Invisible energy policy: A new agenda for research and intervention

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Abstract

Energy demand is not only shaped by energy policy – it is profoundly influenced by a host of other policies, laws, regulations, standards and cross-cutting ambitions like those of liberalisation, growth or austerity. Since the impacts of non-energy policies on energy demand are often unintended, unseen and ignored, we describe them as 'invisible energy policies'. Although invisible, such policies are nonetheless critical, often underpinning increasing consumption, but with the potential to engender radical demand reduction.

Having introduced the concept of invisible energy policy and explained why it warrants attention from researchers and policy-makers alike, we outline a series of propositions regarding the relation between energy demand and non-energy policy. We distinguish between forms of policy process, on the one hand, and policy objectives on the other, both of which have implications for energy demand. We consider the boundaries that exist within policy-making: dividing 'energy' from 'non-energy'; demarcating the roles, remits and responsibilities of different actors; and situating certain forms of energy demand as 'non-negotiable,' and we discuss the relation between energy demand reduction and what counts as 'core business' for national policy makers and for organisations like those in the health sector or higher education.

Building on these observations, we make some suggestions as to how non-energy policy might be deployed in pursuit of radical energy demand reduction. In taking this question seriously, we outline a new agenda for research and policy intervention designed to achieve radical energy demand reduction through many and varied forms of non-energy policy.

Introduction

How is energy demand affected … when planners project a 'doubling of flight demand by 2050' (Marsden 2013) thereby naturalising the need for airport expansion? When energy managers are allowed to formulate energy efficiency strategies, but not allowed to contribute to strategic development plans? When school holidays begin? When labour markets are liberalised? When development agencies and international organisations subsidise road-building and marginal agriculture? When university promotion committees treat attendance at international conferences as a marker of research performance? When hospital trusts are merged and health services centralised? When manufacturing production is exported to China? When high-speed broadband is rolled out nationwide? When taxation rates are changed? When pensions are indexed to inflation? When offices are maintained at the same standard temperature? When Britain exits from the European Union …

Not much unites this disparate list of practices, processes and policies, but one thing that does is that all have the effect of reconfiguring energy demand. Some mainly affect the timing of energy demand. Some matter for where demand occurs. Most have an impact on the extent and scale of demand and in many cases, the result is an increase in consumption. From the specialisation of schools, through to the liberalisation of labour markets and the internationalisation of higher education, non-energy priorities and the policy and regulatory processes that

support them are driving energy demand inexorably upwards. This is why per capita world energy consumption continues to rise, and why the per capita carbon and energy consumption footprints of even post-industrial Western states are doing the same (Daly et al. 2015).

It is widely agreed that this ever-increasing energy demand – and especially the still-rising demand of the most advanced capitalist societies – is a serious problem. It is also accepted that reductions in energy demand are vital if dangerous levels of human-induced climate change are to be averted. For example, the UK Government's Carbon Plan, published in 2011 as a requirement of the Climate Change Act, explicitly states that "Reducing our demand for energy is the cheapest way of cutting emissions, and will also benefit consumers and our economy" (HM Government, 2011: 36).

Despite the pervasive rhetoric of radical demand reduction, it is striking just how impoverished the thinking is about how this might be achieved. It is usually simply assumed that 'energy efficiency' is the answer – that increasingly energy efficient technologies plus consumer awareness, combined with the progressive decarbonisation of energy supplies, represent the most obvious and also the most sensible means of averting climate catastrophe (H.M. Government, 2016). The glaring weakness of such reasoning is that it has been understood ever since William Stanley Jevons' famous studies of coal use in British industry that efficiency of resource use does not automatically translate into decreased demand, indeed often quite the reverse (Jevons, 1866). The fact that, worldwide, ever-increasing technological efficiency continues to run hand in hand with ever-increasing energy use appears to bear this out. Some claim that this is an outcome of the so-called rebound effect (Sorrell 2009).[1] Others argue that it is a more fundamental reflection of what energy is used for in society, and of how energy-dependent practices and ways of life develop and change (Shove and Walker 2014). Either way, the conclusion is the same: unless we assume that a decarbonised energy supply will be able to meet all future energy 'needs', even if these double or triple, we need to start thinking much more seriously about energy demand reduction.

In what follows we outline a research and policy agenda which takes up this challenge. In taking this approach our primary aim is to inspire and guide academics and policy makers and to point to ways in which significant, systemic and long term reductions energy demand reduction might be achieved.

Our central premises can be stated quite simply: that energy demand and associated carbon emissions are to a significant degree shaped by *policy*; that the shaping in question is done not only by *energy policies*, but also by policy agendas and processes across a wide range of *non-energy areas*; and that these are under-studied and in many respects invisible. We use the term 'invisible energy policy' to refer to non-energy policies which have impacts on energy demand that are unintended, unseen or ignored. As we explain below, policies which fit this description may exist in any policy domain, and at any policy scale. Identifying and analysing 'invisible' energy policies consequently depends on 'seeing' how non-energy policies shape demand, and how this shaping occurs. In the rest of the paper we argue that the impacts of non-energy policy need to be better understood, clearly articulated and actively confronted within policy and practice. Doing so will help contain escalating demands arising from non-energy policy, and more positively, enable non-energy policies to be used to engender radical demand reduction. This paper is intended as a manifesto – a call to action – around these premises.

We begin by showing that despite the significant and wide-ranging causal linkages between non-energy policy agendas and processes on the one hand, and energy demand and carbon emissions on the other, these linkages are *not yet adequately acknowledged or understood*. We then reflect on the *reasons* for this invisibility. Thirdly, we advance a set of *theoretical propositions* about energy demand and invisible energy policy which underpin our proposed research agenda. We then identify some of the *methodological strategies* that might be deployed in researching and exploiting the scope for using non-energy policy as an instrument of demand reduction. This is not, we should stress, in order to prescribe precisely how research and policy should be done, but to give a sense of the diverse ways in which relevant processes might be identified, understood and mobilised.

Hidden in Plain View

Although the consequences of non-energy policies for energy demand – including those alluded to at the outset of this paper – are hardly counter-intuitive, they are rarely noticed, let alone reflected on or responded to; like so many of the best secrets, they are 'hidden in plain view' (Poe 2015). Across the board, in academic research, in policy analysis and in strategies for intervention there is a general blindness or at least inattentiveness to the impacts of non-energy policy on energy demand.

Consider the empirical research first. A recent review of literature on the implications of non-energy policies for energy supply and demand (Cox et al, 2016) identified 576 academic and grey literature publications addressing the connections between non-energy policy sectors (e.g. agriculture, communications, culture) and energy supply and demand. It found, however, that the vast majority of these publications related to energy *supply*, not demand; and that those studies that do investigate the impacts of policy on energy *demand* focus almost exclusively on *energy policies*. Researchers writing about how non-energy systems or practices matter for energy demand have rarely had much to say about policy as such (Shove 2003).

This is not universally the case; in the field of transport studies, it is widely recognised that demand for mobility (and hence for fuel) is an outcome of non-transport policies, such as those affecting urban planning, business, education and health. The significance of non-energy policy is much less commonly appreciated outside discussions of transport. Cox et al. did identify some studies making this link (e.g. Dini et al., 2012; Adewuyi, 2016; Royston, 2016), especially in certain domains of policy, such as air pollution, land use and food and agriculture. However, as Cox et al.'s review revealed, there has not yet been any comparative work, nor any systematic attempt to synthesise or

1. Discussions of rebound also routinely naturalise the 'need' for energy, assuming that people will take certain 'normal' actions providing they can afford to do so. What counts as normal is in at least some cases an outcome of 'non-energy' policies and priorities.

consider the impacts of non-energy policies on energy demand. For an issue that is so important and in such plain view, it is remarkable how little attention has been given it.

This intellectual silence has direct parallels in policy and practice. We find this at both national and local levels. For example, UK government estimates of future energy demand and carbon emissions assume trends driven by such factors as economic growth and demographics, modified by the impacts of energy efficiency policies and practices, such as building regulations, the Renewable Heat Incentive, EU 'F Gas' regulations and the introduction of smart metering (H.M. Government, 2015: 15). In such projections, there is no mention of policies adopted across other areas of government, or of how these might shape present and future energy demand (for example the policy to introduce superfast broadband is likely to support and promote increased use of ICT equipment at home and at work and have a variety of other indirect consequences).[2] In effect, the task is assumed to be that of meeting carbon targets whilst also accommodating increases in demand arising from other policy areas. Energy and carbon policy is therefore seen as separate from, and ultimately subservient to, other areas of policy. This is paralleled in institutional structures and processes, which treat 'energy' a separate topic and which do not facilitate coordination between government departments. Again, there are some exceptions such as the European "Smart Cities and Communities Initiative", which aims to integrate policies on energy, transport and information and communication technologies in urban areas (Kylili & Fokaides, 2015). However, such examples remain relatively rare. In contrast, and as considered in more detail below, there are many policy areas where major potential energy impacts are not discussed; for example, in debates about the promotion of domestic manufacturing industries (as opposed to international imports), where issues of employment, regeneration, customer costs, and state interventionism tend to dominate the discourse.

The same overall pattern applies across a myriad of local institutions. Whether in the public or the private sector, non-energy managers are, with rare exceptions, consistently uninterested in energy matters, while energy (or facilities) managers are consistently excluded from non-energy planning – leaving barely anyone at all to think about the relation between non-energy policies and energy demand. Within UK higher education, for example, energy managers typically focus on the efficiency of equipment and the thermal performance of buildings. Meanwhile other managers and senior academics are developing non-energy plans and policies – around improving the student experience (for example, keeping libraries open for 24 hours a day), increasing grant income, promoting 'internationalisation', building new facilities, outsourcing services, and so on – with barely any input from or dialogue with energy managers (Royston 2016). In line with the UK's 2008 Climate Change Act, the higher education sector is committed to reducing its carbon emissions by 43 % by 2020, relative to 2005 levels. But it has so far achieved only a 10 % reduction (Brite Green, 2016) – in large part because overall energy use is increasing despite universities' investments in energy efficient building stock. This is, in our view, a direct consequence of the intellectual and institutional splitting apart of energy from non-energy issues, and of the dearth of coordination and dialogue across the energy-non-energy divide.

Accounting for invisibility

What accounts for the simultaneously scholarly-and-practical invisibility of non-energy policies' impacts on energy demand?

One explanation is that disciplinary specialisms and theoretical frameworks have generally not been conducive to the systematic, cross-cutting analysis of energy demand. *Energy policy* debates have, almost by definition, focused on questions directly related to energy (primarily supply-side issues; but when on demand, then on energy pricing, or energy efficiency). Energy efficiency research has focused, just as narrowly, on improving and evaluating the micro-efficiency of things like boilers and buildings – but has not asked broader questions, for instance about the 'energy efficiency' of trade agreements, standards of office design or planning policies. These various domains of analysis are so trapped in their respective intellectual silos that more fundamental questions about the impacts of non-energy policies and priorities (such as education, health, economic growth etc.) on energy demand have simply not been on the agenda. In part this narrowness also reflects a tendency, especially evident in physics and in economics, to conceptualise energy as a quantifiable resource, the consumption of which is taken to indicate 'demand' – an approach which supposes that people's need for energy simply exists, that such needs should be met, and that needs are independent of mediating infrastructures, technologies and practices.

It deserves stressing that those social scientific traditions which have engaged with questions of demand-as-an-outcome-of-practice have been similarly inattentive to non-energy policy. *Social practice theory* has informed compelling accounts of how consumption, including energy consumption, is constituted through everyday materials and practices (Warde 2005) – but its sociological bent is such that it says little or nothing about policy of any sort, let alone non-energy policy. Work in the traditions of *political economy* and *political ecology* includes much on how global and local energy and environmental crises are shaped by political forces (e.g. Swyngedouw et al. 2002) – but these traditions' generally structuralist orientations and their principal interests in capitalism, power and the state are such that they are not particularly amenable to the study of policy impacts (Walker, 2006). As for *political scientists*, while the analysis of policies and their causes and effects is one of their fortes, research on functional policy areas (agricultural policy, welfare policy, etc.) is not: again one would be pressed to find political science-led work on the impacts of non-energy policies on energy demand. Intellectual, disciplinary and institutional boundaries are clearly important but it would be naïve to overlook other practical and political reasons why non-energy policy influences on demand are so invisible. Exactly what these reasons are, and how they combine, is an empirical question, but issues of complexity, governance and related notions of priority and core-business are almost certainly part of the story. We comment briefly on each.

2. Instead, and in so far as there is an aim regarding demand, it is to 'maintain present standards of living' but with less energy. Consistent with the focus on efficiency mentioned above, the UK's Carbon Plan suggests 'that the UK can move to a sustainable low carbon economy without sacrificing living standards, but by investing in new cars, power stations and buildings' (H.M. Government 2011: 12).

First, the practical *complexity* of the non-energy policy-energy demand relationship is without doubt a significant obstacle to engagement and reform: to put it bluntly, installing new energy efficient light bulbs is far, far easier than engaging in whole-of-institution and inevitably political conversations about social and organisational priorities. Energy and non-energy managers alike may find it hard to negotiate about how much an organisation's energy demand should grow, which non-energy activities should be monitored and regulated, or what performance indicators should be used to evaluate non-energy policy contributions to energy demand and carbon emissions. Researchers, practitioners and policy-makers will often have some awareness of non-energy policy impacts on energy demand, but focus on end-use energy efficiency instead – not out of individual myopia, but from a pragmatic assessment of opportunities for short-term change.

Then there are issues of *governance*: most policy makers and institutions, at national and local levels alike, have not yet rethought their decision-making or administrative systems to meet the challenge of decarbonisation. Instead, the tendencies have been to set ambitious carbon reduction targets whilst tacitly recognising that these cannot be met without challenging or modifying other priorities, and to prioritise 'meeting needs' – 'keeping the lights on' – while neglecting to recognise that policy is in any way also involved in making demand.

Linked to this, policy makers and institutions have, or are beholden to, various *economic and commercial priorities,* and to related interpretations of the scope (or otherwise) of legitimate action. The notion of being part of some competitive chase – a 'global race', as former UK Prime Minister David Cameron called it (Cameron, 2012) – and the ensuing dominance of growth agendas across countless sectors and institutions (such as universities, hospitals, cities) is such that there are strong pressures against meaningful engagement with radical demand reduction, or with the prospect of reconfiguring activities (i.e. changing or challenging current standards of living) in response.

When put like this, the chances of fully engaging with questions of demand, and of understanding how these are shaped (and might be reshaped) by non-energy policy look slim. Yet this is not a reason to give up or to ignore the salience of the topic. We do not subscribe to the economically deterministic and fatalistic view that questions of energy demand and climate change will always be drowned out by the mantra of growth. Instead, and as argued more fully below, significant reforms in the direction of energy demand reduction are both possible and plausible. Before turning to these policy implications, we map out the basic contours of a research agenda, identifying the kinds of enquiries needed to inform and justify a non-energy policy approach to energy demand reduction.

Six Propositions

The research and policy agenda outlined below is underpinned by six core propositions.

PROPOSITION 1: ENERGY EFFICIENCY ALONE IS NOT UP TO THE CHALLENGE OF ENERGY DEMAND REDUCTION.

Policies designed to promote energy efficiency are designed to maintain present levels of service (comfort, light, speed) but to do so with less energy. In so far as they have a bearing on practices, expectations and standards their effect is to perpetuate and reinforce arrangements that people take for granted today. From this point of view, efficiency measures sustain what are, in the long run, likely to be *unsustainable* ways of life.

PROPOSITION 2: TO REDUCE ENERGY DEMAND, WE NEED TO FOCUS NOT ON EFFICIENCY OF USE BUT ON WHAT ENERGY IS USED FOR.

People do not use energy for its own sake: they use it as part of accomplishing social practices at home, at work and in moving themselves and their commodities around. Critically, these practices have social, cultural and material histories. They change and vary along with the institutions, infrastructures, systems of provision and technologies on which they depend. Patterns of energy demand reflect and are constituted through these dynamic processes: they are not defined by technologies alone, nor are they merely expressions of individual behaviour and choice.

PROPOSITION 3: POLICY IS ONE KEY ELEMENT IN THE SOCIAL MAKING OF ENERGY DEMAND.

It is important to be clear about what we mean by 'policy'. The term, as we use it, encompasses the policies of nation-states, international organisations and trans-national policy networks through to provincial and local councils, and to policies adopted by specific institutions, for example prisons, schools and health clinics. In all of these settings, policy refers to a range of *practices* which include governance (in the sense of oversight), strategic and operational planning, decision making and regulation. When we say that policy has a key role in the making of energy demand, we are therefore referring to everything from the impacts of high-level policy decisions taken in inter-governmental fora through to the consequences of planning, standard-setting and implementation as enacted by local managers and 'street level' bureaucrats (Lipsky 1969). In taking this approach we acknowledge that practices of decision-making, regulation and normalisation are dispersed throughout the body of society, often criss-crossing the formal public-private and domestic-international divides. Yet this does not mean that policy is omnipotent. Policy making is often uncertain, and decisions and plans are in any case rarely fully implemented. Furthermore, practices that use energy are in any case integral to forms of social, economic and technological change - all of which are themselves entangled, and mutually-interconnected with policy processes, and can act either to reduce or increase demand. Our premise is simply that policy processes and policy objectives figure prominently in the making of energy demand.

PROPOSITION 4: BOTH ENERGY AND NON-ENERGY POLICIES SHAPE ENERGY DEMAND.

Modern governance or 'governmentality' (Foucault, 1979) has a highly distinctive form. It is organised around abstracted social objectives, agendas or 'goods' and it involves many such goods. These goods and the actions required to protect or optimise them tend to be concentrated in particular institutional spaces, but are not limited to them, instead permeating to various degrees the entirety of society. As a consequence, any one governance agenda necessarily comes into contact with and is, for better or worse, affected by other governance agendas. For example, the abstracted ideal of optimising the health of bodies and populations involves action concentrated in clinics and hospitals, but also action to support the physical safety of

people at work ('health and safety policies'), to support people with physical and mental impairments ('occupational health policies'), to regulate food standards, and so on. This means that health and health governance are deeply affected by non-health policies and agendas. The abstracted ideal of ensuring public order is similarly concentrated in courts and prisons but, as with health, involves countless actions elsewhere (acts of surveillance, data gathering, education, etc.) (e.g. Rose, 2000) which often clash with competing priorities. Much the same can be said of goals like those of equality, education, security or indeed energy demand reduction.

The production and provision of energy is affected not only by energy supply policies, but also by foreign policies, environmental policies, land use policies, and more. And patterns of energy demand – not only the overall volume of demand, but also its spatial, temporal and social distribution – are similarly structured by industrial policies, housing policies, taxation policies, and so forth. These are just some of the 'non-energy policies' that have a bearing on energy demand. Consider, for example, the agricultural sector, which is a major energy consumer across Europe. The intensification of land management increases agricultural energy use, including the use of energy-intensive fertilisers (Rounsevell and Reay, 2009). In the past, some have blamed the Common Agricultural Policy for contributing to this (White, 2007), although the shift to 'area payments', which are conditional on compliance with environmental standards, may have improved matters (Garnett, 2008). At the same time, Garnett's 2008 review noted a wide range of other policies affecting energy use in farming, including the Integrated Pollution Prevention and Control directive, and national policies such as the UK's Food Industry Sustainability Strategy and 'export horticulture' policies pursued by the UK Department for International Development. Meanwhile, there are debates around localised versus international production, 'food miles', their energy impacts and the policies that affect them (e.g. Edwards-Jones, 2010; Saunders and Barber, 2008; Dalin and Rodríguez-Iturbe, 2016), which are often not only agricultural policies but wider economic and trade policies. This illustrates how diverse non-energy policies may combine to shape energy use in just one sector; similar stories emerge when other sectors are considered. To reiterate, we do not claim that the only policies shaping demand are non-energy ones: energy pricing and energy efficiency policies clearly have impacts too. However, our point is that there is virtually no non-energy policy or non-energy practice that does not have implications, to some degree, for energy demand.

PROPOSITION 5: NON-ENERGY POLICY HAS IMPACTS ON ENERGY DEMAND THROUGH BOTH POLICY OBJECTIVES AND POLICY PROCESSES.

As implied above, non-energy priorities and agendas – saving lives, improving welfare, enhancing mobility, maximising economic growth, etc. – underpin policies many of which result in rising energy demand. We can think of all these as non-energy policy 'objectives': they embody ambitions, priorities or ends, each of them ordered around combating a particular perceived social 'bad' and/or extending a perceived social 'good'. Such policy objectives define what we might think of as the *core business* of particular policy spheres: the core business of health policies is to save lives, of transport policies to enhance mobility, and so on. Not all policy 'objectives' are confined to one policy area. There are also *cross-cutting policy agendas*, the most notable of which today is that known as 'liberalisation' or 'neo-liberalisation' – as a result of which, and across almost every policy domain, and at every scale, institutions and policy makers are being pressured or incentivised to prioritise considerations of economic efficiency, to construct users as consumers, to enter new markets, to make new products, and to revise their systems and structures to facilitate competition with rival institutions and growth, all the while continuing to fulfil their 'core business' policy objectives.

Whatever the specific or cross-cutting objectives, *policy processes* – the ways in which decision-making, planning and regulation are done, how responsibilities and remits are defined and demarcated, and how conflicting priorities are (or are not) negotiated and aligned – also have significant repercussions for energy demand. They have a different type of impact from policy objectives, however. When growth objectives and liberalisation pressures dictate an increase in airport capacity, non-energy policy has direct causal consequences for energy demand. When energy and environment managers are denied input into strategic development planning, we are really talking about impacts arising from policy processes.

PROPOSITION 6: MOST NON-ENERGY POLICY IMPACTS ON ENERGY DEMAND ARE BARELY VISIBLE.

Non-energy policy impacts on energy demand involve a double invisibility: those concerned with energy demand are for the most part inattentive to non-energy policy, while those concerned with non-energy policy are generally blind to energy demand. There are exceptions, of course: as noted above, transport demand is widely understood to be 'derived' from practices and policies relating to housing, education and employment, amongst others; and there has been periodic recognition of the energy impacts of policies such as those focused on agriculture, land use and air pollution (e.g. Garnett, 2008; Begg and Gray, 2004). In practice, the invisibility of the link between non-energy policies and energy demand is relative, not absolute. In other words, the relative visibility or invisibility of the link lies in the eye of the beholder, and depends on how causes, effects and problems are conceptualised and framed. Invisibility (or visibility) is not for ever: it is a function of the intellectual blind-spots and policy systems and processes discussed above, which shift over time.

Researching Invisible Energy Policy

These propositions could and arguably should be used to inform future research and policy. In this part of the paper we identify general principles and strategies for concretely analysing the implications of invisible energy policy for energy demand and identifying forms of intervention which build on these insights. To be clear, the aim is not to prescribe or lay out a specific research programme. Neither is it to establish a definitive specification or a checklist that analysts can use to identify 'invisible' energy policy.[3] Instead, our intention is to articulate

3. As we have already explained, invisible energy policies are those which have an impact on energy demand that is not recognised or 'seen'. Exactly what qualifies as 'invisible' cannot be determined in the abstract since visibility is always a matter of degree, and specific to a particular observer.

the characteristics of an agenda that is practical, actionable and consistent with the propositions set out above.

A first essential step is to conceptually and analytically decentre energy. In other words, understanding the impact of non-energy policies on energy demand depends on escaping from a sole or primary focus on energy. For example, in looking at how non-energy policies impact on energy demand in universities, it is as important to talk with IT service managers, or internationalisation officers, as with energy managers (Royston 2016). Since part of the challenge is to investigate how boundaries between energy and non-energy priorities are drawn and managed, research needs to engage with the multiple non-energy policy areas and actors involved.

Second, and following proposition 5, we advocate research on both *policy objectives* and *policy processes*, and on their intertwined impacts on energy demand. Research on the former involves detailing the ways in which non-energy policy objectives are affecting, have affected, or might affect energy demand. Researchers might ask, for instance: how might the commitment to 'provide superfast broadband coverage to 95 % of UK premises by the end of 2017' (Rathbone 2015: 3) facilitate video streaming and other data-heavy practices, and with what likely consequences for domestic and non-domestic energy demand? Or: how have universities operating in an increasingly liberalised and internationalised higher education sector sought to attract students (through upgrading accommodation, services etc.) and at what energy cost? Researchers might consider which non-energy policies have the greatest impacts on energy demand – a challenging question which will involve considering not only the nature of the impacts, but the temporal and spatial scales over which they extend. For example, a relatively minor change to the wording of legislation could have impacts on a national scale, over many decades. There are as yet no established methodologies for assessing these impacts, but a wide range of techniques and methods will be needed, including the use of models and quantitative data. Ideally, enquiries of this kind would set a meaningful baseline in relation to which the effects of non-energy policy might be defined and evaluated.

Studying the impact of policy *processes* depends on describing and analysing governance, decision-making, management and planning structures (both vertical and horizontal); identifying how and where energy demand is located within these; considering how boundaries are defined, maintained, perceived, negotiated and legitimised; examining what is invisible, to whom, and why, and then reflecting on the potential and opportunities for change in how energy and non-energy concerns are integrated. This calls for specific and focused forms of investigation within and of the organisations involved and careful consideration of the sectors and scales at which non-energy policy impacts are analysed.

As implied by proposition 3, policy objectives and processes can be examined in any number of sectors, sites and scales. Multi-scalar, multi-institutional research could also provide important insight into how policies and priorities travel from national to local levels and vice versa. In addition, comparative research promises to show how policy processes and objectives develop and change. This might entail 'vertical' comparison within sectors (e.g. policy may be joined up within a national government department but not within its local offices); through to 'horizontal' comparison of different institutions operating within the same sector, or even between countries. The purpose of such analysis would be to provide a richer, fuller sense of how invisible energy policies shape energy demand and how this varies, or recurs, across multiple sites and scales. This is important work if the aim is to identify 'best practice' and the potential to use non-energy policies to reduce (rather than increase) energy demand.

In addition, the scope for using non-energy policies in this way depends on knowing more about a) how tractable non-energy policies are – i.e. how much potential for change there is within or between different sites/sectors/issues; and b) how policy processes might be reformed to make non-energy policy impacts on energy demand more visible to energy policy makers.

Finally, there is scope for learning from other completely different fields in which previously marginal or 'special interest' priorities have been 'mainstreamed' and become integral to the conduct of 'core business'. Gender equality and health and safety are two relevant examples, and there is much to gain from analyses of exactly how policy objectives and processes have been adapted to incorporate these concerns.

This is a first sketch of some of the more important lines of enquiry to follow, and of some of the questions that researchers need to address in the field of 'invisible energy policy'. Putting these ideas into practice generates a series of related challenges for energy and non-energy policy makers alike.

Working with invisible energy policy

Non-energy policy objectives and processes have a significant impact on energy demand – so can they switch from being part of the problem to part of the solution? Can they be used to steer radical reduction in carbon emissions?

Policy processes, including the demarcation of responsibility, remit and legitimate response have the effect of defining certain issues, ideas or actions as off-limits, non-relevant or out of scope. As we have argued above, the impacts of non-energy policy on energy demand are invisible because of how policy domains are carved up. Some might conclude that overcoming this problem depends on eroding boundaries and distinctions between policy spheres. But since some form of carving up is both inevitable and necessary the solution is unlikely to lie (in general) in greater or closer integration across the board. In short, the problem is not that divisions exist - they always will - but exactly where and how they are drawn. From this point of view, the more modest challenge is to reform policy processes such that non-energy policy impacts on energy demand can be recognised and taken into account. This is not without precedent. For instance, in the health sector it is now widely accepted that non-health policies and practices, distributed across society, impact on patterns of wellbeing and disease (e.g. Egger & Swinburn, 1997). By implication, it should be equally recognised that non-energy policies and practices are the main determinants of energy demand.

In thinking about what this approach would entail and what new challenges would arise, it is important to note that policy processes and policy objectives often interlink. Put differently, processes (including the demarcation of problems and responses) often favour the realisation of some objectives above others. It follows that the potential for using non-energy policy to help realise radical energy demand reduction depends, in part, on

the potential for embedding this ambition within a raft of diverse 'mainstream' or 'core business' priorities. Whether 'core business' priorities can be adapted or not depends on the flexibility, or otherwise, of various non-energy policies and processes (see the research agenda sketched above), but in some situations there will be scope for weaving the goal of energy demand reduction into other policy domains. Identifying and exploiting these opportunities would amount not to an 'energy' policy, but to a policy of energy demand reduction achieved and realised through many and varied forms of non-energy policy making.

As already mentioned, there are relevant parallels in other fields. For example, any equality policy worth its name has to run right through an institution's practices, from hiring and firing, to workload management and pay, and to the design and management of buildings. The same can be said of health or security policies. And the good news is that most of these comparisons would suggest that it *is* possible to mainstream additional priorities without 'core business' falling apart. For example, hardly anyone would now say that universities should ignore equalities legislation or health and safety regulations because the goals of teaching and research are so much more important. Could the same not also apply to energy demand reduction? We do not pretend to have the answers but we are convinced that these are the kinds of questions that could and should be asked.

This kind of mainstreaming is not the only possible response. Economists (and many policy-makers) often argue that invisible effects (on energy or indeed many other outcomes) can be addressed through economic tools, such as market mechanisms, and the ascription of financial values to "negative externalities" such as carbon emissions. In this view, if energy was correctly priced, and if markets functioned efficiently, then all policy development would automatically pay attention to energy, as part of its routine economic cost-benefit analysis. This is the logic behind schemes such the Carbon Reduction Commitment (CRC) and EU Emissions Trading Scheme (ETS), both aiming to make carbon "visible" on balance sheets. A fundamental premise of environmental economics is that "goods" and "bads" of all kinds can be balanced, and diverse priorities integrated, using the universal language of money. However, this approach has obvious limitations. First, there are practical challenges in achieving a perfectly-functioning market, especially one which involves actors of many kinds, with different resources, at different scales. As shown by the cases of the CRC and EU ETS, questions such as how prices should be set, at what level, by whom, and with what level of ongoing intervention, are challenging; flawed designs can result in ineffective mechanisms. Then there are deeper questions about the implications of these approaches for justice, equality and long-term sustainability, especially since such mechanisms risk reinforcing existing structures of wealth and power (we do not have space to discuss these debates here, but a comprehensive critique is provided by Pearse & Böhm, 2014). We do not deny that such policies can potentially contribute to demand-reduction but we do not believe that making energy and carbon visible in decision-making is sufficient to address the institutional and policy divides that are at the heart of the problem.

An invisible energy policy agenda implies a much more comprehensive re-thinking of governance processes, raising and also addressing questions about the root causes of fragmentation, disintegration and the neglect of certain policy goals.

In conclusion, the main purpose of this paper has been to draw attention to a set of important causal relationships which have yet to figure within energy policy and energy research. Recognising that patterns of energy demand are profoundly shaped by non-energy policies suggests that such policies might be used to modify priorities and practices in ways that engender radical, systemic and lasting demand reduction. Understanding the scope for intervention of this kind calls for new research on non-energy policy objectives and processes, at all scales, and for new thinking about how energy demand and carbon reduction might be 'mainstreamed' in non-energy policy. The theoretical and methodological propositions outlined in this agenda setting paper are intended to guide and steer this endeavour.

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