archived for future statistics.

- 11 There is no evidence of an historical archive in the company itself. The only intervention on the archive was carried out when the company moved headquarters, at which time it analysed the state of its documentation, and submitted a report to the AGA that has survived. In such situations, the documentation of institutions usually suffers irreparable losses; from what is indicated in the report, this was probably also the case for the ENCASO documentary collections. The report indicates that before the move, the company had never carried out an organised document destruction effort, which meant that there was a huge volume; individual offices were subsequently tasked with conducting the effort themselves. Despite the existence of reference guidelines, the hasty and unsupervised destruction presumably led to the loss of documentation that should have been preserved. Furthermore, many documents that have survived were slated for destruction under the guidelines issued as part of the company's move, showing the challenges of carrying out a proper document destruction process without specific archival expertise. The guidelines stated the following for each type of document:

- Correspondence relating to agreements or legal affairs should be kept for 2 years after completion of the relevant process.

- Studies, reports, and internal correspondence should be kept while relevant, and for an additional 5 years if of great importance.
- Other documents relating to projects, or plans connected to works, facilities, or products should be kept only while relevant.
- Publications and unofficial newspapers should be kept for 5 years, only for interesting articles.
- Statistics should be kept for 5 years after being used and summarized.
- Statistical summaries should be kept permanently.
- Price rates and circulars should be kept for 5 years once their validity has expired.
- Official periodicals should be kept for 2 years from the date of publication.

The rules of the Commercial Code (Real Decreto de 22 de agosto de 1885 por el que se publica el Código de Comercio) also applied: 12

- The company's official books: 15 years from the date of the last entry.
- Correspondence, business papers, sales documentation affecting legal transactions: 15 years.
- Minutes from Board of Directors meetings and company agreements: while the legal subject they represent continues to exist.
- Contracts and deeds: 15 years after taking effect.

Documents whose retention status was uncertain were sent to the service heads for each department in order to relieve the burden on the central office. 13

There was no subsequent archival treatment for the documentation in the Central Archive. The archive was stored at the AGA for almost thirty years with no intervention whatsoever, until in 2017 when I was appointed by the AGA to proceed with appraisal and to grant access. Because of its historical interest and deteriorating state, I undertook several archival efforts. The Identification and Appraisal Service of the Department of References performed three tasks: 14

- Identification of divisions and documentary series (According to ENCASO's organisational structure)
- Appraisal of each documentary series to determine what parts should be destroyed or preserved.
- Reorganisation of the documentation to separate those in a poor state of preservation from those in a good state of preservation.

APPRAISAL AND IDENTIFICATION OF DOCUMENTARY SERIES

15 As we saw in the previous section, the archive did not identify or evaluate the documentary series, but only proceeded with the destruction of records while they were still in the offices, based on the criteria established by the aforementioned guidelines. For this reason, the Identification and Appraisal Service of the Department of References at the AGA completed the study of the documentary collections, with a view to establishing adequate identification based on the information attached to the boxes. It also carried out an assessment on access to the collections, determining which documentary series should be permanently preserved and opened to the public, and which should be destroyed. The assessment was submitted to the Higher Qualifying Commission for Administrative Documents, and is currently awaiting a response. Over 2,600 boxes were analysed, with each document contained in the units being identified and classified according to the organisational chart (see fig.1) and functional structure of ENCASO. As the various documentary series were identified, the documents selected for permanent preservation were evaluated and separated from those slated for destruction; some documents were purged by nature, due to their poor state of conservation following degradation from fungi or dirt. The identification and assessment sheets were prepared according to the model of the Higher Qualifying Commission for Administrative Documents. The identification and appraisal process allowed us to generate a classification table for the various types of documents in the archive:

CUADRO DE CLASIFICACIÓN	
1.	Presidencia/Dirección General
2.	Consejero Delegado
3.	Servicio Consejo / Secretaría del Consejo de Administración
4.	Secretaría General Técnica
5.	Dirección Ingeniería
6.	Dirección Técnica
7.	Servicio de Asuntos Generales
8.	Servicio Comercial
	8.1. Servicio Publicidad y Propaganda
	8.2. Servicio Asistencia Técnica
9.	Servicio Compras
	9.1. Servicio Comercial Administración
10.	Servicio Económico-Financiero
	10.1 Secretaría
	10.2. Administración Comercial
	10.3. Control Presupuestario
	10.4. Tesorería
	10.5 Oficina de impuestos
11.	Facturación
12.	Servicio de Inspección
13.	Servicio de Oficina Técnica de Obras
	13.1. Servicio Electricidad
	13.2. Proyectos de Puertollano
	13.3. Control Puertollano
14.	Servicio de Planificación y Control Técnico
15.	Servicio de Procesos y Productos
16.	Relaciones Públicas
17.	Administración de Participaciones Sociales
18.	Departamento de Productos Marinos
19.	Estudios Mineros
20.	Proyectos y Construcción

Figure 6: ENCASO classification table.

A list of suggested items for conservation and destruction was also created. 16

Documentary series identified for possible conservation

- Presidency / General Directorate: correspondence (1974-1975); budget reports (1973-1974).
- Secretary of the Board of Directors: proposals presented to the Board and the Permanent Commission (1947-1974); projects presented to the Board and the Permanent Commission (1951-1974); Board Meeting agendas (1972-1973); Permanent Commission Meeting agendas (1972-1973); Directors' Committee Meeting agendas (1972-1973); agreements of the Board of Directors (1957-1971); Board and Permanent Commission Meeting minutes

- (1969-1974); Extraordinary General Assembly Meeting minutes (1953-1974); outgoing correspondence from the Board of Directors (1952-1973); correspondence exchanged with the INI (1968-1973); correspondence exchanged with various councillors (1968-1973); incoming correspondence (1967-1973); Board agreements relating to the As Pontes y Escatrón Complex (no date).
- Chief Executive Officer: reports and correspondence between various departments and for the Board (1963-1974).
  - Control Puertollano: studies (1967-1971), reports (1969-1973), payment proposals (1969-1973).
  - General Directorate of Engineering: supply contracts (1972-1975); correspondence (1972-1975); reports (1971-1974); reports (1970-1971); inventory of planning archive (1975-1977); summaries of activities (1971-1974).
  - Technical Direction: minutes (1972-1973); conferences (S.F.); employment contracts (1972-1973); supply contracts (1974); correspondence (1972-1973); information files (1959-1973); reports (1972-1973); economic reports (1970-1974); technical reports (1970-1980); reports (1972); economic offers (1973-1974); business agendas (1973-1974); proposal to the Board (1973); technical projects (1969); internal claims (1972-1973).
  - Administration of company shares: correspondence with various companies (Alcudia, Paular, Bioquímica Española, Calatrava, Electro, Termoeléctrica del Ebro, Elaboración de Plásticos Españoles, Plásticos Vanguardia, Montoro, Cydeplas, Macaya Lubricantes, Oxcros, as well as with the INI) (1953-1972).
  - Department of Marine Products: correspondence with various services (1969-1975).
  - Mining Studies: contracts (1950-1970); correspondence (1967-1971); mining reports (1962-1973).
  - Puertollano Project: photographs of the construction project (1972-1973).
  - Advertising and Propaganda: correspondence about participation in various events and championships (1967-1973); correspondence with representations and delegations (1969-1973).
  - Public Relations: correspondence of visits, inaugurations, anniversaries (1962-1972); photographs (1960-1970).
  - General Technical Secretariat: Board of Director meeting minutes (1942-1954); project control (1974); correspondence (1957-1960); reports (1943-1973); activity summary reports (1945-1972); national manufacturing plans (no date); proposals to the Permanent Commission (1945-1958); projects (1946-1972).
  - General Affairs Service: meeting minutes (1969-1970); economic agreements (1970); conferences (1944-1971); contracts (1952-1974); correspondence (1948-1973); deeds of purchase and sale (1942-1958); personnel files (1963-1970); reports (1959-1972); economic reports (1963-1970); technical reports (1941-1972); instruction manuals (1970); economic and social development plans (1965-1966); correspondence (1966-1972); requests (S.F.), economic-administrative decisions (1965); supplies of inventoried materials (1966-1967).
  - Technical Assistance Service: correspondence (1966-1973); travel accounts (1968-1972); reimbursements (1971-1972); reports (1971-1973).
  - Commercial Service: correspondence (1962-1973); memories (1966); reports (1965-1972); planes (1971); works projects (1961); activity summary reports (1969); expenditure records (1968).
  - Commercial-Administration Service: correspondence (1960-1974); budgets (1968-1972); insurance policy transactions (1959-1975); reports (1970-1972).
  - Budget Control Service: correspondence (1966-1972); technical-economic reports (1964-1970); technical plans (1971-1972); financing files (1968-1974); contract liquidations (1972).
  - Purchasing Service: expense records (1964-1973); activity reports (1971).
  - Economic-Financial Service/Treasury: correspondence (1965-1974).
  - Economic-Financial Service/Accounting: correspondence (1963-1973), technical-economic reports (1969); reports (1972-1973).

- Economic-Financial Service/Secretariat: meeting minutes (1970-1971); correspondence (1953-1973); financial contracts (1964); service contracts (1963-1965); reports (1957-1966); technical-economic reports (1963); record books (1969-1973).
  - Economic-Financial Service/Tax Office: correspondence (1962-1974); tax records (1953-1973).
  - Electricity Service: meeting minutes (1971-1974); inspection certificates (1953-1973); service contracts (1967-1973); technical-economic reports (1957-1975); technical-economic projects (1965-1971); thermal energy settlements (1963-1973); thermal compensation statements (1967-1970); electric tributes (1973-1974).
  - Inspection Service: Permanent Commission meeting minutes (1942-1963); travel accounts (1972-1973); daily cash and bank bulletin (1972-1973); inspection reports (1947-1973); balance sheets (1964-1970); studies (1972-1974).
  - Works Technical Office Service: meeting minutes (1969-1973); contracts (1969-1972); work contracts (1951-1973), service contracts (1956-1970); correspondence (1964-1975); information files (1962-1969); records of works (1958-1972); acquisition records of inventories (1971-1973); records of award proposals (1970-1971); supply files; meeting reports (1967-1971); economic reports (1967); technical reports (1959-1972); annual reports (1968-1969); economic offers (1968-1973); start-up parts (1970-1971); budgets for works and facilities (1970); reports of incidents of facilities (1970-1971); technical plans (1952-1972); construction projects (1967-1974); correspondence register (1967-1971); facilities repairs (1970-1971).
  - Planning and Technical Control Service: correspondence (1964-1970); reports (1965-1967).
  - Processes and Products Service: correspondence (1968-1971); reports (1963-1973); production statistics (1957-1964), manufacturing plans (1970-1971).
  - Billing: invoices (1972-1973); quality certificates for facilities and appliances (1965-1970); material shipment notifications (1968); production parts (1973); delivery notes for monopolized products (1972-1973); dispatch notices (1971-1973); credit notes (1972-1973); billing orders (1972-1973); packaging movements (1973); invoice summaries (1972-1973).
  - Technical Office/Projects and Construction: orders for the different facilities and projects (1965-1974), timesheets (1972), copies of isometric plans (1968-1971), spare parts (1968-1972), invoices (1967-1972), quality certificates (1968-1974), expenditure certifications (1971-1973), material shipment notifications (1968-1970), production parts (1972-1974), production summaries (1973-1974), accounting notification minutes (1973), expenditure distributions (1971), warehouse stock parts (1972-1974), credit notes (1973), billing orders (1970-1973).
  - Economic-Financial Service: invoices (1966-1974), timesheets (1972), production summaries (1973), delivery notes (1971-1974), shipment notices (1973-1974), credit notes (1973-1974), billing orders (1970-1975).
  - Commercial Service: orders for the different facilities and projects (1964-1974), invoices (1966-1975), production parts (1972), production summaries (1972), delivery notes for monopolized products (1972-1974), warehouse stock reports (1974), dispatch notices (1971-1974), credit notes (1974), billing orders (1974), container movements (1972-1974), transport settlements (1964-1970), insurance premium payments (1965-1975).
  - Engineering Directorate: spare parts (1973), production parts (1970-1975).
  - Advertising and Propaganda: invoices (1970-1974).
  - Budgetary Control: invoices (1968-1972), quality certifications of facilities and fixtures (1972).
  - General Affairs Service: magazine subscription and cancellation records and invoices (1948-1977), files with translation registrations (1956).
- Documentary series for possible destruction**
- Control of Puertollano: offers not selected for hiring (1969-1972).



- Planning and Technical Control Service: production parts (1970-1971), production summaries (1970-1972).
- General Secretariat/Production Department: production parts (1949-1960).
- Distribution: production parts (1973-1974).
- Processes and Products Service: production summaries (1968-1972).

### SOURCES FOR RESEARCH ON THE HISTORY OF HYDROCARBONS IN SPAIN

17 The ENCASO archives are of interest for researchers because they cover various subjects in Spanish contemporary history. The documents are of particular interest because they provide the researcher not only with primary sources generated by the institution in the exercise of its functions, but also with reports and projects summarizing the institution's overall activity over the years, with assessments of the company itself as well as the sector, the economy, and broader society. These reports were produced on a monthly or annual basis. Some of them were published as monographs, and they were also sent to the INI, so that a copy is now available at the library of the Sociedad Española de Participaciones Industriales, which is extremely important given that many of the reports given to the AGA had suffered irreparable damage.

18 The ENCASO archive also has a special place within the larger landscape of the historical heritage of Spanish energy complexes due to its photographic and audio-visual archives, and architectural heritage. The ENCASO archive itself holds a photographic collection capturing the construction phases and inauguration of the company's industrial complexes. Similar material can be found in the archives of the news agency EFE, which was active throughout the Franco regime; in the municipal archives where these facilities were located; and in private documental collections. With regard to audio-visual heritage, it is also important to mention the archives of the Noticiario y Documentales (No-Do), the state company that produced newsreels from 1943 to 1981, which reflected Francoist propaganda and

ascribed great importance to state infrastructure, including energy.<sup>2</sup>

As the industrial heritage of cities is often being repurposed today for a second life by ascribing new uses to facilities, documents relating to industrial architecture are of particular importance. In the case of ENCASO, the architectural historian Felipe Carmona Arriaga wrote a doctoral thesis on the architecture and urban planning generated by ENCASO's activities<sup>3</sup>. His research is based on documentation for construction work, meeting minutes, agreements, technical reports, and photographic and audio-visual documents, in an effort to reconstruct the evolution of industrial buildings over time. Arriaga consulted ENCASO's documentary collection prior to the AGA's conservation interventions, and his thesis is also interesting from an archival point of view, as he comments on his experience accessing ENCASO's documentation, highlighting its poor state of conservation.

Another interesting line of research for the history of ENCASO is the relationship between the company and its personnel, although the records of the central personnel service where personnel files would be found are unfortunately not available. It is nevertheless possible to find information on this subject inside other documentary series, making it possible to reconstruct the company's permanent and contract staff. This reveals, for example, the broad participation of specialized technical personnel from the United States in the construction of facilities, which is striking due to the isolation endured by Spain during the Franco regime. Another interesting discovery in the archives is the workplace practice, during the dictatorship years, of employment recommendations.

<sup>2</sup> One example is this file on the establishment of the Cartagena refinery can be consulted online: Archivo Histórico RTVE, *Raínería de Escombrera* (1950), available at <https://www.rtve.es/alacarta/videos/archivo-historico/refineria-escombreras/2932970/>.

<sup>3</sup> Felipe Arriaga Carmona, *Teoría y práctica del urbanismo y la arquitectura promovidos por las empresas públicas en la España de la autarquía* (PhD thesis, Universidad de Castilla La Mancha, 2017).

Evidence of this can be found in ENCASO correspondence, which includes numerous letters to leadership requesting access to a job, showing the extent to which this custom was ingrained in Spanish business culture. Finally, there is also news on personnel management, labour negotiations, retired personnel, and mutual insurance companies, among others, in the minutes and proposals submitted to the Board and the Commission, as well as in correspondence and reports. One example is personal loans for staff

to finance the purchase of a home. ENCASO itself built large complexes that included services for workers, as well as affordable housing for which workers could get a loan directly from the company.

All in all, the ENCASO archives provide an important overview of Spain's society and economy during these years. The archives are now available for consultation for researchers, while efforts to establish the collections continue. 21

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**REVIEWS**



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## Electrifying Mexico: Technology and the Transformation of a Modern City (Diana J. Montaña, 2021)

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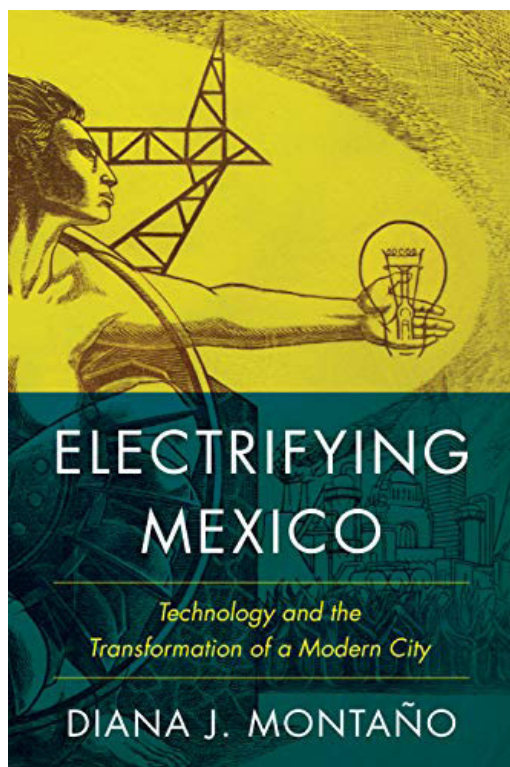
Diana J. Montaña, *Electrifying Mexico: Technology and the Transformation of a Modern City* (Austin: University of Texas Press, 2021)

**Abstract**

Diana J. Montaña's *Electrifying Mexico* is a cultural and social history of electrification in the Mexican capital between 1880 and 1960. She adopts a user-centered approach to place ordinary people at the center of the story of electrification, showing how technological diffusion was a contested and multi-directional process. Incorporating histories of technology, gender, race, class, law, and labor—as well as a creative and varied source base—Montaña reconstructs electrification from the bottom-up and offers several methodological contributions for energy historians to build on.

**Plan of the article**

- Becoming Electrifying Agents
- Social Conflict as Electrification
- The Cultural Life of Energetic Experience
- History of Energy / History of Technology



### BECOMING ELECTRIFYING AGENTS

- 1 Diana Montaña's *Electrifying Mexico* shows how a diverse tapestry of *capitalinos* (residents of Mexico City) shaped the electrification of their city between 1880, when electrification began in earnest, and 1960, when Mexican president Adolfo López Mateos nationalized Mexlight, bringing the nation's largest electric utility under state control after decades of foreign ownership that had drained the nation's wealth through the seemingly banal, though fiercely contested, rate payments of ordinary people—or, as she terms them, “electrifying agents.”<sup>1</sup>
- 2 Using a wide and creative range of sources, she gives this title of electrifying agent to people usually cast as consumers. In the Mexican context, this contribution is particularly important because it also demands energy historians and historians of technology revisit widespread assumptions about the character of the diffusion of energy technologies from Europe and the United States to the rest of the world.

<sup>1</sup> Diana J. Montaña, *Electrifying Mexico: Technology and the Transformation of a Modern City* (Austin: University of Texas Press, 2021), 256–257.

Technological diffusion is not a one-way process in *Electrifying Mexico*. Instead, Montaña takes seriously the way that the demands, aspirations, fears, and expectations of *capitalinos* were part of a transnational conversation about the development of electrical technology for cities around the Atlantic—Mexico City alongside Paris, London, New York, Naples, and New Orleans.

If she takes as her task emphasizing the agency of ordinary Mexicans in the making of electrical modernity, this move should also prompt scholars who work on the United States, Canada, and Europe to revisit their understanding of electrification in the countries who often exported electrical technology and capital investment. How did participation in or support for electrification elsewhere shape the electrical modernities of the countries we normally think of technology diffusing outward from? The methods Montaña deploys to understand Mexican electrification gives us new places to look, and new ways to ask the question. 3

The book proceeds in six chapters spread across three parts. Part one shows how electricity, and particularly electric illumination, arrived in Mexico City. The gradual adoption of electricity, especially electric lighting, was not merely inserting outside technology into a new context. Although an electric light demonstration had taken place in Mexico City in 1850, political crisis meant that the technology only arrived in earnest after 1880, as the consolidation of liberal political power fractured the hold of the Catholic Church over the city. As electricity arrived, the built environment of Mexico City was rapidly transforming: the city's center underwent a dual process of secularization and liberal rationalization, while at the city's edges private enclosures of farmland extended the urban zone. Waves of new arrivals contributed to a rapid growth in the city's population that shattered old ways of living in the city. It was a contingent landscape open to the kind of experimentation that learning to live with electricity required. Electricity was a part of making the city modern in the liberal vision, and equally, the changing city and its residents shaped what electrical modernity would mean. 4

5 The adoption of electric lighting was neither easy nor assured, nor were *capitalinos* passive receptacles for the technology. They complained when too-bright electric lights made it physically painful to move through the uneven darknesses of the nighttime urban landscape. The early brush arc lights called into question long-accepted hygiene practices and changed perceptions of luxury. Electrification was an unequal affair, as Montaña's reconstruction of the birds-eye view of urban illumination as it changes over time makes clear. Illumination, in this telling, is not simply reduced to a map of wealth and poverty. Adding important texture and depth to a growing body of scholarship which examines urban lightscapes, she shows how the real people who navigated the urban nightscape could also move between these zones of illumination, not a binary of darkness and electric light, but an array of turpentine and oil lamps, places where energy forms mixed.<sup>2</sup> Nonetheless, as electrification entered its second decade, illumination—and lack of it—had strong class connotations. Class anxieties about the meanings of darkness mixed with lived class experiences that crossed through the different zones of illumination. If this sounds haphazard, it was. By the turn of the 20<sup>th</sup> C. municipalities were forced to mediate the “material realities” of electrification with rapidly changing social and cultural expectations.<sup>3</sup> Conflict, contestation, and mediation were not responses to electrification, they were electrification. That was true even as spectacles of light gave *capitalinos* a shared belief in electric illumination as evidence of modernity and progress.

### SOCIAL CONFLICT AS ELECTRIFICATION

6 This insight, that electrification was produced not by technological prowess later interrupted

<sup>2</sup> See, for example, this journal's special issue on lights and darknesses, especially Stéphanie Le Gallic and Sara B. Pritchard, “Light(s) and Darkness(es): Looking Back, Looking Forward”, *Journal of Energy History/Revue d'Histoire de l'Énergie* [Online], n°2, 2019, URL: [energyhistory.eu/en/node/137](http://energyhistory.eu/en/node/137), and Ute Hasenöhl, “Contested Nightscapes: Illuminating Colonial Bombay”, *Journal of Energy History/Revue d'Histoire de l'Énergie* [Online], n°2, 2019, consulted 22 December 2021, URL: [energyhistory.eu/en/node/130](http://energyhistory.eu/en/node/130).

<sup>3</sup> Diana J. Montaña, *Electrifying Mexico*, 55 (cf. note 1).

and redirected, but rather that electrification was only created through social conflict, sets the stage for the second part of the book. Montaña's claim that *capitalinos* were not simply consumers, but “electrifying agents”, demands a deep dive into everyday energy practices and their larger meaning. By looking at the conflicts that arose in Mexico City over the electrification of street cars (*eléctricos*) and power theft, Montaña compellingly deploys a creative range of archival sources toward a powerful reconstruction of how ordinary people created the “electricscape” of early 20<sup>th</sup> C. Mexico City. Montaña's concept of “electrifying agents” gives conceptual heft to her focus on everyday life. Creating an electrical system capable of powering a large, complex, unequal, and segregated city was a messy affair. *Capitalinos*, acting simultaneously as individuals embroiled in their own affairs and as structural agents in a rapidly changing city, created electrical modernity by riding *eléctricos* to work (as well as getting injured by them) and by using electric light (and stealing it).

7 For *capitalinos*, *eléctricos* in a decade went from a novelty to a way of life. In the process, they came to stand for both the promise and peril of electrical modernization of the urban landscape. The perils were many, but powerfully shaped by the position one filled in the city's “electricscape”. Pedestrians caught under wheels, street vendors who lost selling spots and had their carts damaged, drivers and accident victims scapegoated for larger systemic issues in the rapid transformation of the city's transportation system.

8 The pervasiveness and persistence of the accidents worried elites deeply committed to the project of electrical modernization: “what if this progress [through electrification] was not real, substantial, or sustainable?”<sup>4</sup> The *eléctricos* required people to learn new ways of living and moving in the city, not just avoiding street cars, but learning to navigate the structures of raced, classed, and gendered urbanity that they represented. But even as the electrified transit

<sup>4</sup> *Ibid.*, 153.

system disciplined *capitalinos*—especially poor, indigenous, and working class *capitalinos*—the city’s residents shaped the technology and its use with their expectations of a right to rapid transport, of certain behavior by drivers, of particular social relationships between the different groups of people who together made the “electricscape” and thus made it real. Sometimes, electrical agency in the face of such peril could be gut-turning, such as when people incorporated the violence of the *eléctricos* into their personal disputes or turned it toward the concealment of secrets, hoping the “wheels of modernity” would obscure evidence and carry away problems.

9 The creation of the electrified streetcar system happened on the public roads, and there were limits to the way everyday life could shape the movement of the *eléctricos* once they were on the tracks. Electric power for homes, factories, and businesses, however, was another story. The extension of electrification throughout the capital was, Montaña shows, often informal. As electric companies like Mexlight extended powerlines, *capitalinos* substantially made the electric grid their own by “stealing” power. These were the *ladrones de luz*, captured in an array of court records, ranging from large factories and hotels to small shops, to private homes.

10 The extensive use of illicit connections to power in a large and rapidly growing city is perhaps not surprising—it’s a fact of life in any electrified landscape. In Chicago, high electric bills once alerted me to a device stealing electricity from my apartment’s connection. A friend recounted how informal connections were responsible for most provision of electricity in her family’s village in northern Pakistan, and in the absence of market transactions to govern its provision, social obligation governed instead. Mahmoud al Massad’s 2016 film *Blessed Benefit* opens against the Amman skyline with a man helping a friend illegally connect his home to electric power. “Please don’t tell anyone about this”, he implores. His friend replies, “The whole neighborhood already knows...half the neighbors did

it!”<sup>5</sup> However, Montaña’s telling imbues this common practice with much larger historical significance, as a primary way in which the social norms and legal practices would be determined: Who had the right to make inspections to the use of electric power? What counted as evidence? Was stealing electricity always a crime? Could electricity even be stolen? The social norms governing electricity, and its theft, were unsettled and subjected to fierce contestation on a legal landscape that didn’t really have the tools to deal with the problem.

Seeing energy as historical invites us to a pluralistic understanding of what energy is, conditioned by its situational and epistemic context. Montaña makes very effective use of court cases to demonstrate this point. Electricity had to be created as a legal object well after it had been understood scientifically, distributed technologically, and incorporated into culture and everyday life. Prosecuting the *ladrones de luz* for electricity theft immediately presented problems for the Mexican courts. The plaintiffs claimed their electricity had been stolen. Mexican law defined theft as “the appropriation of *una cosa mueble* [a movable thing] without the right or consent of the owner.”<sup>6</sup> But in the case of electricity, that was not exactly what happened. In the early years of the 20<sup>th</sup> C., Mexican judges and lawyers had to work out what it meant to steal electricity by fighting over it, case by case.

### THE CULTURAL LIFE OF ENERGETIC EXPERIENCE

The final section of the book looks at the cultural life of electricity in post-revolutionary Mexico, when the idea of rights to electric power and appliances took on a much broader political meaning amid social upheaval in Mexico City, as “young girls who had once filled the ranks of respectable maids now found their financial freedom as either *ranchero* (ballad) singers or go-go dancers.”<sup>7</sup> Montaña reads cookbooks, home advice manuals,

<sup>5</sup> Mahmoud al Massad (Director), *Blessed Benefit* [Film] (Amman, Jordan: jo image, 2016).

<sup>6</sup> Diana J. Montaña, *Electrifying Mexico*, 172 (cf. note 1).

<sup>7</sup> Ibid. (paraphrasing Salvador Novo’s *Cocina mexicana*), 193.



and advertisements against the grain in order to show how race, class, and gender powerfully shaped the meaning of electric appliances, and—simultaneously—those appliances reshaped what *capitalino*'s identities meant. Advertisers rejected indigenous women, more likely to work as maids, in favor of slender, light-skinned, middle-class women who could embody the modern idea of domesticity. In the process, they actively removed indigenous women from domestic scenes where we know they were present.

- 13 The discourse on electric appliances also revealed anxieties around the transformation of social order. To be sure, there is a limit to what can be gleaned from these materials, which Montaña acknowledges. Cookbooks and advertising both created and responded to the social and cultural world around them, and that world inevitably was messier than the one they portrayed. Sources to capture the lived experiences of domestic workers from nearly a century past presents massive challenges, and “Zeroing in on lived experiences—who used what within domestic spaces—is a difficult undertaking”. Her meditation on the methodological challenges presented by a user-centered approach is critical for energy historians to consider as we further develop our understanding of energy at the level of everyday life, particularly its gendered aspects. Montaña makes productive use of the “quandary” her sources have created and has set an important task for energy historians who will build on her work.<sup>8</sup>

- 14 Finally, Montaña puts the *Sindicato Mexicano de Electricistas* (Mexican Electricians Union), or SME, at the center of the story of the 1960 nationalization, arguing that their influence on the process

has been underappreciated. Casting themselves as “soldiers of light”, who fought not only in defense of their own labor rights but in “patriotic defense of the nation’s natural resources” the SME embraced the legacy of the Mexican revolution.<sup>9</sup> The SME’s publication, *Lux*, often portrayed electrical workers as masculinized producers, in contrast to the feminized sphere of energy consumption through appliances. This masculinized, patriotic, revolutionary depiction in *Lux* helped to raise the stakes of their labor struggles not just in Mexico City, but on the national stage. They turned disputes over wages and rates into a broad demand for Mexicans to control their own electric power—a claim which the electric workers felt they had a right to make, since they were the ones who had built the country’s electrical system in the first place. Ultimately, when President López Mateos nationalized the sector in 1960, he did so using language that could have been taken from *Lux*—even if the SME’s contributions were overlooked.

That overlooking of the SME’s contributions, 15 which Montaña both corrects and explains, is not only a convenient ending point, but also a metaphor for the book’s larger argument: that our histories of electrification have underestimated the importance of everyday “electrifying agents”, their anxieties about what modernity would mean for them, and their aspirations for the modernity they saw themselves as making.

## HISTORY OF ENERGY / HISTORY OF TECHNOLOGY

Montaña’s title is a conscious mirror to David 16 E. Nye’s *Electrifying America: Social Meanings of a New Technology* (1991), and it similarly mirrors its structure, down to the problems which drive each chapter. The result, far from feeling like a replica study, allows Montaña to fine tune many of Nye’s formulations while raising new questions and points of departure for the field. In that spirit, I would like to end with a question focused on a productive tension evident in the book between energy history and history of technology.

<sup>8</sup> Ibid., 232; on energy and gender, see Abigail Harrison Moore and Ruth W. Sandwell, *In a New Light: Histories of Women and Energy* (Montreal: McGill-Queen’s University Press, 2021) and this journal’s special issue n°6, “Home and Hearth: Gender and Energies within the Domestic Space”. Sean Adam’s essay in this issue also grapples with the user-centered approach as a way into some of these issues. Sean Adams, “Making Coal Sharp: Gendered Consumers and Users of Mineral Fuel in the 19th Century United States”, *Journal of Energy History/Revue d’Histoire de l’Énergie* [Online], n°6, 2021, URL: [energyhistory.eu/en/node/263](http://energyhistory.eu/en/node/263).

<sup>9</sup> Montaña, 252.

- 17 History of technology functions as Montaña's entry point to energy history. Her work is deeply engaged with the field from which she draws the user-centered approach as well as a critical attentiveness to how electricity works. Nonetheless, this is a tension that energy historians must continue to grapple with as our field expands. When is electricity a "technology" and when is it "energy"? When and how do those meanings overlap? To what effect? Under what circumstances does this difference matter for historical analysis? The form of this tension, it should be said, is not unique to the intersection between technology and energy. It appears at other disciplinary intersections particularly at the interstices of energy and environment, energy and labor, and energy and infrastructure. It is evidence of energy history's growing set of conceptual tools, rooted in a variety of disciplinary backgrounds, and yet, increasingly distinct from them.
- 18 In *Electrifying Mexico*, this tension results a point of categorical slippage. In particular, electricity as it appears in the first three chapters, which dealt with the introduction and exhibition of electric illumination and the way that the *eléctricos* transformed urban life, electricity as energy appears nearly inseparable from technological processes and artifacts. That's true even in the case of the *eléctricos*, where other modes of powering movement are available because of how substantially they transform urban space and time. In the rest of the book, electricity appears as energy—which may have technological aspects but is capable of being distinguished from them. The book thus carries a tension which in some places, like in her examination of electricity theft, is analytically very productive. The liminal status of electricity before the law is captured beautifully by its dual status as energy and technology. That very liminality also merits further historical explanation, to understand how ordinary people understand energy in the world around them, how that understanding changes over time, and how the ways of living with and knowing energy we know better (scientific, geopolitical) were shaped by everyday life. For this task, *Electrifying Mexico* is an exceptional point of departure.

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