The Hi-Lo Club: rural older people as energy users

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1. Introduction – spatial-demographic dimensions to energy use

A trend that began in the later industrial era became highly pronounced in the UK in the last 50 years, to the extent that net migration from urban to rural areas has consistently been greater than the reverse, rural-to-urban migration. This has added to factors in societal ageing to create particularly high concentrations of older people in rural areas. There are a number of discreet factors behind this trend, including:

- The out-migration to urban areas of younger rural dwellers in search of education, jobs and housing
- The in-migration of urban dwellers in mid to later life, seeking rural advantages such as lower cost, larger homes; lower crime rates; more downshifted work options; spatially-dependent sports and leisure options.
- Marginally longer rural life-spans
- General factors in population ageing affecting all areas, urban and rural, including lower birth rates and longer life spans (increases relatively greater for men).

(Champion, 2002; Champion and Shepherd, 2006; Kyte and Wells, 2010; Brooks, 2011).

While older people in general might be assumed constrained in their energy consumption by factors such as smaller dwellings, static and dwindling retirement incomes and pressure to conserve resources in the face of longer lifespans, in fact sizeable sections of the rural older population do not fit this profile. For example, the early retired are more likely to engage in highly mobile life-styles (e.g. Berg et al., 2015). A proportion of mid to later life ex-urban migrants have moved into large, old hard-to-heat homes and can afford to maintain these at good levels of thermal comfort.

At the other end of the age spectrum, the association between higher age, especially age 85 and over, with circulatory disorders and other health impediments as well as impaired mobility (Walker et al., 2003; Brooks, 2011), puts constraints on the ability to make frequent and or long journeys, but may nevertheless increase people's car dependency due to difficulties with walking and using public transport. Later old age, with its associated health and economic constraints, also has implications for greater numbers of hours spent indoors and potential need for higher temperatures to achieve thermal comfort (in relation to the latter, see Kenney and Munce, 2003; Havenith,2005 cited in Day 2015, p252, Schellen et al., 2010).

In line with these indications, research on rural elders' energy use has shown that there are indeed substantial discrepancies in energy use between different groups of elders, while social trends in the polarization between different income groups across OECD countries (Keeley, 2015) imply a likely future amplification of these trends.

This paper first reviews recent research on (rural) older people's energy and transport use. It shows in the second section how energy demand research has tended to highlight older people as active agents in their energy use, with personal, cultural and social characteristics influencing their choice of energy and transport systems and their day-to-day decisions about energy use.

The third section reanalyses interview data generated for a doctoral study of the sustainability of growing older in the countryside, which encouraged older people to talk about their homes, their place of residence and any problems and barriers they might encounter in day-to-day life. Two particular findings from the case studies – older people making surprisingly long and/or frequent car journeys; and an adherence to coal as the main heating fuel among people on different incomes – are used as examples to show that it can add to our understanding of energy use to view it as an

interaction between people at particular stage in the life course and physical and cultural aspects of particular places, with their distinctive path dependencies. This approach, I will suggest, can contribute a more holistic picture, that can go beyond the idea of individuals as sole agents in personal energy consumption.

The examples picked out to illustrate this argument also indicate that particular environments, with their distinctive regional histories and path dependencies in interaction with older people's changing needs and capacities, can structure and even exaggerate discrepancies in energy use among higher and lower income rural older people, in a way that is harmful in terms of both emissions and for some elders' personal well-being in later life.

The fourth section speculates to what extent path dependencies can give way to new paths; and whether the types of polarization in consumption effected by these distinctive rural environments is likely to increase or diminish in the future. It briefly touches upon the potential to address these imbalances through technological and socio-techological developments.

The concluding section summarises the main findings and prospects for rural elders' energy use, highlighting the costs for the environment and human well-being.

2. Background – rural older people's domestic and transport energy demand

This section treats domestic and transport energy use separately, looking in each case at what have been argued as the main factors behind people's home heating and transport use. It then briefly explores how these factors might translate in the context of older, rural-dwelling energy users, including high and low income groups, referring where available to relevant research studies in this area.

Domestic energy use

There are three main aspects to domestic energy use: heating, lighting and the use of equipment and appliances. Of these, by far the most important in terms of both KWh and cost is heating, so this section is mainly focused on research on rural elders' use of energy for domestic heating. A review of the research suggests four main factors are identified as impacting the amount and cost of energy used for domestic heating. These are:

a) the cost of energy for heating, which will depend on fuel type and market conditions, minus any fuel subsidies or grants in operation.

b) the energy efficiency of the home, which includes the heat-fastness of the housing shell, but also the characteristics of the main heating system used, central or topical heating systems, maintenance regime, temperature control technologies, energy consumption control technologies.

c) the qualities, routines and habits of the resident(s), including: household income, number and age of residents, hours spent indoors; number of rooms heated in different seasons; number, type and extent of additional heating appliances used.

d) norms and expectations of the resident in terms of thermal comfort, levels of indoor attire, room ventilation.

(Age UK, 2014; Boardman, 2010; Barnicoat and Danson, 2015; Day and Hitchings, 2009; Guerra Santin et al., 2009; Tweed et al., 2015; Yohanis et al., 2008)

Existing research suggests that several of these dimensions have an age-related and/or a spatially related dimension. In terms of cost, gas is the cheapest form of heating fuel. It has been estimated that gas central heating is around 30% cheaper to run than an oil-fired boiler and 40% cheaper than electricity-fired boilers. But connection to the gas grid is low in rural compare to urban areas because the volume of users makes investment in extending the infrastructure economically unviable (CRC, 2007). This is one of the strongest reasons why rural dwellers are likely to be paying more for their domestic heating. Older people resident in the UK have a slight compensation, in that people aged 62 and over are eligible for the Winter Fuel Payment of £100-£300 per year, while low income households can also get Warm Home discount and Cold Weather Payments (Age UK, 2014).

In terms of the energy efficiency of the home, rural dwellers are more likely to live in hard-to-insulate older buildings, with non-cavity brick or stone walls (CRC, 2007: Figure 2.4.10). Some vernacular stone buildings and older local authority and sheltered housing have very small dimensions by today's standards, being designed with minimal interior space so as to be cheap to heat and easy to maintain on low incomes. Small interior dimensions make interior insulation unviable because too much floorspace will be forfeited; while there can be aesthetic and planning issues with external insulation because it alters the appearance of the dwelling.

Private landlords offer traditional rural properties for rent at low cost on the understanding that upgrades to thermal comfort would also increase rental charged. For housing associations, the costs of insulating stone buildings, although amenable to subsidy through the Energy Company Obligation in recent years, may far outweigh the savings that can be made for tenants. Likewise, for homeowners, it may take many years to recoup the cost of insulation through ECO in energy efficiency savings. Research suggests that it is only the better off who can afford to invest for slow, long-term gain. When it comes to people in later life, home owners can be reluctant to invest in upgrading to more efficient/cleaner energy systems, on the basis that they may not be around for long enough to make the investment worthwhile (Age UK, 2014: 10; Day and Hitchings, 2009: 49).

Spending more time indoors across the seasons is likely to increase with higher age which is associated with greater morbidity, co-morbidity and declining mobility. More time indoors implies longer hours of domestic heating, even though those on lower incomes have to manage the costs by heating only one or two rooms, and/or taking earlier winter bedtimes. Those with good levels of mobility, as well as the recently retired, people working past retirement age and those with access to a private vehicle, are all more likely to spend long periods of time outdoors. Even for the younger old and physically fit, however, various deficiencies in public and community transport provision in rural areas are likely to curtail the type and number of trips made.

Research suggests control and flexibility is important for older people in their energy use (Barnicoat and Danson, 2015). Part of this is the ability to increase heat in particular locations with supplementary devices – for example, in parts of a house that due to orientation or features such as windows, are particularly cold, before guests arrive or during an illness. In rural areas, the higher cost and sometimes less efficient heating systems available in rural areas may lead to greater use of these appliances. Some qualitative studies suggest that cohorts of people coming into their sixties and over may have become habituated over the lifecourse to adding additional layers of clothing as a response to cold (ibid.), before or instead of resorting to an external heating source. There are nevertheless some cultural limitations, as, for example, when it comes to the idea of wearing headgear in bed (Day and Hitchings, 2012). Practices of opening doors and windows to freshen the air in a room, reduce energy efficiency by breaching the heat-fastness of the housing shell (Wright, 2004). These may have a practical and/or habituation element (Day and Hitchings, 2012), perhaps a pre-emptive response to the fear of smells evoking age stigma (ibid.) or a learned habit in response to the poorer interior atmosphere engendered by burning fossil fuels for a heat source.

Transportation use

The research literature suggests that the main factors that affect people's energy use through transport fall into six categories:

a) Qualities, routines and habits of the transport users, including number in the vehicle, household income, number and distance of trips made; tendency or otherwise to chain trips (or to chain certain types of trip);

b) Norms and expectations of the traveller in terms of speed; level of thermal comfort; willingness to share with other users; level of road congestion tolerated

c) Availability and choice of medium of transport

d) Energy or fuel efficiency of medium of transport chosen

e) Cost of using chosen medium of transport, which includes fuel prices and level of fuel taxation, plus vehicle maintenance, minus any subsidies, discounts, free passes and so on.

f) Spatial distribution of attractor destinations.

(Barla et al., 2009; Gilhooly et al., 2002; Giuliano et al., 2003; Su and Bell, 2009;

Several of these dimensions have an age-related and a spatially related dimension and some highlight strong discrepancies between high and low income groups, centred not just around access to a private vehicle, but the type of vehicle used, and the use to which it is put.

Due to the deficiencies in public transport in many rural areas, car ownership is no indicator of income. Far higher proportions of older rural than older urban dwellers run a private car. Older people tend to have less energy efficient cars on the one hand (e.g. Musti et al., 2011), but on the other hand are more likely to chain trips (make a series of stops for different purposes on each trip) (Su and Bell, 2009). Since the introduction of the free bus pass scheme in the UK in 2008/9, older people have also had the option, taken up by a proportion of rural dwellers, of combining private car journeys to a transport hub with a trip by public transport (Ahern and Hine, 2010; Brooks, 2011).

Older rural people generally (Byles and Galienne, 2012) and older rural men in particular (Ahern and Hine, 2012) have been found to be particularly reluctant to give up car use, even when in ill health. This is thought to be related to identity and habituation issues, such as those who have been licence holders since early adulthood, and who have never or rarely used public/community transport. Rural roads are the most dangerous in the UK in terms of fatalities (RoSPA 2015) and although this is attributed to the winding nature of rural roads by the Royal Society for the Prevention of accidents (ibid.), evidence from Maryland in the US suggests driving style and age of driver may come into it, in that older rural drivers are more likely to break rules of the road (Keay et al., 2009). While the accident rate reduces with increasing age up to about 75 or 80, due to physical frailty older people having car accidents are at considerably greater risk of death (Mitchell, 2013).

In terms of cost of fuel, while car ownership and maintenance has reduced immensely in cost over the last several decades, the cost of transport fuel is subject to notoriously substantial fluctuations,

exacerbated in remote rural areas by the cost of transport the fuel to the station and only in a few select cases alleviated by subsidy.[1]

For people/miles travelled, public transport is more energy efficient than private transport. Older people are generally more likely to use public transport than younger age groups; although there is a gender dimension with older women the main public transport users (e.g. Ahern and Hine, 2012). Public transport is also much cheaper for older people aged 60 and over. They are in most parts of the UK eligible for a free travel pass for use on buses; and also eligible to purchase a Senior Railcard, which entitles them to a 1/3 discount on train fares.

However, rural people are much less likely to live near public transport stops and stations (CRC, 2007). And although no other research has been identified on this, interviews in the doctoral study discussed in the next section (Brooks, 2011) suggest there may be particular issues around thermal comfort and public transport that discourage older people from its use. Thermal discomfort is likely to be encountered in cold seasons when waiting outdoors for a bus or train more than in the past, through attempts to design out vandalism from transport stops by removing waiting rooms and enclosed bus stops. Also, although this was not discussed by interviewees, public transport may be difficult for elders with poor thermal regulation, because of the inability to control the heating level in a public vehicle; as well as through the loss of heat when people enter and exit the vehicle at stops and stations.

Thus older rural dwellers who are unable to access private transport as either drivers or passengers (which might be for reasons that include social isolation, lacking capacity to drive or low income) may be particularly disadvantaged in terms of getting out and about. Depending on the season, public realm conditions and their social networks within their settlement, such rural elders may find themselves spending more time than they would wish confined to the home.

3. Insights from case studies in the North East of England

As noted in the Introduction, this section will argue, based on a doctoral study that attempted to build a holistic picture of the sustainability of rural places for people in later life, that additional to the above factors in older people's energy demand, particular place-specific and path dependent factors may structure – and potentially intensify or further constrain - rural elders' energy use.

This Section will first introduce the doctoral study from which this data is drawn and then go on to explore two dimensions that illustrate the idea of path dependencies structuring older people's energy use: older people making surprisingly frequent, and/or long car journeys; and some older people's adherence to coal as the main heating fuel.

Introduction to the doctoral study

The doctoral study, joint-funded by ESRC and DCLG was entitled: "Are country towns and villages sustainable environments for older people?" and took place in three rural areas in the north east: two in Northumberland, centred respectively around the market towns of Hexham and Rothbury; and one in County Durham centred around the market town of Barnard Castle. Within each rural case study area, a total of six settlements was visited: a centrally-situated market town, two

[1] Subsidy for rural petrol stations to help keep the price of petrol down in rural locations existed in Scotland but ended in 2008. But in 2012 Rural Fuel Rebate was introduced for the UK's more remote islands and in May 2015, a mainland scheme was introduced giving a 5p per litre discount for was given to some of the most remote rural petrol stations in England and Scotland.

settlements in an outlying commuting rural area (categorised as lying within the city-region) and three in a more remote rural area (categorised as peripheral to the city-region).

Two or three older interviewees (or interviewee couples) were recruited within each settlement using a door-stepping method. Sampling was purposive, selecting older people with characteristics representing each side of five themes of interest for rural ageing identified in the initial literature review. These were themes operationalised into simple characteristics easy to ascertain with older interviewees, such as using a wheelchair or buggy or not; receiving social care or not; in a household with a private vehicle or not. In total the older people sample consisted of 50 interviews with older people and couples.

The interview approach was semi-structured, using a large coloured disc divided into eight thematic segments, representing different areas of life including location and habitation, routines and responsibilities. Using the prompts on the disc, interviewees were invited to describe their lives in detail and discussions could range in length, depending on the preference of the interviewee, from twenty minutes to two or three hours. The consent procedure was checked by the Newcastle University ethics committee and included anonymising not only the interviewee's name and identifying details but the location of the interview, a requirement that has also been followed in reporting the interviews below.

Additionally to the older people's interviews, from 9 to 13 representatives of organisations providing specialised services to older people in relevant areas were interviewed for each of the three rural areas studied. Place audits, which focused on access, active travel and transport issues, were carried out for all settlements visited; and the relevant local, regional and national policy pertaining to the case study locations was also reviewed.

For this paper, the 50 older people interviews were re-examined with a focus on people's accounts of transport and domestic energy use. Due to their salience to the issue of excessively high and low rural energy consumers, the phenomena of high car use and continued use of coal for domestic heating were picked out for further investigation. Data from the interviews has been contextualised where relevant with the broader case study material presented in the doctoral thesis.

Reasons for more frequent and/or longer trips by car

The vast majority of the study's 51 older interviewees, across the market towns, had access to a personal vehicle and/or to regular lifts from neighbours, friends or relatives. Older people who could afford it, and wished to, used their car to lead multi-location lives, little different from younger rural people still in employment. *Michael* in Barnard Castle, for example, drove to a voluntary wildlife conservation job 50 miles away on a regular basis; *Martha* in *Tees Grove* regularly drove her daughter to part-time work in an urban mall 35 miles away; several interviews noted that they stayed with hairdressers, doctors or dentists in places where they had formerly lived or worked long after there was any practical reason for doing so, which seemed to be due to a reluctance to take the chance on a switch once a trustworthy provider of these services had been found.

A number of interviews with older people in all three areas researched show for many it had become part of the rural lifestyle to make regular long car journeys of up to 30 miles to access a major supermarket in an urban area, in spite of living near to a range of smaller shops, or ample-sized town centre stores. Besides avoiding overcrowded town-centre parking and sometimes poor quality surfacing in their local centres, with these journeys older people sought a range of co-benefits, including better mix of lower prices, cheap petrol outlets, and free or low-cost parking. An interview with an older person reported in a study carried out concomitant with this research, and reported in Gilroy et al. (2007: 77-78), suggested that some older people with mobility impairments might prefer

to shop in edge-of-town supermarkets in preference to the more conveniently located town centre stores, because of the wide, uncluttered aisles that can be safely navigated with a mobility aid. Other advantages of the kinds of large footprint retail outlet (often constructed on cheaper, peripheral land and mainly for car access) were observed from the place audit in the main study and included ample disabled parking bays near the store entrance and customer toilets.

Besides the consequences in terms of energy consumption and emissions of these kinds of trips, another consequence was to further reduce the footfall and viability of the town or village centre stores (Simms et al., 2002; New Economics Foundation, 2007). The loss of town centre grocery stores can have serious consequences for those local people unable to access private transport, in particular because current generations of older people include many unable or unwilling to use online grocery delivery – due to factors this study identified as including delivery charges, unreliable, slow, expensive or non-existent broadband, and preference for selecting foods in person.

The interviews with older people also threw up a number of very context-dependent reasons for making frequent car journeys, often to places within walking distance or within range of a Personal Electric Vehicle (PEV). These included unsafe walking conditions due to a traditional public realm, typical of rural settlements which were designed for more youthful demographics, with horse and cart or carriage the only alternative to walking. Features, such as roads that twist and turn to pace horse drawn vehicles and livestock brought to market, steeped guttered edges to keep water and waste separate from pavements, and coarse surfacings such as cobblestones (retained or even retro-added, for touristic reasons as in the case of parts of Barnard Castle), are only beginning to be recognised as hazardous for the ageing rural population (and the mobility impaired of any age) and in need of modifications (Brooks, 2011, p247).

Other typically rural features highlighted by interviewees as leading to more car use included a lack of strategically placed benches on steep inclines; a lack of safe conditions for Personal Electric Vehicles (PEVs) on rural roads, where the roads are regularly used by large military vehicles and industrial haulage; pavements too narrow for PEVs in central shopping zones of towns and villages; or in residential areas, pavements impassable for PEVs due to widespread pavement parking; steep inclines between housing and shops and services; lack of alternative forms of transport, particularly in smaller settlements or residential areas outlying a market town deficient in public and community transport schemes.

The very development pattern that is so common in rural market towns, whereby a concentric circle of new (often bungalow) developments is periodically succeeded by another such ring (see Taylor, 2008), means that people moving to a new property at the edge of the town when they are still able to drive can become cut off from the town centre when they have to give up driving. This is particularly the case when the town lacks a town bus service or has one with a sparse schedule, or where the conditions for a Personal Electric Vehicle are too hazardous, as described above.

Sometimes it seems that the walk into town from the newbuild edges is too mundane or unattractive for the older person, as in the case of *Emma*, an inhabitant of the new estate at the edge of the village of in the well-connected direction of the Barnard Castle case study, who commented upon how, although a life-long inhabitant of the village, and involved in many activities and the village social life, she preferred to shop and walk elsewhere and would only rarely use the local Post Office or shops.

Reasons for adhering to coal as the main form of domestic heating:

The counties of Northumberland and Durham that make up the Northeast region of England have for centuries been a leading centre for coal extraction and mining industries, a history that not only influenced the type and design of housing up right up to the 1980s, but even the settlement pattern. The influence on settlement type is particularly evident in County Durham, which is characterised by a pattern of hundreds of dispersed, small mining villages spread over a large rural area, a major challenge for public transport services (Durham County Council, 2006). In spite of attempts by local authorities to reduce settlement dispersal by mothballing a number of what were labelled Category D ('unsustainable') villages, a strong local resistance, also influenced by the close mining culture of the area, ultimately prevented withdrawal of local authority services from settlements (Pattison, 2004). According to the study respondents, the villages located nearer to the Teeside conurbation have been attractive to migrants from the EU, while the more rural east of the region, characterised by gentle walking country, has proved attractive to both mid and latelife inmigrants, to the extent where one professional described it as "an older people's ghetto".

The older people interviews in these areas revealed several householders who were still using coal as their main, or one of their main, heating fuels: two in sheltered housing and three in owner-occupied housing. There were three main motives for doing so:

- The house was only for heating by coal (in Northumberland, this included both older homes and recent Housing Association sheltered housing);
- The person received free coal as part of their or their spouse's pension (former coal board employees).
- Coal deliveries were available locally at a low price.

Another reason, habituation to, and enjoyment of, the routines and rituals around coal fires, was mentioned by a household that used coal only as a supplementary fuel.

The hard work and inefficiency in coal as a fuel was highlighted in one account:

> Interviewee: I can't kneel on my knee, the one I had replaced, they said I shouldn't put the strain on it, so I have to bend from the waist to do the fire every morning. It gives me heartburn. I wish they would come and do something. In this day and age, we shouldn't be shovelling coal. […]
>
> Researcher: It must take a lot of planning to keep the fire stoked up to the right temperature.
>
> Interviewee: Well, by the morning, the fire's been out for hours. You get out of bed and it's perishing. […] (*Evie, 83, widow, Housing Association tenant, village, less-well connected direction, Hexham case*).

It should not be forgotten that lack of thermal comfort can have a range of consequences beyond simply feeling cold. Day (2015: 254) cites various research studies that find benefits not just for physical but for mental health, social and family relationships when thermal comfort is improved. As part of the study, a manager at the Housing Association responsible for the estate where Evie lived had previously been interviewed, but did not seem aware of the difficulties faced by tenants such as Evie. While it was possible in some cases to obtain a Disabled Facilities Grant to convert properties with coal-based heating systems to electric central heating, the Housing Association had encountered some resistance in rural areas: "The pit pension can include free coal. If people have had it all their lives, it's hard to get them to change." (*Housing Association, Northumberland*). Evie felt unable to raise her difficulties with coal heating, and other housing issues, as her Housing

Association's tenant feedback meetings were held in a larger neighbouring village but no transport was provided for tenants living elsewhere to get to the meetings.

An interview with a professional from an older people's support organisation interviewed for the Rothbury case study showed that this is not just an issue for Housing Association properties in the North East, but also affects the large proportion of rural private rented housing provided by landed estates:

> But some of the things that do concern me about the Estates is the state of the property. You know, and we've got some really elderly clients who are probably living on peppercorn rents in property that is desperately in need of renovation, desperately in need of central heating systems and all that sort of thing. We've got ladies in their 80s still lighting coal fires and things like that. (*Older People's Support Organisation, Alnwick*, *Rothbury Case*).

Several professional interviewees raised the poor conditions in landed estate private rented property, which often had older tenants due to the low rents, but where improvements in the interior conditions would not necessarily be welcomed by tenants as leading to rent hikes.

Besides the limitations of coal in providing heat to areas of a home when (and where) it is needed, another issue is that it can affect the quality of the indoor atmosphere, particularly in certain weather conditions producing 'blow-back' that sends smoke back down the chimney into living areas. This could be a particular issue for people with existing respiratory problems, of which there is a high prevalence among older North Easterners. However, although one coal user mentioned a campaign by incomer neighbours to get the village made a "smoke-free zone". about the layer of smog over the village in the winter, none of the interviewees mentioned being personally bothered by the polluting aspects of coal fires.

> Interviewee - wife: It does hang, if you're coming in about tea-time-ish in the winter, when it's getting dark, and people are lighting their fires, you can see it sort of hanging about, but we never feel that we're breathing it.
>
> Interviewee - husband: You never get the smog that you cannot see through, or anything like that. (*Irma, 64, and Louis, married, owner-occupiers, village, less-well connected direction, Barnard Castle case, County Durham).*

Nor, in spite of heavy floods in the middle of the period of the interviews, was the connection made by older interviewees with fossil fuel use and climate change. However, a Key Actor interviewee in Teesdale noted the impact of a combination of traditional housing and oil, coal and calor gas heating on the area's carbon footprint, which is very high. Looking ahead at a prospect of rapidly increasing energy bills, the public health interviewee was considering proposals to pipe in cheap oil from Eastern Europe. He was also considering the plan proposed by the Community Energy Trust for a deep level borehole heating project for Teesdale, a prospect for which pilot studies and modelling have since taken place in the North East (Fairs et al., 2015).

4. Developments in rural elder's energy use and future predictions

There is growing evidence that economic conditions among the general population are polarising – the rich are getting richer and the poor are getting poorer – a trend which seems unlikely to abate due a combination of withdrawal from redistributive policies by recent governments and the increasing automation and casualization of low-skill jobs.

Older people's resources in later life are based on a whole life history of work, saving and expenditure (Burholt and Windle, 2006). While, overall, older people are likely to be better off than young starters in their teens and 20s for the foreseeable future, the discrepancies between rich and poor elders are likely to intensify due to both longitudinal and cross-sectional factors. Longitudinal factors include discrepancies in the quality of the childhood environment, in lifetime health, earning and saving opportunities (OECD 2015), and the cross-sectional factors include policies such as higher rates of tax relief on pensions saving by high earners.

With the bigger gap between the lowest and highest pensions, increasingly elevated ages at which pensions can be accessed, and the higher rate of post-retirement age employment in rural areas (Green, 2006) may increase in importance as a pull factor for better-off ex-urban retirees. The current level of low oil prices due to over-extraction which perverse incentives may 'lock into' the system for some time, will do nothing to discourage mid-life downshifters and early retirees from relocating to a rural area.

Concurrent with this, as whole tranches of skilled jobs are removed from the economy through digitisation and the excess pool of labour allows continued casualization of employment through such means as zero-hour contracts, there are likely to be a large swathe of rural older people on very restricted pension incomes. Among these groups will be people with lifelong health and disability, people from what has been called as the 'precariat', in uncertain and sporadic employment, as well as those with limited capacity to accrue savings from work such as care work, retail and the hospitality industry.

As more people survive to higher ages, usually with a degree of mobility and or sensory loss that makes navigating barrier-ridden environments more difficult, there may be increasing awareness of planning rural settlements as Lifetime Neighbourhoods (see, for example Age UK, 2015). As the last generations who are used to hauling and maintaining coal fires dwindle and disappear and with the passage into retirement of later generations of more ecologically aware Generation X-ers and Millenials[2], high-emission and inefficient coal-fuelled heating systems may become a thing of the past, replaced by a new generation of energy-efficient, low emissions technologies, perhaps including efficient wood-fired stoves and biomass boilers. However, as noted by Hamza and Gilroy (2011) the concurrent increase in these generations of high levels of expenditure on energy-hungry home entertainment systems (such as plasma-screen TVs), as well as the increasing affordability of telecare and telemedicine domestic technologies, might potentially offset carbon savings made by switching to greener home heating methods.

While future generations of elders can be expected to be more aware of the emissions implications of their energy use than the current generation, barriers to wider uptake among older people in terms of the flexibility and operability of the systems (see Day, 2015) will need to be addressed. Due to the higher expectations and standards for thermal comfort in the later 20th and early 21st century, there may be fewer with lifetime experience of a) low cost strategies for dealing with indoor low temperatures and temperature variation b) using public transport and the complex of strategies for dealing with its deficiencies needed in a rural context (see Brooks, 2011).

On the other hand, while at the time of the North East case studies, only 1 of the 51 older people interviewed spoke of regularly using the internet for grocery shopping, several others reported using the internet for other purposes and were toying with the idea of ordering groceries online. Since the last interviews in 2009, and partly due to various digital inclusion initiatives, internet use by older people has soared and by the time the first internet generation reach retirement age, the promise to roll out superfast broadband to 95% of the UK by 2017 (HMG, 2015) may make the sight of a liveried

[2] For the categorisation of 20th century generations into named cohorts with supposed common characteristics, see the description in Barnicoat and Danson, 2015.

grocery van more common in the countryside than that of a local bus service (it probably already is in many areas).

Wider and more cross-generational internet use in the future might also be predicated to facilitate aspects of the sharing economy (or collaborative consumption) that uses the internet to connect people who want to use particular services, and thus spreads access to them by sharing the costs. This could be particularly helpful in allowing those on low incomes to access personal vehicles through a system of advance booking of a shared vehicle, where the costs of owning and running the vehicle are spread across the community of users (see, for example, Age UK, 2015). The introduction of 'driverless cars' suitable for older people (ibid.) which would seem the perfect solution for people who never gained or have lost the capacity to drive, is somewhat more dependent on developments in the technology. The incapacity of current models to predict non law-abiding behaviour in other vehicles (*Guardian*, 2016) could be particularly dangerous on country roads (Keay et al., 2009).

Another solution may be an increase in community energy schemes although under current conditions, such schemes are likely to continue to be hard-won and piecemeal, due to lock-ins in the energy grid system that reinforce domination by the big energy providers. However, centres of energy research in academic institutions may be able to play a role in providing flagship projects that dislodge the dominant model, as, perhaps, in the deep level borehole heat project piloted by Newcastle University in the County Durham area.

5. Conclusions

This paper has looked at factors behind energy and transport use by the current generations of older rural people, and has underlined the different pressures towards heavy and very low consumption that arise not just from well-researched factors such as energy efficient services and people's habits and patterns in using these, but from specific path dependencies in terms of heating, transport and travel infrastructure, some of which are broadly characteristic of rural areas, and some which may be regionally specific.

The last Section argues that better-off mid-life to older people will continue to seek the advantages of rural areas as places to both downshift work patterns and to gain the advantages of rural amenities. These future generations of later life in-migrants may be better informed about their own likely life expectancy and the environmental impacts of their energy use. This could increase their preparedness invest in measures, including low carbon technologies, to increase their domestic and transport energy efficiency. Older rural people who have aged in place, however, may be less well-placed to make these investments, given the increasing precarity of the low-wage work that characterises rural areas.

The extremes between the highest and lowest energy users among older rural dwellers can therefore be predicted to become ever more polarized unless more checks and balances are set in place to prevent excessive energy consumption among the 'haves' and damaging underconsumption among the 'have-nots'. Perhaps, in line with the localism agenda that favours more local and regional self-governance, the distinctive local factors in people's energy use behaviour as indicated in this paper may suggest the usefulness of regional energy strategies and schemes – as in the case explored by the Teesdale public health professional noted in Section 3 - as one way forward in beginning to tackle these inequalities and their human and environmental consequences.

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