Response to Westminster Sustainable Business Forum's call for written evidence on domestic energy efficiency

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We welcome the opportunity to respond to this important and timely enquiry. We have focused our response on nine of the questions posed by in the call for written evidence. Our evidence is drawn from many years of combined experience working in the fields of energy efficiency, sustainability and fuel poverty, including ongoing projects being undertaken at CURE in Manchester (such as the 'EVALUATE' project: http://urban-energy.org/evaluate/).

(2) In your opinion, what are the most effective financial and non-financial drivers for energy efficiency demand?

Energy efficiency retrofits offer a number of benefits. Some of these have the features of a 'private' good, experienced by the household receiving the retrofit (http://combi-project.eu). These include: (i) increased comfort due to increased indoor temperatures and/or an increase in the total area heated: (ii) better health and wellbeing due to improved thermal comfort and possibly also reduced indoor crowding; (iii) reduction in energy bills; (iv) improved housing resilience against extreme weather events. It can also have many benefits that can be thought of as 'public' goods (http://combi-project.eu), such as (v) improved air quality and therefore, human health, state of ecosystems and the built environment; (vi) poverty alleviation and social cohesion and possibly also a reduced need for state subsidies; (vii) improved energy security and facilitation of energy transition; (viii) reduced greenhouse gas emissions.

However, the marketing of many energy efficiency programmes (including ECO) have focused predominantly on only one of these benefits: reduction in energy bills for householders. This approach has for many years been critiqued (e.g. Gram-Hanssen, 2010; Wilhite, 2008; Wilk and Wilhite, 1985), as it is based on a flawed conception of human behavior as driven purely by 'strict economic rationality'. In reality the reasons people undertake energy efficiency measures are typically much more diverse and multifaceted, including factors such as a desire to have a secure, safe, 'cosy' and 'comfortable' home (Bouzarovski and Petrova, 2015; Wilhite et al., 1996; Wilk and Wilhite, 1985). A further issue is that energy efficiency improvements can be socially and culturally

stigmatizing for households, particularly when focused on issues of financial 'savings', as they may signify that a household is in need of assistance and thus incapable or poor (Hards, 2013; Hitchings and Day, 2011; Reid et al., 2015).

Energy efficiency programmes have to be crafted in recognition of these diverse benefits and barriers, going beyond the view of people as purely economically 'rational' actors. It is also important to recognize that the primary motivations for undertaking energy efficiency measures are likely to vary between households, and measures and methods should be tailored accordingly. For those suffering the negative effects of poor quality housing, prospective gains in comfort and health may be a key motivation for energy efficiency investments. For others, it may be more about investing in the quality of the house (potentially in the hope of increasing its value, such as landlords – see below). Others, particularly those who are financially comfortable, may be motivated by environmental concerns. For many people, it is likely that a *mixture* of reasons underpin their desire to undertake energy efficiency improvements.

This is not to suggest that financial issues are not important, and energy efficiency programmes do need to be recognize the different financial capabilities of households. High upfront capital costs can be a significant barrier to the uptake of energy efficiency measures by low-income or elderly groups (Bouzarovski et al., 2015), whilst landlords and tenants of rented accommodation also face a particular set of circumstances and barriers (discussed further below).

(3) What is the relation of 'easy retrofits' vs 'deep retrofits' left to be carried out in the UK? What implications does this have on the design of future policies?

State of the art retrofits may bring down energy consumption levels of existing housing stock to those comparable to passive house standards (Dodoo et al., 2010; Harvey, 2009; Ürge-Vorsatz and Tirado Herrero, 2012). The implications of "easy retrofits" versus "deep retrofits" have been discussed by Ürge-Vorsatz & Tirado Herrero (2012) and (Ürge-Vorsatz et al., 2012). They argue that opting for "easy retrofits" instead of deep "retrofits" may lead to a lock-in effect – unrealized energy savings. That may hamper climate change mitigation goals and also may impede maximizing of associated co-benefits of energy efficiency: avoided air pollution co-benefits and alleviation of energy poverty.

Superficially retrofitted buildings may need to be revisited in order to capture the remaining potential. Ürge-Vorsatz & Tirado Herrero (2012) warn that this may be technically difficult or uneconomic having in mind (likely) rather recent retrofit investments (including transaction costs), some of which may need to be forgone. Also, additional difficulties may be posed by convincing the public of the need to revisit retrofits. Having in mind a tight timeline of required greenhouse gas emission reductions, revisiting suboptimal retrofits may be needed rather soon. Whereas the public expectation on the sufficiency of previous retrofits may clash with the need of additional retrofits as housing investments are usually regarded as long-term investments.

A direct consequence of this is that the government may become cornered to pursue more expensive climate change mitigation options, e.g. renewable energy, carbon capture and storage (Ürge-Vorsatz and Tirado Herrero, 2012).

The difference between doing the "deep retrofits" versus superficial retrofits is portrayed in the Figure **1** and Figure **2** below. It illustrates how big the differences in energy savings can be by 2050 under different technological choices. In total, despite a 126% increase in the housing space area between 2005 and 2050, 46% of final energy demand could be saved with a significant increase in comfort levels if "deep retrofits" were implemented (Ürge-Vorsatz et al., 2012). While under "easy retrofits", the global space heating and cooling energy demand is projected to increase by 32.5% by 2050 and the lock-in effect standing at 79% (ibid.). Although these illustrations represent trends on the global scale, the same logic of argument applies to the UK.

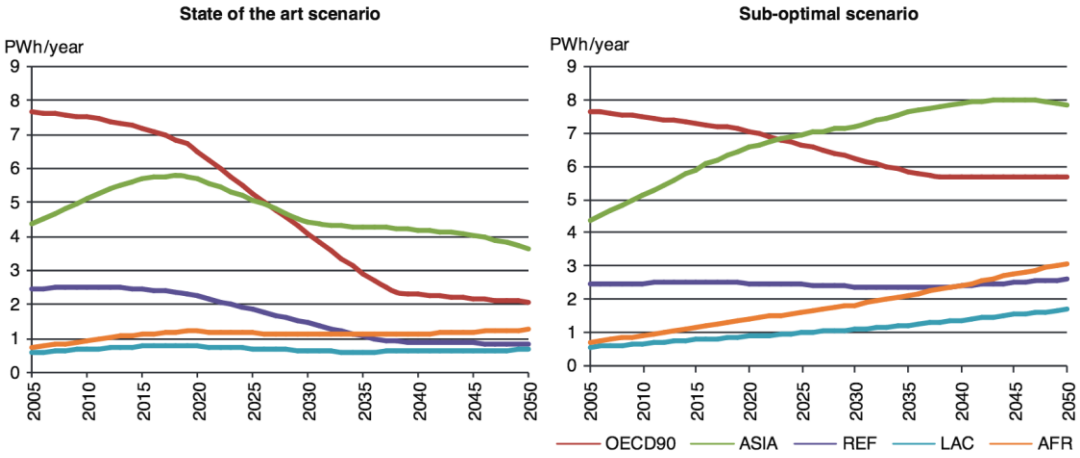

Figure 1. Space heating an cooling energy demand for five world regions under state of the art retrofit scenario and sub-optimal scenario, including increasing demand for new housing. Source: **(Ürge-Vorsatz et al., 2012)**

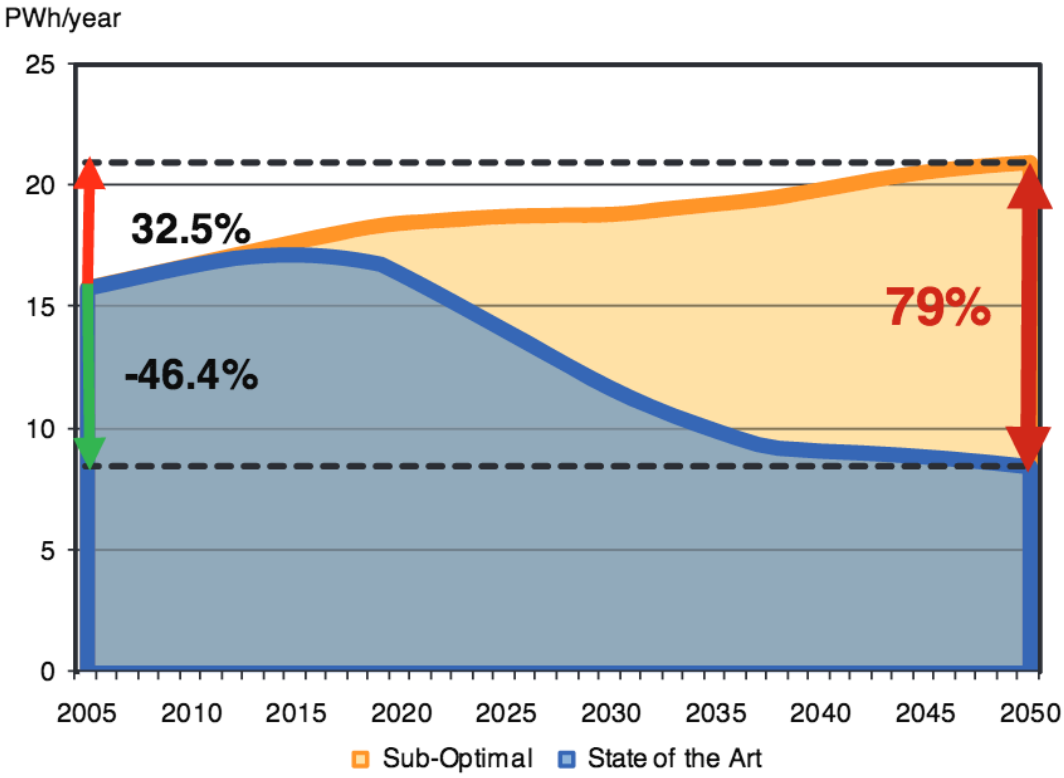

Figure 2. World space heating and cooling final energy use scenarios: "sub-optimal retrofits" or "easy retrofits" versus "state of the art" or "deep retrofits". Source: **(Ürge-Vorsatz et al., 2012)**.

(4) How can the successor policy to ECO in 2017 be designed to deliver the volume of treatments it aims at while also achieving carbon reductions in line with the UK's climate change commitments and tackling fuel poverty? Can all these objectives be reconciled in the first place – why/why not?
Our belief is that twin objectives of achieving carbon reduction and tackling fuel poverty *can* be reconciled – evidence has shown that poor energy efficiency is a key driver of energy poverty, whilst also being a cost effective way of reducing carbon emissions (Boardman, 2013; Bouzarovski, 2015; Petrova et al., 2013). Therefore, an appropriate and well-targeted approach that tackles energy efficiency has the potential to achieve these twin goals. However, for this to happen there needs to be changes in the way that schemes are managed, funded, operated and targeted. Alongside the answers we provide in relation to question 5 below (which are also relevant here), we therefore make four specific recommendations:

- The successor to ECO should be funded through a fairer and more progressive mechanism than the current form of fuel bill levy, so that (unlike the current, unjust situation) the poorest consumers are *not* paying a bigger proportion of their income than more well-off consumers in the financing of energy efficiency measures.

- Much more, and better quality, advice and training should be included as part of energy efficiency packages than in currently the case. The idea of simply installing a new technology and then leaving the household to work with it is can limit or decrease the benefits of efficiency measures.
- Greater funding should be provided for local and community-based forms of advice and networking, as these have been shown to be more trusted and effective.
- "Deep retrofits" – which involve multiple parts of the house, and include more difficult measures – can make much larger impacts on energy bills, thus maximizing the social welfare gains.

We now explain further our rationale and evidence for these recommendations.

An extremely problematic aspect of the current ECO scheme is that it is funded via a levy on electricity and gas bills, with costs pushed on to consumers. This is an extremely 'regressive' and arguably unjust form of funding – it means that the costs of funding such measures imposes a disproportionate impact on lower-income households, who have to pay a larger proportion of their income on energy bills than more comfortably-off households (Bickerstaff et al., 2013). Such increases in energy bills can contribute to making energy unaffordable for low-income households, thus pushing people into fuel poverty (ibid.). Therefore, to reconcile the goals of delivering a high volume of treatments whilst also tackling fuel poverty, **the successor to ECO should be funded through a fairer and more progressive mechanism than the current form of fuel bill levy.** Alternative possibilities of funding include general taxation – far more progressive than a flat levy on bills, but potentially unpopular with politicians. However, given the widespread public dissatisfaction with energy costs (Simcock et al., 2014), such a measure may be popular with the public if accompanied by lower energy bills. A second option is for a levy on the bills of specifically households who consume high amounts of energy (where exactly the line is drawn on 'high amounts' of consumption is a further question). This would be fair and legitimate based on the 'polluter pays' principle, but careful safeguards are required to protect vulnerable groups who consume a lot of energy out of necessity rather than choice (e.g. the elderly, sick or disabled who may spend a lot of time at home and/or require specialist electrical equipment). However, importantly this does ***not*** mean an **overall** reduction in funding – funding should be increased from the current ECO levels.

A further factor to consider is the potential for 'rebound effects', an observed phenomenon in resource efficiency studies in which the energy and cost savings associated with retrofits is lower than anticipated (Petrova, 2014). One reason for this is that fuel poor or low-income households may heat their house less and consume less energy than is assumed in the 'averages' of typical assessment models (ibid.). Furthermore, following the installation of energy efficient equipment such as heating systems, smart meters and solar PV, a lack of training for end-users in how their new system works and how its benefits can be maximized can also lead to unanticipated and counter-productive behavior (ibid.). Installed technologies and equipment do not just fit seamlessly into people's previous behavior and habit – they can also actively *shape* and alter what people do (Wilhite, 2008) as evidenced by the 'rebound effect' in which people keep their homes at higher temperatures after the installation of insulation. Therefore, **there is a real need to include more advice and training as part**

of energy efficiency packages – the idea of simply installing a new technology and then leaving the household to work with it can decrease the benefits of efficiency measures (Liddell, 2015; Petrova, 2014). There are several innovative examples of effective advice and training, including those which attempt to create local 'retrofit communities' in which the sharing of experiences amongst local residents and other stakeholders help improve learning and outcomes. Such approaches can be used to trial a new technology in a specific community or housing style, or a new way of engaging residents and encouraging energy efficient behaviours. A crucial point here is that non-commercial actors and those considered to be 'peers' are often considered to be some of the most trustworthy and useful sources of advice by members of the public, making it more likely that their advice is effective and acted upon (Simcock et al., 2014; Liddell, 2015). These approaches are not just theoretical – there are several examples of innovative community approaches happening on the ground. Our own research has found a number of emerging examples, including:

- **Technology pilots**: with a small number of tenants to introduce and test a new technology (heatpumps, solar panels)
- **Demonstrator homes**: occupied/ unoccupied
- **Energy champions:** peer-to-peer, 'word of mouth' methods
- **Energy advice:** third party e.g. energy doctors, or in-house teams
- **Mainstream** tenant engagement: e.g. leaflets, coffee mornings

However, there is also a lack of resources for creating retrofit communities (Catney et al., 2014; Petrova, 2014). **Therefore, to help reconcile the goal of reducing both fuel poverty and carbon emissions, a further recommendation is to provide greater funding for these kinds of local and community-based forms of advice and networking.** This may have the further benefit of increasing the volume of treatments undertaken.

The level of intervention may also be an important determinant of poverty alleviation. Easy retrofits, such as elimination of drafts, may improve indoor thermal comfort, but may not have a significant impact on the energy bills and therefore poverty alleviation. "Deep retrofits" – which involve multiple parts of the house, and include more difficult measures such as solid-wall and underfloor insulation – can make much larger impacts on energy bills, thus maximizing the social welfare gains. For further discussion of "easy" and "deep" retrofits and their implications see question 3.

(5) How could future energy efficiency levies be formulated for them to operate effectively? What can be learnt from past supplier obligation schemes, for example with respect to their competition element or their effectiveness in targeting the fuel poor? Could the 'Warm Home Discount' be utilised in tackling energy efficiency uptake in the fuel-poor target group?

We note that in many ways this question is interlinked with question 4 – effective targeting of efficiency schemes will help to ensure that the twin goals of reducing fuel poverty and reducing carbon emissions can be achieved, and in the most cost-effective way.

The Warm Home Discount is not the best way to target the fuel-poor group, as this is solely based on measures of a household's income. For fuel poverty, the relative energy *efficiency* of a person's home

and appliances (along with a number of other factors) is more crucial in determining whether a household is vulnerable to fuel poverty (Boardman, 2010; Bouzarovski and Petrova, 2015). It is possible for a household to be low-income but not fuel poor if they are living in fairly well insulated property.

One promising method to improve the targeting of households that are vulnerable to fuel poverty (as well as to reduce costs by improving the value for money of spending) is to focus on areas that contain high-proportions of *both* low-income households and energy inefficient homes (Bouzarovski et al., 2015; Rosenow et al., 2013).

There are also current and future opportunities to utilise smart meter data to identify households with below-and above-average energy consumption, thus potentially identifying under-consuming fuel poor households, and households with poor energy efficiency. Data sharing arrangements could also be put in place with the Department for Communities and Local Government in order to access their Domestic Energy Performance Certificate Register, for identification of households with the poorest ratings.

(6) How can retrofit energy efficiency improvements be funded following the Government's decision to end financing for the Green Deal? In your opinion, what were the most problematic aspects of the Green Deal, is there a future for pay-as-you-save schemes and if not, what could replace them?

The Green Deal had a number of problematic aspects. These include, but are not limited to:

- **Trust** – or more specifically, a ***lack* of trust** in those advertising, advising and installing in relation to the Green Deal **–** was a key problematic aspect of the scheme. A 3-year University research project explored how members of the public perceive different kinds of information about energy saving and efficiency. A striking finding from this research was the strong distrust for information supplied by commercial interests – regardless of the quality and detail of such information, the fact it came from a commercial party meant that it would be treated with a high-degree of skepticism (Simcock et al., 2014; see also http://www.recckn.org.uk/findings.htm). Although the Green Deal was only in the early stages during the time of this research, already many of the project participants were suspicious about whether any advice provided after 'Green Deal Assessments' would be truly impartial and trustworthy. Particular concerns were that Assessors were not required to be fully independent from suppliers and installers; and that the 'Big Six' energy companies could be involved. Far more trusted forms of information included 'community-based' sources, such as friends, neighbours and peers who have had personal experience of energy efficiency measures. Truly 'independent' experts and social enterprises that were not considered to be driven by a profit motive were also perceived positively. However, it was problematic that very few people are aware of where they can actually access and contact such sources of advice (Dobson, 2014; Simcock et al., 2014). Rather than being organized and managed in a

'top-down' manner through large corporate institutions, a far more trustworthy way to implement the Green Deal would have been from the 'bottom-up' – tapping into already existing community groups and attempting to nurture new ones that could provide advice and assessments (Dobson, 2014). As we state above, this requires funding and support for local and community-based forms of energy efficiency advice and networking.

- The **high interest rate of Green Deal loans**. At around 8%, this was far above inflation and even many commercial loans from banks. Even with the 'pay as you save' aspect of the deal, this would still leave households paying back substantially more in the long-term compared to the costs of installation, and so was not a particularly 'good deal' in financial terms. Unsurprisingly, studies have shown that interest rates around 0-2% is the optimum range for households to be willing to undertake loans of energy efficiency improvements (Bryson Energy and the University of Ulster, 2014).
- Amongst landlords in the private-rented sector, there was a belief that Green Deal loans would put-off prospective tenants, and a mistrust that mechanisms such as the 'Golden Rule' would function as they were supposed to and that bills would genuinely be lower following the changes. Many landlords also disliked the fact that they would have to continue paying the Green Deal loans even if the properties were currently empty (Ambrose, 2015), even though this represented an investment in their property.

This is not to suggest that there is no place at all for 'pay as you save' schemes in the future. However, the design of any such programs should take the above points into account. Evidence suggests that a combination of an upfront grant and a (low-interest) loan can be attractive way to fund energy efficiency measures (Bryson Energy and University of Ulster, 2014). Lower-income households need a greater proportion of the measures to be paid via an upfront grant.

(9) With the Landlord's Energy Saving Allowance having ended in April 2015 and the end to Green Deal financing, are private rented sector regulations still sufficient and, if not, how could they be strengthened?

In short, our view is that *no,* private-rented sector regulations are not currently sufficient to encourage investment in energy efficiency and decent homes, or in protecting the interests of vulnerable and low-income groups.

Recent research suggests that there are a number of disincentives that prevent landlords taking action on the energy efficiency of their properties, including misinformation about the benefits of such changes (Ambrose, 2015), and the belief that energy efficiency improvements won't yield landlords personal financial benefits (e.g. capital gains via an increase in the value of their property) (Bryson Energy and University of Ulster, 2014). There is also the perception (perhaps correct) amongst landlords that tenants are generally more interested in the cosmetic aspects of the house over its energy efficiency, and so efficiency improvements make little difference to the demand for such homes (Ambrose, 2015). The only 'market' incentive is that high energy costs may increase the risk of tenants being unable to pay their energy bills, but in a climate of high-demand for rental properties eviction of such tenants and replacement with new ones is makes this issue avoidable (ibid.). It is also vital to consider the particular challenges of Houses in Multiple Occupancy (HMO). For HMOs that are

let on room-by-room basis, Energy Performance Certificates are not required at point of rental because "the European Energy Performance of Buildings Directive only requires EPCs for fully self-contained dwellings and the UK government has refused to 'gold-plate' the Directive" (Viitanen and Weatherall, 2014, p.4). Therefore, landlords can escape this legislation for HMOs. The sector is also unlikely to be prioritized by energy suppliers for ECO funding because they contain multiple tenants, are typically old and hard-to-insulate properties, and the aforementioned lack of clarity over energy assessments and certificates (ibid.).

These factors mean that voluntary accreditation schemes and 'market' incentives don't, and won't, have the impact that is expected by some. There is a strong argument that **landlords should be required to meet a minimum standard of energy efficiency as part of a basic legal obligation to provide decent and habitable housing**, and arguably be blocked from renting if these standards are not met within a reasonable period of time. The right to adequate housing has been recognized by the United Nations as a human right (Christman and Russell, 2016). 'Adequate housing' means somewhere that is safe and does not compromise residents' health – it is free from damp and can be kept sufficiently warm, which in practice requires a certain standard of heating and insulation (ibid.). We reaffirm that this is not a luxury, but a *human right* – a basic necessity for health, education, and the ability of people to participate in society and improve their economic situation (Sovacool et al., 2014). It is therefore deeply disappointing that a proposed amendment to the recent housing bill, which aimed to insert a legal requirement that private-rented homes be fit for human habitation, was not approved in parliament.

Enforcement of minimum-standards through regulation could be accompanied by efforts to raise awareness amongst landlords of the positive consequences of improved energy efficiency. Tenants should also be more fully informed of the consequences of energy inefficiency, so that this is a high priority for them when choosing a rental property – however, this can only ever be a *supplementary* measure to increased regulation, since often affordability and the imperative of having somewhere to live means that fully free and flexible choice cannot be exercised by many people when choosing where to live.

(18) How can product end users be trained in order to ensure that energy efficiency equipment is used to its full potential?

We have provided an answer to this in relation to question 4 above, and emphasize again here the importance of end-user training provided through *trusted and impartial* organisations. Community groups (*provided with adequate funding*) and local authorities can play an important role here.

(21) Could a combination of a localism approach and an infrastructure approach help with the deployment of energy efficiency and the pitching of its benefits at a mass scale? How could this be designed?

As we note in more detail in relation to question 4 above, local and community-based approaches to energy efficiency installation have significant potential, partly because of their understanding of local social, cultural, political and material circumstances and contexts. Community-based groups (specifically those that are seen as impartial and not for profit) and are also significantly more trusted

by members of the public compared to businesses, energy companies and large institutions, so their advice is more likely to be acted upon. We feel that local and community-based approaches should be further investigated and encouraged.

(22) What is the role of local authorities for area-based energy efficiency programmes and an infrastructure- focused approach and how will local government spending and structure need be reformed to enable this?

Again in relation to question 4 above, local authorities have a potentially important role to play in local and community-based approaches to energy efficiency, as they can potentially act as trusted impartial sources of advice for households and intermediaries between households and energy efficiency installers. This can provide legitimacy to installers and increase trust amongst end-user households.

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