2007-12-04

Averting catastrophic climate change: confronting wealth

Hurth, V

10.1504/IJISD.2007.016058
International Journal of Innovation and Sustainable Development
Inderscience Publishers

Averting catastrophic climate change: confronting wealth

Victoria Hurth

School of Geography, Archaeology and Earth Resources and School of Business and Economics, University of Exeter, Exeter EX4 4RJ, UK Fax: +44 (0)1392 263342 E-mail: vmfh202@exeter.ac.uk *Corresponding author

Peter Wells

Centre for Automotive Industry Research and ESRC Centre for Business Relationships, Accountability, Sustainability and Society, Cardiff University, Cardiff CF10 3EU, UK E-mail: wellspe@cardiff.ac.uk

Abstract: There is increasing certainty over human-induced climate change as well as the short time scales available to avert catastrophic consequences. Given these time pressures and the extent of carbon reductions deemed necessary, it is vital that the key drivers of carbon reduction are pinpointed and dealt with. One of the key drivers of carbon emissions is shown to be increased economic wealth. The nature and strength of this relationship, although highly debated, is not well understood or widely considered, especially at the detailed level of the consumption behaviour of wealthy individuals who exist globally and not just within wealthy countries. In this paper, we argue that because increasing wealth impacts heavily on carbon dioxide emissions, both directly and indirectly, the structure of global wealth and the drivers between wealth and energy-intensive consumption practices must be much better understood and addressed as a critical means of reducing climate change. The concentration of wealth into a growing minority of wealthy people in the context of growing poverty gaps makes this not only a growing environmental issue, but also one integral to issues of social justice. Additionally, it highlights the moral responsibility of those with access to wealth and the disproportionate power to influence climate change, to reduce the impacts of their consumption and the consequences of their wealth.

Keywords:

Reference to this paper should be made as follows: Hurth, V. and Wells, P. (xxxx) ‘Averting catastrophic climate change: confronting wealth’, Int. J. Innovation and Sustainable Development, Vol. x, No. x, pp.xxx–xxx.

Biographical notes:

1 Introduction

As our scientific understanding of climate change processes grows, the certainty of

human's role in creating climate change is reinforced and the estimates of the time we have available to prevent catastrophic consequences of climate change shorten (IPCC, 2007; Hansen et al., 2007). Carbon dioxide is the most prevalent greenhouse gas (IPCC, 2007) and if global warming is to be tackled effectively and urgently, the significant causes of this pollutant must be isolated and directly confronted. One of the key drivers of energy use and carbon dioxide emissions is shown to be increased economic wealth (Vringer and Blok, 1995; Schipper et al., 1997; Lutzenhiser and Hackett, 1993; OECD, 2002; IEA, 2004; Pachauri, 2004; Cohen et al., 2005; Moll et al., 2005; Lenzen et al., 2006). Although the topic is widely researched at an aggregate level, the nature of this relationship is not well understood or widely considered, especially

at the detailed level of what drives the consumption behaviour of wealthy individuals. There has been much research and discussion about the ways in which wealthy nations have contributed disproportionately to carbon dioxide and have a moral responsibility to reduce their emissions (WCED, 1987; Agarwal and Narain, 1991; Redclift, 1996). Additionally, there has been a range of empirical research, which underlines the statistical links between growth in wealth and growth in carbon dioxide emissions, again mostly at a country level (Schipper, 1998; EIA, 2004; IEA, 2004; Lenzen et al., 2006). These studies have highlighted the capacity and moral responsibility of rich countries to reduce their impact on climate change through carbon dioxide reductions. However, there is a notable need for research and policy intervention that addresses the important capacity and moral responsibility of wealthy individuals or households, who exist in both rich and poor countries, to reduce their carbon emissions.

Data indicate that carbon dioxide intensive consumption continues to increase as people reach the higher levels of wealth, and may even increase disproportionately at these levels (Mendelsohn Media Research 2006). Consumption may also change qualitatively, as after certain levels of wealth, particular high-energy consumption practices become feasible, such as use of a private jet. Furthermore, the financial means and social influence of the wealthy makes them able to influence the adoption of carbon dioxide intensive consumption practices in other indirect ways. Research that considers how the link between wealth and carbon dioxide might feasibly be changed is particularly important in light of the exploding number of wealthy individuals in rich and poor countries, who exist in the context of increasing poverty gaps worldwide. In this paper, we argue that because wealthy groups are critical to climate change, wealth structures and the consumption behaviour of the global wealthy must be much better understood by researchers and governments and addressed as critical opportunity to mitigate against climate change. Furthermore, wealthy consumers need to accept the moral reality that how they choose to exert their consumption power and influence environmental resources is likely to be of disproportionate consequence to

everyone, particularly the poor.

The paper initially highlights the growing number of wealthy and then presents a brief account of the links between wealth and carbon dioxide emissions. This is done first at a macro level and then by highlighting the consumption categories of cars and meat. The next section looks more closely at how current trends in consumption patterns at different levels of wealth appear to impact negatively on climate change, and argues that much more perceptive data in this area are needed. In light of the links between wealth and carbon dioxide emissions, the paper then highlights the implications of current wealth structure trends for climate change and social justice. The paper concludes with a brief discussion of the potential policy implications for government. Opinions on the relative ineffectiveness of traditional policy instruments, such as taxation and (product) regulation, are then used to highlight the need for more innovative socio-cultural solutions.

2 Consumption patterns and carbon dioxide emissions

There are many measures of economic wealth, variously referring to measures of assets (physical and financial) and income. Assets and income are generally strongly correlated and as such both can be seen as measures of economic wealth (Davies et al., 2006). Wealth represents resources and ultimately energy: put in another way, wealth could be defined as the potential to influence resources and energy flows (Stern et al., 1997). Wealth, therefore, represents the power to purchase and use environmental resources, including fossil fuels. The more wealth one has, the more power one has to consume and pollute.

It is, therefore, of great importance that there has been a recognised explosion in the number of wealthy in recent decades. In the USA, the figure has grown steadily since the 1970s (Michman and Mazze, 2006) with the number of households classed as affluent growing from 3% of the population in 1977, to 21% in 2006 (Mendelsohn Media Research, 2006). Between 1995 and 2001 alone, the number of US households with annual incomes of over US$200,000 had doubled to 3 million and between 1990 and 2004, the number of billionaires grew from 55 to 313 (Michman and Mazze, 2006). This growth situation is mirrored worldwide. Merrill Lynch and Cap Gemini have for several years undertaken a survey of the global wealthy (Lynch, 2006). Their definition of High Net Worth Individuals is for people with net assets of at least US$1 million excluding their primary home and consumables; this group showed an aggregate wealth of US$33.3 trillion in 2005, an increase of 8.5% over 2004; they numbered some 8.7 million people, an increase of 6.5% in one year alone. One source estimates that there are approximately some 80,000 ultra-high net worth individuals with incomes of more than US$20 million (Hutton, 2006).

It is clear that those with greater wealth have greater capacity to influence the

carbon dioxide and other environmental factors through consumption, but it is important to understand whether this potential is exercised and how strong the relationship between wealth and carbon dioxide is. At a high level, discussions of this kind are not new. The topic is in fact a controversial one that has been highly debated. Many have argued that increased wealth has resulted in increased environmental degradation and climate change (WCED, 1987; Agarwal and Narain, 1991; Redclift, 1996). Counter-intuitively, some others have argued that in the long –term, increased wealth actually tends to result in better environmental conditions both at a macro country level (Hollander, 2003; EIA, 2004) and a micro personal level (Beckerman, 1992). Despite limited evidence, these views have been very influential and have even led to energy policy conclusions about the environmental benefits of growth and the dangers of growth-inhibiting environmental protection measures (Perrings and Ansuategi, 2000; EIA, 2004). Such arguments are based on an extrapolation of empirical evidence of Environmental Kuznet Curves (EKCs), in other words an inverse-U relationship between per-capita income and environmental pollutants, where pollution increases up to a certain income level and then decreases (Grossman and Krueger, 1993; Seldon and Song, 1994; Panayotou, 1997). Lenzen et al. (2006) suggest the four main theories used to explain EKCs are first, that environmental quality is consumed as a luxury good and is increasingly demanded with increased wealth. Second, that structural changes in the economy as a country develops reduces environmental pollution. Third, income distribution, democracy and civil rights increase environmental protection, or fourth, that technological progress overcomes pollution issues.

However, EKC data have been widely critiqued as empirically inadequate to conclude a link between wealth and environmental quality at an overall level, or even at the level of individual pollutants (Arrow et al., 1995; Barbier, 1997; Cole et al., 1997; de Bruyn and Heintz, 1999; Deacon and Norman, 2004). This is particularly true for the case of carbon dioxide where research has consistently shown no inverse-U relationship to exist between carbon dioxide emissions and wealth (Shafik, 1994; Holtz-Eakin and Selden, 1995; Roberts and Grimes, 1997; Perrings and Ansuategi, 2000; Lenzen et al., 2006). One reason cited is that with pollutants such as carbon dioxide, negative externalities are globally dispersed and are often felt by the poor, other countries or future generations. Consequently, the associated incentives for behaviour or institutional change are very low (Perrings and Ansuategi, 2000; Shafik, 1994; Holtz-Eakin and Selden, 1995; Roberts and Grimes, 1997).

Furthermore, there is much evidence supporting the fact that rising incomes are strongly related to rising carbon dioxide emissions at both a country and individual level. High-profile organisations have consistently reported strong correlations (OECD, 2002; EIA, 2004; IEA, 2004, 2007). A number of studies confirm that

wealth is the strongest driving factor for carbon dioxide emissions and energy consumption at a household level (Vringer and Blok, 1995; Schipper et al., 1997; Pachauri, 2004; Cohen, et al., 2005; Moll et al., 2005; Lenzen et al., 2006). A study of electricity consumption in 93 countries showed per-capita income to be the most significant driver (Burney, 1995). Perrings and Ansuategi (2000) concluded that GDP and consumption, as two separate measures of wealth, both increase monotonically with carbon dioxide emissions and Lutzenhiser and Hackett's (1993) study of mixed income Californian residents revealed that those on the highest incomes (more than US$40,000) on average consumed more than twice the direct household energy than the lowest, had twice the amount of large energy using appliances and used over twice the amount of energy for automobile use. Their results showed that variations in energy use at the lower income levels were adequately explained by other independent variables, but at the higher income level, income became a vital driver of energy consuming practices.

These and numerous other data concur with international statistics on the links between wealth and particular high carbon consumption activities. For example, automobiles have been assessed as the world's fastest growing energy consumer, and within this, private car use is the biggest factor (Worldwatch Institute, 2004). Studies show a strong correlation between car ownership and wealth, which is consistent across countries but with varying strengths of relationship (IEA, 2004). In the USA, car ownership is believed to be the strongest statistical predictor of total national energy needs (EIA, 2005). The USA has shown not only a high-income elasticity for cars but also a seemingly insatiable demand, with the country now containing more cars than people (IEA, 2004). Income and vehicle miles travelled in the USA since 1983 have followed a 'near lock-step formation' with a growth in income of 3.2% average per year between 1983 and 2001 and a growth in car travel of 3.6% (EIA, 2005, p.18). Sports utility vehicle ownership and fuel inefficiency has also increased with income levels. Additionally, wealth had a 'dramatic effect' on the number of cars per household with around 0.1 cars being added for every US$5,000 increase in income (EIA, 2005, p.12).

Meat consumption is another high carbon dioxide category that correlates with income. In general, meat consumption requires up to ten times the resources in terms of water, land and energy of plant-based foods (York and Gossard, 2004; Durning and Brough, 1991; Pimentel and Pimentel, 1996; Harrison and Pearce, 2000). In terms of carbon dioxide, intensively produced beef in the USA has an estimated input of 34 fossil fuel calories for every one food calorie produced, and for pork this is 68 : 1 (Manning, 2004). As with cars, the literature indicates strong links between meat consumption and wealth at an aggregate level (Brown, 1995; Rosegrant et al., 2001; York and Gossard, 2004). York and Gossard (2004) show that the link between wealth and meat consumption is statistically significant, but that the strength of this relationship depends on ecological and cultural conditions.

The effect of consumption practices by wealthy households cannot be underestimated. When considering all direct and indirect consumption of energy, households are considered to be responsible for between 70% and 80% of total energy demand (Rothman, 1998). Some interesting work has been done at a household level to analyse the links between a direct and indirect energy consumption and income. These are generally high level analyses of pre-existing data and have shown that in aggregate, household energy intensity tends to reduce slightly with increased income, although overall energy consumption rises dramatically (Moll et al., 2005; Lenzen et al., 2006). However, studies of this scale are highly complex with many data assumptions, and by their nature cannot always consider detailed variances in real-life consumption, which may impact significantly on a household's energy intensity or overall carbon dioxide emissions. For example, how goods were delivered to the home, large variances in carbon intensities of similar products, or the impact of hobbies or holidays. With reports of those in higher wealth groups flying in outfits on the day of purchase and heli-skiing on vacation, these details can be important (Wilson, 2002; Foroohar, 2007). Furthermore, the relationship between income and energy use is neither directly proportional or the same across countries, cultures or households and is mediated by a variety of structural, social and cultural factors (Hackett and Lutzenhiser, 1991; Lenzen et al., 2006; Carlsson-Kanyama et al., 2002). Specifically, notions of status, success, identity, power and 'the good life' will all critically influence the energy intensity of 'luxury' consumption and the strength of relationship between energy and wealth. All of these crucial yet subtle data will be very difficult to pick up in aggregate data analyses.

It is at this level of detail and with greater attention to important socio-cultural influences that much more research is needed. It is particularly in the higher stratum of wealth, either on a global level or within a country, that targeting behaviour change can provide great reductions in carbon dioxide emissions and, therefore, where research efforts should be focused. One reason that energy consumption of the wealthy, despite being particularly important, are largely unexplored, may be that wealthy groups are inherently difficult to research. They are known to be less likely to fill in questionnaires about their income and consequently are often underrepresented in analyses of wealth (Banks et al., 2000; Davies et al., 2006). The very wealthy are also often able to obscure the details of their personal financial position, or in the case of successful criminals and corrupt politicians such measures are of course necessary. Where more detailed information exists, it is normally held and designed by those seeking to exploit the wealthy in order to market more goods and services (Danzinger, 2004; Mendelsohn Media Research, 2006; Michman and Mazze, 2006). Although not generally employing robust socio-cultural methodologies, these marketing data do provide useful insights into potential carbon dioxide impacts of wealthy lifestyles for sustainable consumption purposes. They indicate that the carbon-intensive

activities and purchases not only continue to increase with wealth, but can increase disproportionately.

The Mendelsohn Affluent Survey has been running in the USA since 1977 and is one of the few comprehensive surveys of the wealthy with a sample size of around 26,000. The data are unfortunately only for the USA and do not explore motivations of consumption, but they do give an important indication of the potential consumption trends resulting from increased wealth. The survey splits the wealthy population into three groups of wealth. For 2006, the least wealthy are considered to have an annual household income of between US$85,000 and US$99,999 the middle wealthy have between US$100,000 and US$199,999 and the wealthiest have incomes of over US$200,000. The aggregate consequences of these consumption tendencies are not slight as the wealthy in the USA represent 21% of the national population (Mendelsohn Media Research, 2006). Figures 1 and 2 summarise the change in consumption as incomes rise across some key consumption activities that are likely to have high carbon dioxide intensity. Figure 2 is indexed to the group size so it shows, for example, that those in the highest income bracket are twice as likely to own or lease four or more cars as would be expected for the size of the group. Just as consumption can change dramatically as income rises, it can also change with assets accumulated. Figure 3 shows that those with a net worth of at least a million dollars, who are present across all income segments, are likely to consume more when compared with the rest of the wealthy population for some key consumption groups.

Figure 1 2006 consumption activity likelihood by household affluence group compared with level expected for the size of group

Source: Mendelsohn Media Research (2006)

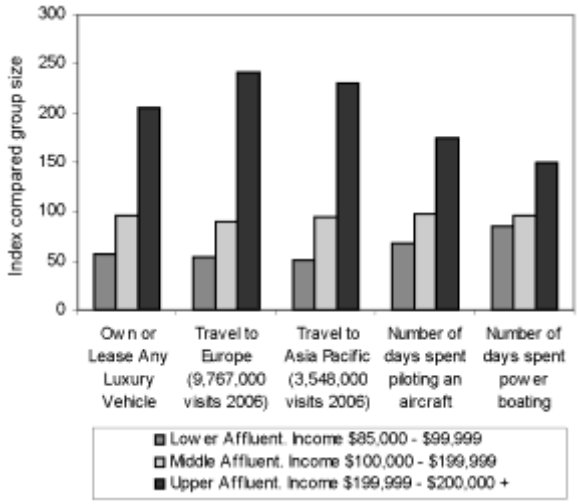


Figure 2

2006 consumption activity, by household affluence group

Source: Mendelsohn Media Research (2006)[1]2006 consumption activity likelihood of households with net worth of at least

$1,000,000 compared with the total affluent population

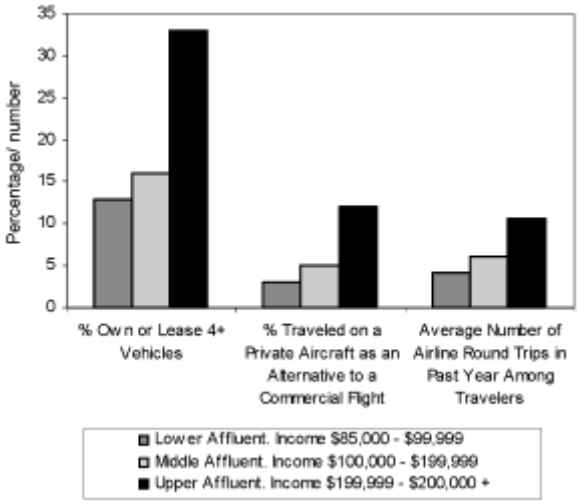
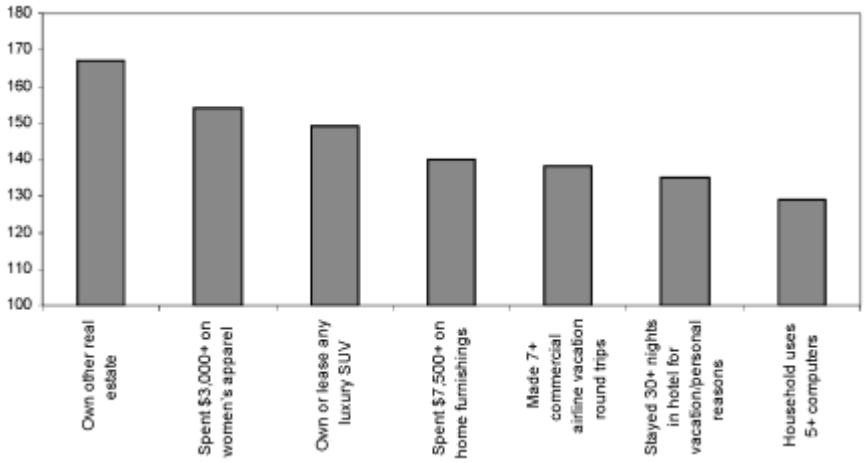


Figure 3



Source: Mendelsohn Media Research (2006)

It is not only disproportionate increases in volumes of consumption that can result from increased wealth, but with different levels of affluence, consumption can take on qualitatively different forms. The example of piloting and owning a plane is one example where the activity only becomes feasible above a certain level of wealth. Another example is not only that increased hotel stays that can follow increased wealth (Figure 3) but the fact that luxury hotels generally use considerably more energy and water and create more waste (ITP, 2005).

Apart from the clear benefits of targeting those who have the opportunity and propensity to engage in carbon dioxide heavy consumption, there are other unique opportunities to targeting consumption behaviour change in the wealthier groups.

They have the financial means and often the inclination (Rogers, 1995), to be early adopters of often expensive environmental products and technologies that need help to become established, especially as they frequently compete with powerful and sometimes subsidised traditional industries (Sawin, 2004). These products can be monetarily out of the reach of less wealthy consumers early on, but with the patronage of the wealthy may become more affordable as economies of scale are created and critical mass reached (Rogers, 1995). Additionally, they are often socially and professionally influential and therefore can exert authority both structurally and politically through their public activities and providing visual stimulus to each other and aspiring others as to which consumption norms distinguish them from 'the rest' (Veblen, 1899; Bourdieu, 1984; Dittmar et al., 1989). The environmental and social implications of wealthy consumption signals, for example by high-profile wealthy such as Roman Abramovitch, the Hinduja brothers, Paris Hilton, Warren Buffet, and of course Bill Gates, are as potentially impactful as the actions themselves.

From an aggregate down to an individual level, wealth can be seen as a major driver of carbon dioxide emissions. Because access to wealth influences carbon dioxide emissions, the distribution of global wealth can also have important consequences for climate change. Furthermore, the power of the wealthy to influence the environmental futures of the less wealthy means that how wealth is distributed has important moral and social justice implications.

3 Wealth, climate change and social justice

When considering wealth distribution, the wealthy have traditionally been considered under the banners of north and south or developing and developed. However, evidence suggests that this may be an inadequate way to assess or deal with issues of wealth and climate change. There are a growing number of wealthy across developed and developing countries, who can theoretically locate and move their money globally. Furthermore, within developed and developing countries where the global rich are being created, large and growing poverty gaps mean wealth is being concentrated into a relatively small but growing number of people.

As described in Section 2, the number of wealthy worldwide has been growing rapidly. Although the majority of wealthy individuals still reside in traditionally wealthy countries, according to Merrill Lynch's report the fastest rates of growth of high net worth individuals in 2005 are to be found in Korea (21.3%), India (19.3%), Russia (17.4%), and South Africa (15.9%) (Lynch, 2006). Myers and Kent (2002) have analysed the growing number of wealthy consumers who they define as those who can afford the pre-requisites of a wealthy way of life, such as cars, higher levels of meat consumption as well as a range of household technologies such as computers and air conditioning. They estimate that the 850

million established wealthy consumers have recently been joined by over a billion new ones across 17 developing and three transition countries (who are between developing and developed). Although still lagging behind the spending capacity of the established wealthy, the number of emerging consumers and their associated environmental impacts are growing all the time. It is estimated that these new consumers already have the aggregate purchasing power to match the USA (adjusted to purchasing power parity) (Myers and Kent, 2002).

It is only since the 1980s that these new consumers have emerged (Myers and Kent, 2002) and their existence could be seen as a measure of development success. However, these wealthy represent an elite group that are holding an increasingly disproportionate share of the new wealth in their respective countries, and are consuming in ways that can disproportionately influence climate change. In all of the 20 countries Myers and Kent analysed, income was skewed with at least 62% of the wealth being held by 40% of the population. In 16 of the countries, 50% of national income goes to the top 20% of the population. These figures reflect poverty gap issues worldwide.

Utilising a wide range of available data, a recent report published by the World Institute for Development Economics (WIDER) produced a first effort at roughly estimating global wealth distribution (Davies et al., 2006). It confirmed that wealth is highly unevenly distributed, with the top 10% of the world's adult population owning 85% of the world total wealth, the top 2% owning over half and the top 1% owning 40% of the world's wealth. Meanwhile, the poorer half of the world population is likely to own barely 1% of global wealth. The study's authors note that this means that an average adult in the top 1% is more than 13,000 times richer than an average person in the bottom 10%; and an average adult in the top 10% is 3000 times richer. To put this into perspective, total individual assets of only US$61,041 is needed to qualify as a member the top 10%.

Just as there are growing poverty gaps in developing countries, there are also large poverty gaps, and absolute poverty in wealthy countries. All OECD countries, for which inequality data exists, are considered to have wealth that is very unequally distributed with the wealthiest 5% of households owning between 25% and 50% of a country's wealth (Cagetti and Di Nardi, 2005). Furthermore, there are high child poverty rates, as an indication of absolute poverty, in some of the wealthiest countries. An analysis of 26 countries using the US-defined household poverty threshold (with incomes converted to reflect purchasing power parity), ranks the USA and the UK as having second and third worst child poverty rates behind Russia (Bradbury and Jantti, 1999).

Although not immediately apparent, wealth disparity trends can also have distinct and additional implications for climate change. Increased wealth inequality can increase the importance of status symbols in a society through restricting social

mobility (Wilk, 2002). If wealth inequality enhances the desire in society for items such as powerful cars, large houses and private planes, then wealth inequality is likely to further enhance carbon dioxide emissions, as well as heighten the role of the wealthy as the key people who embed status symbols with social value. However, the implications of increased wealth disparities are not just physical, but deeply moral. Wealth concentration puts the power, and therefore responsibility over sustainable resource use into the hands of a small but significantly growing number of people. Therefore, there is enhanced moral burden for the wealthy to actively understand the implications of their consumption and to use their wealth responsibly. Apart from the wealthy themselves, governments and those in positions to influence how the wealthy choose to consume and how wealth is distributed in the first place, also have a responsibility to face such issues as a matter of urgency. However, governments, perhaps owing to their cultural significance, have shown to be reluctant to face up to the real carbon dioxide impacts of increased wealth.

4 Accounting for wealth and achieving carbon dioxide emissions reductions

If concentrated wealth and carbon heavy consumption patterns are locally produced yet globally felt, they should be addressed at both global and local levels. In the case of intangible global pollutants such as carbon dioxide, it is difficult for consumers to reduce carbon-intensive consumption behaviour because there is no clear connection between the consumption practice and the associated environmental issue (Perrings and Ansuategi, 2000; Lenzen et al., 2006). Therefore, governments have a critical role in making these links explicit at global and local levels. To do this, the real carbon impacts of wealth must be assessed. For governments to take a lead in this, they must first be willing to accept the full extent of carbon emissions related to their wealthy inhabitants, and not only that which can be traced to national boundaries. The ‘distance’ between a polluter and their emissions is enhanced as wealth increases. As wealth rises, the proportion of indirect energy consumption through derived and imported products increases (Lenzen et al., 2006; UNESA, 2007), and wealthy countries often shift from agricultural and manufacturing, to service industries (Ekins, 1997; Rothman, 1998, Heil and Selden, 2001). As a result, the wealthy can effectively outsource carbon emissions to the poor, giving the impression of reduced emissions through indirect energy consumption (Bullard and Herendeen, 1975; Rothman, 1998). Hence the UK in its draft Climate Bill states its greenhouse gas emissions are 2% of the global total (DEFRA, 2007), although the real figure that would include the impact of its indirect emissions and investments is estimated to be much higher (Henderson Global and Trucost, 2005; Christian Aid, 2007). Until governments such as the UK’s can own up to their true carbon dioxide emissions, it is unlikely

that they will be able to help their wealthy inhabitants to do the same.

Beyond the initial step of recognising the true carbon dioxide impacts of wealth, governments must also recognise the potential for behaviour change campaigns targeted at the wealthy to achieve carbon dioxide reductions. South Africa is one country where the critical opportunity presented by the wealthy is understood. In the highly wealth unequal city of Cape Town, it is approximated that poor un-electrified households produce 146 kg of carbon dioxide per month and poor electrified households 193 kg, compared with 751 kg for wealthier households (COCT, 2003a). Such figures have helped local and national government conclude that the wealthy are a logical target group for climate change programmes. Yet, at the same time they admit that almost nothing has been done to address energy use of the wealthy (DME 1998; COCT, 2003b, p.6). Research shows that one reason for the inaction in South Africa is because the wealthy are perceived as unfathomable, not motivated by financial savings and difficult to persuade to be more energy efficient (Hurth, 2004). Furthermore, it is considered politically difficult for government to be seen to divert funds to the wealthy, even if it ultimately addressed social justice issues and is for the benefit of everyone (Hurth, 2004). Possibly as a result of such perceived barriers, the desire to achieve combined goals or possibly due to the cultural difficulties of highlighting issues with wealth accumulation in a market economy, energy efficiency programmes in South Africa are almost exclusively aimed at the 'fuel poor' (those who spend at least 10% of their income on fuel) (Hurth, 2005). This situation is mirrored in other countries such as the UK. Between 2004 and 2005, a budget of £166 million was dedicated to reducing fuel poverty through the Warm Front programme in England alone (DTI, 2005) with no funding focused on reducing the carbon dioxide emissions of the wealthy. Although increasing the energy access of the poor is a vital social issue, it is misleading to consider such an approach a viable, or fair, strategy for climate change mitigation. Furthermore, if the poor are targeted exclusively, energy efficiency could become symbolically associated with poverty. This may reduce the chance of energy efficiency measures being implemented by wealthier groups and could result in the poor discarding energy efficient practices if their economic situation improves (Hurth, 2004).

A further reason for inaction by government in this area may be that when dealing with the carbon dioxide impacts of wealth, the traditional measures of taxes or regulations are unlikely to be appealing or appropriate. Taxes are traditionally politically unattractive, and the fear that climate change is an excuse for higher taxes is one used by those sceptical about the issue. Moreover, increases in the direct cost of fuels tend to be regressive in terms of social impact and affect the fuel-poor (DEFRA, 2003; Dresner and Ekins, 2006). Additionally, it has become clear that the very rich non-domiciled elite pay little or no taxes at all through the use of tax havens. It is estimated that the current amount held that avoids tax is

US$11.5 trillion (Spicer, 2006). If one country decides to reduce its attractiveness as a tax haven through increased taxes, the wealth can be easily moved to a more attractive country. Research also shows that tax is generally ineffective at reducing energy use. Energy demand is largely resilient to price change fluctuations with households displaying an inelastic response in respect to overall energy consumption and energy saving measures (DEFRA, 2003; IEA, 2004). More specifically, a recent survey of air travellers in the UK showed that the wealthy contribute to the majority of carbon emissions from air travel and are unlikely to be affected even by a substantial increase in taxes (Brand et al., 2006).

Regulations to improve the energy efficiency of consumer products have also been cited by governments as holding great potential for carbon dioxide reduction. However, it has been shown that efficiency measures are undermined by consumption levels with increases in worldwide energy use from appliances and vehicles, despite significant efficiency advances in these areas (IEA, 2004). Some have observed that energy efficiency can actively spur energy use because the reduced cost of inputs created by efficiencies effectively stimulates demand. This phenomenon has been termed the boomerang effect, or, after the economists who observed it, Jevon's paradox or the Khazzoom–Brookes postulate. Others have argued further that the relationship has resulted in energy efficiencies being the major driver of economic growth (Ayers and Warr, 2004), and consequently, carbon emissions.

The issues with tax and regulation does not preclude the use of such measures entirely, with some form of 'progressive' taxation on gross polluting products clearly possible (as is the case for company car taxation in the UK, where the taxation bands are structured according to the level of carbon dioxide emissions generated by the vehicle). More innovative forms of regulation are also potentially viable, such as personal carbon allowances (e.g., Tradable Energy Quotas), which would effectively prevent aggregate emissions above a certain level and provide a base level of equity (Fleming, 2005). This would not only help to explicitly connect consumption with carbon dioxide, but would make clear to the wealthy, and others, how far above the equitable rate of emissions they are living.

Even in light of the most promising fiscal measures, a multi-layered, multi-levelled approach to consumption change will be needed. As part of that, many, including governments conclude that approaches to behaviour change must include far more innovative methods (DEFRA, 2003; Perrings and Ansuategi, 2000; Brand et al., 2006). One area that needs to be explored in much more detail is that of socio-cultural drivers of change. The variances in energy use between and within countries discussed earlier, as well as other research, indicate that socio-cultural environments are vital to understanding the drivers of energy use (Hackett and Lutzenhiser, 1991; Vringer et al., 2007). Particularly in the case of

the wealthy, where consumption is heavily bound up with issues of status, success, class, identity and 'the good life', it is likely that much deeper socio-cultural analyses and interventions, for example using social marketing, will be necessary if sustainable wealthy lifestyles are to be created and maintained.

6 Conclusion

The first point of this emerging discourse is that the complex and contentious issue of concentrated wealth needs to be confronted. The time scales faced to make large reductions in carbon emissions are short and the projected increases in carbon emissions under business-as-usual scenarios are great. The large amount of evidence showing very strong statistical links between carbon emissions and wealth means that as part of a multi-dimensional approach, a logical and ethical place to target change is with those global consumers with disproportionate amounts of wealth. However, the ideological and cultural barriers faced by such a strategy, along with the minimal amount of information about how to introduce sustainable behaviour change into wealthy groups means this is not a small task. Wealth brings with it unique policy problems for government, and therefore innovation in the policy arena is both urgent and vital. To inform such policy, more research is needed into the nature and structure of wealth and how it relates to energy-intensive consumption, in particular socio-cultural contexts, as well as the ways in which increased wealth can, or cannot, be translated into sustainable modes of consumption. Even with such research, a moral determination to address wealth distribution and consumption is needed. Besides governments and other institutions, the wealthy themselves need to accept the moral reality that how they choose to exert their consumption power and influence environmental resources is of consequence to everyone, particularly the poor. With perhaps ten years to avert catastrophic climate change (Hansen et al., 2007), the moral responsibility for addressing the structure of wealth and consumption behaviour of the wealthy has never been so great. It is becoming clear that we have a window of opportunity to choose short-term wealth for a few, or long-term sustainability for all. As ever, it is the vulnerable poor of the world who will suffer most if we are unable to change the consumption habits of a minority but growing wealthy elite, but ultimately it could be everyone who suffers.

References

Agarwal, A. and Narain, S. (1991) Global Warming in an Unequal World, Centre for Science and Environment, New Delhi.

Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C.S., Jansson, B.O., Levin, S., Maler, K.G., Perrings, C. and Pimentel, D. (1995) 'Economic growth, carrying capacity, and the environment', Science, Vol. 268, pp.520–521.

Ayers, R.U. and Warr, B. (2004) ‘Accounting for growth: the role of physical work’, Structural Change and Economic Dynamics, February. Banks, J., Blundell, R. and Smith, J.P. (2000) Wealth Inequality in the USA and Great Britain, Institute for Fiscal Studies, London.

Barbier, E.B. (1997) ‘Introduction to the environmental Kuznets curve special issue’, Environment and Development Economics, Vol. 2, No. 4, pp.357–367.

Beckerman, W. (1992) ‘Economic growth and the environment, whose growth? Whose environment?’, World Development, Vol. 20, pp.481–496.

Bourdieu, P. (1984) ‘Distinction’, A Social Critique of the Judgement of Taste, Harvard University Press, USA.

Bradbury, B. and Jantti, M. (1999) ‘Child poverty across industrialized nations’, Innocenti Occasional Papers Economic and Social Policy, Series No. 71.

Brand, C., Preston, J. and Boardman, B. (2006) Counting your Carbon: The Development and Deployment of Integrated Travel Emissions Profiles, ESRC Integrated Travel Emissions Research Report, Economic and Social Research Council, UK.

Brown, L.R. (1995) Who Will Feed China? Wake-Up Call for a Small Planet, Norton, New York. Bullard, C.W. and Herendeen, R.A. (1975) ‘The energy cost of goods and services’, Energy Policy,

Vol. 3, No. 4, pp.268–278. Burney, N.A. (1995) ‘Socioeconomic development and electricity consumption’, Energy

Economics, Vol. 17, No. 3, pp.185–195. Cagetti, M. and Di Nardi, M. (2005) Wealth Inequality: Data and Models, Federal Reserve Bank of

Chicago, Chicago.

Carlsson-Kanyama, A., Karlsson, R., Moll, H.C. and Kok, R. (2002) Household Metabolism in the Five Cities, Fms Report 177 September, Forskningsgruppen for Milostrategiska Studier, Stockholm.

Christian Aid (2007) Coming CLEAN: Revealing the UK’s True Carbon Footprint, Christian Aid, London.

COCT (2003a) State of Energy Report for Cape Town, City of Cape Town, South Africa.

COCT (2003b) Cape Town Energy Strategy October, City of Cape Town, South Africa.

Cohen, C., Lenzen, M. and Schaeffer, R. (2005) ‘Energy requirements of house-holds in Brazil’, Energy Policy, Vol. 33, No. 4, pp.555–562.

Cole, M.A., Rayner, A.J. and Bates, J.M. (1997) ‘The environmental Kuznets curve: an

empirical analysis', Environment and Development Economics, Vol. 2, No. 4, pp.401–416.

Danzinger, P.N. (2004) Why People Buy Things they don't Need, Dearborn Trade Books, Chicago.

Davies, J.B., Sandstrom, S., Shorrocks, A. and Wolff, E.N. (2006) The World Distribution of Household Wealth, Helsinki: World Institute for Development Economics (WIDER), United Nations University.

de Bruyn, S.M. and Heintz, R.J. (1999) 'The environmental Kuznets curve hypothesis', in van den Bergh, J.C.J.M. (Ed.): Handbook of Environmental and Resource Economics, Cheltenham, Edward Elgar Publishing Limited, UK, pp.656–677.

Deacon, R.T. and Norman, C.S. (2004) Does the Environmental Kuznets CurveDescribe How Individual Countries Behave?, University of California, Santa Barbara.

Department of Environment, Food and Rural Affairs, UK (DEFRA) (2003) Delivering Energy Efficiency Savings Background Note, Department for Environment, Food and Rural Affairs, London.

Department of Environment, Food and Rural Affairs, UK (DEFRA) (2007) Draft Climate Bill, Department for Environment, Food and Rural Affairs, London.

Department of Minerals and Energy, South Africa (DME) (1998) White Paper on Energy Policy, DME, South Africa.

Department of Trade and Industry, UK (DTI) (2005) UK Fuel Poverty Strategy Third Annual

Progress Report, Department of Trade and Industry, London.

Dittmar, H., Mannetti, L. and Semin, G.R. (1989) 'Fine feathers make fine birds: a comparative study of the impact of material wealth on perceived identities in England and Italy', Social Behaviour, Vol. 4, pp.195–200.

Dresner, S. and Ekins, P. (2006) 'Economic instruments to improve UK home energy efficiency without negative social impacts', Fiscal Studies, Vol. 27, No. 1, pp.47–74.

Durning, A.T. and Brough, H.B. (1991) Taking Stock: Animal Farming and the Environment, Worldwatch Paper 103, Worldwatch Institute, Washington, DC.

EIA (2004) World Energy use and Carbon Dioxide Emissions, 1980–2001, Energy Information Agency, Washington.

EIA (2005) Energy overview, Household Vehicles Energy use: Latest Data and Trends, Energy Information Agency, Washington.

EIA (2007) International Energy Outlook 2007, Energy Information Agency, Washington.Ekins, P. (1997) 'The Kuznets curve for the environment and economic growth: examining the

evidence', Environmental Planning A, Vol. 29, pp.805–830.Fleming, D. (2005) Energy and the Common Purpose – Descending the Energy Staircase with

Tradable Energy Quotas (TEQs), The Lean Economy Connection, London.Foroohar, R. (2007) Luxury Goes Undercover, Newsweek 2–9 July, Newsweek International,

New York.

Grossman, G. and Krueger, A.B. (1993) 'Environmental impacts of the north American free trade agreement', in Garber, P. (Ed.): The Mexico-USA Free-trade Agreement, MIT Press, Boston.

Hackett, B and Lutzenhiser, L. (1991) 'Social structures and economic conduct: interpreting variations in household energy consumption', Sociological Forum, Vol. 6, No. 3, pp.449–470.

Hansen, J., Sato, M., Kharecha, P., Russell, G., Lea, D.W. and Siddall, M. (2007) 'Climate change and trace gases', Phil. Trans. R. Soc. A, Vol. 365, pp.1925–1954.

Harrison, P. and Pearce, F. (2000) AAAS Atlas of Population and Environment, University of California Press, Los Angeles.

Heil, M.T. and Selden, T.M. (2001) 'International trade intensity and carbon emissions: a cross-country econometric analysis', Journal of Environment and Development, Vol. 10, No. 1, pp.35–49.

Henderson Global and Trucost (2005) The Carbon 100, Quantifying the Carbon Emissions, Intensities and Exposures of the FTSE 100, Henderson Global and Trucost, London.

Hollander, J.M. (2003) The Real Environmental Crisis: Why Poverty, not Affluence, is the Environment's Number One Enemy, University of California Press, Berkeley.

Holtz-Eakin, D. and Selden, T.M. (1995) 'Stoking the fires? CO_2 emissions and economic growth', Journal of Public Economics, Vol. 57, pp.85–101.

Hurth (2004).

Hurth (2005).

Hurth, V. (2006) Encouraging the Household Energy Efficiency of High-Income Earners: Towards an Approach for South Africa, South Africa, University of Kwa-Zulu Natal.

Hutton, R. (2006) 'Rich spurn ultra-luxury cars', The Sunday Times, 5th November

2006.

IEA (2004) Oil Crisis and Climate Challenges. 30 years of Energy use in IEA Countries, International Energy Agency, Paris.

IPCC (2007) 'xxxx', O.R., Bosch, P.R., Dave, R. and Meyer, L.A. (Eds.): Climate Change 2007: Mitigation, Contribution of Working Group III to the Fourth Assessment Report of the

Intergovernmental Panel on Climate Change, in Metz, B., Davidson, Cambridge University

Press, Cambridge.

ITP (2005) Why Environmental Benchmarking will help your Hotel, International Tourism Partnership, London.

Lenzen, M., Wier, M., Cohen, C., Hayami, H., Pachauri, S. and Schaeffer, R. (2006) 'A comparative multivariate analysis of household energy requirements in Australia, Brazil, Denmark, India and Japan', Energy, Vol. 31, pp.181–207.

Lutzenhiser, L. and Hackett, B. (1993) 'Social stratification and environmental degradation: understanding household CO_2 production', Social Problems, Vol. 40, No. 1, pp.50–73.

Lynch, M. (2006) The 10th Anniversary Edition of the World Wealth Report, Merrill Lynch and CapGemini, New York.

Manning, R. (2004) The Oil we Eat: Following the Food Chain Back to Iraq, Harper's, February, USA.

Mendelsohn Media Research (2006) The 2006 Mendelsohn Affluent Survey, Mendelsohn Media Research, New York.

Michman, R.D. and Mazze, E.M (2006) The Affluent Consumer Marketing and Selling the Luxury Lifestyle, Praeger Publishers, New York.

Moll, H.C., Noorman, K.J., Kok, R., Engstrom, R., Throne-Holst, H. and Clark, C. (2005) 'Pursuing more sustainable consumption by analyzing household metabolism in Europeans countries and cities', Journal of Industrial Ecology, Vol. 9, No. 1–2, pp.259–275.

Myers, N. and Kent, J. (2002) 'New consumers: the influence of affluence on the environment', PNAS, Vol. 100, No. 8, pp.4963–4968.

OECD (2002) Towards Sustainable Household Consumption? Trends and policies in OECD Countries, Organisation for economic co-operation and development, Paris.

Pachauri, S. (2004) 'An analysis of cross-sectional variations in total household energy requirements in India using micro survey data', Energy Policy, Vol. 32, No.15, pp.1723–1735.

Panayotou, T. (1997) 'Demystifying the environmental Kuznets curve: turning a black box into a policy tool', Environment and Development Economics, Vol. 2, pp.383–399.

Perrings, C. and Ansuategi, A. (2000) 'Sustainability, growth and development', Journal of Economic Studies, Vol. 27, Nos. 1–2, pp.19–54.

Pimentel, D. and Pimentel, M. (1996) Food, Energy, and Society, University of Colorado Press, Niwot.

Redclift, M. (1996) Wasted: Counting the Costs of Global Consumption, Earthscan Publications, UK.

Roberts, J.T. and Grimes, P.E. (1997) 'Carbon intensity and economic development 1962–1991: a brief exploration of the environmental Kuznets curve', World Development, Vol. 25, pp.191–198.

Rogers, E.M. (1995) Diffusion of Innovations, 4th ed., Free Press, New York.

Rosegrant, M.W., Paisner, M.S., Meijer, S. and Witcover, J. (2001) Global Food Projections to 2020: Emerging Trends and Alternative Futures, International Food Policy Research Institute, Washington.

Rothman, D.S. (1998) 'Environmental Kuznets curves – real progress or passing the buck? A case for consumption-based approaches', Ecological Economics, Vol. 25, pp.177–194.

Sawin, J. (2004) Mainstreaming Renewables in the 21st Century, Worldwatch Paper 169, Worldwatch Institute, USA.

Schipper, L. (1998) 'Life-styles and the environment: the case of energy', IEEE Engineering Management Review, Vol. 26, Nos. 1, pp.3–14.

Schipper, L., Ting, M., Khrushch, M. and Golove, W. (1997) 'The evolution of carbon dioxide emissions from energy use in industrialized countries: an end-use analysis', Energy Policy, Vol. 25, Nos. 7–9, pp.651–672.

Seldon, T.M. and Song, D. (1994) 'Environmental quality and development: is there a Kuznets curve for air pollution emissions?', Journal of Environmental Economics and Management, Vol. 27, No. 2, pp.147–162.

Shafik, N. (1994) 'Economic development and environmental quality: an econometric analysis', Oxford Economic Papers, Vol. 46, pp.757–773.

Spicer, J. (2006) Biodiversity: A Beginner's Guide, Oneworld Publications, UK.Stern,

P., Dietz, T., Ruttan, V.W., Socolow, R.H. and Sweeney, J.L. (Eds.) (1997) Environmentally

Significant Consumption, National Academy Press, Washington. UNESA (2007) Sustainable Consumption and Production: Promoting Climate-Friendly Household

Consumption Patterns, United Nations Department of Economic and Social Affairs.

Veblen, T. (1899) The Theory of the Leisure Class, Macmillan, New York.

Vringer, K. and Blok, K. (1995) 'The direct and indirect energy requirements of households in the

Netherlands', Energy Policy, Vol. 23, No. 10, pp.893–910. Vringer, K., Aalbers, T. and Blok, K. (2007) 'Household energy requirement and value patterns', Energy Policy, Vol. 35, pp.553–566.

Wilk, R. (2002) 'Consumption, human needs and global environmental change', Global Environmental Change, Vol. 12, pp.5–13.

Wilson, A. (2002) FT Pink Snow: Heli-Skiing: Are we in Heaven or Hell?, Financial Times 26, October, London.

World Commission on Environment and Development (WCED) (1987) Our Common Future (the Brundtland Report) Oxford University Press, Oxford.

Worldwatch Institute (2004) State of the World Trends and Facts: Making Better Energy Choices, Worldwatch Institute, USA.

York, R. and Gossard, M.H. (2004) 'Cross-national meat and fish consumption: exploring the effects of modernization and ecological context', Ecological Economics, Vol. 48, pp.293–302.