Energy Strategy Reviews 11-12 (2016) 29–40

Contents lists available at ScienceDirect

Energy Strategy Reviews

journal homepage: www.ees.elsevier.com/esr

Energy efficiency retrofitting services supply chains: A review of evolving demands from housing policy

Luke Gooding*, Mehreen S. Gul

[a] Royal Academy of Engineering Centre of Excellence in Sustainable Building Design, Heriot Watt University, Edinburgh, UK

ARTICLE INFO

Article history:
Received 27 April 2015
Received in revised form
26 May 2016
Accepted 14 June 2016

Keywords:
Energy efficient retrofit
Policy learning
The Green Deal
ECO
CERT
CESP

ABSTRACT

Attention regarding the energy saving potential of existing houses has been occurring within the UK for a number of decades, producing an evolving landscape of policy mechanisms. Experience shows that innovative schemes are required, implemented at a large scale, to reach carbon reduction targets. In an unprecedented move within the UK, private industry was enlisted with the task of delivering the most recent domestic energy efficiency policy; the Green Deal (GD). This policy required the energy efficiency retrofit services (EERS) sector to increase capacity and deliver efficiency improvements to the UK's existing housing stock, at scale. This review evaluates this Green Deal policy landscape in relation to the requirement of EERS sector expansion. Previous UK retrofit policies act as comparative exemplars, to assess how policy is progressing in promoting private enterprises. Key findings suggest EERS expansion is most successful if policies are designed more holistically; UK policies show strategies which focus on simply the property and not the occupants have their disadvantages. Therefore, a move away from marginal financial incentives, such as the Green Deal's loan structure, to a wider consideration of how policy tools interact with supply chains and end users, would enable increased impact.

1. Introduction

Domestic energy efficiency and the ability for tenants and home owners to live comfortably and affordably have been long standing foundation stones in the energy policy discourse. These factors have taken on enhanced importance as calls for heightened sustainability; economic activity and energy security have amplified. From a sustainability perspective, the built environment is estimated to use 37% of all energy consumed within the UK (2013) [1]. As the largest area of energy consumption, the Group of 8 (G8) countries have determined built environment energy efficiency improvements to not only be cost efficient but also substantial in having the potential to save 8.2 $GTCO_2$ per year, by 2030 [2]. This reduction in carbon emissions via an increase in energy efficiency is necessary to meet the UK's target of an 80% carbon reduction from 1990 levels by 2050 [1].

Many supporters retain that increasing domestic property energy efficiency via private sector delivery channels will meet sustainability and economic growth targets simultaneously [3]. To meet these targets, capacity expansion within the Energy Efficiency Retrofit Services (EERS) sector is required, involving the assurance that equipment, materials, production processes, investment, and the skills base are in place to absorb demand [4–6]. This challenge of increasing capacity is obviously a complex task; composed of numerous hurdles. To assist the advancement and growth of the EERS sector, governments intervene to accelerate rates of change via policy interventions. This research assesses the impact of UK policy mechanisms utilised during the recent past, to determine the ways in which barriers encumbering the EERS sector, to deliver retrofit at scale were brought down. This research does not claim to be comprehensive, but instead aims to be exploratory in highlighting specific effects from past policy mechanisms, and details key areas where the EERS sector benefitted or was hindered by the policy.

2. EERS sector activities

The EERS sector encompasses numerous activities from the design of refurbishment schemes, to the installation and ongoing maintenance of energy efficient equipment and materials. The stakeholders operating within the sector are wide ranging and include; contractors, designers, trades people and architects. In

* Corresponding author.
E-mail address: lmg31@hw.ac.uk (L. Gooding).

http://dx.doi.org/10.1016/j.esr.2016.06.003

general there has been a deficiency of research focusing on the EERS sector specifically and its policy interaction, mainly due to the sector being previously identified as a sub-division of the general construction industry [7].

2.1. The EERS sector within an evolving policy landscape

In providing retrofit measures to increase carbon savings within the UK housing stock, the EERS sector is aiming to reduce the energy efficiency gap; the difference between potential carbon savings and savings which are actually realised [8]. Therefore, in designing policy to increase the level of energy efficiency upgrades, mechanisms are needed to effectively limit barriers to retrofit at scale and in turn the extent of the gap [9,10]. These barriers have been detailed extensively in existing literature and cover all areas from building heterogeneity, to business approach, to the behaviour of end users and the assessment of energy usage [11–15]. For this research the barriers of interest are those which are deemed by the literature to directly impact the supply chain, and inhibit EERS sector businesses from increasing capacity. In particular this research is focused on assessing the barriers which can inhibit retrofit processes prior to any end users being involved, thus, they are the barriers which are contained within supply chain inability, or the negative operational conditions within which businesses operate.

3. Policy schemes

This section provides an overview of the key UK energy policies to identify how expectations of the EERS sector have varied. These policies include the Green Deal (GD) and its sister policy the Energy Company Obligation (ECO) [16] and the precursor policies; the Carbon Emission Reduction Target (CERT) and Community Energy Saving Programme (CESP) [17]. Therefore, the mix of policy covers obligatory schemes utilising energy supplier funding and also schemes aimed at private home owners and housing associations. These schemes involved the allocation of differing amounts of financial input (Table 1), amounts which are important to consider when discussing policy impact. Throughout this research, these differences in cost will be referred to, to support findings in the level of effectiveness of each scheme.

Table 1 shows that due to the obligatory nature of ECO and CERT, and the fact that they operated at such a large scale, CO_2 savings per year were much higher in comparison to CESP which operated on a smaller scale, and the GD which did not have an obligatory aspect. The table also shows that both CERT and CESP achieved the most cost effective ways in which to save carbon, in comparison to ECO which placed a high requirement on energy companies to retrofit more vulnerable households, which required increased resources per retrofit, and the GD, which required increased finance to recruit loan applicants. These increases in requirements of scheme administration cause ECO to cost £61 per tonne CO_2 saved and £150 per tonne CO_2 saved for the GD.

3.1. Carbon emissions reduction target (CERT)

From 2008 to 2012, CERT was positioned as one of the UK's primary energy efficiency policy tools. CERT placed monetary obligations (Table 1) upon energy suppliers to reduce customer carbon emissions via retrofit measures. 60% of savings had to be achieved via insulation measures, and the remaining 40% of carbon savings needed to focus on energy savings within priority groups (low income, elderly households) [17]. CERT development grew from a technical base, emphasizing the take up of carbon saving measures. This produced a policy which was focused and achievable, with a high degree of stakeholder consultation, particularly with suppliers [19]. In addition to the policy focus, transparency and target setting offered policy clarity, and contributed to success in delivering high volumes of energy saving measures [20].

3.2. Community energy saving programme (CESP)

CESP was a scheme funded via energy company obligations, aimed at providing funding to community groups, housing associations and local authorities to improve property energy efficiency. CESP emphasised a whole house approach, treating properties street by street [21]. During the operational periods of 2009–2012, the scheme, alongside CERT, financed almost 100 community initiatives, resulting in 90,000 individual property retrofits. The impact of the scheme meant that in a post retrofit assessment, 75% of participant's agreed that their property was warmer and took less time and energy to heat to comfortable levels [22]. The CESP delivery model focused on creating partnerships and schemes which were locally specific, offering a method of increasing the rate of localised energy savings particularly within deprived areas. This local emphasis meant that the delivery model focused primarily on the economies of scale which could be generated on large social housing estates for instance [20].

3.3. Green Deal (GD)

Operational from late 2012/early 2013 to July 2015, the GD permitted bill payers to retrofit their properties with energy saving measures, without the need for any upfront payments [16,23,24], as loans were secured against the property. This meant homeowners and tenants could save energy without the need to take on personal debt [16] . Repayments for the retrofit upgrades were generated via on bill payments post installation [25]. The GD relied upon 'the Golden Rule' to ensure that the value of any energy saving generated by the improvements, was no less than the repayments for the measures [26]. The delivery, management and financing of the GD was placed in the hands of the private sector. A consortium made up of banks, businesses, local authorities and investors took on the responsibility of finance provision [3]. Plus, during the early stages of the policy, the Government offered cash back incentives to early adopters, by way of accelerating initial demand [16, 24] (Table 1).

Table 1
Policy cost comparison.

Policy	Timeframe	Annual expenditure (£bn)	CO_2 savings (lifetime) per year (Mt)	Cost per tonne CO_2 saved (£)
GD	2013–2015	0.24	0.4	150
ECO	2012–present	1.00	10.47	61
CERT	2008–2013	0.79	26.24	34
CESP	2009–2013	0.22	1.28	34

(Figures originating within DECC National Audit Office, Green Deal and Energy Company Obligation Report. April 2016 [18]).