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Chapter Nine

Gender and Agency in the Anthropocene: Energy, Women and the Home in Twentieth-Century Britain

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Introduction

> "As a very new demonstrator in a very new Board, I felt strange and uncertain, because I had first to convince myself that the new ways were going to be better than the ones I … had grown up with. Having done this, I had to pass on my conviction to other people. At times, it was not so easy, because tradition dies hard."[1]

This was Edna Petrie in 1963, looking back on her early days as an electricity demonstrator for the North of Scotland Hydro-Electric Board. Founded in 1943, the Hydro Board had a mission to provide electricity for all in the Scottish Highlands and break the dominance of coal- and peat-fired cooking, heating and washing. Their efforts saw a rise from just under 2,000 farms and crofts electrified in 1948 to over 33,000 by 1963: around 85% of such properties in the region.[2] By that point, over half of the Board's customers were using electric cookers, a higher market share than in any other region in Britain.[3] Edna Petrie was one of hundreds of demonstrators and Home Advisors employed by electricity and gas boards in mid twentieth-century Britain. In addition, there were thousands of women active in voluntary organisations sponsored by energy suppliers (at first private, then nationalised bodies from 1948): the Electrical Association for Women (established 1924), Women's Gas Federation (1935) and the Women's Advisory Council for Solid Fuel (1943).[4] These women in Britain, and their counterparts in other industrialised countries, were indispensable to new and expanding demand for electricity and gas in twentieth-century homes. This chapter asks about the role of such women in the light of what we now know about fossil fuels. Though electricity and gas were promoted as clean alternatives to domestic coal fires in post-war Britain, their use alongside oil is now recognised to be at the heart of the global climate crisis. The residential sector, alone, was estimated to contribute 14% of all UK greenhouse gas emissions in 2016.[5]

Now seems a good moment to highlight once more women's agency in the transition to energy-intensive domestic technologies of the past century. The 'Anthropocene' – the image of anthropogenic transformation and environmental damage on a 'geological' scale – has attracted criticism since its formulation in 2000 for its vision of species-level agency. A critical body of social science and humanities literature has pointed instead to the distinct forms of agency rooted in capitalist power structures, to the large corporations and main beneficiaries of environmental exploitation, and its vast inequalities.[6] This is a necessary corrective to narratives of undifferentiated human agents. But what is striking is how absent women are in these accounts. From Andreas Malm and Alf Hornborg's critique of the concept of the Anthropocene as obscuring the real historic culprits – a 'clique of white

British men' at the dawn of industrialization – to Jason Moore's 'capitalocene' or Raewyn Connell's recent discussion of institutionalized 'power-oriented masculinity' in the 'sociocene', women's role in the unfolding catastrophe caused by our rising reliance on energy-hungry technologies and polluting systems is largely invisible.[7] Beside Moore's important parallel between women's unpaid work in the home and the role of value-less nature in capitalist exploitation, we also need to trace the ways in which women's expanded agency in many industrialized countries has entailed their increased culpability.[8] This chapter argues that women should be included more fully in this 'man-made' crisis.

Producer-led visions don't engage directly with existing work on women's complex engagements with domestic technologies over the past 200 years.[9] Agency in domestic energy transitions was distributed across a wide, varied network of actors – from energy suppliers to housing reformers, appliance manufacturers, different household members, and the logics built into technologies.[10] For electricity to take root in every home in the industrialised world required the active engagement of millions of users: people resisted new energy intensive technologies or used them on their own inconvenient terms; they also adopted and promoted them. We need to look at the drivers of cars as well as their manufacturers; at the consumers of electricity as well as the energy barons. The purpose of this chapter is not to measure women's culpability but to trace some historical forms of their agency in the diffusion of fossil fuel technologies, and to acknowledge their fully human role in the environmental damage resulting from this.

Specific cases reveal more than generalized statements, and the next section explores questions of agency and constraint in the context of early and mid twentieth-century rural Scotland. This chapter argues that the energy industry had specific impacts on women in Britain from the 1920s to the 1970s. Changes in household technologies transformed the daily lives of women, men and children, though not in all the ways hoped for by energy-industry professionals. Political debates, popular discourse and marketing relating to new energy forms and appliances sought to constitute women ideologically as a distinct category – the domestic energy consumer in the home – ignoring the complexities of energy use by women and men within and beyond the walls of the home. At the same time, women's involvement in the industry as professional demonstrators and voluntary promoters was both a function of their limited employment opportunities and opened up new avenues for them.

Women in Scotland in the Electrical Age

Edna Petrie's short 1963 account of her career in the Scottish Highlands and Islands written for *The Electrical Age* (published by the Electrical Association for Women) offers a window onto women's highly active but often ambiguous roles in the diffusion of energy-intensive domestic technologies, and the constraints and opportunities those roles reflected and created. The area where Miss Petrie spent her life and career was no ordinary regional electricity board. As a largely rural area with extreme difficulties of terrain and distinctive ways of life, the North of Scotland demonstrates the challenges faced by electricity suppliers trying to expand rural networks at their most acute. The long-term legacy of the Highland clearances and a strong policy concern to stem rural depopulation lent urgency to the mission of the pioneering North of Scotland Hydro-Electric Board (established in 1943), which helped to pave the way for electricity nationalization in Britain. With its unique 'social clause', requiring it to 'have regard to the social and economic betterment of sparsely populated areas',[11] the board prioritised affordable power for domestic consumers, and sought to encourage small rural industries. Its founding director, Tom Johnston, credited his international models as the Hydro-Electric Power Commission of Ontario (1906) and Tennessee Valley Authority (1933).[12] But not everyone shared this vision of Highland Scotland, with its damming of rivers and flooding of valleys. Major landowners, amenity

bodies such as the National Trust, salmon fisheries, tourism interests and local authorities had to be navigated and consulted.[13]

With 137 inhabited islands and miles of sparsely populated mountains on the mainland, a report in 1942 had concluded that most of the region would remain without electricity.[14] But the Hydro Board proved inventive, working with a complex mix of fuels and modes of generation. By the early 1950s, almost 13,000 premises were served by diesel generators, with groups of islands linked by submarine cable. At this point there were as many diesel stations as hydro-electric stations. A decade later, several islands were still without electricity, with up to 2,000 households being supplied with bottled gas by the electricity board. There were also steam power generators at Aberdeen and Dundee (supplied from Scottish coalfields), an experimental station at Altnabreac in the far north east – where peat was used to fuel a 500 Kw gas turbine – and a 100 Kw windmill at Costa Head contributing to supply on Orkney's Mainland. The Highland Grid was eventually supplemented by atomic energy from Dounreay built by the UK Atomic Energy Authority in the late 1950s, though this was also a major user of electricity. The separate North of Scotland and southern Scotland electricity boards exchanged electricity in response to fluctuating supply and demand across seasonal and daily cycles. In addition, Highlanders continued to fuel their own premises with wood and peat, and by 1952 they were still using 925,000 tons of coal a year in fireplaces and stoves, alongside paraffin lamps or gas for lighting.[15]

Edna Petrie's career with the Hydro Board spanned the key early developments of the Highland Grid, including its work with diesel, coal-fired steam and atomic power, as well as hydro-electric power. Electricity promotion was not her first choice of career. She had wanted to learn German at school in war-time Orkney, but 'teachers were scarce' and she had been advised to '"try Domestic Science instead"': no accident, of course, given the educational pathway of most 1940s schoolgirls. Without German, she said and with a 'continued interest in the domestic arts', she went to the Aberdeen School of Domestic Science and joined the Hydro Board in 1947 as its second demonstrator. By 1948 she and her colleague Miss Lydia Scott were delivering cooking demonstrations to packed houses twice a week in the Kirkwall electricity showroom on Orkney, and travelling widely elsewhere. As she later recalled of her travels between islands and the mainland in a 'small boat … tossed in the fast running tides': 'inconvenience' was 'hardly the word to describe the thrill I got from these unusual journeys'. With Petrie's roots in Orkney and Scott's on a neighbouring island, these 'local ladies' were well-placed to do the hard work of eroding local traditions.[16]

By the early 1950s Miss Petrie was expanding her skills in Aberdeen on Scotland's north eastern coast; at that time, as she noted, 'a "gas" stronghold'. The war had halted the progress of electric cookers in privately owned or rented homes and up to 1950 the Corporation of Aberdeen hadn't installed a single electric cooker in its council housing. Many such urban areas were the scene of rivalries between electricity and gas providers hoping to monopolise services in expanding local authority housing. But by 1952, the Hydro Board had agreed to provide electricity to council premises for a flat rate irrespective of whether gas was also provided, allowing tenants 'freedom of choice' in their appliances.[17] Petrie was part of the vigorous sales campaign that followed. As she noted, the Hydro Board needed Aberdeen's domestic customers for their diversity of load (to aid the 'load factor' of its power stations) and relied on urban areas to subsidize its uneconomic remote areas. The efforts paid off: electric cooking by Aberdeen's council tenants rose from 9% in 1952 to 80% in 1963 (though across Scotland by this point 50% of cooking was still done on gas, coal or peat-fire stoves). After Aberdeen, Edna Petrie transferred to the north coast for 'domestic reasons', facing her family's home island of Orkney across the Pentland Firth, working in the '"Atomic" town of Thurso'. With many of the residents here employees of the new Dounreay nuclear power station, this was a 'small but very cosmopolitan'

community, according to Petrie: people were 'not unnaturally, very electrically minded' and many of their homes, 'all-electric'.[18]

Despite the electricity industry's rhetoric, it is often unclear who really were the intended beneficiaries of domestic electricity: the consumers or suppliers? Technology historian Thomas Hughes famously said of electricity turbines that, with their constant drive to achieve sufficient load and economies of scale, they were 'in effect … supply in search of demand'.[19] The case of rural electrification was more complex, however. Left to their own devices, turbines would never have ventured into the Highlands and Islands. Their engineering logic was subordinated to policy ideals about raising standards of living and achieving universal provision in the early and mid-twentieth century Britain.[20] Electricity for all became attached to long-standing calls for housing reforms. At the same time, energy transitions shaped changing views on what was and was not 'fit for habitation', as yesterday's luxuries became today's necessities. But it was not just housing that seemed to need updating as energy services expanded. This also meant targeting long-standing everyday practices and forms of self-reliance that were unremunerative (from a supplier's viewpoint) in order to create well-drilled, monetized energy consumers who could help 'build' the load.[21]

Modes of domestic energy provision were entwined with a multitude of everyday routines, and gas and electricity suppliers were up against both deep-routed traditions that 'died hard', as Petrie said, and more ephemeral conveniences. In 1927, groups of women in parts of London were said to be in 'revolt' against local authority plans to introduce electric cookers, as dyed-in-the-wool gas users. Women in the Scottish coastal region of Fife in the 1930s locked their doors against the local gas provider who came to change their prepayment meters, because their existing meter settings ensured regular refunds and were being used as a handy savings bank.[22] Petrie's claim in 1963 that electric lighting 'was one thing that needed no commendation' was borne out by other electricity suppliers reporting from rural areas in the 1940s and 50s. Indeed, some suppliers complained that *only* lighting was being used in the countryside, in preference to the many other energy-intensive and load-building appliances that could prove so useful around the home and farm if only people would invest in them.[23]

The frequent gaps in priorities between energy suppliers and appliance manufacturers, on one hand, and users, on the other, has been the focus of much attention in the literature on women's approaches to domestic technologies. This has demonstrated the inadequacy of supply-focused accounts of energy transition, looking instead at processes of appraisal by women within the home. To what extent new energy-use technologies made sense to potential buyers in the light of their cost, ease of access, and interaction with existing household technologies and routines were just some of the issues contained in Ruth Schwarz Cowan's concept of the 'consumption junction', for example. This body of work has shown, firstly, how new energy forms and appliances gained uptake in homes only where they were successfully 'domesticated', and, secondly, that women were key agents in this process: both women inside the home and female promoters possessing the necessary authority to persuade other women.[24] Structural constraints within and beyond the home that determined their freedom to select fuels or appliances included housing tenure and socio-economic status, and questions of who had the power to make decisions within the home, in a context where women in the UK couldn't sign their own credit agreements until the late 1970s.[25]

To what extent 'labour-saving' devices were *imposed* on women remains an important question, given their varied circumstances. So too is the question of the effects of these devices on women's lives, despite Cowan's persuasive argument that the 'semi-industrialized' household led not to less 'women's work' but to higher expectations of domestic performance.[26] There is a wealth of evidence that women in inter- and post-war

Britain were living in cold, damp housing, lacking in nutrition and health care, and with daily domestic burdens that made them ill. A 1930s study of British housewives carried out by the Women's Health Enquiry Committee indicates the way in which concerns about women's housing, domestic labour, access to networked water and energy services, and health became harnessed together at this time. This stated that 'the present difficulties of water, lighting and heating should no longer be tolerated, even for old cottages', adding - as was commonly assumed - that if these problems were removed, 'one of the causes of rural depopulation will disappear'.[27]

The concerns of such studies have much in common with the more earnest contemporary discussions of the benefits of electricity that focused on how to make life easier for working-class women. There seems little doubt that Edna Petrie was hoping for a better life for the people among whom she lived and worked; and improvements on the 'paraffin and tilley-lamps' that could take 'upwards of an hour preparing', the solid fuel stoves used for cooking, washing and heating, the cold bedrooms with their 'registered grates' that were hardly ever used, and laundry day – 'a major event', involving tubs of heated water, flat- and box-irons, a gap in the rain and 'the wind in the right direction'. Electricity, Petrie claimed, was 'now a life-line throughout Scotland, and especially so in the scattered countryside I've worked in'; it had 'made life easier for them in every way'. Living in scenic Ross-shire (north-west Highlands) by 1963, she reported that the expanding tourist industry here had

> Raised the standard of living, and in the most unlikely places the visitor from the South finds washing machines and spin-driers, tumble-driers and rotary ironers. These things are necessities where there is such a heavy rainfall, and where there is no commercial laundry within 100 miles.[28]

The groundswell of women's housing and welfare groups working to raise living standards, alongside such energy promotion work, provided a vehicle for women's expanding citizenship during these years.[29] Though they did not all share the same vision of the future, the need for rural Britain to embrace modernity was one of commonalities.

The phenomenon of the 'black-house' shows how standards of living, modes of energy provision and moral standards were frequently bundled together. Some of these black-houses were still inhabited in remote islands in the 1940s. Here, as Edna Petrie said, '[t]he cooking-pot was hung on a chain suspended from the roof, a fire lit under it, usually of peat, and the smoke found its way out of the room as best it could'. By 1963 these houses had long symbolised all that was wrong in rural housing in Scotland. Considered as fever hotspots (for typhoid and typhus, especially), there were also persistent moral and cultural concerns about these one- and two-roomed dwellings shared between household members of different sexes and different generations; sometimes between people and animals.[30] Electricity seemed to provide a moral as well as practical advance on this way of life. As the *Aberdeen Journal* had put it in 1927, the 'chimney-less house', though rare, was as 'an advanced example of all the "Electric House" and its advocates are out to banish, dirt and disease being among the foremost evils'. Shiny new standards of lifestyles on a US model cast shadows that fell not just on the black-houses but on homes and their residents right across Britain. As the reporter continued,

> Though women interested in science, domestic and otherwise, and hygiene are among the prime-movers in the campaign to put the coal-and-gas ridden houses of Britain on the same level as the clean, cosy,

> and easy homes of America, the final success or failure of the movement lies with the woman in the house.[31]

Some women were at the vanguard of this campaign, but many other women themselves required an upgrade.

Forms of rural self-reliance on the part of both men and women were targeted during the inter-war and post-war years, by the Hydro Board, by policy makers and by various forms of propaganda whose ultimate source is not clear. The self-reliant practices of rural Scotland did not fit the model of paying energy consumers required by networked services. Like the black-houses, the long-standing practice of collecting free peat from local peat bogs for domestic fuel, carried out by women and men, seemed to be a problem that needed solving. This kind of cash-free productive work was invisible in talk of women as decision-making consumers, which was a fiction rather than reality in a context where women were frequently working alongside their husbands and older children in inter-connected activities such as fuel gathering and animal husbandry. A 1924 *Illustrated London News* feature suggests that this was partly a question of what work was deemed appropriate to different genders. While its crofter man and boy bearing driftwood represented a 'sturdy race … that gave many sons in the war', the fuel gathering of women was a Highland tragedy: it was 'a common sight to see women and children staggering home with great bundles of sticks on their backs'. There are indeed many photographs of women from rural Scotland at this time, digging out peat or carrying it home on their backs, but in many cases phlegmatically knitting as they went. In a report to the 1950 Ridley Committee, the Scottish Hydro Board commended its own experimental peat-fired gas turbine at Caithness as more cost effective than the individual efforts of Highlanders.[32]

Policy makers by the 1940s were trying hard to find out what the people of the Highlands wanted and what could help to stem depopulation, commissioning a series of social surveys that built on rural housing reports.[33] But the results were ambiguous. A 1949 social survey on rural depopulation in Scotland considered the conditions of remote locations and out-migration. The answers suggested a range of issues, from dissatisfaction with the absence of electricity, gas or water, to the lack of good jobs or need for a better social life. A small-scale postal survey that disaggregated women and men did not suggest that women were more concerned with poor housing than men. Contrary to expectations, the wider survey found that people with access to better facilities in houses were *more*, not less, likely to migrate to towns. Employment prospects were the key driver for migration but, of those wanting to move, 'their households were, more often than the average, enjoying a main water supply and main drainage, and were more often provided with gas, electricity, telephone and refuse services'.[34] The priorities of the more remote rural inhabitants remained obscure.

Despite the lack of clear evidence for what women (or men) wanted, there were frequent generalized discussions about the housewife as a unitary consumer, who could best be understood by those who shared this consumer's viewpoint. Women had, as the *Aberdeen Journal* put it in 1927, 'a clear part in the matter in advisory and utilitarian capacities'. A decade later, Phyllis Thompson writing in the EAW's magazine also commended a 'feminine regard for the more practical details of housing' which, she noted, had led women 'to urge the electrification of the homes of the working class at a reasonable cost.' She highlighted the benefit of having 'the woman's viewpoint' represented on local authorities' electricity committees (in the era of municipal electricity boards).[35]

Consulting Women

The confident statements about women's viewpoints, like those about the benefits of modernity, were a convenience and rhetorical strategy more than a description of reality. People knew that in fact women did not all share the same viewpoint and nor were their views confined to purely practical matters. The multiplicity of women's viewpoints was evident in highly political debates over energy nationalisation in the late 1940s; in the debate, for example, over whether the British Housewives League (formed c. 1945) – opponents of nationalization – should be represented on the Electricity and Gas Consultative Councils and Domestic Coal Consumers' Council: a Conservative move resisted by Labour.[36] The Consultative Councils of the regional electricity and gas boards were intended as a bridge between suppliers and a range of industrial, commercial and domestic consumers, landowners, trade unions and other interests. Though their real power is debateable,[37] the varied organizations who ended up on them demonstrates a recognition that women's representation required a range of viewpoints. From the 1940s to the 1970s, these included the Electrical Association for Women, Women's Gas Federation and Women's Advisory Council on Solid Fuel for their respective sectors, but also the Co-operative Women's Guild, National Council of Women of Great Britain, National Federation of Women's Institutes, National Joint Committee of Working Women's Organisations, Women's Royal Voluntary Service, the Scottish Women's Rural Institutes, Scottish Women's Group of Public Welfare and Union of Jute and Flax Workers in the 1950s and 60s (a Dundee-based textile union with a large female membership).[38] There were also individual women (often local authority representatives) on the district-level consultative committees reporting to the regional level. That no woman sat on the North of Scotland Hydro-Electric Board itself between 1948 and 1972 suggests the limits of women's power in this sector. The board remained a stronghold of nine men, flanked by technical advisors and two influential committees, again all male with the exception of local grandee The Hon. Lady MacGregor of MacGregor OBE, a fixture on the Amenity Committee.[39]

The fortunes of the energy sector in Britain rose and fell between the 1920s and 1970s; ultimately their promotion efforts paid off, though the 'solid [fuel] women' were fighting a losing battle by the mid 1950s, with the onset of Clean Air legislation.[40] Through these years, women's groups were vital in helping women to expand their appreciation of electricity's potential and in keeping gas use buoyed up against its younger competitor. The strategy of the energy industries in providing an ever-expanding array of domestic technologies for women chimes with Schwarz Cowan's argument about ever higher expectations of women's domestic performance. The Women's Gas Federation's 'Brides-to-Be' classes and 'Young Homemakers' wing aimed to ensure that the next generation growing up in the 1950s and 60s would continue an allegiance to gas cooking and to rising domestic standards.[41] Women's work in the energy sector into the 1980s continued to reflect their constrained social and economic status. Their voluntary contributions of free time in this field was closely tied to their primary domestic roles and widespread exclusion from the labour market. It is also significant that Edna Petrie and many other women employed in this sector up to the early 1950s were unmarried, at a time when the marriage bar was being eroded only slowly.[42]

But the constraining context of women's engagement with the energy sector was not the whole story. Some saw the potential for labour-saving appliances in freeing women from domestic sphere. The pioneering engineer Caroline Haslett, a founder of the Women's Engineering Society and Electrical Association for Women, was in 1947 already advocating electricity as a way of allowing working-class women more time to do paid work, as 'a valuable asset to the nation'. [43] A female engineer Haslett (also unmarried) was atypical within the industry, but the sector offered a wide range of women – from engineers, to domestic scientists and voluntary promoters – an expanding field of opportunities. The increasing professionalisation of demonstrators and Home Service Advisors during the

1950s is indicated by the Association of Home Economists (formed in 1954). As women became more difficult to find in at home, home visits declined in the 1960s and 70s. Such face-to-face interaction became less valuable to the industry over time, though women continued to work as demonstrators in retail outlets and as freelancers, including paid work in print journalism and television demonstration.[44] By the 1980s, electricity had been successfully established. Annual sales of electricity per head of British population rose from 442 kilowatt hours (kWh) in 1938 to 4,137 kWh by 1980. Electricity sales in domestic residences and farms rose from 5,361 gigawatt hours in 1938 to 87,907 GWh in 1980.[45] Gas, in decline by the 1950s, had received a great boost with the discovery of North Sea gas (and oil fields), which enabled the roll-out of 'high-speed gas' in the late 1960s and 1970s.

Women within the voluntary energy promotion organisations – often married – valued their expanded opportunities highly. In a 2016 interview, a former Women's Gas Federation (WGF) representative for Eastern England recalled the first time that she ever flew: when British Gas arranged for a helicopter trip for WGF Council members to see the first of the North Sea gas rigs off the Norfolk coast at Bacton around the late 1960s: 'I was petrified. I thought, "I'm going to". So I did.'[46] 'It was always about social friendship', she said: 'I'm sure my members would say it enriched their lives, and it opened many doors.'[47] While there were undoubtedly tensions between different groups – for example, between male (and some female) professionals and volunteers – new social communities were forged. As a former National Chairman of the WGF recently told me:

> 'we had a couple of members whose sisters were Home Service Advisors for an electricity company. We were all sort of friends together. […] we wanted everybody to have a better life and better opportunities.[48]

WGF members launched campaigns on issues they cared about in the 1980s, including promoting equal pay, care for those with HIV, and tests for cervical cancer.[49] Elspeth Howe, the Women's Gas Federation President in the 1980s, was earlier Deputy Chair of the Equal Opportunities Commission and active in the campaign for women's right to sign their own credit agreements (e.g. to buy appliances on credit cards or using Hire Purchase arrangements).[50] When the women's voluntary organisations ceased to be funded by the newly privatised energy sector in the early 1990s, very many of the WGF local branches continued to meet as social groups and are still active today as 'CAMEO' clubs.[51] Through these activities women made the most of their opportunities, like men. It was never just about the energy.

Women did sufficiently extricate themselves from hard physical labour in the home to enter paid work, while bearing the dual burden of child-rearing. Women also chose not to become wives and mothers in unprecedented numbers. Following an overall twentieth-century trend the female workforce in the UK rose from just over 7 million to nearly 23 million between 1950 and 1990, while the participation of older, married women and mothers in the labour force expanded significantly. By 1995, nearly 67% of women aged between 15 and 64 years were in work, though the majority of working mothers were in part-time work, and women were still concentrated in a narrower range of sectors than men and in the lower paid jobs.[52] With rising living standards came rising expectations of household comfort, as the energy industry and policy makers had always wanted. Lack of central heating, the norm in the UK in the 1940s, became a measure of deprivation.[53] Despite post-war aspirations for universal provision, not all inhabitants of the UK have been equal beneficiaries of this rising affluence. In Scotland, nearly 25% of households were considered to be in conditions of fuel poverty in 2017. Fuel poverty was higher among rural residents, still reliant on oil, more highly priced rather than gas. Remote rural fuel poverty was estimated at around 59% in 2017.[54]

This is a story of women's role in achieving conditions of rising affluence for themselves and wider society, though the benefits have been unevenly distributed and have come at an environmental cost. And geographers Chris Gibson et al put it: 'The strongest predictor of carbon footprint/greenhouse gas emissions is affluence, at both the macro and the household scale'.[55]

Conclusions

This chapter has traced some of the ways in which women's role in the energy sector – of women such as Edna Petrie and others like her – was predicated on sexual hierarchy and ideologies of women's domestic role. The ideological framing of women as primary domestic energy consumers suppressed both their involvement in productive roles within and beyond the home and forms of self-reliance in energy provision that were presented as inimical to modern life and to appropriate gendered behaviour. Weaving women into the project of growing energy consumption was at the heart of the sector's domestic energy aims in the twentieth century. Many women engaged in this process with enthusiasm, if not on an equal footing with the men in charge of the industries, and with some ambivalence (as neither truly 'domestic' women, nor fully equivalent to men). This was part of the route to women's emancipation from the home and the increasingly industrialised affluence of women as well as men. Today in Britain, with the increased equivalence of women and men, we flicker in and out of our sexed and gendered identities as we move through our daily lives. We are also still framed by forms of distributed agency over which we have limited control, but British women today have a higher carbon footprint partly as a result of pathways forged by the women who came before us. Globally, many women are very far from equivalent either to men or to women in affluent industrial nations.

The path to affluence and environmental degradation was paved with good intentions as well as relationships of exploitation. Can we envisage a different future for people that doesn't tread the same path, especially as global warming is widening environmental and economic disparities globally? While women in their domestic roles have – like men – exploited cheap nature, the idea of 'women' as in some ways outside of capitalism nevertheless still acts as a kind of cultural resource, similar to Nancy Fraser's (2014) 'reservoirs of "non-economic" normativity'.[56] This idea holds out the promise of doing things differently in the future, but it is far from clear what it means. If we want to realise this potential, we must not forget the many ways in which women have also always been part of the problem.

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[1] Edna S. Petrie, "A Demonstrator's Work in the North of Scotland," *The Electrical Age* (January 1963), 497.

[2] North of Scotland Hydro-Electric Board (NSHEB), *Annual Report and Accounts 1963*, 20.

[3] NSHEB, *Annual Report and Accounts 1963*, 19.

[4] Pursell, "Domesticating Modernity: The Electrical Association for Women, 1924-86," 47-67; Clendinning, *Demons of Domesticity*; Gooday, *Domesticating Electricity*.

[5] Department for Business, Energy & Industrial Strategy. *2016 UK Greenhouse Gas Emissions, Final Figures* (6 February 2018): 24-25. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/680473/2016_Final_Emissions_statistics.pdf (accessed 24 June 2019). This is in addition to emissions arising from the generation of electricity used in the home.

[6] Crutzen and Stoermer, "The Anthropocene," 17-18; Chakrabarty, "The Climate of History: Four Theses," 197-222. Cf. McAfee, "The Politics of Nature in the Anthropocene," 65-72; Meyer, "Politics in – but not of – the Anthropocene," 47-51. Cooper, "Why we Still Need a Human History in the Anthropocene". For existing connections, see e.g.: Sandwell, "Pedagogies of the Unimpressed: Re-Educating Ontario Women for the Mineral Economy, 1900-1940," 36-59; Sherilyn MacGregor, "Go ask "Gladys": Why Gender Matters in Energy Consumption Policy and Research," LSE Blog, February 9, 2016, https://blogs.lse.ac.uk/politicsandpolicy/go-ask-gladys-why-gender-matters-in-energy-consumption-policy-and-research/ (accessed 8 July 2020); Otter, Bashford, Brooke, Jonsson and Kelly, "Roundtable: The Anthropocene in British History," 584, 591.

[7] Malm and Hornberg, "The Geology of Mankind? A Critique of the Anthropocene Narrative," 64; Malm, *Fossil Capital*; Moore, "The End of Cheap Nature or: How I Learned to Stop Worrying about 'the' Environment and Love the Crisis of Capitalism," 1-31; Connell, "Foreword: Masculinities in the Sociocene," 6; Moore (ed.), *Anthropocene or Capitalocene?*.

[8] See Moore, "The End of Cheap Nature or: How I Learned to Stop Worrying about "the" Environment and Love the Crisis of Capitalism," 288, 301-302; also Fraser, "Behind Marx's Hidden Abode: For an Expanded Conception of Capitalism," 55-72. But on the capacity of liberal feminist gender equality to produce "ruling-class women", see Arruzza, Bhattacharya and Fraser, *Feminism for the 99%*, 53.

[9] See note 23.

[10] On distributed agency, see Wilhite, "Energy Consumption as Cultural Practice: Implications for the Theory and Policy of Sustainable Energy Use," 60-72.

[11] *Report from the Select Committee on Nationalised Industries: The Electricity Supply Industry Vol. I Report and Proceedings* [236-I] (London: HMSO, 1963), No. 482. Chick, "Time, water and capital: The unintended contribution of the North of Scotland Hydro-Electric Board to the application of welfare economics in Britain, 1943-1967," 29-55.

[12] Johnston, *Memories*, 181; "Hydro-Electric Development (Scotland) Bill," Order for Second Reading, HC Deb 24 February 1943 vol 387 cc 182, 233, https://api.parliament.uk/historic-hansard/commons/1943/feb/24/hydro-electric-development-scotland-bill (accessed 9 July 2018).

[13] Smout, *Nature Contested*.

[14] Scottish Development Department [SDD], *Electricity in Scotland: Report of the Committee on the Generation and Distribution of Electricity in Scotland* (Edinburgh: HMSO, 1962) [Cmnd 1859], No. 155;

Scottish Office, *Report of the Committee on Hydro-Electric Development in Scotland* [Cooper Committee] (1942) [Cmd 6406], No. 47.

[15] For diesel: SDD, *Electricity in Scotland*, Nos. 147, 156-162. NSHEB, *Annual Report 1952*, 15, Appendix VII Nos. 3, 4, 5, 11; NSHEB, *Annual Report 1953*, 14, 16-17, Map; NSHEB, *Annual Report 1972*, 3, 4, 9-11. Payne, *The Hydro*, Tables 24, 25.

[16] Petrie, "A Demonstrator's Work in the North of Scotland," 496-97; "Electrical Cooking," *Orkney Herald, and Weekly Advertiser and Gazette for the Orkney & Zetland Islands*, 6 April 1948, 4; "By Kirsteen," *Aberdeen Evening Express*, 1 April 1952, 4; "Sealing the Cookers," *Aberdeen Evening Express*, 16 December 1954, 11. Petrie came from Tankerness; Lydia Smith from Shapinsay.

[17] Petrie, "A Demonstrator's Work in the North of Scotland," 497. "Smaller Electricity Bills," *Aberdeen Journal*, 2 December 1942, 4; "Electricity or Gas," *The Scotsman*, 20 May 1950, 5; "Gas Board will Seek Conference," *Aberdeen Evening Express*, 9 April 1952, 5. "Gas V. Electricity Grouse: Tenants Don't Get Free Choice," *Dundee Courier*, 10 April 1952, 2. NSHEB, *Annual Report 1953*, 23. For local authorities as "multiple" or "proxy consumers" of appliances, see: Schwarz Cowan, "The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology," 266, 269, 270; Trentmann and Carlsson-Hyslop, "The Evolution of Energy Demand in Britain: Politics, Daily Life, and Public Housing, 1920s-1970s," 807-839.

[18] Petrie, "A Demonstrator's Work in the North of Scotland," 497-98. NSHEB, *Annual Report 1972*, 3, 13, Map ix. For load factor, see Hughes, *Networks of Power*, 217-21; Roberts, "Electrification," 68-112.

[19] Hughes, *Networks of Power*, 364.

[20] Paul Brassley, Jeremy Burchardt and Karen Sayer, "Conclusion: Electricity, Rurality and Modernity," in Paul Brassley, Jeremy Burchardt and Karen Sayer (eds), *Transforming the Countryside: The Electrification of Rural Britain* (London: Routledge, 2017), 221-45.

[21] Savage, *Rural Housing*; Thresh, *The Housing of the Agricultural Labourer*; Ministry of Health, *Rural Housing: Third Report of the Rural Housing Sub-Committee of the Central Housing Advisory Committee* (London: HMSO, 1944), 15, 41; Smith, *A Guide to Housing*; Ambrose, *The Quiet Revolution*, 190-91. SDD, *Electricity in Scotland*, No. 151; Gillott, "Domestic Load Building: A Few Suggestions upon Propaganda Work," 197-202.

[22] "Electrifying the Home," *Aberdeen Journal*, 26 February 1927, 6; "Fife Housewives' Protest: Gas Meter Alterations Resented," *Dundee Courier*, 12 December 1934, 7.

[23] Petrie, " A Demonstrator's Work in the North of Scotland," 496, 497. See e.g. South West Electricity Consultative Council Chairman in "Women are Leaving Countryside: Current is their Great Need," *Western Daily Press*, 6 July 1949, 6.

[24] Schwartz Cowan, "The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology," 253-72; Parr, "What Makes Washday Less Blue? Gender, Nation, and Technology Choice in Postwar Canada," 153-86; Sandwell, "Pedagogies of the Unimpressed: Re-Educating Ontario Women for the Mineral Economy, 1900-1940;" Sandwell, "How Households Shape Energy Transitions: Canada's Great Transformation," 23-30; Oldenziel, "Man the Maker, Woman the Consumer: The Consumption Junction Revisited," 128-48; Gooday, *Domesticating Electricity*.

[25] Taylor and Chappells, "What Consumers in the Past Tell us about Future Energyscapes," 11-21. For credit, see 1974 Consumer Credit Act, 1975 Sex Discrimination Act.

[26] Schwartz Cowan, *More Work for Mother*.

[27] The Women's Health Enquiry Committee, established 1933, included women from these organisations: Council of Scientific Management in the Home (National Council of Women), Midwives Institute, National Council for Equal Citizenship, National Union of Townswomen's Guilds, North Kensington Women's Welfare Venture, Standing Joint Committee of Industrial Women's Organisations, Women Public Heath Officers' Association, Women's Cooperative Guild, Women's National Liberal Federation. For the quotation, see: Spring Rice, *Working-Class Wives*, 196-97.

[28] Petrie, "A Demonstrator's Work in the North of Scotland," 496, 498.

[29] Meller, "Women and Citizenship: Gender and the built environment in British Cities 1870-1930," 234-35; Llewellyn, "Designed by Women and Designing Women: Gender, Planning and the Geographies of the Kitchen in Britain 1917-1946," 42-60; Hannam, "Women as Paid Organizers and Propagandists for the British Labour Party between the Wars," 69-88; Cowman, "'From the Housewife's Point of View': Female Citizenship and the Gendered Domestic Interior in Post-First World War Britain, 1918-1928," 352-83.

[30] Petrie, "A Demonstrator's Work in the North of Scotland," 496. Royal Commission on Housing of Working Classes, *Second Report (Scotland), Minutes of Evidence, Appendix, Index*, 1885 [C. 4409], qq. 20910 - 20919. "The Black Houses in Harris," *The Scotsman*, 8 May 1896, 6; "'Bundling' system in the Lews," *North British Daily Mail*, 5 June 1900, 3; Drummond Smith, "The Housing of the Scottish Farm Servant," *The Economic Journal*, Vol. 25 No. 99 (1915), 466-74; "Highland Needs," *Aberdeen Press and Journal*, 14 June 1919, 4. See also discussion of the "bothies"/"chaumers" of unmarried male workers: Scottish Housing Advisory Committee [SHAC], *Report on Rural Housing in Scotland* (Edinburgh: HMSO, 1937) [Cmd 5462], No. 103.

[31] "Electrifying the Home," *Aberdeen Journal*, 26 February 1927, 6.

[32] "The Plight of the Highland Crofter: Starvation in the Hebrides," *Illustrated London News*, 8 March 1924, 10. NSHEB, *Annual Report 1952*, Appendix VII, No. 4. See also British Pathé, *Peat* (1949). https://www.britishpathe.com/video/peat/query/peat; British Pathé, *Peat Utilisation Scheme* (1955) https://www.britishpathe.com/video/peat-utilisation-scheme/query/peat+scotland; Scottish Film Council/Scottish Educational Film Association/Joint Production Committee of the Scottish Education, *Crofter Boy* (1955), https://www.bfi.org.uk/films-tv-people/4ce2b69e9c180 (all accessed 9 July 2020).
For photographs, see e.g.: "The 'Buts' of Lewis," *Picture Post*, 28 May 1955 (Malcolm Dunbar photo); "The Crofters' Isle," *Picture Post*, 3 September 1955 (Bert Hardy photo) (Hulton Archive/Getty Images). See also discussion in David Fleetwood, "The Electrification of Scotland," 79-80.

[33] SHAC, *Report on Rural Housing in Scotland*, No. 90; SHAC, *Distribution of New Houses in Scotland* (Edinburgh: HMSO, 1944) [Cmd 6552], e.g. Nos. 92-96, 205; Kathleen Box and Geoffrey Thomas, "The Wartime Social Survey," *Journal of the Royal Statistical Society*, Vol. 107 No. 3/4 (1944), 164-67.

[34] The National Archives, UK: RG23/136: Bertram Hutchinson, *The Social Survey: Depopulation and Rural Life in Scotland* ["A Summary Report of three Inquiries for the Department of Health for Scotland in parts of rural Scotland as to the causes of rural depopulation"] (London: Central Office of Information, 1949), pp. 9, 27-8; Tables 21, 22, 23, 32, 33; Appendix II. The provision of electricity to rural areas did not succeed in stemming depopulation of the Highlands. Payne, *The Hydro*, 206.

[35] "Electrifying the Home," *Aberdeen Journal*, 26 February 1927, 6; Phyllis Thompson, "Women on Electricity Committees," *The Electrical Age* (Winter/Spring 1938), 334-35. For women's authority in reaching female consumers, see Gooday, *Domesticating Electricity*, 33-34.

[36] "Clause 7 (Consultative Councils)," HC Deb 24 June 1947 vol 439 cc. 231-83, https://api.parliament.uk/historic-hansard/commons/1947/jun/24/clause-7-consultative-councils (accessed 9 July 2020). For the Housewives League, see Elizabeth A. McCarty, "Irene May Lovelock (1896-1974)," in *Dictionary of National Biography* (Oxford: Oxford University Press, 2004).

[37] Tivey, "Quasi-Government for Consumers," 137-51; Hilton, *Consumerism in Twentieth-Century Britain*, 147-49.

[38] NSHEB, *Annual Report 1953*, App. VI Consultative Council Report; NSHEB, *Annual Report 1963*, App. V Consultative Council Report; NSHEB, *Annual Report 1972*, App. VIII Consultative Council Report; "Written Answers," HC Deb 19 January 1968 vol 756 cc 702-704W, https://hansard.parliament.uk/Commons/1968-01-19/debates/7328b6eb-95b5-4780-8d88-ab3fcfe5b6fa/WrittenAnswers (accessed 3 November 2019).

[39] NSHEB, *Annual Report 1953*, 4-5; NSHEB, *Annual Report 1963*, vi-viii; NSHEB, *Annual Report 1972*, v-vii. Though see call for woman on the board from George Thomson, Labour MP for Dundee East, and Dame Irene Ward, Tynemouth MP: "North of Scotland Hydroelectric Board (Report and Accounts)," HC Deb 27 January 1958 vol 581 c145, https://api.parliament.uk/historic-hansard/commons/1958/jan/27/north-of-scotland-hydroelectric-board (accessed 3 November 2019).

[40] Stephen Mosley, "Clearing the Air: Can the 1956 Clean Air Act Inform New Legislation?".

[41] Classes renamed "Teens and Twenties" in the 1960s. Material Cultures of Energy (MCE) Oral History Interview No. 4, 10 March 2016 (VT).

[42] See e.g. Sex Disqualification (Removal) Act 1919 and "Civil Service Marriage Bar (Abolition)," HC Deb 15 October 1946 vol 427 cc 794-796, https://api.parliament.uk/historic-hansard/commons/1946/oct/15/civil-service-marriage-bar-abolition (accessed 9 July 2020). After the Home Civil Service marriage bar was lifted in 1946, local authority members across Scotland and elsewhere worked to continue the ban: "Married Women: Employment in Municipal Service," *The Scotsman*, 16 January 1946, 6; "Employment of Married Women: Dundee Committee's Discussion," *The Scotsman*, 27 December 1946, 3. "Time Limit on Civic Jobs for Mrs," *Dundee Courier*, 23 April 1952, 2.

[43] Caroline Haslett, "Electricity in the Home," 651-52. For Haslett, see also Graeme Gooday in this volume.

[44] MCE Oral History Interview No. 4, 10 March 2016 (VT). For the professionalisation of Home Economists, see Pratt, "Home Economics Subject Development in the Context of Secondary Education," 33, 93-94, 108-110.

[45] Hannah, *Engineers, Managers, and Politicians*, Table A.2.

[46] MCE Oral History Interview No. 3, 2 March 2016 (VT). Likely to have happened c. 1968-71.

[47] MCE Oral History Interview No. 3, 2 March 2016 (VT).

[48] MCE Oral History Interview No. 5, 10 March 2016 (VT).

[49] MCE Oral History Interview No. 5, 10 March 2016 (VT).

[50] See e.g. "City Notes: Lady Howe takes Shopkeepers to Task," *Birmingham Daily Post*, 16 March 1978, 8.

[51] E.g. Coedpoeth CAMEO [Come and Meet Each Other], North Wales. MCE Oral History Interview No. 8, 12 March 2016 (VT).

[52] Walsh and Wrigley, "Womanpower: The Transformation of the Labour Force in the UK and the USA since 1945," p. 2, Table 1. See also Baroness Elliot of Harwood in "Women in Industry and the Home", HL Deb 193

June 1963 vol 250 cc 1308-1312, https://api.parliament.uk/historic-hansard/lords/1963/jun/19/women-in-industry-and-the-home-1 (accessed 4 November 2019).

[53] Department for Communities and Local Government, *The English Indices of Deprivation 2010*, 15-16.

[54] Fuel poverty is defined here as: "to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income on all household fuel use". Scottish Government (Housing and Social Justice Directorate), "Scottish House Condition Survey: 2017 Key Findings" (4 December 2018), Sections 4, Nos. 137, 145, 180-181, https://www.gov.scot/publications/scottish-house-condition-survey-2017-key-findings/pages/6/ (accessed 10 November 2019).

[55] Gibson, Head, Gill and Waitt, "Climate Change and Household Dynamics: Beyond Consumption, Unbounding Sustainability," 4.

[56] Fraser, "Behind Marx's Hidden Abode: For an Expanded Conception of Capitalism," 69.