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THE EVOLUTION OF ENERGY DEMAND IN BRITAIN: POLITICS, DAILY LIFE, AND PUBLIC HOUSING, 1920s–1970s*

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ABSTRACT. *This article offers a fresh perspective on the evolution of energy consumption in Britain from the 1920s to the 1970s. The twentieth century witnessed a series of energy transitions – from wood and coal to gas, electricity, and oil – that have transformed modern lives. The literature has primarily followed supply, networks, and technologies. We need to know more about people and their homes in this story, because it was here where energy was used. The article investigates the forces that shaped domestic demand by focusing on working-class households in public housing. It examines the interaction between political frameworks, public housing infrastructures, and the changing norms and practices of people's daily lives. It connects social and political history with material culture and compares the different paths taken in London, Stocksbridge, and Stevenage in the provision of gas, electricity, and heating. Evidence collected by local authorities is used to analyse the uptake, use, and resistance to changes in domestic infrastructures, such as gas-lit coke ovens and central heating. The case-studies make a more general pitch for a new historical study of energy that places people's lifestyles, their ideas of comfort, and political attempts to change them more squarely at the centre of inquiry.*

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On 16 March 1939, Mr Luford wrote to the chairman of his local council in Stocksbridge, a small industrial town at the outskirts of Sheffield in south Yorkshire. He had learnt that a power cable for the Spink Hall estate would pass his council house and asked for permission to have it wired. He also wanted to know whether a tenant who wired his home but later moved out would be compensated for his investment. A week later, the council met and resolved that tenants had permission to wire their houses as long as they pledged not to remove gas pipes and restored all gas fittings if they left.[1]

Mr Luford's questions were testing the meaning of tenants' 'freedom of choice' between gas and electricity, which had been the subject of national debate a few years earlier. Mr Luford's home was one small piece in the bigger story of twentieth-century energy transitions. For Britain, the picture is clear at an aggregate level. The decline in the use of coal for domestic cooking and heating of space and water started in the interwar years and accelerated in the 1960s and 1970s, while the consumption of gas (first town gas then natural gas) and electricity rose.[2] We know surprisingly little, however, about the micro-changes in demand that made up this macro-development. Electric lighting was promoted as cleaner and safer than gas, and electric fires as admittedly more expensive but flexible sources of quick, smokeless heat. Gas providers, by contrast, disputed that the future would be electric, insisting that people preferred gas for cooking. Coal interests argued for the continued use of solid fuels, especially for heating. But what did end-users think and how did they actually use these fuels? The aim of this article is to illuminate the interplay between households, urban infrastructures, and politics in the transformation of energy use between the First World War and the first oil crisis (1973), a period when a large part of the population saw their lives transformed by public housing. This historical case-study is part of a growing interest in the dynamics of demand. It asks what energy is used for, instead of treating it as a function of supply.[3]

This article examines changing energy provision and use in public housing occupied mainly by working-class tenants in three cities: Stocksbridge (a small industrial town near Sheffield, dominated by the local steelworks which had a

[1] Luford to Stocksbridge Urban District Council, 16 Mar. 1939, Sheffield Archives and Local Studies (SA), CA87/2, housing generally, Jan. 1939–Dec. 1946; Housing – applications, tenants etc., minute books 1935–41, SA, CA61/2, p. 5, 1939.

[2] Jason Palmer and Ian Cooper, *United Kingdom housing energy fact file 2013* (London, 2013); Roger Fouquet, *Heat, power and light: revolutions in energy services* (Cheltenham, 2008); Leslie Hannah, *Engineers, managers and politicians: the first fifteen years of nationalised electricity supply in Britain* (London, 1982); Leslie Hannah, *Electricity before nationalisation: a study of the development of the electricity supply industry in Britain to 1948* (Basingstoke, 1979); Ian Rutledge, Phil Wright, and Sheffield Energy & Resources Information Services, *Coal companies worldwide: competition and performance indicators* (Sheffield, 1989). For the earlier period, see Karl Ditt, *Zweite Industrialisierung und Konsum: Energieversorgung, Haushaltstechnik und Massenkultur am Beispiel nordenglischer und westfälischer Städte 1880–1939* (Paderborn, 2011).

[3] 'DEMAND' centre: www.demand.ac.uk/.

coke and gas plant connected to it); Stevenage (the first of the 'New Towns' planned after the Second World War); and London (with its large and growing number of public housing estates).[4]

Supply-oriented technological approaches have tended to treat demand as the almost inexorable result of ambitious engineers and their political and business allies. As Thomas Hughes put it in his seminal *Networks of power*, bigger turbines were 'supply in search of demand'.[5] Hughes and scholars in this tradition have been aware that new capacities of supply did not immediately spawn new demand – hence the aggressive marketing of special tariffs and appliances. Even here, however, demand is assumed to be created by the supplier, not by the consumer. Since the 1970s, it has been clear that household electricity use does not neatly follow trends in GDP.[6] Viewing demand as a reaction to supply becomes problematic, once we recognize that household energy use arises primarily as a means to an end, such as heating, cooking, entertaining, or mobility. This recognition is critical for the current debate about energy transitions and future demand. While the active role of users has become a recognized feature of consumption and science and technology studies, with the exception of Graeme Gooday's work on how electricity was domesticated in the early years, it has yet to be properly integrated into histories of energy.[7] The best recent history of energy is characteristically entitled *Power to the people*, with plenty of useful data and analysis of energy supply and efficiency gains in the twentieth century but very little about 'the people' themselves and where their demand *for* power was coming from in the first place.[8]

What is revealed if we look at how households actually engaged with local government and utility providers? The politics of everyday life has emerged as a fresh site of historical inquiry in recent years. Taylor and Trentmann have

[4] Already by 1936, Greater London had 150,000 council dwellings. At that time, 6 per cent of residents in inner London were housed by their local authority: by 1971, this had risen to 34 per cent; Jerry White, *London in the twentieth century: a city and its people* (London, 2008), pp. 53, 235–8.

[5] Thomas Hughes, *Networks of power: electrification in Western society, 1880–1930* (new edn, London, 1993), p. 364.

[6] E.g. see 'The physicist's role in using energy efficiently', in *AIP Proceedings no. 135: energy sources, conservation and renewables* (Washington, DC, 1985), pp. 15–32; Energy Saving Trust, 'The rise of the machines: a review of energy using products in the home from the 1970s to today' (London, 2006).

[7] Graeme Gooday, *Domesticating electricity: technology, uncertainty and gender, 1880–1914* (London, 2008); Nelly Oudshoorn and Trevor Pinch, *How users matter: the co-construction of users and technology* (London, 2003). Cf. the growing attention to energy and users in anthropology and sociology: Sarah Strauss, Stephanie Rupp, and Thomas Love, eds., *Cultures of energy: power, practices, technologies* (Walnut Creek, CA, 2013); European Council for an Energy Efficient Economy, Energy Efficiency and Behaviour Conference 2009, www.eceee.org/library/conference_proceedings/EE_and_Behaviour/2009.

[8] Astrid Kander, Paolo Malanima, and Paul Warde, *Power to the people: energy in Europe over the last five centuries* (Oxford, 2014). An exception is Bill Luckin, *Questions of power: electricity and environment in inter-war Britain* (Manchester, 1990).

shown how Victorians' changing attitudes to cleanliness and growing water use triggered new forms of consumer politics.[9] Our article takes this discussion a step further, by extending it to energy and into the era of social democracy, when the state became a main provider of public housing. In a seminal article on the merit of consumer-focused analysis of technological diffusion, Ruth Schwartz Cowan noted that the market for home heating systems in America did not only consist of private consumers but also of government agencies responsible for public housing.[10] In England and Wales, council homes' share of the housing sector rose from 7 per cent to 31 per cent between 1931 and 1971.[11] Public housing in this period acted as an increasingly important conduit between public infrastructures and private demand. This spread 'consumption by proxy', with local governments building certain capacities for fuel use and appliances for their council tenants. Council houses came equipped not only with pipes and wiring but with particular types of heating and, into the 1950s on many estates, with cookers installed. The importance of social services and transfers for income has been highlighted in recent proposals for alternative measures of well-being to that of GDP,[12] but this has yet to leave its mark on studies of consumption. The energy nexus of public housing is an interesting case for exploring the links between public and private consumption in the creation of demand. While the examples in this article are English, its qualitative micro-level approach will, we hope, be of methodological interest for students of energy, everyday life, and consumption more generally.

This article follows the changing configuration of demand from the macro-political context, which framed the availability of different fuels, to the micro-level of households. In the 1930s, the 'freedom to choose' between gas and electricity was the result of a political settlement, reached by parliament. It set the framework for energy provision and use at the local level and forms the natural starting point of our inquiry. In a second section, we look at the reality of freedom of choice in the daily life of council tenants. We then

[9] Vanessa Taylor and Frank Trentmann, 'Liquid politics: water and the politics of everyday life in the modern city', *Past and Present*, 211 (2011), pp. 199–241; Frank Trentmann, 'The politics of everyday life', in F. Trentmann, ed., *The Oxford handbook of the history of consumption* (Oxford, 2012), ch. 26.

[10] Ruth Schwartz Cowan, 'The consumption junction: a proposal for research strategies in the sociology of technology', in Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, eds., *The social construction of technological systems* (Cambridge, MA, 1987), p. 278. For the state, see Lizabeth Cohen, *A consumers' republic: the politics of mass consumption in postwar America* (New York, NY, 2003), ch. 3; J. Logemann, 'Is it in the interest of the consumer to pay taxes? Transatlantic differences in postwar approaches to public consumption', *Journal of Consumer Culture*, 11 (2011), pp. 339–65; Frank Trentmann, *Empire of things: how we became a world of consumers, fifteenth century to the twenty-first* (London, 2016), ch. 12.

[11] Mary E. H. Smith, *Guide to housing* (3rd edn, London, 1989).

[12] Joseph E. Stiglitz, Amartya Sen, and Jean-Paul Fitoussi, 'Report by the commission on the measurement of economic performance and social progress, www.Stiglitz-sen-fitoussi.Fr', (2009), pp. 126–30.

examine sources for traces of what households actually used energy for. This varied enormously, a fact obscured in the general picture of aggregate demand and supply. Finally, we reconnect private use to the public sphere by giving attention to tenants' voice and new forms of knowledge and governance.

I

Price continued to be a significant factor for energy consumption in the twentieth century but did not determine individuals' actual preferences. Price movements of fuels were dramatic in the interwar years. In 1920, it was almost twenty times more expensive to heat and cook with electricity than with coal: by 1938, it had dropped to four times. Gas had narrowed the gap with coal even earlier; cooking and heating with gas cost 60 per cent more than coal in 1920; by 1938, it was merely 45 per cent more expensive. Electricity would benefit further from low pricing during and after the Second World War. What mattered ultimately was not the diminishing price of electricity as such, but the cross-price effects of gas, its principal competitor.[13] By the outbreak of the Second World War, three-quarters of British homes were wired. Electricity controlled lighting – but was also making inroads into cooking and heating. Some 1·5 million electric cookers were in use compared to 9 million gas cookers. One in four households had an electric fire.[14] Other appliances were slower to arrive, especially when compared to the United States; as late as 1955, fewer than one in five British households owned a fridge or a washing machine, compared to 80–90 per cent in the USA. English working-class families lived on tighter budgets. High eviction rates and tenant turnover on many council estates reflected that rents and travel costs were higher than in their previous homes.[15] Working-class tenants mostly used the cheapest available fuel: coal (49 per cent of their fuel expenditure went on coal in 1938, compared to 23 per cent on gas and 15 per cent on electricity).[16] Many relied on coal clubs which eased budgeting by paying for coal on a weekly basis throughout the

[13] Peter Scott and James Walker, 'Power to the people: working-class demand for household power in 1930s Britain', *Oxford Economic Papers*, 63 (2011), pp. 598–624; Sue M. Bowden, 'The consumer durables revolution in England, 1932–1938: a regional analysis', *Explorations in Economic History*, 25 (1988), pp. 42–59; Sue Bowden and Avner Offer, 'The technological revolution that never was: gender, class, and the diffusion of household appliances in interwar England', in Victoria de Grazia and Ellen Furlough, eds., *The sex of things: gender and consumption in historical perspective* (Berkeley, CA, 1996), pp. 244–74.

[14] Hannah, *Electricity before nationalisation*; Anne Clendinning, *Demons of domesticity: women and the English gas industry, 1889–1939* (Aldershot, 2004); Political and Economic Planning PEP, *The market for household appliances* (London, 1945).

[15] See e.g. Ruth Durant, *Watling: a survey of social life on a new housing estate* (London, 1939); Terence Young, *Becontree and Dagenham: a report made for the Pilgrim Trust* (London, 1934).

[16] Scott and Walker, 'Power to the people'.

year. Prepayment meters made temporary non-payment possible and allowed tenants to switch to candles, oil lamps, or the coal range.[17]

Cost was one reason for the slow diffusion of electric appliances; hire purchase restrictions were another.[18] The work of servants and housewives was another and made labour-saving appliances appear less essential. As Bowden and Offer have shown, until the 1960s, most British families preferred to spend discretionary income on furniture, clothes, and home entertainment, such as radio and television, rather than on labour-saving devices such as washers or fridges; although the vacuum cleaner was ubiquitous.[19]

Fuel and light continued to make up a significant portion of the household budget across the twentieth century, especially for the poor. Rigorous comparisons of their precise share across time are, however, complicated by a number of quantitative and qualitative limitations. The Ministry of Labour's survey of 1937–8 working-class households, which underpins Scott and Walker's important article, reported on the cost of energy as share of household *expenditure*. Post-war surveys, by contrast, give figures by *income* distribution. Nor are the social groups surveyed identical. The 1937–8 report focused on non-manual workers as well as manual wage-earners but excluded the long-term unemployed, lodgers, and workers earning more than £250 a year. Massey's survey of the following year studied public sector employees with an income of over £250. It is not possible to compare the changing fortunes of these two samples with the larger and more representative household surveys of 1959 and 1970. In addition, the real price of electricity fell relatively for domestic users after the Second World War, partly because rising demand itself lowered costs, partly because domestic consumers were cross-subsidized by industrial ones – in 1962 domestic consumers paid the same nominal price they had in 1936 (50 per cent less in real value), while nominal prices doubled for industrial consumers. British households paid disproportionately little during the costly peak hours, a time of day when their consumption expanded significantly in the mid-twentieth century thanks to the spread of electric heating; a differential day and night tariff was only introduced in 1962–3.[20] Just as important were changing norms of comfort – as expectations of indoor temperature, domestic habits, and the use of different parts of the home changed, so did the use of fuel. The same percentage of the household

[17] Peter Scott and James Walker, 'Working-class household consumption smoothing in interwar Britain', *Journal of Economic History*, 72 (2012), pp. 797–825; Madeline McKenna, 'The development of suburban council housing estates in Liverpool between the wars' (D. Phil. thesis, Liverpool, 1986).

[18] Great Britain, Department of Trade and Industry, Committee on Consumer Credit, *Report of the committee, chairman: Lord Crowther, etc.*, 1971, Cmnd 4596.

[19] Sue Bowden and Avner Offer, 'Household appliances and the use of time: the United States and Britain since the 1920s', *Economic History Review*, 47 (1994), pp. 725–48.

[20] D. P. Sayers, 'Electricity supply costs and tariffs', *Proceedings of the Institution of Electrical Engineers*, 110 (May 1963), pp. 944–54. Cf. Martin Chick, *Electricity and energy policy in Britain, France and United States since 1945* (Cheltenham, 2007).

budget devoted to heat might therefore have produced greater comfort. The following tables, then, need to be read with caution. Still, they are a reminder of the considerable amount of money that working-class and lower-middle-class households continued to devote to fuel and light, even during the affluent sixties, spending between 7 per cent and 13 per cent on energy (see Table 1).

II

The interwar years saw intense competition between gas and electricity. In some areas, councils and electricity suppliers tried to require new tenants to use electricity for all their household needs. In others, the authorities favoured gas and sought to halt electrification by refusing to permit the laying of mains or prohibiting the canvassing of potential customers on their estates.[21] It was much more economical for public authorities to build housing that relied on one fuel rather than two. All-electric or all-gas installations (which in reality often meant coal plus either electric or gas) were promoted by their respective industries, which often did not recognize the preferences or financial need of consumers for mixed fuel services. In older building stock, dual provision required costly retro-fitting. Offering one energy provider a monopoly, moreover, was a bargaining strategy leading to lower costs for the local authority and, by extension, for local tax-payers and tenants. Conversely, it paid electricity providers to have an exclusive contract for an entire estate and offer favourable terms for wiring and connection, because electricity for cooking and heating promised to absorb a large part of the load otherwise left underutilized by electric lighting on its own.

Several councils in the 1920s and early 1930s championed electricity. Electric wiring meant ceilings could be lower, and electric fires eliminated the need for additional flues. In Tilbury, Essex, the local council laid down in its tenancy agreement that since houses had been equipped with electricity for lighting, heating, and cooking, tenants were prohibited from using alternative fuels or appliances. Doing so was grounds for eviction. The council also tried to add 1*s* a week to the rent for the electric cooker it had installed, regardless of whether a tenant wanted to use it. When the rent increase was rebuffed, the council sent a letter ordering tenants to 'take immediate steps to have the gas cooker removed' and to inform the council accordingly.[22] Fulham (London) and Cardiff tried to make their tenants use electric lighting only.[23]

Such restrictive terms were controversial. Two main forces converged: the special interest of the gas industry and the broader political assault on

[21] Political and Economic Planning, 'Supply of electricity in Great Britain' (London, 1936), p. 53.

[22] House of Commons debates (HC Deb) 18 May 1933 vol. 278 c. 615.

[23] Francis Goodall, *Burning to serve: selling gas in competitive markets* (Ashbourne, 1999), p. 213.

Table 1 *Weekly expenditure on fuel as a proportion of total expenditure, by income or total expenditure, 1937–70*

1937–8 survey (expenditure)[1]			**1938–9 survey of public sector employees (income per head of family)**[2]		
Expenditure band in 2010 prices, £/week	Proportion of total expenditure spent on fuel and light	Base size	Income band in 2010 prices, £/week	Proportion of total expenditure spent on fuel and light	Base size
Under 100	11·3%	*62*	239–335	6·2%	*598*
100–25	9·7%	*131*	335–479	5·8%	*507*
125–49	9·0%	*229*	479–670	5·6%	*186*
149–74	8·5%	*349*	670 and over	5·0%	*69*
174–99	7·8%	*328*			
199–224	7·5%	*284*	*Average for all households:*		
224–49	7·3%	*211*	*429*	*5·9%*	*1,360*
249–74	7·5%	*171*			
274–99	6·6%	*127*			
299–324	7·0%	*101*			
324–49	6·1%	*70*			
349 and over	5·6%	*162*			
Average for all households:					
219	*7·4%*	*2,225*			

1959 survey (household income)[3]			1970 survey (household income)[4]		
Income band in 2010 prices, £/week	*Proportion of total expenditure spent on fuel and light*	*Base size*	*Income band in 2010 prices, £/week*	*Proportion of total expenditure spent on fuel and light*	*Base size*
Under 54	10·9%	*87*	Under 121	13·1%	*626*
54–109	11·5%	*354*	121–81	10·6%	*568*
109–45	9·0%	*152*	181–241	8·6%	*476*
145–81	8·0%	*206*	241–301	7·6%	*581*
181–254	7·7%	*549*	302–62	7·0%	*670*
254–363	6·1%	*808*	362–422	6·6%	*661*
363–544	5·0%	*628*	422–82	5·9%	*651*
544–907	4·1%	*239*	483–543	5·7%	*530*
907 and over	4·4%	*69*	543–603	5·4%	*405*
			603–724	4·6%	*507*
			724–965	4·5%	*463*
			965 and over	4·6%	*255*
Average for all households					
281	*6·1%*	*3,092*	*Average for all households*		
			345	*6·3%*	*6,393*

Notes and sources: Expenditure and income have been converted to 2010 prices using RPI values from Gregory Clark, 'What were the British earnings and prices then? (new series)'; MeasuringWorth, 2016, www.measuringworth.com/ukearncpi/; 1938 values have been used for the 1937–8 and 1938–9 surveys.

[1] Ministry of Labour and National Service, *Weekly expenditure of working-class households in the United Kingdom in 1937–1938* (London, 1949).

[2] Philip Massey, 'The expenditure of 1,360 British middle-class households in 1938–1939', *Journal of the Royal Statistical Society*, 105, 3 (1942), pp. 159–96.

[3] Ministry of Labour, *Family expenditure survey: report for 1957–1959* (London, 1961).

[4] Department of Employment, *Family expenditure survey: report for 1970* (London, 1971).

municipal socialism, as the Conservative tide turned against Labour-dominated councils that controlled public services of energy and transport. The Electricity Act of 1926 weakened the power of local authorities over electrical supply in what became the National Grid. In the area of the London County Council (LCC), the Passenger Transport Act further took away the power of East Ham, Barking, and other local authorities to run their own trams. In 1925, 'freedom of choice' in fuel was enshrined in the Newport Corporation Bill. Efforts to expand the principle came both from the National Gas Council and the Ministry of Health. In 1932, the Kettering Gas Company went to parliament to stop Kettering Urban District Council from forcing electricity on its tenants. The private bill was successful and immediately sparked attempts to extend the clause to other areas. The following year, the London-based Gas Light and Coke Company – which served 1·4 million customers – pressed successfully for a similar clause that prevented the thirty-one local authorities in its area from restricting tenants' choice over lighting and heating.[24]

In the House of Commons in 1934, the Liberal National MP for Luton, Dr Burgin, referred to fifty-six cases in his constituency of tenants forced to light candles or use oil because they could not afford the electricity forced on them by their municipalities.[25] Some MPs reported that local authorities had poured cement into gas pipes – or had cut through pipes while the meter was still running.[26] It was now that legislation applied the principle of freedom of choice to all local authorities, preventing them from prohibiting or deterring any occupier from taking a supply of gas from an authorized supplier.

'Freedom of choice' legislation has not gone completely unnoticed by historians,[27] but its significance for framing energy provision and use has yet to be appreciated. It was national politics that preserved a degree of flexibility about fuel type and appliances, reduced technological lock-in, and slowed electricity's advance. The LCC compromised accepting dual provision provided that gas and electricity undertakings paid for the necessary pipes, wires, and services without placing an additional charge on local taxes. Tenants were given the right to switch to their preferred fuel for cooking and heating, as long as they asked the council for permission, bought and installed their own cooker, and restored the home to its original state on moving out.

[24] Newport Corporation Act, 1925, 15&16 Geo. 5, The National Archives (TNA), HLG 54/282, ch. 56, col. 12(6), p. 11. See also Will Thorne (Lab.) in HC Deb 18 May 1933 vol. 278 cc. 605–8; the exchange between Walter Womersley (Con.) and Arthur Greenwood (Lab.) HC Deb 8 July 1930 vol. 241 cc. 291–7; Herman Finer, *Municipal trading* (London, 1941), pp. 396–7; Stirling Everard, *The history of the Gas Light and Coke Company, 1812–1949* (London, 1949), p. 347.

[25] HC Deb 15 June 1934 vol. 290 c. 2099.

[26] HC Deb 18 May 1933 vol. 278 cc. 615; and HC Deb 18 May 1933 vol. 278 cc. 629–30.

[27] Clendinning, *Demons of domesticity*, p. 227; Goodall, *Burning to serve*, p. 214; Hannah, *Engineers, managers and politicians*, p. 82.

There was nothing inevitable about this compromise between gas and electrical interests. It was a political settlement underpinned by ideas about citizenship, property rights, and the relative powers of public providers and private utilities. Parliamentary debate about 'freedom of choice' came on the heels of the world recession and the 1931 political crisis that finished the second Labour government and gave rise to a Conservative-led national coalition. Amongst the victims of the crisis were independent Liberals and their most cherished policy: free trade between nations. However, as far as trade and competition at home was concerned, the post-1931 alignment was an opportunity to block the creeping municipalization associated with Labour. In the late nineteenth and early twentieth centuries, municipal bodies took over the bulk of utilities. Although in London, the private Gas Light and Coke Company and the South Metropolitan Gas Company dominated, in gas and electricity, public utilities outnumbered private companies by 3:2 in the early 1930s.[28] The debate over fuel in public housing connected a liberal defence of individual freedom with anxieties about government control of natural monopolies. Frank Briant, one of the few independent Liberal MPs, told the House of Commons in 1932, '[s]ome of my Socialist friends seem to want to make us live under conditions imposed by someone else who does not know our wants. I know my own wants.' Whether or not a person wanted a gas fire, was 'purely a private matter': 'an Englishman's home is his castle [and] I strongly resent interference by a landlord, whether municipal or private, with a man's judgement as to his own convenience and taste'.[29]

Conservatives agreed. According to Herbert Williams, the Conservative MP for Croydon South, local authorities were abusing their power as landlords and coercing their tenants.[30] To give council tenants a subsidy with one hand, but take away the ability to choose cheap fuel with the other, was also 'illogical', the Conservative MP Alfred Wise (Smethwick) said; mocking Labour's enthusiasm for electricity, he stressed that he only used gas for cooking and had 'not yet progressed to the height of wealth or passion of cleanliness' of the socialist Labour MP for West Walthamstow, Valentine McEntee.[31] The fight between tenants and municipalities was another historic parliamentary battle between free Englishmen and tyranny.[32] For Conservatives, the whole matter cast more general 'doubts on the wisdom of making municipalities landlords and giving them the control of big industrial undertakings'.[33]

[28] Scott and Walker, 'Power to the people', p. 602; Hannah, *Electricity before nationalisation*, p. 214; Robert Millward, *Private and public enterprise in Europe: energy, telecommunications and transport, 1830–1990* (Cambridge, 2005).

[29] HC Deb 14 Mar. 1932 vol. 263 cc. 132–3.

[30] HC Deb 15 June 1934 vol. 290 cc. 2102–3.

[31] HC Deb 18 May 1933 vol. 278 cc. 617–18.

[32] Edward Tempest Tunstall North, Conservative MP for Nuneaton, *Times*, 15 Mar. 1932, pp. 8–9; and HC Deb 14 Mar. 1932 vol. 263 cc. 138–40.

[33] Oswald Lewis (Colchester), HC Deb 14 Mar. 1932 vol. 263 cc. 154–6.

With more and more councils entering the housing market and running their own electrical utilities, there was a risk of monopoly and collusion. Protecting tenants' right to choose their fuel would help defend private utilities against the Leviathan of state enterprise.

Interestingly, Labourites invoked property rights to demand local authorities be 'masters in their own house', just like private landlords.[34] But these were minority views. When it came to provision within public services, consumer choice beat property rights. Even the two Labour MPs for West Ham who favoured nationalizing industry accepted that municipalization should not overrule a tenant's right to choose.[35]

III

What was the effect of this political principle for tenants, for the infrastructures of their homes and for consumption? To have freedom of choice between a stable set of services was one thing. To have it in an environment where infrastructures, standards, and the services themselves were changing fast, another. Gas and electricity competed first over lighting, then over cooking, and by the mid-twentieth century over the biggest use of household energy: the heating of space and water. Solid fuels (coal or coke) had dominated here. Water heating was linked to space heating; coal fires and ranges heated water in kettles or in a back boiler that used some of the heating stove or cooking range's output to heat water. In the 1950s and 1960s, new public housing with additional wiring and central heating transformed infrastructural provision and capital costs. Changes like these redefined freedom of choice for tenants, councils, and energy providers.

In reality, 'freedom of choice' did not result in the dual provision of all services but in a division of services between gas and electricity. Amendments to the 1933 bill threw out the requirement to install dual provision for gas and electric lighting. In London and other cities, tenants in new council housing had electric lighting from the outset. And 'freedom of choice' was not the same as the right to electric wiring. Public housing in Stocksbridge, for example, was almost exclusively dependent on gas until the Second World War.[36] In London, equity between gas and electricity was regional rather than individual. The 50/50 split between gas and electric wash boilers that the LCC observed from 1945 into the late 1950s meant that on some housing estates tenants did their laundry with gas wash boilers while on others they used electric ones. There was little choice from a tenant's point of view. On new estates, however, kitchens did have both gas and electric points for a

[34] HC Deb 14 Mar. 1932 vol. 263 cc. 115–16.

[35] HC Deb 18 May 1933 vol. 278 cc. 611–13. The Plaistow MP was a former gas worker and the LCC's Beckton Gas Work was close to the Silvertown constituency.

[36] Housing at the Royd, 17 May 1938, Stocksbridge Urban District Council minute book, SA, CA 61/2.

cooker; a gas point was also provided for heating in the first bedroom.[37] Tenants then had to hire appliances from authorized suppliers. In practice, then, 'freedom of choice' provided tenants with negative liberties rather than positive rights. They did not have a right to a particular fuel, but they were allowed to install particular appliances at their own expense. Choice depended on what infrastructures public housing came with in the first place. In council housing in 1930s, London this included electric lighting. A tenant who wanted gas lighting could not be refused but had to obtain the council's consent and meet 'reasonable' conditions, for example, adding a gas fitting on the wall if electric lighting had been installed in the ceiling.[38] In a place like Stocksbridge, where only gas reached council housing at the time, such freedoms were meaningless. The council only began installing electric light in 1937.[39] Stevenage New Town, by contrast, offered its tenants the choice of gas or electric fuel for cooking from its foundation in 1947.

The position was equally varied with regard to appliances. London and Stevenage provided their homes with fewer built-in appliances and left it to tenants to obtain a cooker and wash boiler of their choice from a separate supplier – mostly rented or by hire-purchase – whereas Stocksbridge directly installed cookers and wash boilers until the late 1960s; after 1969, all tenants except old age pensioners had to provide their own cooker, and existing cookers became the property of current tenants. After the war, the LCC introduced electric immersion heaters alongside coal fires in all houses and flats. This was less about giving tenants a chance to switch completely from one fuel to another than about enabling them to adjust their fuel mix seasonally, with coal automatically heating both space and water in winter and the option of using electricity to heat water only in summertime.[40]

Making freedom of choice a reality could be expensive for tenants. In December 1952, for example, Stevenage Corporation decided to install electric immersion heaters in new houses where tenants wanted these – at an additional 7*d* of rent per week. The Gas Board objected that tenants had not been given a fair choice. The corporation stuck to its decision and installed electric immersion heaters in all houses that did not have solid fuel boilers. It did 'not consider that the gas heaters were economic to run'. However, a provision was made for the installation of gas water heaters over sinks, 'which would be provided if the

[37] Rawlinson to deputy director of housing and deputy valuer, 9 Jan. 1954, 'Gas and electricity supplies for permanent housing', London Metropolitan Archives (LMA), GLC/HG/HHM/10/L055, part 2, development & construction, heating & hot water services.

[38] Report by valuer, 3 May 1933, LMA, GLC/HG/HHM/10/L001, gas bills and various acts: correspondence and reports.

[39] In the 1950s, however, the Electricity Board used freedom of choice to force Stocksbridge council to install further power points and to offer new tenants the choice between gas or electric cookers. Special Housing Committee, 24 Mar. 1955, SA, CA60/29, Stocksbridge Urban District Council minute book 1954–5.

[40] Memorandum on supplies to LCC block dwellings, 10 Dec. 1947, LMA, GLC/HG/HHM/10/L055, part 2, development & construction, heating & hot water services.

tenant so wished'. The corporation agreed to pay the initial capital cost, but ultimately it would be 'recovered from the tenant by an addition to the rent'.[41]

When tenants exercised their right to choose gas or electric cookers and heaters, they also chose for the next generation of residents. On estates in London, a 1974 investigation revealed that council tenants had fitted thousands of flue-less gas cookers, and had had 14,000 gas sink water heaters installed by the council.[42] Such decisions could be costly. In Stocksbridge in 1953, the council ruled that tenants who had installed electricity at their own cost would not be compensated when leaving and that new tenants would nonetheless automatically be charged an additional 9*d* a week in rent, the same that the council charged when it put in electricity itself.[43] Freedom of choice had become an excuse for raising the rent. By the early 1960s, tenants were granted permission to remove the pantry and fit a refrigerator in its place, but had to agree to leave behind the refrigerator for the next tenant.[44] Such additional charges and outlays mean that available budget surveys probably underestimate the true share of energy in the household budget.[45]

In the early 1930s, it had been the gas industry that had rallied behind 'freedom of choice'. By the 1950s, it was electricity boards. In 1955, in Stocksbridge, for example, the local council was under pressure from central government to cut the costs of new housing. Initially, solid fuel central heating was used but this was shelved in May 1950 in favour of 'modern' New Marathon solid fuel fires. Subsequent plans to install these in fifty houses on the Stubbin Farm estate, though, were cancelled to save costs.[46] Electricity now was to be limited to light and a few plugs and the council opted for the cheapest available gas cookers and gas wash boilers.[47] The Electricity Board argued that it could only electrify the houses for free if there were 'adequate facilities…to give all tenants a freedom of choice' and ensure 'a substantial use of electricity which would make their schemes fully economic by producing

[41] 173rd meeting of the corporation, 10 Nov. 1953, Hertfordshire Archives and Local Studies (HALS) CNT/ST/1/1/1, minute book 1953. Gas and electric providers tried to outbid each other with special tariffs for councils; see, e.g., Crowther to Lee, 9 Aug. 1939, SA, CA87/2, housing generally, Jan. 1939–Dec. 1946. For similar strategies in private suburbia, see Peter Scott, *The making of the modern British home: the suburban semi and family life between the wars* (Oxford, 2013), pp. 170–1.

[42] Reply to question in council regarding the number of flue-less gas appliances in the council's dwellings, 1974, LMA, GLC/HG/HHM/10/L001, gas bills and various acts: correspondence and reports.

[43] Council meeting, 26 Mar. 1953, and Housing Committee, 18 Nov. 1952, SA, CA60/27, Stocksbridge Urban District Council minute book 1952–3.

[44] 20 Sept. 1964, SA, CA87/4, housing generally, Sept. 1963–Dec. 1964.

[45] Scott and Walker, 'Power to the people'.

[46] Council meeting, 26 Aug. 1954, SA, CA60/29, Stocksbridge Urban District Council minute book 1954–5.

[47] New World S4183 gas cooker (£17 14*s* 8*d*) and the 20a Elton Gas Wash Boilers (£5 5*s* 0*d*).

revenue adequate to cover the heavy capital costs'.[48] It demanded a capital contribution charge of £21 per house, unless the next 123 houses on the Stubbin Farm estate got an extra power point in the kitchen and tenants were asked what type of cooker they wanted. The council caved in, and took some of the gas cookers back into store. On one part of the Stubbin Farm estate, twelve tenants chose gas cookers, twenty-nine electric ones, and three brought their own.[49]

As central heating advanced in the 1950s and 1960s, the principle of 'freedom of choice' was increasingly invoked by competing suppliers jockeying for market share. In 1956, the Local Authority Associations and the Electricity and Gas Boards agreed that the Boards would not charge capital contributions if tenants were given the freedom to choose the fuel for their main domestic use. Central heating made this formula all but meaningless, since the fuel picked for central heating by the developers and local authority was also the preferred fuel to heat water, whether tenants liked it or not.

Stevenage illustrates how rising standards and new energy systems that favoured one fuel triggered increased demands for provision of the other. The Parker Morris report (1961) encouraged central heating, making higher standards of housing mandatory for new towns in 1967 and for all council housing two years later; dwellings had to have heating systems that kept the kitchen and circulation space at 13 degrees Celsius, and living and dining spaces at 18 degrees when the outside temperature dropped below -1 degree.[50] This was achieved by installing various forms of central heating. In the 1960s, most central heating in Stevenage New Town was by gas, although flats in Martins Wood had electric storage heaters. Initially, the Electricity Board was pressing for freedom of choice for cooking and an equal share of central heating. In 1964, it successfully tested off-peak, electric warm-air heating systems in eleven houses in Trotts Hill. Stevenage Corporation, however, continued to favour gas, which its heating consultant considered cheaper and more advanced. Without an equal share of the heating market, the Electricity Board pressed the town to at least fit all houses with electric immersion water heaters. The Corporation had already fitted some immersion heaters in the past and by 1970, 10,000 out of 14,000 dwellings had them. Still, the Board was not satisfied and in 1969 demanded £23,406 in retrospective connection charges. Stevenage Corporation refused. A year later, in 1970, the conflict was finally settled when the Gas Board agreed to pick up part of the connection charges for electricity, in exchange for controlling the heating market, a

[48] Electricity Board circular of 1 Oct. 1954 and letter of 26 Jan. 1955, read at the Housing Committee, 15 Feb. 1955, SA/CA 60/29, Stocksbridge Urban District Council minute book, May 1954–May 1955, and for the following point.

[49] Housing Committee, 18 Sept. 1956, SA, CA60/31, Stocksbridge Urban District Council minute book 1956–7.

[50] John Burnett, *A social history of housing, 1815–1985* (London, 1991).

quid pro quo settlement repeated elsewhere in England.[51] Freedom of choice for the tenant had transmuted into fair shares between suppliers.

Freedom of choice thus boosted demand from two directions. The first originated with tenants, who were allowed (at a cost) to install additional appliances. Some of this was about substitution, such as wanting a gas cooker instead of an electric one (or vice versa). In other cases, it brought altogether new appliances and, with it, higher levels of use. The tenants who demanded electric immersion heaters in 1950s Stocksbridge fall into this category. The second came from energy providers themselves. Freedom of choice here legitimated competing suppliers' encouragement of greater demand. As consumption of one fuel went up in one part of the home (such as the use of gas in central heating), providers of the competitor fuel fought to secure new outlets for themselves. Choice was no longer just about meeting present demand but about building future demand into the fabric of the home with additional points, wiring, and appliances. Higher housing standards, such as the Parker Morris standard, gave this momentum an added push.

IV

So far, the discussion has focused on the infrastructural capacity of the home. Capacity matters, but it is not the same as demand. How did tenants actually use the equipment for heating, cooking, and lighting? The following section explores tensions arising from unforeseen practices and complaints about inadequate provision.

Housing estates were planned with categories of imagined users in mind. In some cases, homes were divided into 'better' or 'normal' grades with different energy capacities. Councils also redesigned homes in anticipation of future lifestyles. In London, the LCC ensured that larders could hold a refrigerator from as early as 1945.[52] In 1961, Stevenage Corporation decided that kitchens would have a space for a refrigerator, even though working-class homes still relied on a larder. Some council members called for fittings for a radiator in the hallway, again to meet an anticipated rise in standards.[53] In 1945, Stocksbridge decided to increase 'comfort' in its post-war houses by installing central heating, although the policy was reversed in May 1950, when a newly elected council cut the housing budget and brought back the fireplace.[54]

[51] Finance Committee, 26 Feb. 1970, appendix A, minutes of 369th meeting of the corporation, 8 Dec. 1970, p. 5, and general manager's report, HALS, CNT/ST/1/2/2/40, box 10, corporation agenda and reports July 1970.

[52] LCC, *A survey of the post-war housing of the London County Council, 1945–1949* (London, 1949), p. 69.

[53] 258th corporation meeting, Planning Committee, 17 Jan. 1961, HALS, CNT/ST/1/1/1, minute book 1961.

[54] A Labour member (Mr Rains) pushed for the change in policy, so this was not a clear-cut party-political issue. Housing Committee, 31 May 1950, SA, CA60/25, Stocksbridge Urban District Council minute book 1950–1.

The switch from one fuel to another sometimes had unintended knock-on effects on existing equipment. Where gas wash boilers could not be adapted to electric ones because they would have overloaded the circuits, for example, the LCC eventually asked the Gas Board to install salvaged convertible ones.[55] The conversion to natural gas from the 1960s posed particular problems; natural gas burnt hotter than town gas, requiring burners to be adjusted or appliances replaced. In London in the early 1970s, the council discovered only after the introduction of natural gas that some gas fires could not be converted. Those with an insufficient flue had to be removed and replaced with electric fires, whether tenants liked it or not. The substitution prioritizd shared living spaces and many tenants thus lost heating in their bedrooms; the LCC made an exception for pensioners and the disabled. The Barking Consumer Advisory Council and tenants' associations responded with petitions and demands for rent reductions.[56]

What the wires and pipes reaching in and out of the home eventually demanded in reality was the result of what tenants actually did. The gap between demand and capacity could cut both ways. Tenants overloaded circuits, sometimes requiring an entire building to be rewired. They were often frustrated by the small number of electric sockets. The British story here parallels that on the continent and cautions us against imagining developers, energy providers, and producers as always joining forces to manufacture demand.[57]

Just as importantly, though, demand also sometimes fell below the level for which the home and supporting infrastructures had been designed, damaging the property. In Stevenage, 11 per cent of council dwellings showed frost damage in February 1963. This was partly the result of an unusually harsh winter, but it also reflected shifting work and social patterns that changed the use of the home in ways not anticipated by town planners, architects, and engineers. The rise in female employment, in particular, meant more homes were unoccupied and unheated for longer periods of the day.[58] In multi-storey buildings, heating in flats varied sharply, exacerbating problems with condensation. In London in 1971, officers of the Greater London Council (GLC) estimated that 10 per cent of dwellings on the worst affected estates suffered from condensation.[59] In Stevenage as in Stocksbridge, tenants were reluctant to raise the

[55] Memorandum to the senior assistant director 'H', conversion to natural gas, 8 May 1970, LMA, GLC/HG/HHM/10/L068.

[56] Barking Consumer Advisory Council to chairman of the LCC, 22 Mar. 1972, and director of housing to Miss Marshall, 24 Oct. 1974, LMA, GLC/HG/HHM/10/L068, conversion to natural gas.

[57] As late as 1964, 41 per cent of flats in Germany still had only one socket in the kitchen, and 4 per cent had none at all, *Energiewirtschaftliche Tagesfragen*, 14/123 (1964), pp. 155ff.

[58] 282nd and 283rd corporation meeting, 12 Feb. and 12 Mar. 1963, HALS, CNT/ST/1/2/2/26, corporation agenda and reports Jan. 1963 and HALS, CNT/ST/1/1/1, minute book 1963.

[59] 'Condensation and mould growth on council estates', Housing Committee, 27 Jan. 1971, LMA, GLC/HGH/HM/03/A224, heating 1971, part 4. In 1943, Mass-Observation found that

heat in order to reduce it.[60] At the same time, inhabitants often used intermittent, rapid-response heating systems (e.g. gas warm air as opposed to continuous coal fires) while new building materials reduced ventilation and the capacity to store heat. Many engineers and housing managers blamed the condensation in post-war housing on changing lifestyles, such as the rise in showering.[61]

Tenants were at times troublesome users who put considerable strain on infrastructures and local authorities. In addition to overloading circuits, some blocked up the hot air grill in the sitting room.[62] Others took plugs and the cooker with them when moving out. Housing inspection reports in Stocksbridge in 1964–5 give a snapshot of the state some dwellings were left in. In 2 Lilac Avenue, the tenants had taken with them three plugs and the ceiling light in the living room. Other homes were left in 'grim' conditions with broken plugs or without a gas and electric meter.[63]

These were forms of transgression or 'exit', but tenants also exercised their 'voice'. The use of fuel was intimately linked to expectations of comfort, and new infrastructures changed people's sense of what was fair and 'normal'. Energy adds an interesting dimension to our understanding of consumer politics and casts the period between the rent agitation of the 1880s/1890s and the privatization of council housing in the 1980s in a new light. Tenants did not suddenly become more demanding in the era of post-war affluence. Tenants raised their voice in the interwar years, encouraged by promises of 'homes fit for heroes' and the marketing of gas and electricity. There was also a growing awareness that standards were rising in public housing and higher than in private accommodation.[64] In London, tenants' associations were already asking the LCC to extend electric lighting in 1920.[65] A decade later, a dozen tenants on the Shay estate in Stocksbridge complained about the 'vast

complaints about damp were disproportionally high in older housing stock: Mass-Observation, *An enquiry into people's homes* (London, 1943), pp. 134–5.

[60] Planning Committee, 7 July 1965, HALS, CNT/ST/1/1/1, minute book 1965; Housing Committee, 13 Apr. 1972, SA, CA60/46, Stocksbridge Urban District Council minute book 1971–2.

[61] S. I. Benson, 'Condensation in housing: management consideration', *Housing: The Journal of the Institute of Housing Managers*, 2, 3 (1966), pp. 27–33; J. B. Dick, 'Condensation in perspective', *Building Services Engineer*, 40 (1972), pp. 89–91.

[62] P. H. W. Parish to Stevenage Development Corporation, 1 Jan. 1968, HALS, CNT/ST/5/1/AP/N9, neighbourhood no. 6 Pin Green, vol. 2, Apr. 1967–Mar. 1970.

[63] Housing inspection reports, 1962–5, SA, CA92/1.

[64] David Englander, *Landlord and tenant in urban Britain, 1838–1918* (Oxford, 1983); Peter Shapely, *The politics of housing: power, consumers and urban culture* (Manchester, 2007). As late as 1967, 52 per cent of privately rented housing had no internal WC and 52 per cent also lacked hot and cold water at three points, compared to 12 per cent and 15 per cent respectively in council housing.

[65] William Parish (London County Council Tenants' Association) to director of housing, 16 Nov. 1920, LMA, GLC/HG/HHM/10/L71. In Tooting, there was considerable interest in having electric lighting among tenants living to the east of Franciscan Road (the west side

difference in the conveniences of houses on the estate'. Why should they have to pay the same rent as neighbours who had a range in the kitchen as well as the front room, while they had to make do with 'the low type of Grate with oven that you have to kneel to attend to, and you can only get one pan on [the] fire'?[66] In 1941, the tenants of Wilson Road in Deepcar and parts of Shay House in neighbouring Stocksbridge complained about a rent increase, pointing to houses on the Spink Hall estate that enjoyed superior amenities of electric light and 'decent fire ranges' but paid lower rents.[67] Tenants thus came to demand higher standards already before the Parker Morris Committee drew up new official benchmarks in 1961.

In the long run, tenants' voice and official standards were mutually reinforcing. Poor construction and flawed design translated into long-term costs, with tenants understandably concerned about added responsibility for maintenance, repairs, and redecoration. Damp and condensation were a growing source of complaint. In Stevenage, residents complained about damp and fungus almost from the moment they moved into council homes in the new town in the early 1950s. The corporation put air bricks in affected walls and treated spots with fungicide and emulsion paint. Residents were asked to help by washing their walls. As all involved acknowledged, damp and mould were not limited to Stevenage: '[t]he problem is nation wide'.[68]

It is not possible to disentangle the precise role played by changes in the built environment and changes in cultural sensitivity. Surveyors did not specify degrees of damp and mould or the levels of moisture, but tenants were certainly becoming more vocal about it. In Stocksbridge, they complained that damp exacerbated their rheumatism, caused fungus to grow, and spoiled paint and furniture. In January 1942, a young woman wrote to the council describing conditions in her parents' bungalow. Their bedroom

> is damp in Summer as well as in Winter, it has a Gas fire built in the wall which is most inadequate and very expensive, if this fire is on for 12 hours it doesn't bring the temperature of the room up to more than 50 degrees F [10 degrees Celsius]. I have known times when the damp has rested on top of the blankets like dew.

She wanted her parents to get a regular coal fire. The surveyor found 'no obvious defect such as leaking roof, defective walls, or lack of surface concrete' and blamed the 'coldness' that resulted on the 'remote position from [the]

already had it), but also concern about higher rents; Tooting Tenants' Association to director of housing, LCC, 15 Dec. 1920.

[66] E. Hall, E. Baddeley et al., letter to Stocksbridge District Council, submitted to monthly council meeting, 30 June 1929, SA, CA87/1, housing generally.

[67] Petition, Wilson Road, 8 Jan. 1941, and Shay House Petition (n.d.), council response by acting clerk, 31 Jan. 1941, SA, CA87/2, housing generally, Jan. 1939–Dec. 1946.

[68] Tripartite meeting between the Stevenage Development Corporation, the Urban District Council, and the Residents' Federation, 28 July 1955, quoted at p. 2, HALS, CNT/ST/4/1/T15/1, box 127, vol. 3.

main fireplace, the length of external wall, and the position of the house'. He agreed that an 'ordinary fire is more desirable than a gas fire under these circumstances'. [69] In this case, the lay-out of the house was a main culprit. In other cases, surveyors pointed their finger at tenants. In Stevenage in 1965, for example, the investigating chief estate officer acknowledged some constructional defects on Archer Road but stressed how many tenants on those blocks aggravated the situation by keeping their windows firmly shut when leaving for work, blocking off the larder vents or using paraffin heaters – a gallon of paraffin, he noted, produced a gallon of water vapour.[70]

Expectations of warmth were changing, too. In 1943, Mass-Observation found that one in eight residents on newer housing developments spontaneously complained about being cold.[71] In oral histories conducted in 2014–15 by the DEMAND research group, tenants in Stocksbridge recalled how into the 1950s and 1960s clothes were routinely warmed in the oven, coats were worn indoors ('woolly heat') and mothers would iron the bed before sending their children to sleep or slip in a hot brick in a pillowcase.[72] The arrival of central heating was often recalled as miraculous. As one woman (b. 1963) remembered the change that reached her young family in the mid-1980s: 'The council were very very good, they, you'd have to pay a little bit more rent but the council actually installed the central heating…Just not dreading the winter. Not dreading it at all.'[73] The revolution in comfort, however, should not be exaggerated. In many cases, the warm air was pumped through slots in the ceiling, leaving people with cold feet.

Rising standards of warmth were winning out, but at a social cost. 'We were more together when we had the fire', a mother (b. 1938) recalled life before the mid-1970s.[74] The main fire brought family members together in front of the radio and television. Central heating dispersed them into their own comfy rooms or the kitchen. It did not, however, kick-start this centrifugal process singlehandedly. Already during and immediately after the Second World War, British households had purchased millions of portable electrical and gas heaters trying to beat coal shortages.[75] These opened up new zones

[69] Miss C. Morton to Stocksbridge council chairman, 16 Jan. 1942, and Douglas E. Robinson to councillor H. Bradbury, 21 Jan. 1942, SA, CA87/2, housing generally, Jan. 1939–Dec. 1946; it is unclear whether the council granted the request.

[70] Chief estate officer report 'Dampness in dwellings', contract 594 – Pin Green East Housing – Fairlands, 16 Feb. 1965, HALS, CNT/ST/5/2/18, departmental.

[71] Mass-Observation, *An enquiry into people's homes*, p. 138.

[72] 'Oral histories of homes and daily lives in Stocksbridge and Stevenage', interviews conducted by Nicola Spurling and Lenneke Kuijer (DEMAND centre) in 2014–15, UK Data Service, 852575, http://reshare.ukdataservice.ac.uk/, see esp. interviews SB5, SB6, see also STV7 and STV10; 'woolly heat', quoted from STV14.

[73] 'Oral histories of homes', STV7, interviewed on 13 Nov. 2014.

[74] 'Oral histories of homes', interview STV4.

[75] Leslie T. Wilkins, *Social survey: domestic utilization of heating appliances and expenditures on fuels in 1948/1949* (London, 1951).

for leisure and work. There was a parallel shift to separate bedrooms, even for children. Without heat in bedrooms, however, these remained primarily places for sleeping. A survey of 4,000 housewives by the Building Research Station in the early 1960s found that many mothers were surprised by the very question whether their children entertained friends in their rooms.[76]

By the late 1960s, the minimum temperatures laid down by the Parker Morris standard provided a shared point of reference. In January 1969, the residents' association of the completed Martins Wood houses in Stevenage complained: while 'it was possible for the heating system to meet the design specifications with normal outside temperatures, as soon as it really became cold the heating system failed to cope and even at the design temperatures many people were cold at the lower levels in the room'.[77] In the same year, the Women's Section of the Bedwell Labour party in Stevenage collected tenants' complaints about damp and mould in the lobby, ground floor WC, kitchen, or larder.

Many councils upgraded their estates in response to such vocal tenants. In Stevenage, the corporation had begun fitting a newer type of solid fuel fire, the Parkray 66, with two radiators in 476 houses of the C5 type, with 'marked improvements in combating condensation and mould growth in this area'.[78] This scheme continued, but tenants who were able to afford it were now urged to take part in the corporation's general scheme for installing central heating.[79] Both schemes were paid for out of rent increases. In addition, the corporation agreed to install electric extractor fans (with 1*s* 3*d* per fan per week added to the rent), additional power points where requested by tenants who had 'satisfactory rent records' (with 3*d* added per point per week), and stainless steel sink units (2*s* 6*d* per week). In Stevenage, at least, the local authority finally relieved a tenant of 'some part of his liability for redecoration' at the end of their tenancy for changes they had made, including improvements to the bathroom and the removal of the larder.[80]

V

Within these broader pressures for greater demand, energy use continued to vary considerably by class, region, and housing type. In 1942, the Wartime Social Survey found that among working-class families earning less than £160 a year, 35 per cent used a 'copper' – an in-built pan or vat large enough to

[76] W. V. Hole and J. J. Attenburrow, *Houses and people: a review of user studies at the Building Research Station* (London, 1966), pp. 25–9.

[77] 349th corporation meeting, Martins Wood, 18 Feb. 1969, HALS, CNT/ST/1/2/2/38, box 9.

[78] 358th corporation meeting, Bedwell and Monkswood Survey, 9 Dec. 1969, ibid.

[79] General manager's report, estates, improvements of existing dwellings, central heating, and hot water supply, 14 Apr. 1970, 362nd corporation meeting, HALS, CNT/ST1/2, box 10.

[80] 359th corporation meeting, 13 Jan. 1970, ibid.

do the laundry in, heated by the same solid fuel used for the cooking range – to heat the water for their laundry, 25 per cent had a gas boiler, 20 per cent boiled water in pans and kettles on a fire, and a mere 2 per cent used an electric boiler. The percentage using gas boilers and electric boilers for laundry rose to 30 per cent and 4 per cent respectively in the next income bracket (£160–300 a year).[81] Four out of five low-income working-class households (on less than £160 a year) heated only a single room in February and March. Amongst better-off working-class respondents (earning £160–300 a year) the figure was 70 per cent. Equally important were differences between types of dwelling that cut across the same social group. Among affluent working-class tenants living in a house, 23 per cent heated two rooms compared to 37 per cent of those living in flats.[82] Solid fuel for heating water was more commonly used in Scotland, the north of England, and the Midlands than in the south and south-west, which relied more on gas and electricity.

On the same council estate, homes in different eras of fuel and power co-existed. In London, the last group of council homes built before the Second World War relied on an impressive range of fuel and facilities to heat water. On the Chingford and Kidbrooke developments, tenants in a two-room flat heated their bathwater in a solid fuel coal copper, while those in a 'normal' size cottage had a three-point gas water heater in the kitchen which fed the bath as well as wash basin and sink. By contrast, 'better-class' more expensive houses at Becontree and Hanwell all had gas points in the bathroom, in addition to an independent boiler or a back boiler heated with coal in the kitchen. Flats in block dwellings had either a coal copper or gas water heater.[83]

Cooking apparatus and practices varied similarly. On the eve of the Second World War, many working-class households used their living room coal or coke grates for cooking as well as heating. By contrast, in Levita House on the Ossulston estate in Camden, London, completed in 1931, tenants considered the combined range and grate 'unsatisfactory…so that the whole of the family cooking, other than perhaps the boiling of water in the winter months, was done on the electric cooker'.[84] Space heating saw similar divergence into the so-called era of affluence after the Second World War (see Table 2).

Diverse habits and conventions happened behind closed doors and are difficult to catch, but the spectrum of variation becomes visible at moments when actual household demand became the subject of controversial investment decisions. In September 1936, the Southern Metropolitan Gas Co. announced

[81] The Heating and Ventilation (Reconstruction) Committee of the Building Research Board of the Department of Scientific and Industrial Research, *Heating and ventilation of dwellings, post-war building studies no. 19* (London, 1945), p. 177.

[82] Ibid., p. 156.

[83] H. Westwood (LCC valuer), 10 Dec. 1943, GLC, HG/HHM/Lo55, part 1.

[84] Notes of a meeting between the LCC valuers, the Gas Light and Coke Company, the chief engineer's department, and the architect's department, 14 Oct. 1938, GLC, HG/HHM/Lo55, part 1.

Table 2 *Varieties of heating used in the early 1960s*

Stocksbridge	East Whitwell (houses of different types)	Gas warm air heating or electric under-floor storage heating
Stevenage	Pin Green (most houses)	Open fire, back boiler + a radiator
	Pin Green (large houses)	Gas warm air heating
London	Flats up to six storeys and houses	Solid fuel fireplace/stove in living room
	Blocks of flats higher than six storeys	Central heating, or electric under-floor, or gas warm air

Sources: Council meeting, 25 Feb. 160, SA, CA60/34, Stocksbridge Urban District Council minute book 1959–60; LCC, *Housing type plans, enlarged edition* (London, 1960); memorandum from chief estate officer to chief executive architect, 'Gas heating in flats Fairlands and Sishes End', 13 Sept. 1967, HALS, CNT/ST/5/1/AP/N9, vol. 2, Apr. 1967–Mar. 1970, neighbourhood no. 6 Pin Green.

plans for a switch from a single tariff (8¾*d* a therm regardless of quantity) to a three-step tariff that favoured heavier users, as an attempt to get the LCC to promote further gas appliances on its estates. Was the gas company courting existing demand or trying to create future demand? In 1934, Labour had gained control of the council from the Municipal Reform party in a hard-fought campaign focused heavily on housing.[85] Given the capital investment at stake and potential costs for its tenants, the LCC had a natural interest in investigating tenants' actual consumption. Contrary to the gas company's proposals, which imagined lots of tenants rewarded for their growing use of gas cookers, wash boilers, and central heating, investigations and meter readings demonstrated that the vast majority of working-class tenants used less than 20 therms of gas a month – the average was 12 therms – and spent between 2*s* to 2*s* 6*d* a week on gas, considerably less than the 4*s* a week, at which a consumer would start to benefit from the new tariff.[86] On the Totterdown Fields estate in Wandsworth (south-west London) a mere 10 of 384 lettings used more than twenty therms a month; for comparison an efficient gas heated wash boiler used around four gas units an hour or one therm in six hours.[87] The gas company pointed to the electric companies which did use a graduated tariff, but the latter was more easily defended as a fair way of pricing since electricity providers had to install sufficient plant to cope with the peak load. For the LCC, the survey was a useful weapon in containing the gas interest and protecting the small pre-payment consumer from having to switch from coal and electricity to greater use of gas and being punished by the graduated tariff.[88] The mandatory graduated tariff was withdrawn and tenants in London continued to refuse being put on a graduated tariff into the post-war years, even where the new tariff would have saved them money.[89]

Fifteen years later, in spring 1951, the North Thames Gas Board investigated energy use on a number of London housing estates. On the Shepperton estate, at the south-western outskirts of London, dwellings were equipped with an Ascot water heater, gas cookers, and gas coppers. Actual usage varied enormously. Between April and June, one family of four used 10,800 cubic feet of gas, a neighbouring household of two topped this with 13,100 cubic feet. One

[85] Helen Jones, 'Conservatives and the LCC after 1934', in Andrew Saint, ed., *Politics and the people of London: the London County Council, 1889–1965* (London, 1989), pp. 237ff.

[86] Joint report by comptroller, chief engineer, solicitor, and valuer, 'South Metropolitan Gas Company – tariff', 30 Sept. 1936, LMA, GLC/HG/HHM/10/L81, LCC General Purposes Committee.

[87] 'Totterdown Field estate, gas consumption in 1930', surveyor note, 28 Sept. 1936, LMA, GLC/HG/HHM/10/L81. A gas unit is 1/25th of a therm.

[88] For the earlier period, see Martin Daunton, 'The material politics of natural monopoly: consuming gas in Victorian Britain', in Martin Daunton and Matthew Hilton, eds., *The politics of consumption: material culture and citizenship in Europe and America* (Oxford, 2001), pp. 69–88.

[89] South Metropolitan Gas Company to LCC, 'Supply of gas to LCC tenants', 29 Mar. 1938, LMA, GLC/HG/HHM/10/L055, part 1, development & construction heating & hot water services; Pusey to Sibthorpe, 9 Apr. 1951, ibid., part 2.

family of eight used 19,100 cubic feet. They felt 'that the Ascot is rather expensive', but that 'with a large family the ready supply of hot water is a boon and is used very liberally'; they also used the gas cooker and gas copper 'very frequently'.[90] By contrast, several neighbouring families (with two or three members) managed with 2,550–3,700 cubic feet per quarter and were just as 'satisfied' with their Ascot, finding it 'very economical' for baths. Such differences in gas consumption point to radically different cooking, bathing, and washing habits. On the same estate, twelve dwellings were equipped with an electric cooker. Interestingly, some of these still consumed more gas (5,300–7,100 cubic feet) than their neighbours.

Similar variations are apparent in surveys of electricity use and heating. In 1948, several dwellings in Naylor House, a three-storey block of flats in Southwark, London, were equipped with electric cookers and refrigerators. Their electricity consumption ranged from 2,733 to 4,754 units a week, hinting at markedly different cooking habits.[91] The 'normal' use of central heating varied even more. Some households in Stevenage had theirs on 16½ hours per day, others only for 4½ hours. Some spent 45*s* per week on heating, others a mere 10*s*. Among nine families where someone was at home all day, six used their heating for 15–16 hours each day, while the other three made do with 6–9 hours.[92] Average aggregate fuel budgets for working-class families with similar incomes thus hide considerable variation between households, reflecting not only differences in family size and equipment but more or less energy-hungry ways of life.

The co-existence of different forms of 'normal' life with different degrees of energy use deserves emphasis. It was in the 1960s and 1970s that universal norms of space, heat, and comfort won official approval, on the back of the Parker Morris report and new building guidelines. It is worth remembering how recent this change has been. In the 1940s and 1950s, it was far from clear whether it was either possible or desirable for the entire nation to aspire to shared norms. In 1945, the Egerton Committee (Heating and Ventilation [Reconstruction] Committee of the Building Research Board) set out a list of recommendations that included 65 degrees Fahrenheit (18·3 degrees Celsius) for the living area. At the same time, it conceded that such 'standards of heating…are considerably higher than were customary in the past, and some of us feel that they represent more than what most people would be able or willing to pay for', and would lead 'to needless consumption of coal, our resources of which have to be conserved'.[93] There was considerable

[90] Shepperton estate Sunbury, 1951, ibid., part 2.

[91] Southwark Borough Council, Naylor House, fuel statistics for twelve months to 31 Dec. 1948, ibid., part 2.

[92] Memorandum from chief estate officer, 'Gas heating in flats, Fairlands and Sishes End', 13 Sept. 1967, HALS, CNT/ST/5/1/AP/N9, vol. 2, Apr. 1967–Mar. 1970, neighbourhood no. 6 Pin Green.

[93] Heating and Ventilation Committee, *Heating and ventilation*, p. 2.

debate whether one should look at the future of heating in terms of what was efficient and technologically possible, or if one should give equal consideration to personal preferences and to social, cultural, and regional diversity. Who was to tell a working-class family that they should raise their indoor temperature to some average national standard, if they preferred to spend their money elsewhere or if they were used to a different sense of comfort? Did it make sense to plan houses, as happened in Swindon in 1950, which offered tenants a constant supply of hot water in the kitchen at 130–40 degrees Fahrenheit (54–60 degrees Celsius) as well as spreading heat to their bedrooms, if working-class households in the interwar years were accustomed to getting their hot water from a kettle and having no heat in the bedroom at all?

This fundamental clash of viewpoints haunted the debate about district heating in the post-war years. On the one hand, engineers and urban planners had all the data they needed to prove beyond doubt that district heating (by using cheaper, low-grade coal and thanks to economies of scale) was both more efficient and saved the nation expensive high-grade coal for export. On the other hand, critics worried that central heating might force a much higher indoor temperature on workers than they would otherwise choose. As one engineer stressed in 1945, the low price per therm for district heating was one thing, but just as important was a tenant's total weekly expenditure: 'to give him many more times the heat than that to which he is accustomed may not console him if his outgoings are thereby doubled or trebled'. The same author also noted the 'psychological tonic' of the open fire: 'nor will he readily part with the cheerfulness of a coal fire, despite its inefficiency'.[94] Such recognition of diverse habits and preferences was often animated by a genuine concern for the poor and the right of the individual to determine their own environment, but it could also reflect paternalism, or worse, suspicion of the undisciplined, great unwashed. In 1944, for example, G. N. Maynard, the borough engineer and surveyor of Stourbridge, expressed his concerns that post-war homes might be equipped with gas cookers, refrigerators, and washing machines: 'I hesitate to think what would be their condition in a few years' time if provided in houses occupied by some tenants.' 'Gas or electric fires in bedrooms to be used by children would be generally wasteful and a source of danger.'[95]

Transitions from one fuel to another, therefore, were rarely clean or sudden. Surveys document their piecemeal nature, residents' ambivalence, and their reliance on complementary fuel strategies. Its large and dense population, resulting air pollution, and investment in new council housing made London a major site in the campaign for smoke abatement and efforts to replace coal

[94] R. F. Brooks Grundy, 'The economics of a district heating system for 500 houses at Harrow', *Journal of the Institution of Municipal Engineers*, 71, 12 (1945), quoted at pp. 393, 411.

[95] G. N. Maynard, 'Post-war housing with particular reference to housing manual, 1944', *Journal of the Institution of Municipal Engineers*, 71, 6 (1945), quoted at pp. 176, 178.

grates with gas-ignited 'smokeless' coke fires. By 1936, Greater London had about 150,000 council dwellings.[96] The Gas Light and Coke Company had a natural interest in advertising the cheapness and convenience of their coke fires and in extending its foothold in council properties. It organized experimental installations of gas-lit coke fires at an LCC estate. In response, the LCC carried out inquiries, gathering detailed records of consumption by individual households from the energy providers. These revealed a complex picture of how tenants actually used and felt about the new fire. On the Dinmont and East Dulwich estates, tenants' responses were decidedly mixed. Some felt the fire to be 'very comfortable and cheerful', others said they 'do not like it', that running it was 'extravagant' and that it 'throws all the heat to the ground'. They reported 'no comfort' or felt the ordinary coal grate in the bedroom was 'more comfortable and cheerful'. Some used the gas to light the fire (as designed), but many found this 'very expensive' and used wood or paper instead. Many mixed coal into the coke 'to get a good fire' – or used the new fires to burn coal only. A couple of tenants complained about the dry air of coke hurting their chests, others of fumes coming out of the bedroom grate when coke was burnt in the next room. As the LCC Housing Department surveyor acknowledged, flats on the top floor tended to suffer from more fumes from the coke fire because of 'downdraught'.[97]

Surveyors initially assumed that the ambivalent reaction simply reflected differences in income.[98] However, from tests carried out in January 1938 at Wentwood House, an LCC estate in Hackney, it is also clear that costs were increased by tenants managing their fires in ways contrary to their designed use. Fitted meters by the Gas Light and Coke Company's Coke Appliances Laboratory revealed that in all cases 'gas consumption are too high and are due to the tenants deciding for themselves when the fuel is alight instead of following the instructions given' and 'leaving the gas on after the coke has reached its ignition temperature'. In some cases, tenants burnt five times more gas than necessary to light their Eagle fire.[99]

New centrally provided electric heating technologies met with similarly surprising use patterns in the 1960s. In the case of electric under-floor heating, lower than expected usage caused unforeseen maintenance problems. In a survey carried out in March 1963, the LCC interviewed thirty-eight tenants in one block of flats, Rowley Gardens, who were paying on an instalment plan, as well as forty tenants in Osterley House who were paying the Electricity

[96] William A. Robson, *The government and misgovernment of London* (London, 1939), p. 216; LCC, *London housing* (London, 1937).

[97] Survey responses and analysis by officers, spring 1936, LMA, GLC/HG/HHM/10/Lo55 part 1.

[98] Report by surveyor, Housing Department, 14 May 1936, LMA, GLC/HG/HHM/10/Lo55 part 1.

[99] Tenant responses to surveys and report by No. 1 Coke Appliances Laboratory, 3 Feb. 1938, ibid.

Board directly. Of the thirty-eight tenants on the instalment plan, thirty-four were regularly using under-floor heating but most of them criticized its 'lack of warmth'. Among tenants who were paying their bills directly, three in four were not using the under-floor heating at all; five tenants had not even switched it on once. Several who had tried it had given up after only a few weeks; it was only starting 'to get warm when it was time to go to bed'. One tenant stopped using it after two winters because she felt she 'lost too much heat to the flat below hers, where the floor warming was not being used'. In several cases, people 'seemed to be under the impression that carpets on the floors would render the floor warming useless'.[100]

What accounts for the different uptake of electric under-floor warming? The investigation of the two London housing blocks in 1963 concerned a small sample (seventy-eight) and did not provide a socio-economic breakdown of the tenants. But it does hold a few clues. As on most estates, income varied among households on Rowley Gardens (where usage of under-floor heating was higher) in Haringey and on Osterley House in Poplar (where usage was low). At Rowley Gardens, 38 per cent made do with less than £15 a week while 21 per cent had £20 or more; in Osterley House 58 per cent lived on less than £15 a week. Income itself, however, was not decisive. Investigators found that 'people's opinion of the cost was not necessarily related to their income'. Payment method was one factor. In contrast to the 71 per cent who were on the instalment plan and who liked under-floor warming, 72 per cent of the tenants who paid their own bills decided not to use it. Age and the heating equipment in previous accommodation may also have been factors. In 30 per cent of the households on Osterley House, most members were over sixty years of age – only 18 per cent in Rowley Gardens. And at Osterley House, the overwhelming majority (88 per cent) had had solid fuel in their previous homes and 38 per cent said they would still prefer it; the figures were 61 per cent and 5 per cent respectively in Rowley Gardens.[101]

That the hours of operation were beyond their control was a major source of frustration. Kitchens and hallways were felt to be especially cold. Even in a 'normal' winter, twenty-eight tenants in the two London housing blocks surveyed in 1963 supplemented their main heating system with 2 kw electric fires fitted by the council; two relied on additional oil heaters. Seven people who said they were never warm enough had the thermostat always set at 75 degrees Fahrenheit (24 degrees Celsius). Two-thirds would have preferred another type of heating, especially solid fuel. Many tenants, investigators noted, 'expressed a nostalgia for a 'cosy' and 'homely' coal fire.'[102] Such comments are a reminder that transitions from one kind of heating to another are not exclusively about technology or cost but also involve feelings about what

[100] Survey of electric under-floor warming, 1963, LMA, GLC/HG/HHM/10/L247, part 1.
[101] Ibid.
[102] Ibid.

heat should look and feel like. The First World War slogan 'keep the home fires burning' had celebrated the open fire as a symbol of domestic life and national duty. In the 1930s, many investigations noted that coke might heat a room more cheaply but acknowledged that it lacked the 'liveliness and cheerfulness' of a coal fire.[103] In the Second World War and immediate post-war years, the coal fire became an icon of British aesthetics and the war-time spirit.[104] While this cultural moment was over by the late 1950s, the coal fire clearly continued to have an emotional appeal, at least in working-class households, well into the 1960s. With its mantelpiece, the fireplace has remained a stage for memorabilia, long after it stopped burning coal.[105]

The complementary use of energy was just as evident in the partial advance of gas heating. Stevenage Corporation studied tenants' views of gas fired heating on the Trotts Hill estate in 1967. Of 149 households surveyed, only 18 (12 per cent of all residents) relied entirely on the central gas heating system; 81 households also switched on electric heaters, 6 relied on additional oil heaters, and 11 used both electric and oil heaters. Most tenants surveyed were satisfied with gas as a fuel, but many complained about the vents being too high and how cold air was blown out of the system when the thermostat cut in. The chief estate officer reported that in spite of the deflectors fitted the previous year, a 'constant complaint' continued to be 'that the tenants [sic] feet are cold'. Some complained about 'overwhelming heat' and 'stuffiness' causing 'throat and chest complaints and headaches'. Two people did not use the central gas system 'on doctor's orders'; the view that central gas was bad for 'chesty' people or killed plants was widespread.[106] Gas salesmen made little progress on public housing estates. In 1961, the Southern Gas Board found that an owner-occupier was seven times as likely to buy a gas heater as a council tenant; a resident of a detached house was three times as likely to buy one as a resident of a terraced dwelling. Habits and prejudice were reinforced by the price structure. An oil heater might be costlier than gas in the long run, but it was cheaper to buy.[107]

On London estates in the late 1950s and early 1960s, many tenants still used and appreciated solid fuel space heating appliances. A 1959 survey studied 715 tenants on seven London estates. The daily use of the fire was especially high (85 per cent) among working-class households on average income who had a back

[103] Scottish National Development Council, 'First report of the "Oil from Coal" Committee', *Economic Series*, 12 (Glasgow, 1933), p. 15, with thanks to Robert Bud for this reference.

[104] See Lynda Nead, *The tiger in the smoke: art and culture in post-war Britain* (New Haven, CT, 2017).

[105] Mass-Observation archive (Brighton), MOA, responses A60 and A002. This subject is currently being investigated at the Sussex Humanities Lab by Rebecca Wright, with thanks for discussion.

[106] See the memoranda by the chief estate officer, 'Gas heating in flats Fairlands and Sishes End', 13 Sept. 1967, and Trotts Hill estate, 16 Nov. 1967, HALS, CNT/ST/5/1/AP/N9, vol. 2, Apr. 1967–Mar. 1970, neighbourhood no. 6 Pin Green.

[107] A. F. Hetherington, 'The domestic space heating market' (Gas Council, 1961), National Gas Archive, Warrington.

boiler. Among households who had an open fire without a back boiler, only half (49 per cent) lit theirs on a daily basis, relying on an electric fire instead. Higher-income households 'more frequently use additional heat in their living room [from electric and oil heaters] and are more anxious to have central heating', and disliked the dirt and inconvenience of an open fire. They were more likely to rely on immersion heaters. For households on 'average' income, cost tended to matter more than convenience and saving time.

The data is not a statistically representative sample, but it does raise intriguing questions about the relative significance of family composition versus an in-built dependence on available technologies and fuels. Interestingly, young children and female employment had only marginal effects for daily heating habits. Among 'average' tenants with a back boiler, 139 of the 145 households with 5 or more persons (96 per cent) regularly used the open fire, but so did 47 of the 51 1–2 person households (90 per cent). In the same group, 99 per cent of those with children under 5 years relied on the open fire, but so did 92 per cent of those without children; among higher-income households with a back boiler, usage even went up from 50 per cent of those with small children to 66 per cent for those with no children.

For 'average' households with a back boiler, it made virtually no difference whether the wife was in full-time employment (90 per cent used the open fire) or not employed (95 per cent). Similarly, among higher-income groups, it made no difference for the use of the fire whether the wife was employed (67 per cent used the fire) or not (65 per cent). The decisive factor was not additional sources of income, time, age, or family composition but the simple presence of an existing technology: the back boiler attached to the open fire. In the words of the director of housing, the 'backboiler with the feeling it gives of providing "free" hot water is, therefore, a strong inducement to light the fire, and at present outweighs the disadvantages of dirt, increasing costs, inadequate warmth and inconvenience which are mentioned by those not using the open fire'. On the basis of these surveys, senior council officers decided that houses and blocks of flats with fewer than six floors should continue to be heated with solid fuel fires.[108] In other words, we are not dealing so much with social groups separated by income, age, or employment but with a working class internally divided by the equipment provided in their council homes – an example of consumption by proxy (see Table 3).[109]

[108] Housing Development and Management Sub-Committee, reports by the director of housing, 'Comparative costs of space heating', 26 Oct. 1956; Housing (Improvements) Sub-Committee, report by the director of housing, 'Modernisation schemes: heating', 1 Oct. 1958; Housing Development and Management Sub-Committee, report 'Housing estates – use of fires by tenants', 12 Apr. 1961, LMA, GLC/HG/HHM/10/Lo55, part 2, development & construction heating & hot water services.

[109] 'Housing estates – use of fires by tenants', Housing Development and Management Sub-Committee, report by the director of housing, quoted at p. 5, 18 July 1959, LMA, GLC/HG/HHM/10/Lo55, part 2, development & construction heating & hot water services.

Table 3 *Variation of use of open fires with and without back boilers, on seven London housing estates, 1959*

Group of tenants	Daily use of fire	Limited use of fire	Never use fire	Sample size
(1) With back boiler (excl. higher income)	337 (85%)	35 (9%)	25 (6%)	*397*
(2) With back boiler (higher income only)	63 (46%)	25 (18%)	50 (36%)	*138*
(3) No back boiler	89 (49%)	20 (11%)	71 (40%)	*180*

Source: 'Housing estates – use of fires by tenants', Housing Development and Management Sub-Committee, report by the director of housing, quoted at p. 5, 18 July 1959, LMA, GLC/HG/HHM/10/Lo55, part 2, development & construction heating & hot water services.

These investigations reveal how expectations about heating comfort and the uses of different rooms in the home were changing. While in some households it was still common to organize life around a single warm room, others were starting to demand an even distribution of heat across the house, including in bathrooms and corridors.[110] Significantly, the more extensive separation of people and practices across the home often pre-dated the arrival of full central heating. On the Trotts Hill estate in the late 1960s, for example, some young families no longer kept their baby in their bedroom but turned the small bedroom into a separate nursery, only to then complain about the lack of central heating in it. The shift towards more individual, private spaces in the home, such as giving children their own bedrooms, meant energy-using practices moved into new areas of the home. A bedroom was no longer just for sleeping at night but a space for studying and entertaining friends during the day. These are a good illustration of the interplay between new practices and new technologies in the creation of greater demand.

VI

This article has looked at the evolution of energy demand by examining the interplay between provision and use in public housing in English cities in the middle of the twentieth century. Tenants, it has shown, were neither passive nor always compliant in the transition from coal to coke or to gas and electricity. They were already becoming more demanding before the era of affluence

[110] That electric warm air heating did not reach the bathroom was one disadvantage noted by several tenants in a 1968 survey at Trotts Hill, 27 May 1968, HALS, CNT/ST/5/1/AP/N9, vol. 2, Apr. 1967–Mar. 1970, neighbourhood no. 6 Pin Green.

associated with greater choice and material expectations. Energy is sometimes treated as a 'basic' form of consumption, but while it may be tied to many ordinary routines of daily life, there is nothing 'basic' about having electric cookers, gas wash boilers, central heating, or the wiring, points, and pipes to connect and power them. For most tenants, public housing was a step change in their material lives, raising standards to a new 'normal', although this normality took different forms in different cities, estates, and homes. What we might call 'welfare consumerism' needs to be put back into the story of rising demand and consumer citizenship.

Domestic energy demand was ultimately the result of the multitude of things that tenants did. How (and how much) they used energy for heating, washing, and cooking was partly influenced by price but just as important were social conventions, habits, and the opportunities and limits set by energy systems provided by local government. To be clear, the article is not an appeal for replacing the dominant supply-oriented approach with an exclusive focus on demand. Rather, the article has used public housing to unravel the intersection between politics, infrastructures, and daily life. It is an argument for a more nuanced and creative use of scale in the study of demand. A focus on large-scale energy systems has come with an equally large-scale view of demand counted in millions of kilowatt hours and therms. Averages of total consumption provide figures per household or per capita, but these are faceless aggregates. They can track broad economic shifts, not the changing dynamics of demand. At worst, they conjure up the idea of a typical consumer, defined by income or some other socio-economic category.

Lowering the analytical scale to the level where we can see how infrastructures have intersected with the home, domestic technologies and daily practices enable us to capture people's varied patterns of consumption. Demand was composed of a spectrum of normal lives, within a context of uneven provision of fuels and household technologies, and varying norms of warmth and comfort. Energy transitions were not smooth or linear, moving from one fuel to another. Fixed domestic technologies such as cookers and boilers were important mediators between people, practices, and the fuel they used, and these exercised resilience to change. For all their limitations, the sources analysed in this article (housing records, surveys, engineering reports, tenants' complaints, oral testimony) let us glimpse some of the process through which energy transitions actually worked themselves out, and the obstacles as well as opportunities for change involved. The article should be read as an invitation for future research to tell a richer history of energy, with the people put back in it. We need to know more about the interplay between domestic habits and time use, the relationship between leisure and paid and unpaid work, and the impact of generational change and household composition.

How people used energy and adapted their daily lives was not only a function of cost and supply but of technological equipment, habits, and emotions. Recognition of their interplay does more than add new insights for historians.

It can also provide historical support for current investigations, such as those that have found that low energy users in California today are not distinguished by poverty but by lifestyle and habits of conservation and experimentation.[111] Greater knowledge about the forces in the past that promoted certain forms of energy use over others should prove valuable to those interested in developing more sustainable lifestyles in the future.

[111] Reuben Deumling, Deborah Poskanzer, and Alan Meier, 'Who are the low energy users? Lessons for climate policy', *Proceedings of the ECEEE 2017 Summer Study*, pp. 2159–67 (European Council for an Energy Efficient Economy). This study analysed the lowest 10 per cent of energy users in Sacramento, California, 2008–10.