De-energising and de-carbonising society

Making energy (only) do work where it is really needed

A think-piece for Friends of the Earth's Big Ideas Project by Professor Gordon Walker, DEMAND Centre and Lancaster Environment Centre, Lancaster University

Introduction

There has been for too long now a compelling case for reducing global carbon emissions at scale and at speed. The evidence continues to stack up of the need for urgent and serious mitigation, including already experienced climatic shifts that point towards the more extreme end of the range of climate model expectations. The IPCC 5th Assessment and its clear call for a carbon budget that keeps us below 2°C global average temperature rise, implies '*profound and immediate changes to the consumption and production of energy*' (Anderson 2015: 898). Agreement, at the Paris climate summit, to a goal of limiting temperature rises to only 1.5°C implies even more profound changes. But, as climate justice arguments also make absolutely clear, these have to be made in ways that are not blind either to patterns of responsibility for climate change, or to the social and geographical distribution of the consequences and implications that follow.

In this think piece, informed by various strands of collaborative work in the DEMAND Centre (www.demand.ac.uk) over the past 3 years, I argue that the combined need to reduce carbon emissions at scale, at speed, and in ways that embody fairness and justice, means that particularly in the more wealthy parts of the developed, carbon-saturated Global North, we have to both de-carbonise the energy supply system *and* de-energise the conduct of everyday life, at home, at work and in moving around. The notion of de-energising means radically reducing how much technologically produced energy is used and consumed to sustain the shared social practices that make-up accepted and normalised ways of living and being (Shove and Walker 2014); and, as I will outline, achieving this through forms of change and intervention that go well beyond seeking improvements *just* in technical energy efficiency.

An underpinning principle for this line of thinking is *to make energy do work where it is really needed.* Energy is defined by physicists as the 'ability to do work' but in the face of carbon and other limits we need to properly consider what work really needs to be done by technologically produced energy, and what can be achieved through other means and in other ways. These are not simple questions to resolve, but we are at a time when focusing on 'what energy is for' (the mantra of the DEMAND Centre) has to be a crucial part of both tackling energy poverty and properly addressing climate change in a socially just way.

Why de-carbonising is not enough

Before tackling these questions, a first step is to dismiss the seduction of only needing to pursue de-carbonisation. Make energy production low carbon, the seduction goes, and we can then use as much of it as we want. The examples of the few countries that have seemingly all but achieved this nirvana, makes it seem all the more possible. Iceland, for instance, is already in the virtuous position of generating all of its electricity through low carbon means (hydro and geothermal) and having 90% of its homes geothermally heated. Hence, its electricity and heating system carbon emissions have plummeted since the 1970s as coal-fired power generation has been removed. Transport fuels are still heavily carbon-based and combined with mega-scale aluminium production this mean that, in per capita terms, total carbon emissions are not as low as imagined. However, Iceland today represents a way of thinking about an energy future that strips carbon out of supply to the extent that energy use appears unproblematic - geothermally sourced water in an outdoor hot tub carries little judgement, guilt or carbon cost. So why shouldn't we *all* head towards this goal, meaning that we don't have to worry about how energy is being demanded and consumed?

First and most evident as a basic problem is the slow speed at which de-carbonising supply has progressed to-date and is likely to in the future. Anderson et al. (2015) stress this in making their case for prioritising demand reduction, arguing that just the long planning, construction and commissioning schedules for large scale energy supply infrastructures makes them inadequate to the challenge. Looking back to Iceland, its state-led transformation to low carbon electricity has been impressive in many ways, involving new innovations in high temperature geothermal exploitation, but this took over 40 years, in a country with a total population of only 330,000 and with plentiful available low carbon resources. The de-carbonisation challenge is so much more profound in the very many national and regional contexts in which there is a much higher existing aggregate level of

current energy consumption and where alternatives to carbon lock-in within the energy system are much less immediately available. The rates at which small scale modular technologies – particularly solar power – are materialising and costs are falling *are* impressive, proving much more agile than traditional large scale investment trajectories. But on the other hand the rates of turnover and replacement of many energy using devices are relatively slow, so intended transformations in supply (e.g. from gas or petroleum to low carbon electricity) are likely to be held back by matching end use devices, such as electric vehicles or heating systems, not being in place at sufficient scale. Questions of achievable speed and trajectory are therefore difficult to be at all certain about, but what is more sure is that an energy supply system with much less recurrent energy demand to satisfy can only be easier and quicker to de-carbonise. Given also that carbon is a cumulative problem in which every tonne counts, staying within the 1.5°C temperature increase limit has to be very focused on the carbon produced in the short term here and now, not only the mid and longer term future.

Second, and closely related are the cost implications and burdens of de-carbonisation that are both substantial in scale and that, without careful and progressive policy design, will have justice consequences for those already struggling to afford and/or access the energy needed to sustain their well-being. Whilst blaming renewable energy subsidies and similar interventions for energy price rises has been politically overblown, there are undoubtedly significant costs which have to be carried now and in the near future if decarbonisation of energy supply is to progress at pace. An estimate referred to in the most recent IPCC Assessment Report is 190-900 billion US Dollars *additional* investment in the energy supply sector globally, per year, to limit global temperature increase to below 2°C (IPCC 2014; 552). During a period of austerity (enforced or chosen), governments have been unable or unwilling to source significant levels of public investment and, in the UK at least, there has been little appetite for supporting low carbon policy through socially progressive measures, rather than simply passing on costs to the consumer - including fuel poor ones. Longer-term costs are arguably so uncertain as to be essentially unknowable (Rosen and Guenther 2015).

Third, again for social justice reasons much of the investment now in low carbon technologies needs to be in Global South, addressing the 'right to energy' for much of the global population whose access to energy and affordability is insecure. I have argued elsewhere (Walker 2015) that the 'right to energy' whilst compelling in its simplicity, becomes far more involved in the working out of exactly what this means (what form of energy, how much, on what terms etc..) and that there is a danger of the space for political work that this opens up being co-opted by those wanting to roll out further forms of big centralised carbon-based energy infrastructure into 'new markets'. Far better for new infrastructures to 'jump over' the carbon-era and into local distributed networks and low carbon technologies. What can be achieved in improving *well-being* from a single solar panel in a village in rural Africa or India, is so much more than using the panel (along with many others) as part of decarbonising an ongoing energy profligate way of living in a village in leafy Surrey.

Fourth, it would be naive to approach low carbon technologies energy supply as resoundingly virtuous, without recognising the problematic impacts and injustices they can generate. This is most clearly the case with nuclear power, which in the UK and other countries is presented as a key part of de-carbonising supply, with little proper recognition of

the appallingly unresolved matter of how to deal with radioactive wastes, let alone the many other forms of risk and injustice that the industry presents along its geographically extended 'fuel cycle' (Butler and Simmons 2013). In Iceland, hydro-power might provide low carbon electricity, but its expansion in sensitive highland areas in order to power aluminium production has been deeply controversial (Benediktsson 2007, Saethorsdottir and Saarinen 2016). As Newell and Mulvaney (2013) argue, so called 'clean technologies' should not be presented as 'homogenously green', pointing to environmental and justice issues with the production of solar PV and biofuels as two further examples. Wind, also, has not proved environmentally unproblematic. Editing out some low carbon technologies because of their wider implications, or at least using them sparingly and cautiously, evidently serves to put more pressure on points one to three above.

The work that (produced) energy really needs to do

So only aiming at rapidly de-carbonising supply is insufficient and problematic on justice grounds. What is simultaneously needed is a serious and systematic focus on de-energising – without diminishing the complexities that will also involve. A key way of approaching what de-energising entails is to focus on the work that technologically produced and supplied energy *really* needs to do. To focus on this is in contrast to either assuming that all energy demand is necessary and given; or that how energy is used and the work that it does is unchangeable. It is also different to thinking about demand reduction only in terms of increasing energy efficiency (more on that below). Before getting into some specifics in the next section, it is useful to outline some of the more *general* directions that including the notion of 'really needs to do' takes us in. Three are discussed here, recognising that there are others that could be pursued.

(i)   *Energy use and the baseline of well-being* – one direction involves concentrating directly on the notion of 'need' and to ask how energy use contributes to the basics of well-being and human flourishing. Clearly if energy use is to be substantially cut back (including in ways that protect the needs of the most vulnerable) we would need to have sense of where a 'baseline' of energy use might need to be - or at least a way of trying to work that out. With colleagues in the DEMAND Centre, we have approached this question in different ways. One was to look to theory and specifically the 'capabilities approach', which we have recently argued (Day, Walker et al. 2016) provides the most well founded, coherent and generally applicable way of conceptualising domestic energy use in relation to the outcomes that are derived and how these matter to well-being. Focusing on capabilities – what people are able to do or be – makes it possible to ask questions about both how and why energy use matters, and as we argue to also to look '*for alternative means to support capabilities, that do not necessitate a specific energy service at a household level*' (ibid p262) which might include forms of sharing and collective provision.[1] It also provides a flexible approach to defining what a 'right to energy' (see earlier

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[1] For fuller discussion of the opportunities provided by sharing models, see Julian Agyeman and colleagues' think-piece for Big Ideas at
https://www.foe.co.uk/sites/default/files/downloads/agyeman_sharing_cities.pdf

discussion) might need to mean - in outcome terms - in different contexts around the world.[2]

An alternative more grounded approach to finding a baseline is to look to evidence of public deliberation about what forms of energy use are seen to really matter. In our work we did this by turning to the stream of 'Minimum Income Standards' (MIS) research outputs, produced by a team at Loughborough University for the Joseph Rowntree Foundation (Davis et al., 2014). Over the last eight years, this research has used a consensual, deliberative approach to ascertaining the goods and services that members of the public consider to be the basic necessities that everyone in the UK should be able to afford and have present in their everyday lives. We used this data to identify which energy using technologies and services are implicated in shared expectations of a minimally decent living standard, and also the reasoned grounds on which these judgements are being made (Walker, Simcock et al. 2016). This showed the diverse and multiple ways that energy use is part of a minimally decent way of life, and how this had shifted even over an 8 year period, with computers for example becoming seen as increasingly essential energy using items. Such evidence raises dilemmas though. On the one hand it provides a deliberative basis for defining what a profile of minimum energy uses might be (in the UK) and therefore what at least part of the work that energy 'really needs to do' might be. On the other it shows how new energy-using expectations are continually being made, how wants become needs and what is 'normal' is always on the move, through sets of interweaving processes of social and cultural change.[3] The 'minimum' it follows is not fixed and can extend or diminish in the future, and challenging the movement of what becomes normal might therefore be warranted. On a third interpretation, however, it shows how much *higher* than the minimum the profile of everyday energy use is for many people in the UK, and therefore the substantial 'headroom' there is, a least in principle, for making significant reductions within this *without* cutting into baseline levels of well-being.

(ii)   *Energy use and natural energy flows* – moving in a rather different direction is to consider the relationship between technologically produced flows of energy (that currently predominantly involve the production of carbon) and those that flow through 'natural' (although modified by man-made climate change) processes - therefore light and heat in particular. Some at least of the history of the extension of energy use has been to extend, supplement or modify natural energy flows – extending light into the dark evening, warming up already cold air in the winter, cooling already hot air in the summer. Part of the future of de-energising needs to be about reconfiguring these relationships, making our relationship with natural energy flows less dependent on technologically produced ones (a rather perverse arrangement), and in this way

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[2] Whilst this work focused on household energy, colleagues in DEMAND have also used related thinking and ideas to consider conceptually what 'need' means in relation to transport and mobility (Mullen and Marsden 2015, Mattioli 2016). See also Caroline Mullen's think-piece for Big Ideas https://www.foe.co.uk/sites/default/files/downloads/transport-freedom-movement-fairness-102382.pdf
[3] Victoria Hurth and colleagues discuss how genuinely responsible marketing might work to redefine and reshape needs to support sustainability in their think-piece for Big Ideas. Available at: https://www.foe.co.uk/sites/default/files/downloads/reforming-marketing-sustainability-full-report-76676.pdf

'making (produced) energy do work where it is really needed'. There are many possible dimensions and strategies. One obvious one is the established but often neglected or badly done skill of building design, in which natural forms of lighting, air flow, ventilation and heating are maximised and energy using ones dispensed with. Allied to this are shared expectations of what internal environmental conditions will be, and enabling a greater breadth of normal room temperatures in particular, resisting the spreading standardisation of 21ºC around the world (Shove, Walker et al. 2014). This means tackling the network of professional norms, product designs and clothing cultures that serve to make one temperature the apparently desired norm and expectation.

Following a different line is to focus on the rhythmic interrelations between natural energy flows, what is done when and the temporal organisation of society (Walker 2014). One macro-scale question, discussed further below, is how clock time and solar time are related, through both the setting of time-zones and seasonal clock-shifting. Another is the way that the timing of potentially energy-using activities are organised, such that natural flows are accessed. A simple example is drying clothes through sun and wind, rather than by tumble drying, but there are many others including relating to how opening/start and closing/finishing hours of a host of activities are set and how activities are matched to seasonal climatic variations rather than in defiance of them. Extend 'natural' flows of energy into that which is metabolised through bodies and their muscles and we are into the merits of mobility through walking and cycling, and matching social rhythms to those of both the climate *and* the body. In these are other instances, justice considerations mean that we need to be aware of how issues of inequality and difference are potentially implicated (e.g. in relation to gendered patterns of doing housework) and develop means of addressing these.

These are in many ways familiar observations and assertions, with equally familiar objections to why they are problematic to materialise in practice; and, as noted, also with potential inequality and injustice problems to grapple with. But the climate-related demand for de-energising seriously and at scale makes them opportunities that need to be rediscovered and reinvigorated in how their materialisation is imagined and steered.

(iii) *Energy use and its 'efficiency'* – it is commonplace for 'energy demand reduction' to be seen as synonymous with acting on energy inefficiency, and getting technologies to do their 'work' with only the energy consumption that is really needed, is patently sensible. Some significant gains have undoubtedly been achieved through improving technical energy efficiencies and there is potential to still be realised. Brenda Boardman (2014), for example, lays out the significant impact on total and peak electricity demand there has been and will be from converting the UK light bulb stock to progressively more efficient forms. However, the contribution of efficiency to de-energising is constrained and there are substantial critiques of approach and outcome (Diamond and Shove 2015). Lutzenheiser (2014), for example, characterises the 'energy efficiency industry' as working within the frame of a 'physical-technical-economic model' which focuses almost exclusively on technical devices and costs, and sees consumers as economic actors who are calculative,

rational and conscious of the purposes of their use of energy. This adds up to an 'energy efficiency wonderland' (ibid: 148), he argues, that promises much, but is constantly undermined by the simplicity of its underlying assumptions and crucially the fact that social change is continually at work around it. Hence individual light bulbs might be more efficient, but we now have many more of them integrated into normal home, shop and office designs than ever before, offsetting to some degree the efficiency gains that were theoretically available. This is a more serious and pervasive problem than the economic rebound effect alone (Sorrell, 2007). Moreover in justice terms it is often the case that efficiency gains are materialised through more expensive forms of technology and economic mechanisms, such as the hopelessly ineffective 'Green Deal' in the UK, that have little relevance or impact on the situation of those already struggling to afford access to energy. Efficiency therefore has a role, but is not of itself, or in the ways it is typically pursued, sufficient to the task of achieving rapid de-energisation in ways that are fair and just.

Making de-energisation a priority

So to recap, there are clear arguments for pursuing de-energisation alongside de-carbonisation, and starting with the principle of 'making energy do work where it is really needed' provides a number of different directions for approaching and conceiving of energy demand reductions as part of a low carbon *and* low energy transition that recognises its necessary justice dimensions. Turning these 'directions' into an active and fully engaged policy environment in which de-energising matters to political priorities and that has some prospect of working, at scale and at speed, is not at all straightforward. In the UK we are a very long way from that position currently, and working out how to get there and what it would mean in detail and in practice remains very much a work in progress. There are some contexts internationally in which at least substantial ambitions for demand reduction are making more headway. For example, the German Energiewende includes a raft of targets for reducing energy demand, including overall primary energy demand falling by 20% by 2020 compared to 2008, and by 50% by 2050. Demand-side action, for example on housing retrofits, has already achieved significant gains (McLaren 2014) with substantial financing delivered through state and local banks, but there are competing views on the rate of progress, some positive and arguing that targets could even be exceeded (Lovins 2013) and others more critical and guarded (Heymann 2016).

Looking ahead though it is reasonable to suppose that at some future point there could be crises or problems that emerge for which serious or even radical de-energising becomes prioritised as part of a necessary response. An overt climate-induced crisis maybe, one that finally asserts the need for more radical mitigation action; or a systemic failure of the electricity system burdened with ever more escalating peak demand as heat and mobility become electrified in the pursuit of low carbon solutions. 'Saving electricity in a hurry' is already the title of guidance produced by the International Energy Agency for national governments faced with unexpected supply crises (IEA 2011), but as yet this is not imagined as applying beyond enabling a temporary response that bridges over a return to normal service.

Future crises might not be so readily 'bounced back' from and arguing now for de-energising and filling out its possibilities is both a way of potentially avoiding damaging system crises in

the first place, and being prepared for intervention once energy and climate politics do shift away from their supply-dominated heartlands. There are three key high level and related targets in this respect on which work needs to be developed and sustained.

Re-framing energy demand in public discourse - one of the most basic problems of making demand reduction matter politically is the way in which energy demand is talked about in public discourse. Recurrently there are associations made between growing demand being a sign of strength and progress, and the converse to have lower demand being a sign of weakness. To quote a recent discussion in the Economist (2016) '*for now, the strain on the grid is lightened by **feeble** electricity demand in Britain, which is still more than 10% below its level before the financial crisis in 2008-09*'. As in this extract, there is also a recurrent assumption that demand will grow in the future (still below its past level, but not for long), and that this will be both inevitable and an indicator of success. Such a rationale has been closely mirrored in recent justifications for major energy policy decisions. For example, in giving approval to the new Hinkley point nuclear power station the need to meet rising demand was recurrently referred to in government statements, despite the fact that UK energy demand has been steadily falling since 2005 (DfBIES 2016) and is projected to continue on that trend.

In analysis we undertook in the DEMAND Centre on how the media connected energy to languages of need and necessity, we also found a recurrent connection made between demand and need; in simple terms energy demand now and in the future is what is needed and what is needed has to be supplied; non-negotiable. Energy security it follows can only be about ensuring supply, not reducing demand. Any attempt by those in government or in the energy industry to suggest that reducing demand might be a good thing, was immediately also cast in news reporting as a threat to fuel poor households, who were already not able to stay warm in their own homes.

In combination this means there is little discursive space currently for demand reduction to be seen in a positive political light. That space needs to be made, contested and filled out in new terms, so that 'need' can be questioned and debated rather than assumed, high levels of energy demand seen as a problem rather than a virtue, demand reduction recast as a positive rather than a weakness, and interventions to that end seen as sensible and necessary rather than radical and fanciful. The justice case for de-energisation can also be a positive dimension of such a reframing.

Making demand reduction *really* the top of the energy hierarchy – there have been a number of attempts to bring the notion of a hierarchy into the energy world, mimicking that of the waste hierarchy which has been influential in shaping priorities in waste management policy. The idea is that the hierarchy guides or specifies what 'solution' or action should be looked to first, before the next step in the hierarchy is enacted and so on. So in waste 'prevention' comes first before 're-use', 'recycling', 'other recovery' and 'disposal' in order of priority. How effective the waste hierarchy is in practice is much debated, but through its prominence and embedding in regulation it at least makes waste prevention visible and legitimately arguable for across many different waste management settings. For energy a properly constituted and legislatively embedded hierarchy could do similar work, with, for example, 'avoiding energy use' positioned at the top, followed by 'minimising energy use', and only then 'maximising energy efficiency', 'using renewable low carbon energy', 'shifting

energy use out of peak periods' and other categories. There is little formal recognition of an energy hierarchy currently in policy, and those that are applied are constrained in how they see the top level – for example the Greater London Authority (2015) works with a simple 'be lean, be clean, be green' structure, and a version produced by the Institution of Mechanical Engineers (2009) begins with 'energy conservation' understood in very conventional terms as the '*reduction or elimination of unnecessary energy use and waste*'. Opening up the top steps of a policy-embedded hierarchy to a much fuller and substantial set of demand reduction principles and properly filling out what these mean – including questioning the basics of what counts as needed energy and implications for inequality and vulnerability - could give de-energisation a significant impetus and practical foundation. Financing and properly incentivising action at the top of the hierarchy would then need to follow.[4]

Bringing energy demand reduction into non-energy policy – a key limitation of the energy hierarchy though, is that it is positioned essentially in an energy policy world, concerned first and foremost with managing energy. However, just as preventing waste includes intervening in processes that are beyond the domain of those who deal with waste directly, avoiding and minimising energy use rapidly extends to processes that are about the ongoing making and constitution of energy demand across society. A major stream of work in the DEMAND Centre is focusing on the 'invisible' consequences of policies (see http://www.demand.ac.uk/influencing-demand/#invisible) across multiple domains – such as health, education, defence, planning, welfare and employment - that are directly implicated in making and shaping energy demand. De-energising at speed and scale therefore means developing forms of intervention that can steer the dynamics of everyday life and multiple social, business and institutional phenomena in lower energy directions - including in relation to their timings and rhythms, relationships to natural energy flows, embedding in conventions and standards, reliance on technologies and much else that has been touched on in this discussion.

De-carbonising the energy system is vital, but, I have argued, not enough on its own or sufficient to realise a just and fair energy transition. De-energising has an equally important part to play, working in concert with stripping carbon out of energy supply, but extending its reach far beyond improving technical energy efficiency. Making energy (only) do work where it is really needed, re-framing demand in public discourse, putting demand reduction at the top of an energy policy hierarchy and extending the reach of demand reduction policy beyond just the energy domain are all key moves for taking de-energisation forward in a fair way in a necessarily severely carbon-constrained future.

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[4] For a fuller discussion of the challenges and opportunities for redirecting financing to support sustainability see Dave Powell's article for Big Ideas at: https://www.foe.co.uk/page/transforming-finance-do-we-need-rewild-finance-system

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