Social and material cogs of the needs satisfier escalator

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Abstract

Energy consumption does not happen for its own sake, but through the homes and buildings, infrastructures, appliances, and vehicles used in the course of everyday lives. These everyday lives are made up of social practices that relate to work, education, leisure, shopping, sport, and holidays. The Covid pandemic has seen a short-term transformation in some of these elements of lifestyles, but such changes may revert back to their previous unsustainable levels unless the needs that they satisfy are understood and addressed. Much energy efficiency research focuses on the material and technological drivers of energy demand – the buildings, devices, and vehicles. More sociological approaches to understanding and attempting to address energy consumption behaviours and practices seek to explore how the routines of life that utilise these materials become established across society in ways that are hard to change. The pursuit of 'the good life', the fulfilling of human needs using the 'satisfiers' that are available, and the locking-in of particular ways of pursuing wellbeing, are ways of understanding energy consumption that go beyond energy efficiency to address energy sufficiency. Our study explores how high levels of energy consumption can be locked-in through needs satisfaction, by applying Daramy-Williams et al.'s (2019) understanding of "travel decisions as nested in a hierarchy of life decisions" Brand-Correa et al.'s (2020) understanding of lock-in of unsustainable travel-related energy consumption through 'need satisfier escalation', and Mattioli's (2020) exploration of 'mobility links' as explaining habitua-tion to long distance travel. We present data from an interview study of 30 'high consuming' households to illustrate the social and material drivers of energy consumption particularly linked to Long Distance Travel.

Introduction

The restrictions on everyday life brought in by different governments across the world in 2020 to attempt to stop the spread of Covid-19 were revealing in many ways. Perhaps the most important factor was how conceptions of 'normal' were temporarily suspended, and they are only slowly, and partially, returning afterwards. Work on infrastructures (Graham and Marvin 2001) has noted that these essential underpinnings of everyday life remain un-noticed and taken for granted until disruptions bring their necessity for the smooth running of everyday life and normality crashing into the 'foreground' of attention (Rinkinen 2013). Energy infrastructures in particular are notable during their absence, and experience of losing electricity highlights the way in which so many other infrastructures, device and appliances, and the social practices that rely on them, have slowly and imperceptibly become intertwined with electricity, data, and all that they facilitate and enable. In a similar way, the Covid restrictions on travel except for a few permitted purposes brought into sharp contrast which journeys could be legitimately considered 'essential', and which discretionary. As I write these words on the first anniversary of the UK's first 'lockdown' working from home remains a totally acceptable and newly 'normal' aspect of post-Covid everyday life for many. Just as wartime posters asked citizens to consider 'Is Your Journey really Necessary?', new understandings of what

is essential, negotiable, discretionary, surplus to requirements or excessive are currently circulating across society and media.

This context made the Covid era a perfect time for our study of 'excess energy consumption', which seeks to explore high levels of domestic and travel-related energy consumption in the UK, and thereby to interrogate the concept of 'excess' consumption. This is vital to developing a just and fair approach to achieving climate change targets, in particular the UK's 2050 Net Zero ambition[1]. Given well-established associations between a number of factors and high levels of energy consumption and therefore CO_2 emissions, including especially income (Brand and Boardman 2008, Druckman and Jackson 2008, Druckman and Jackson 2009, Gough, Abdallah et al. 2011, Fell and King 2012, Büchs and Schnepf 2013, Hargreaves, Preston et al. 2013), but also sociodemographic variables (Hunecke, Haustein et al. 2007), and income-correlated factors such as house(hold) size, car ownership and number of flights taken, it is clearly suggestive that those in society with the highest carbon footprints are also likely to have the highest agency to be able to take action to reduce their impacts. This is because many of the most straightforward actions that can be taken to reduce energy consumption require capital for investment, or else control over the fabric of the home, available only to homeowners. In the area of domestic energy consumption, these actions include purchasing insulation, new boilers or space heating technologies, renewable energy such as solar PV panels, and highly efficient devices and appliances. In the area of travel, the UK's plans to decarbonise travel emissions rely heavily on electrifying road transport fleets, and Electric Vehicles currently cost an average of £44,000[2]. Research has also highlighted that the most carbon intensive form of travel (aviation), whilst excluded from national carbon budgets and the accounting processes of the Paris Agreement along with shipping, is an area where a minority of people are responsible for the majority of the most damaging travel behaviour: 15 % of people take 70 % of flights[3]. Research in the CREDS research centre which funds this study has established that the top 5 % of travellers consume 80 % of travel energy (personal communication). These factors all highlight that in the context of binding 'Net Zero' targets[4], tackling climate policy in *a just and fair* way requires attention to these inequalities and how different policies to reduce energy consumption and carbon emissions will impact differently on different groups. Research at the University of Leeds has shown household energy consumption rising smoothly with income dodeciles, that the largest increases in the energy footprint come from increasing mobility and leisure, and the mobility increases are most notably in flying, as income rises (Owen and Barrett 2020). These factors justify the project's focus on higher levels of energy consumption, and the narrower focus of this paper on air travel. However, the issue of what constitutes 'excess' consumption remains undetermined by the data, being a matter of debate and analysis.

1. https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

2. https://www.nimblefins.co.uk/average-cost-electric-car-uk#:~:text=Purchase%20Prices%20of%20Electric%20Cars,%C2%A3138%2C826%2C%20or%20even%20more.

3. https://www.creds.ac.uk/curbing-flying-for-climate-reasons-is-it-reasonable/

4. https://www.legislation.gov.uk/uksi/2019/1056/contents/made

The paper thus begins by surveying six potential ways of understanding 'excess' consumption that were developed in early reading, and then proceeds by reviewing the literature we have reviewed in preparing the study. First we outline insights from the broadest and simplest understandings of what 'drives', explains or predicts high levels of energy consumption, through interdisciplinary approaches to specifically more sociological approaches that go beyond understandings of 'behaviour' and choices. We then explore approaches that focus on human needs and 'satisfiers', before focusing more clearly on a small body of literature that addresses the issue of how it is that certain high-carbon ways of fulfilling human needs and wants get locked-in to everyday lives, through processes of choice and routinisation, involving social and material components. This provides the conceptual framework for our analysis: a socio-material needs satisfier escalator. After a short explanation of the methods of our interview study, we explore some of the findings with a specific focus on aviation and Long Distance Travel, the most highly impactful form of energy consuming behaviour, applying the conceptual framework in analysis, highlighting the processes of escalation, and links to what Mattioli (2020) has called 'mobility links'. We then discuss the implications of this analysis for research and for climate policy fairness, before laying out the conclusions and contributions.

Literature and conceptual frameworks

SIX DEFINITIONS OF 'EXCESS' ENERGY CONSUMPTION

To begin with, we address the question of how 'excess' consumption should be defined. This is not to resolve the matter but to acknowledge that the issue is not settled. The team of researchers on the project that produced this research came at the question from a number of different disciplinary approaches and these can be summarised as consisting of three quantitative and three qualitative interpretations. Firstly, quantitative approaches to excess focus on a 'top percentage' of aggregated data on consumption, consumption over an imposed 'cut-off' point, or obvious outliers of extreme consumption. The first definition has popular currency in discussion of the consumption practices of the rich, for instance in the 'Occupy' movement's popularising of the idea of the '99 %' and therefore of the richest '1 %'. In our project, aggregated travel diary data on annual car mileage driven was used to identify socio-demographic and other characteristics associated with those individuals who were in the top 1, 5, 10, and 20 % most car mobile – who were thereby defined as 'excessive' drivers. The same analysis also calculated how much mileage would be eradicated if driving over arbitrarily set 'cut-off' mileages was banned, in a thought experiment relating to the idea of applying rationing to travel-related energy consumption. This analysis found that setting 'rations' of 20,000 car miles per annum would reduce mean car mileage by 9 %, whereas rations of 15,000 or 11,000 miles would similarly reduce mileages driven by 15 % or 24 % respectively. Both of these quantitative definitions of excess appear somewhat arbitrary, and would likely be considered such as the basis for focussing policy measures. A third quantitative definition was not operationalised in analysis, but was raised by the same mileage data being plotted in 'box and whisker' graphs that highlighted significant outliers in the data points – a relatively tiny number

of travellers whose annual mileage was extreme by comparison to the bulk. Defining excess by reference to such outliers would be statistically simple, but targeting this excessive energy consumption would not be significant in aggregate.

By contrast, three alternative qualitative definitions of 'excess' were also raised, which can be summarised as consumption 'above what is necessary' (based on definitions of minimum need); as 'wants not needs' – (which rests on distinguishing needs from wants or desires), and as being 'unreasonably high' (which rests on an ability to justify consumption to others). All three rely to some extent on concepts of 'need', but in subtly different ways. The first definition is the concept deployed in the Joseph Rowntree Foundation's work on a 'Minimum Income Standard' (Bradshaw, Middleton et al. 2008, Dowler 2010), which is "a measure of how much various types of households need to earn to reach what members of the public think is a minimum acceptable standard of living" (Dowler 2010). This concept relies on a consensual definition of need which is relative to the society and the time in which the definition was created – such needs are empirically seen to rise over time, as new goods or services become 'locked in' to society's definition of what is minimally acceptable, in a process of upwards ratcheting of norms (Shove 2003). An extreme definition of 'excess' consumption might then include any consumption that goes beyond a consensual, societally-relative definition of needs. A similar, concept involves drawing a distinction between consumption which fulfils 'basic needs' (Gough 2015, Brand-Correa and Steinberger 2017, Lamb and Steinberger 2017) and that which goes beyond this to increase well-being. The definition of basic needs here rests on the harm that results from such needs not being satisfied, whereas in "the case of overconsumption or luxury consumption, the decline in consumption might result in subjective discomfort at loss of convenience or social status, but does not result in increased physical or mental harm, or in the decrease of a person's ability to participate meaningfully in their society" (Brand-Correa, Mattioli et al. 2020: 309). Such a definition could also be applied to 'excess' consumption, as that which could be avoided without harm. The same authors outline that their human needs approach draws on the distinctions made by both Doyal and Gough and Max-Neef in their respective 1991 papers, between needs – which are "self-evident (i.e., universal, recognizable by anyone), incommensurable (thus satiable, irreducible and non-substitutable) and non-hierarchical" (Brand-Correa and Steinberger 2017) – and the societally specific 'intermediate needs' (Doyal and Gough 1984) and satisfiers (Max-Neef, Elizalde et al. 1992, Mattioli 2016) through which the specific forms of well-being that constitute such needs are pursued and secured. These are highly variable and contingent, and furthermore, their use may satisfy an individual's needs whilst also frustrating others' ability to satisfy their basic needs. According to Mattioli (2016: 121, 122), Doyal and Gough's distinction between needs and wants means that:

> 'satisfaction of basic needs has normative precedence over the satisfaction of wants' [and …] In a climate- and resource-constrained world, this constrains the right to need-satisfaction to 'the highest level (…) which is generalizable over the relevant population' and the relevant population includes both the present world population and future generations

Such a definition combines a strict 'Brundtland' definition of sustainable development with a form of a Kantian 'categorical imperative', and suggests that the means through which individuals in contemporary, developed societies pursue wellbeing and extended or intermediate 'needs' cannot be enjoyed by everyone without the serious intergenerational inequity of damage to the climate, which means that satisfying e.g. a need for sociality through flying abroad to visit friend or family can be considered in 'excess' of what is reasonable. The third definition of 'unreasonable' excess could be founded on such an argument, but also raises the idea that excess, like need, can be based on consensual definition. On this account, excess is whatever people can agree it is. Such a definition lies at least partly behind our project's research beyond the interview study reported here: a series of deliberative workshops which explore with members of the public how different policy approaches to reducing energy consumption might be justified.

SOCIOLOGICAL AND PHILOSOPHICAL FRAMEWORKS OF MOBILITY-RELATED ENERGY CONSUMPTION

Our project set out to explore excess energy consumption, but to do so in ways which move beyond understandings of 'energy consuming behaviour' or ECB in ways that are simplistically behaviourist. That is, to go beyond understanding ECB as simply (rational, and individual) decisions, behaviour or choice (Shove 2010). As Burger et al. (2015) point out in their outlining of a framework for understanding ECB, there are also routines and habits. Routines and habits are understood in different ways in different philosophical and social science traditions, and in recent decades, 'social practice theory' has been deployed to great effect in writing on consumption and the environment, defining as it does all social activity as social practice, understood as routinized patterns of action that are stabilised through performances across society (Warde 2005, Gram-Hanssen 2007, Halkier and Jensen 2011, Shove 2012, Southerton 2012, Shove and Spurling 2013, Browne, Pullinger et al. 2014). Such work has analysed the nature and underpinnings of 'everyday life', and the socially-prescribed ways in which humans fulfil a relatively small number of human needs, but is not essential to the argument of this paper.

Daramy-Williams et al. (2020) instead take a deep philosophical dive into the nature of habits as a way of thinking about how everyday life is made up of routines that are simultaneously largely 'automatic', and yet in explanation and in the context of their performers' lives, also intentional and chosen. Their elaboration of different philosophical accounts of habit, particularly drawing on Anscombe (2000) while using the example of travel highlights that intention and choice is revealed when activity is questioned and explained, when reference is made to broader or higher contexts of the lives within which the studied routines are situated/embedded, and understandable, which "would certainly seem to apply to the case of driving the car" (Daramy-Williams et al. 2020: 6). This focus on intention as being linked to explanation then links to the 'justifiability' definition of excess consumption. Different descriptions of the same activity can be made, which see different 'intentions' being 'swallowed up' in others. Thus in their example of car-driving, gear-changing or steering are explicable only in relation to driving, but driving may be swallowed up by the intentions of 'commuting to work', and in turn, 'earning a living in

consumer capitalism'. This reveals a nested set of intentions that 'explain' seeming habitual and automatic use of cars, by reference to higher needs being served. Daramy-Williams et al. also draw on 'mobility biography' literature, which they identify as stretching from the early more quantitatively focused work of Salomon et al. (1983) to Satlegger and Rau (2016). The former's conceptual framework focused again on travel, and described household decisions as being:

> … structured hierarchically, coming into the following three categories: Life-style choices, mobility choices, and activity and travel choices. Life-style choices were in the supreme category, sitting at the very top of the hierarchy, and were related to such questions as to family formation, participation in the labor force, and orientations towards leisure. Below this, mobility choices were concerned with the choice of where to work and live and whether or not to own a car. At the bottom of the hierarchy were day-to-day activity and travel choices, such as the decision to walk or drive to work. (Daramy-Williams et al. 202: 8)

Daramy-Williams and colleagues then point out that the later work in this area, from a more interpretivist qualitative research methodology does not strictly separate out levels or insist on strict causal chains or determination, but their model of energy consuming behaviour taking place in a set of nested and hierarchically linked intentional action is compelling.

In their 2020 paper 'Understanding (and tackling) need satisfier escalation' Brand-Correa et al. set out a conceptual framework for understanding how to approach climate change mitigation through tackling energy consumption. They do so in the context of well-being theories which, like this paper, they do not have space to illustrate, instead referencing their previous work (Gough 2015; Brand-Correa and Steinberger 2017; Lamb and Steinberger 2017). (Brand-Correa et al. 2020: 310). Their 'Orders of Need Satisfiers' approach similarly uses car-driving to explore how such intentions are nested or hierarchically ordered, "inspired by the analytic level framework proposed by Mattioli (2016) to understand the role of car use in need satisfaction […] we focus on car use in the context of satisfying the need for economic security" (312, 315). They also stress that their 'orders' of need satisfiers are different sorts of 'things' theoretically: they all relate to their central interest in explaining why the satisfaction of human needs such as sustenance, physical and mental health is achieved under fossil consumer capitalism in ever more energy intensive ways, but encompass: '**Systems of provision**' at the societal level, especially the provision of car infrastructure, the rise of car-dependent land-use patterns, and the withering of public transport provision which cannot compete with the car's 'door to door' flexibility; **Activities**, which they particularly interpret in the theoretical terms of social practice theory, which stressing that "our ordered categorization of satisfiers does not mean that we are situating social practices on a different ontological level" (315), rather it is a mode of analysis which sees practices as connecting all the 'orders'; **Services** (energy and material), by which they mean the things sought in using technologies in activities, such as warmth and communication, but in the context of car use, speed, flexibility, storage capacity, comfort, personal safety, and protection from the outside environment; and **Specific products or technologies**, which perform the actual function of

consuming and converting energy to provide services in the activities governed by systems of provision. In their example: cars. These should not be understood as different ontological 'levels', but "our ordered categorization of satisfiers specify different analytical levels," (315).

The purpose of their exploration of this analytical approach is to focus on car use in the context of satisfying the need for economic security. They use the illustration of the orders of need satisfiers to exemplify how a fourth order needs satisfier, the 'specific product or technology' of the car has become locked into society at all four 'levels' of the analysis, such that the 'basic' need for economic security is of near necessity satisfied through use of an unsustainable technology of travel-related energy consumption, whereas the same non-negotiable basic human need could in theory be satisfied in very different, lower energy ways, were it not for the 'lock in' of cars at all levels of need satisfaction in contemporary society, a lock-in which one of the authors then goes on to suggest is now applying to aeromobility (Mattioli 2020). Before turning specifically to this article, which most directly frames our topic of analysis in this paper, it is worth summarising that the analytic conceptual frameworks outlined above:

- Accept that human action is diverse and that different theoretical approaches are required for explaining/predicting/understanding it. No single totalising theory or analytical approach can simultaneously grasp all energy consuming activity;

- Are multi-scalar or nested, they identify certain influences and drivers as being more relevant to explanation at different scales, from the individual up to the societal or even international;

- Suggest the best way to describe or understand this is that the activity at each scale is best understood as being framed or conditioned by what is going on at the next scale 'up', or (in nested frameworks) 'outside'; and

- Include a dynamic or biographic aspect, in which choices (e.g. purchases) and life events structurate other and subsequent decisions and routines, which collectively form the structuration context of energy consuming behaviour and practices in society.

Mattioli (2020), one of the co-authors with Brand-Correa, specifically seeks to understand the factors behind massive increases in Long Distance Travel (LDT). He first highlights the distinction between daily travel decisions and Long Distance Travel as a separate category, pointing out that daily travel being seen as resulting from sequential lock-ins in individuals' life courses is a commonplace of social-psychological accounts (Verplanken and Aarts 1999) also drawn on by Mobility Biography research where major life changes (moves, births of children, jobs) lock in new habits. However, he highlights that this sequential model has been critiqued (Greene and Rau 2018) as being simplistic, in comparison to exploring "longer-term processes of habituation and acquisition of dispositions … closer to the notion of socialisation" (Mattioli 2020: 86) which might be more appropriate to LDT. These, in his literature summary, encompass upbringings where parents have daily long-distance commutes or overnight work trips (Vincent-Geslin and Ravalet

2015) or in migrant families(Cairns 2015), but also the normalisation and institutionalisation of LDT at the individual and societal levels, acting as recursive 'structuration' effects, in the work of Frändberg (2006, Frändberg and Vilhelmson 2010) and centrally, the concept of 'mobility links', where "various forms of international mobility, such as holiday travel, visits, migration, and business and education travel, are interlinked in people's lives" (Frändberg 2006, p. 321). These mobility links comprise skills and dispositions, social networks, and practices. Skills and dispositions are acquired through experience, that facilitate ease of travelling abroad, and the inclination to do so (Vincent-Geslin and Ravalet 2015), enable living in multiple places (Petzold 2017) or frequent flying (Randles and Mander 2009). The 'stretching' of social networks across greater distances induces travel to maintain them, through visiting friends and family (Janta, Cohen et al. 2015), in a process that threatens to become an autopoetic positive feedback loop (Frändberg and Vilhelmson (2010: 110) "similarly to the well-known feedback loop between increasing car travel and urban sprawl in daily mobility" (Mattioli 2020: 92). Practices, and 'carriers' in them (Hui and Spurling 2013) can also be seen to drive increasing international travel, whether this is involvement in specific sports such as skiing (Frändberg 2010) which can be passed on inter-generationally (Hui and Spurling 2013: 6) or the internationalisation of rituals such as weddings, anniversaries, stag and hen parties (Mattioli 2020: 93; Randles and Mander 2009).

Methods and sample

METHODOLOGY

The interview study was a qualitative and exploratory piece of research intended to collect data about the 'what' and 'why' of 'excess' energy consumption. It did this through first exploring what constitutes everyday life for households with 'excess' energy consumption, taking in as broad a selection of the factors that had been identified by the preceding research in the project, including the elaboration of various conceptual and theoretical frameworks through the literature reviews. It also explored how this excess consumption is understood and explained by those for whom it is the norm, to understand how lifestyles of what can seem as extreme energy consumption to others are rationalised and normalised by those who pursue and enjoy them. A semi-structured interviewing approach enabled the capturing of the large amount of 'content' required (accounts of houses and their contents, vehicles, family and locational details, employment, and all the practices of everyday life), whilst also allowing for areas of particular interest to the interviewer or interviewee to be identified and explored in more detail, in as naturalistic a way as possible, in order to maximise the value of the data collected for interpretative analysis. This would enable comparisons of the 'reasonableness' of pursuing 'the good life' in such energy intensive ways in later stages of the research project: deliberative workshops on policy approaches to tackle energy consumption.

Interview schedule

The literature review suggested a structure for the content of the interview schedule, which was topped and tailed with consent questions and a follow-up about willingness to participate in the deliberative workshops, with schedule sections of prompt questions on the following: **Household and general life**: Jobs, home location, household/family, aspirations and lifestyle, reasons; **Normal regular or predictable 'everyday' travel**: work, education, caring commitments, leisure; infra-household organisation/planning; distances, frequencies, modes, reasons, costs, longevity of these patterns, why they changed to current patterns; **Less regular or frequent travel**: holidays, getaways and weekends, visiting friends and family, other leisure etc., how these changed from earlier in life, how they are decided; **Home heating and hot water**: central or other, gas or other, insulation, renewables, areas heated, controls, changes over life course, reasons; **Outdoor spaces**: heating lighting, cooking, entertainment, sport; **Biography**: Differences to houses/homes earlier in life, upbringing, reflections on links to differences in 'everyday life'; **Appliances**: what, where, use frequency, reasons for buying/selection, room-by-room, borrowing or hiring; **Activities and energy used**: Mop up questions to make sure all covered (cooking, washing up; relaxing and entertainment; working; visiting friends and family; DIY; cleaning and hoovering; laundry); **Communications and data**: devices and networks, arrangements and billing; **Infrastructures**: Water, data, gas, electricity, how arranged and billed, metering, reasons, changes; **Changes to home/travel activities from covid**: what, how, feelings about changes, permanency; and **Changes planned or anticipated**: in short, medium, long term: travel, home, what and why.

Recruitment and sample

The sample required was of high domestic and travel consumption, and a quantitative approach was taken first to identifying locations where such a sample might be most easily found, to aid recruitment, and then to defining proxy measures for the recruitment and screening process. The first area-based analysis identified a short-list of 33 Lower Super Output Areas combining the following criteria: in the top 10 % for Gas or Electricity or Driving; in England; urban; with more than 50 % of people within 15 minutes of a town centre by public transport (thus eliminating the 'traditional' understanding of car dependent areas; and having above average EPC rating (> 64). These were then further filtered to focus on areas where more flights may be expected, using the mean number of household flights by Super Output Area classifications. Consumer data and contacts in the 8 super-shortlisted LSOAs were located and purchased, and a professional recruiter was used to approach potential interviews by telephone, using a screening script to ensure that recruits fitted a set of broad quotas (on roughly equal numbers of male/female, a spread of ages, nationally representative BAME numbers), and a set of specific recruitment criteria. All the sample were to live in newer (post-1930) OR high EPC (A-C) houses, and responsible for bills (i.e. not students or dependents), made up of 20 high domestic + mobility energy using households: i.e. monthly bills over £120/mo and car mileage >10,000 m/yr, with sub-samples: 5 super high domestic energy consumers (monthly energy bills over £160 per month), and 5 super high mobility households (one recruit with >2 personal vehicles, one household with 3+ vehicles, one recruit driving >15,000 miles p.a., and two recruits who take 4+ annual return flights. All recruitment factors apply to 'in a normal (i.e. pre-Covid) year'.

Table 1. Sample characteristics achieved.

Sex		Ethnicity		Age		Cars		Mileage		Flights		Bills		Housing	
M	17	White	27	18–40	6	1	7	<10K	1	0	2	<£120	1	Pre-1930	4
F	13	BAME	3	41–65	17	2	16	10–15k	19	1	6	£120–160	18	1930–1960	6
				65+	7	3	4	>15k	10	2	5	>£160	11	1960–2000	17
						4	2			3	3.5			Post-2000	3
						5+	1			4	3.5				
										5+	10				

The achieved sample included some who fell out of these requirements, as shown in Table 1. One recruit accounted for no flights, the too low bills and low mileage, but their interview acted as a useful comparator to the others, as a low consumer.

The interviews were conducted over telephone or Zoom, and took between 60 and 90 minutes, with the duration being dictated by answering all items in the interview schedule at last to some degree, with some participants being far more willing to talk at length than others. Transcripts were coded using Nvivo software, beginning with a 'deductive' coding structure derived from the schedule and with additional codes from the literature review, and inductive codes were added as coding progressed, used to lexically recode[5] when they were set up, and at the end of coding inductive codes were reassigned to other parent codes or used as new parent codes.

Findings and analysis

CONFIRMATIONS OF THE KNOWN

The data collected highlights how high domestic and travel-related energy consumption households are configured and how they live. There are confirmations of many of the unremarkable associations that were identified in the literature. In terms of demographic characteristics, although no questions were made about income specifically, the households interviewed usually comprised at least two wage-earners, with the exception of one divorced parent (who was on a 'career break' for more than 10 years without needing to earn an income) the sample-breaking household mentioned, and a couple of high-earning households where the partner was a 'traditional' house-spouse. A number of interviewees were in early, part, or full retirement, and it was clear from the interviews that they had amassed substantial savings and/or investments from which they were living very comfortably with no sign of having to restrict high energy lifestyles. Occupations mentioned were mostly middle class professions, with engineering backgrounds, managerial and sales roles also dominant, along with self-employed and business owners. In terms of house sizes as an influence on domestic energy behaviour, most houses were detached, with some semi-, one terrace and one flat. With the exception of the latter (the terrace was an HMO), all houses had at least 4 bedrooms, with the largest having 7, and bathrooms were also in multiples, with the largest homes having four or more. Car ownership is a known predictor of high mile-

age, and this was again unremarkably confirmed in the sample, although perhaps more interesting were the details of use, with some interviewees having redundant and unused cars, another having a 'spare' for children to learn driving, and many examples of two cars being used, even for near-identical commuting journeys. Although our recruitment processes only required a subsample of 5 participants who flew a certain number of return flights in a year (at least four), a third of the sample flew at least 10 times, and the mean number of annual return flights taken by interviewees was a minimum of 3 (flying more than 5 times was only recorded as 5+). This is in a context where 300 million flights take place annually[6], which can be assumed to equate to 150 million return flights, or a national mean of 2.22 flights[7], which we know are distributed unequitably such that 52 % of people do not fly in a given year, including 70 % of households in the bottom income quintile do not take overseas flights in a typical year, while 70 % of households in the top quintile do, 15 % of flyers take 70 % of all flights[8], and 1 % of English residents take one-fifth of overseas flights, while the top 10 % of fliers take more than half[9].

As suggested in the introduction, a huge proportion of the increased energy footprint of the rich is comprised of mobility, where just the mobility footprint of an average household in the top income dodecile is roughly the same as an entire household energy footprint in the bottom decile, and in the rich, this mobility footprint is on average 75 % aviation (Owen and Barrett 2020). Also based on the literature review, we wish to move beyond the insights that have been suggested for routinized car travel and focus on Long Distance Travel, given that "while the situation in daily mobility point to a lock-in of high levels of car use, the long-distance sector shows lock-in in the making" (Mattioli 2020, 84) For this reason, the remainder of the findings and analysis focus on the travel and flights of the sample, seeking to understand and explain it, and to relate the findings to the conceptual frameworks brought to the study.

FLIGHTS

The numbers of flights and variety of destinations in the sample are too numerous to summarise or even list, but several interviewees self-described as having been to 'most' places in the

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5. Essentially, in order to recapture the specific issues identified in a new code, the software's text search function was used to quickly identify segments with relevant material.

6. CAA figures, quoted by Sally Cairns, https://www.climateassembly.uk/about/meetings/weekend-2/dr-sally-cairns-university-leeds-fairness-and-reducing-emissions-air-travel/index.html.

7. Assuming the 67,100,000 2021 population.

8. https://bettertransport.org.uk/sites/default/files/pdfs/Air%20Traffic%20Controls%20report.pdf#page=25

9. https://www.theguardian.com/environment/2019/sep/25/1-of-english-residents-take-one-fifth-of-overseas-flights-survey-shows

world: "he's always travelled quite a bit for work so he's been sort of all over the world for work" (KS, about her husband); "we've been to most places in the world I suppose" (KG). The participants displayed different levels of self-awareness of the energy and environmental implications of flights, from explicit references, if not 'guilt' ("previous job I used to fly to China as well so if you go back in my history my footprint is massive." (KG); "I did a lot of work in South America for a previous company … so I was always down in Buenos Aires, Rio for work, so we had a holiday to both of those as well … So, yeah, yeah, I'd hate to think of my carbon footprint [laughter]" (PL)) to a conflicted position where the irony or oxymoronic situation of travelling to visit a glacier is discussed:

> I wanted to have an experience of something **that …** almost a seminal experience; we did the cruise to … the Hubbard Glacier … For me there's so much to see in the world and also it's so important to value it. And if I can do it as green as I can I will, but I do get the fact **that …** But it makes you realise the value of what we've got and we shouldn't take it for granted. (MH)

Both highlighted ellipses are not deleted data but place where the speaker seems to have self-censored a reality that they didn't want to express, that they were visiting glaciers before they disappear due to climate change.

In terms of the balance of flight purposes (i.e. work or leisure) in the sample data, Nvivo analysis reveals that there are 52 segments in 24 interviews where 'planes' co-coded with 'holidays' or 'getaways or weekends', compared to 14 segments from 6 interviews where 'planes' co-coded with 'work' or 'trips away with work'. As the above quote from PL highlights, international flights might directly influence destinations for holidays, and although PL's hypermobility might seem an outlier: "So, last year, Shanghai, Buenos Aires. The year before, Dubai, New York. So, you know, I was trying to think today, I probably take, with holidays as well, maybe 60 flights a year", at least one other interview struggled to remember the details of chains of flights for business and pleasure, taking a four-day holiday to Thailand from a trip to America: "So, that was on a business trip in between, so that was New Jersey … what did I do? … I did New Jersey to (laughing). I can't even remember what I did. I did New Jersey to Hong Kong … and then Hong Kong to Phuket … there was a stopover there" (SK2). International travel for work seems to breed a comfortable familiarity for some ("you can give me an airport probably anywhere in Europe and I'll tell you how to shortcut through it" (PL)), but almost contempt in others ("he's always travelled quite a bit for work so he's been sort of all over the world for work so I think that has, you know, it kind of puts a slightly different spin, when he goes to the airport it makes him think that he's going to work" (KS)). In either case, in can be understood as a routinized social practice with its own material arrangements, meanings, and competences.

In much of the data on international travel, there is frequent mention of friends and family as networks. These influence travel in three ways. Firstly, as people who share and thereby duplicated trips ("I'd probably go on maybe one or two other skiing holidays … one with my friends, and then another one often with work colleagues." (AS)). Secondly, as 'destinations' inspiring trips, particularly for those with transnational families ("I go to see my parents abroad or my sister … in Russia

… They will come here every year and I would go there maybe every second year" (KR); "They live in Oslo in Norway, so they'll tend to fly to us, and they spend half the year in the south of France, so we'll see them when we spend time there." (PL); "I normally try and save my leave to try and get to South Africa once, you know, in an ideal world, once a year, … back to my roots and back to my friends … I've always got my reasons to go back there" (WW)). "Thirdly, providing destination facilities, for example a villa or apartment or simply accommodation to stay in ("the family have got a villa in Spain, where we can use" (EO); KG described 'driving around' Spain to meet up "with some friends who had a villa in Portugal"; "a friend of mine has got an apartment in Portugal, so we've been there a few times. You know, just somewhere relatively short; three or four hours away with a bit of sunshine" (ML)). Fourthly, maintaining social networks requires rituals such as birthday celebrations, wedding and stag parties, which appear to increasingly incorporate international travel. An evolution can be traced from the early travel experiences of older interviewees ("It wasn't until I was really in my teens that really went overseas and that was with a football tours and bunches of lads so, you know, that was Benidorm…" (TW)) through more availability of cheap flights and disposable income to more far-flung destinations: ("I've travelled on honeymoons, so to Africa … When … I got married [to] my current wife, we went to Australia for three weeks … I think, as you move into the '90s and '00s, all my friends were international stag dos, and I even got married second time around in France, so we had all the guests flying over for that as well." (PL); "we have friends in New Jersey … and her son was getting married in California. So after … New York, Toronto, I then took a flight out from Toronto straight to California for her son's wedding, back to New Jersey and then back to London." (SK2))

Moving beyond the most straightforward explanations of flight purposes as being driven by work, holidays and friend and family networks, SK2 provides an example of travelling for professional training (New York in the above quote, to which she plane-commuted from a friend's house in Toronto) but also for pure, and apparently impulsive, leisure trips, including the four-day holiday in Thailand, and a trip to South America for yoga:

> so I literally woke up and thought 'oh shit. I need to book this, haven't booked it'. Ended up booking it through a cousin of mine and said 'right, get me on a plane' … and then I was on a plane at ten o'clock in the evening out to Columbia … for our Arhatic yoga practice or Pranic healing for four days

This travel agent friend seems to be the main social factor facilitating this hyperaeromobility: "anything that I can't do on the Internet, I just pick up the phone to [Friend's name] and say, "Right. I need a flight to so-and-so, do your deal with it", and it will be yay or nay (laughing). Either I get on a flight or I don't get on a flight, simple as that." (SK2).

Numerous participants gave explanations of how they chose holiday or travel destinations, being influenced by media ("we've been to Greenland, Iceland, Norway, Russia, yeah you know it's a chance to see parts of the world you only read [about] or see on the television." (MC)), a desire for novelty ("we've been to Thailand a couple of times, and we've been to

America a couple of times, but we don't like going to the same place again and again, we just find it a bit boring." (AW); "No, we try and go to different places … we do try and chop and change it." (CC)) which one person explained as addictive or ratcheting ("I think once we've been somewhere a bit different once we just seem to kind of … we wanted to go somewhere a bit more off the beaten track and a bit sort of more unusual" (KS)). One participant illustrated an aspect of Bourdieusian distinction, in that they aimed to visit places where British tourists wouldn't go ("I think it's a case of when we go abroad we like … I like going to places where we go where a lot of normal tourists don't, but I don't see the point in going to Greece and then going and sitting in a hotel and get fed English food" (SM)). In one interview, a teenage son was described as self-organising holidays in the Far East specifically as a sort of rite de passage in which personal freedom was key: "he's gone to Bali, he's gone to Thailand when he was, like, 17 … his motivation was he wanted to … go to places that were, you know, free … you know, you could ride on a motorbike without permission from us and that sort of thing" (WW). Finally, in a particularly rich interview, MH explained how he and his wife had both experienced a lot of travel, through a teen 'career' in ballroom dancing and working on cruise ships respectively, but described trying to pass on a sense of meritocracy about the travel opportunities they were now introducing to their son, where the new experiences of travel are the pay-off for hard work and ('luck'):

> that bucket list … it's about that exposure to experiences and inspiring people. So, for [son] … we've said to him, "The reasons we've been able to take you to Mexico, the reasons we've been able to take you for a week in Chicago to stay with friends and stuff is because of the life we've made", and he sees me and [wife] working really hard to achieve the funds and necessitate the ability to be able to do those things, and we hope that rubs off … And we're really fortunate we've got fantastic friendship networks all over the world … being able to pass on those experiences and those stories I hope would be inspiring … those memories, they are the most valuable things in the world. It's new experiences … what price can you put on that glint in your eye and that sort of buzz in your heart and the hairs on the back of your neck

The material arrangements which are linked to air travel might be considered irrelevant or prosaic. While car ownership is associated with miles driven, no one in our sample owned an aeroplane. However, as 'automobility' as a socio-technical system (Urry 2004), and as a Foucauldian *dispositiv* (Manderscheid 2014) encompasses both roads, garages, and service stations, and the discursive associations between driving, freedom, and status (Cass and Manderscheid 2018), so 'aeromobility' as a system (Cwerner, Kesselring et al. 2009, Gössling, Nilsson et al. 2010) encompasses airports, hire cars, a familiarity with and competence in navigating such 'mobility spaces' and the discursive associations of elite travel and (literally jet-set) freedom.

Whilst disposable income and cheaper flights are obvious facilitators of more frequent air travel, so is living close to airports or being able to drive to them quickly. In describing the appeal of their home location (the first follow-up question in the interviews), several raised the proximity of airports, un-

prompted ("So it's in the south east, about 20 minutes north of Heathrow" (AW); "we were very centralised and we'd got the airport nearby. So, it ticks all the boxes." (MH); "as I developed my career I was travelling a lot out of Heathrow so it's 15 miles away but not hearing the sound" (TW)), while others tied the proximity into the idea of a 'three hour flight' as some sort of optimum or ideal ("I particularly don't like long plane journeys. So to get there it's like just over three hours, which is great. So, you know, we can leave here, be at Heathrow Airport in half an hour and then a three-hour flight to Malta and at the hotel within sort of four or five hours" (RS). Foreign properties are another material 'infrastructure' of escalating travel, with 8 of the 30 interviewees (27 %) mentioned villas, chalets or apartments. AS described his dad as "a mad skier, so he would take us on a family ski trip and then … he invested in a chalet. That obviously means that we've now got that availability, so we use that". PL visits his in-law's villa in the south of France as one of a minimum of 3 annual holidays, including "half term, in April, Easter, for a week or ten days … the south of France … every year for two, three weeks… then we would look to do a sort of late like half term, winter trip to somewhere like – we've done Malaga the last couple of years for a week", with this routine being driven by "School holidays, that's the driver, I think. So, we're dictated to a little bit by the term time … So, we're looking at no more than three hours' flight." TW, as a retired businessman, visits their apartment on a subtropical island "between four and six times a year … it's usually my wife and I but since … the grandchildren are very young … sometimes then they all … all the family come out". The 'three hour flight' is mentioned in numerous of the quotes above, and specified by 4 participants, for some a common understanding of an ideal limit ("we try and look for places that are, you know, close enough that it's not… we don't want to be more than a three hour flight really" (KS)), and here tied to convenience, in comparison with car driving in the UK: "one of the first things we did; we bought a property abroad, we bought an apartment in the south of France … I could be in the south of France quicker than I could get to my sister is Dorset, or as quick; three and a half hours I could be there on the balcony with a glass of vino." (MH)

Discussion and conclusion

The data clearly illustrate many of Mattioli's (2020) 'mobility links', from specific instances such as skiing being passed from a father to son as a regular holidaying practice, and yoga retreats occasioning trips to other continents, to social networks driving and facilitating foreign travel, and some indication of e.g. the skills of navigating airports or booking flights becoming habitual, and associated with a dispositional blasé attitude to sometime impulsive travel that in the context of other lives would be unique and life-changing experiences. All of these tend to support Mattioli's (2020: 86) suggestion that "for some (highly mobile) individuals, various elements of LDT (mode, destination, and so on) can become habitual" (Mattioli 2020: 86). The findings provide rich examples (too many to cite here) of how introductions to these elements of LDT appear in individual life histories in different ways, whether from upbringings in high travel or transnational families, explorations in youth, friendship network bonding rituals, expected face-to-

face meetings in work, and gradually expanding geographies of holidaying, driven by novelty, exploration, media, disposable income and cheaper flights. Moving beyond simply identifying explanatory factors to consider the *escalation* of these factors in society, and to the nested or hierarchical arrangement of energy cultures, opportunity spaces, or 'orders of need satisfaction', it is clear that the material services of provision of aeromobility that enable smooth flying, along with the systemic effects of excluding aviation fuel from taxation and its emissions from climate accounting, have rendered flying more 'normal' over the lifetimes of the older participants, to the extent that several interviewees claimed that flying abroad was much cheaper than holidaying in the UK, especially for families. The (continuing) multiplication and expansion of airports, combined with travel connections to them provide a material and geographic reordering of space into aerospace, and the spreading of norms such as the 'three hour flight', online technological possibilities and media-driven familiarity with the spectacle of foreign travel consumption, lead to cases such as the 16-year old booking his own trips around Thailand, to enjoy helmetless motorbiking.

Interpreting the data in terms of Brand-Correa et al.'s (2020) framework certainly reveals systems of provision, practices, and the specific technologies of planes, hire cars, mobile phones and laptops involved, however, it is not clear that their 'services approach' maps on to these aeromobile practices. What energy services or human needs are being satisfied here? Work-related trips can be said to be required by the human needs for food, shelter and so forth that are only available through money, for which employment is generally required in our capitalist societies. And the jobs of the most hypermobile interviewees (excluding the most impulsively aeromobile subject, who was on a 10-year career break) were in industries and roles that 'necessitated' face to face meetings, e.g. checking foreign offices of a company, or factories and providers, helping with sales support and generally glad-handing, or indeed being part of the oil industry whose global expansion is part of the ratcheting system of provision. It is clear that this extent of travel cannot justifiably be linked to 'human need' in any meaningful sense- it is 'necessary' only to maintain a standard of living that is denied to the majority of society.

The covid restrictions and explosion in the use of 'virtual mobility' (Urry 2002) to substitute for physical travel indeed demonstrate that some of this travel could be reduced or eliminated. In the area of work, the most hypermobile interviewee agreed that "I think Zoom's great. So, you know, Microsoft Office, Teams, all of those packages work pretty much to par. So yeah, I think we'll see a very big change in corporate travel next year. I think there'll be a lot less of it." (PL). Another reflected on week-long trips to foreign countries: "when I went out there it was meeting after meeting after meeting so I … Can you do it by video link? Yes, you can, I'm sure you can. And after this pandemic I wonder if a lot more happens this way because actually it works quite well and I think it's okay." (CB). Transnational family networks crave embodied 'co-presence' (Boden and Molotch 1994) but have also adopted technologies to satisfy some of that need: "Yeah, and we celebrate lots of holidays, all Russian holidays, so the whole family has to get together at the table and we will Skype my parents and Skype my sister, so they feel like they're part of the celebrations and they're at the

table with us, so to speak." (KR); "I attended one wedding in Dubai, and again over Zoom! So, we have attended three weddings in lockdown, all over Zoom! … and they delivered the food to your doorstep!" (HI).

Holidays can clearly be seen to be subject to ratcheting pressures, particularly driven by class-based distinction, and desires for novelty and new experience. The 'bucket list' mentioned by one participant is part of a social media-driven hypermobility linked to Instragrammable packaged moments of tourism, and bucket lists that are ironically predictable in their attempts to be exclusive and unique, such as the cruise to a dying glacier, or the same interviewees' "flying by helicopter to the Grand Canyon to have a champagne picnic" (MH). With many of the interviewees seeing such travel as a reward for 'hard work', the 'orders of needs satisfier escalation' framework suggests that while imposing frequent flier taxes might disincentive some aeroplane use, the ways in which international flights as a practice are systemically linked to systems of provision undermines critique or policy which tackles leisure-related flying only on the basis that the 'services' that it provides are largely wants, rather than needs based. To tackle the entire edifice of flying will require instead a degrowth agenda that refines the 'good life' in more equitable, local, and climate-friendly terms. For many, the current unequitable distribution of something that is often taken to be a considerable contributor to quality of life or well-being (travel), is a prime example of an area of energy consumption behaviour where excess could be fairly reduced.

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