



# Working Paper Series

SWPS 2018-05 (January)

## Reorienting Finance Towards Energy Efficiency: The Case of UK Housing

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## SPRU Working Paper Series (ISSN 2057-6668)

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# Reorienting finance towards energy efficiency: the case of UK housing

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## Abstract

This paper examines the challenges associated with stimulating large-scale investment in energy efficiency and demand management measures, using residential energy efficiency-improving retrofits in the UK as a case study. We consider how issues of energy policy, consumer choice and financial systems intersect, drawing on recent literature including energy policy documents and research reports, and on interviews with stakeholders from the finance sector, energy efficiency practitioners and more. We suggest that following the withdrawal of the Green Deal, there is a need to reconsider the framing of policy for household energy efficiency improvements, and examine three potential aspects of a new framing: *energy efficiency as infrastructure*; *new business and financing models for energy efficiency provision*; and *decentralised financing institutions for energy efficiency investment*

This would require a long-term commitment from government on energy efficiency, and a need to ensure that projects are attractive and investable from both householders and investors' perspectives. We conclude that there are important roles for government in any large scale initiative for energy efficient retrofitting of UK homes, even if the mechanisms are market based. These includes signalling long-term policy consistency and reducing risks for financial investment, and intermediating between finance and energy efficiency projects.

## Keywords

energy efficiency, energy policy, green finance, demand side management (DSM), infrastructure

## Acknowledgments

We are grateful to two anonymous SPRU reviewers and the SWPS editors for helpful comments on this paper.

This work was supported by the Research Councils United Kingdom (RCUK) Energy Programme [grant EP/K011790/1, "Centre on Innovation and Energy Demand" (CIED)]. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of RCUK Energy Programme.

# 1 Introduction

There is widespread agreement that improving the efficiency of provision of energy services is an important contributor to meeting the stringent climate change mitigation goals in the Paris Agreement and broader sustainability goals, including addressing fuel poverty. However, compared to the depth of analysis and range of policy measures aimed at promoting innovation and investment in low carbon energy supply technologies, there has been relatively little attention paid to understanding incentives for improving energy efficiency and reducing end-use energy demand (Wilson et al. 2012). In particular, there is a challenge associated with promoting investment in household energy efficiency improvements, both for new build and for retrofit, in which issues of energy policy, consumer choice and financial systems intersect. This paper examines how this challenge is (and could be) addressed in UK energy policy for financing household energy efficiency retrofits. This contributes to a small but growing academic literature examining how energy finance can be reoriented towards low carbon investments, though this literature has mostly focussed on renewable energy investment (Wüstenhagen & Menichetti 2012; Bolton et al. 2015; Hall et al. 2016; Hall et al. 2017; Mazzucato & Semieniuk 2016).

The paper argues that framing of these issues is important. In the UK in recent years, the dominant framing has been that market solutions and incentives will deliver household energy efficiency improvements, informed by concepts of ‘market failures’ and ‘barriers’ to take-up (DECC 2012; Sorrell 2015). However, reviews of decades of energy efficiency policy in the UK (Mallaburn & Eyre 2014) and internationally (Geller et al. 2006) raise doubts about the efficacy of a neo-classical economic framing and emphasise the need to take into account the range of systemic factors affecting household and investor decision-making. The main market incentive mechanism in the UK, known as the Green Deal, failed to attract either households or investors in large numbers, and has now been withdrawn (Rosenow & Eyre 2016). It has been argued that this policy failure relates to failing to create investable opportunities that are appropriate and attractive for both householders and investors (Rosenow & Eyre 2016; Hall & Caldecott 2016). In this paper, we explore alternative framings for energy efficiency policy, and examine how these could help to create more attractive investable opportunities.

We identify three key concerns from the literature relating to stimulating low carbon investment: that incentives resulting from a ‘market failure’ framing do not necessarily create attractive investment opportunities from the perspective of investors; that a lack of coherence and consistency in policy fails to deliver a stable environment, and creates uncertainty that hinders private sector investment; and that an overly centralised financial system fails to stimulate more diverse and decentralised investment opportunities. Section 2 includes a brief review of UK household energy efficiency policy development, where we argue that the specific implications of these concerns for energy efficiency investment have not been explored in detail. In Section 3, we outline the methods of this study, drawing on expert stakeholder interviews and review of recent reports and policy documents. In Sections 4, 5 and 6, we describe three potential aspects of a new framing for policy makers

and industry stakeholders: *energy efficiency as infrastructure; new business and financing models for energy efficiency provision; and decentralised financing institutions for energy efficiency investment*, and discuss how attention to these aspects could help to address the above concerns for energy efficiency investment. Section 7 presents our overall discussion and Section 8 our conclusions.

## 2 Linking energy efficiency to finance – policy and literature review

### 2.1 UK household energy efficiency policy

UK energy efficiency policy is currently in a state of flux, not least as the UK negotiates 'Brexit' from the European Union. At the high level, the UK government remains committed to addressing the energy 'trilemma' – meeting climate change targets, ensuring security of energy supply and maintaining affordability of energy for households and businesses. In addition, following the 2015 general election, a renewed emphasis has been placed on developing an industrial strategy, including "securing the industrial opportunities for the UK economy of energy innovation" (HMG 2017a, p.89). However, the issue of affordability of energy has been high on the political agenda for years. In August 2017, the UK government commissioned an independent review examining how to "best minimise the costs of energy consistent with the overarching objectives", to report by October 2017 (BEIS 2017a). This review argued, from an economic perspective, that "avoiding detailed intervention is the key to keeping costs down" and that energy efficiency objectives should not be confused with fuel poverty objectives, which should be addressed through general welfare payments (Helm 2017). However, others have argued in response that this approach plays down the key roles that technology and energy efficiency policies have played in bringing energy costs down (New Power 2017; UKERC 2017).

Domestic retrofitting is significant in UK's energy efficiency and climate change mitigation policy: In 2015, 23% of UK carbon emissions came from the domestic sector (BEIS 2017b). Domestic emissions are predominantly from space and water heating (Palmer & Cooper 2013), due to the majority of residential buildings being constructed before 1980, and a slow rate of replacement of buildings (Sweatman & Managan 2010). However, climate policy discussions in the UK lack a systemic focus on demand (Holmes et al. 2015), despite a long-argued need to tackle demand, rather than "decarbonis[e] an ever-increasing energy supply" (Holmes 2010).

In 2012, the previous UK Coalition government produced an Energy Efficiency Strategy with a "mission to seize the energy efficiency opportunity" (DECC 2012), which recognised the importance of linking financing opportunities to energy demand. The main household energy efficiency measure was the Green Deal, which aimed to provide a novel way of financing energy efficiency improvements. However, this scheme was discontinued in 2016, after only around 20,000 home energy improvements were funded between 2013-2015 (Hall & Caldecott 2016). We discuss the reasons for this failure and lessons to be learned in more detail below. The remaining measures are the Energy Company Obligation (ECO) which is an obligation on suppliers to improve energy efficiency for poorer households, and

a roll-out of smart meters (to be offered) to every home by 2020, which aims to stimulate a transition to a smart energy system (HMG & Ofgem 2017). Improvements in energy efficiency of household appliances have largely been driven in recent years by the implementation of European Union (EU) Directives, and it is not clear how the UK government intends to continue progress in this area, after the UK leaves the EU in 2019.

In October 2017, the UK Government published its Clean Growth Strategy (HMG 2017b), setting out a framework for further measures to meet carbon reduction targets out to 2032, whilst minimising costs and maximising social and economic benefits. This included an ambition to make millions of homes more energy efficient by 2030-2035. It seeks policies to encourage homeowners to improve their properties, as well as address fuel poor homes and rental properties. While it does not give detailed policies, it calls for evidence, including “incentives and other levers that could encourage homeowners to invest in energy efficiency improvements” (HMG 2017b, p.77). However, the dominant framing is still in terms of “building the market for energy efficiency” (*ibid.*). This raises the question of whether this framing neglects important aspects of the challenge, particularly from investors’ perspective.

## 2.2 Reorienting finance towards energy efficiency

In recent years, questions of climate change and sustainable development have raised issues about the nature of global finance. For example, the United Nations Environment Programme (UNEP 2015; UNEP 2016) reports on the prospects of aligning the global financial system with climate mitigation and sustainable development goals. There is growing recognition that the finance system needs to be reshaped, as it “remains disconnected from the long-term needs of the real economy” (UNEP 2016, p.1). An example of shifting away from the real economy can be seen in the trend of financialisation of corporate decision making, e.g., diverting financial surplus to acquisition of financial assets instead of financing physical investments or productive capabilities (Lazonick 2010; Lazonick 2014; Madi 2017a). The Global Commission on the Economy and Climate argue that the financial system has to be transformed if it is to deliver the scale and quality of investment needed in order to ‘green’ the system (New Climate Economy 2016), including making significant investments in energy efficiency in buildings, energy and transportation.

At the same time, climate finance – finance related to climate change mitigation and adaptation – is starting to play a more prominent role in global finance in general, and development funding in particular, as concerns about the effects of climate change increase. Green finance is becoming a competitiveness factor as efforts are being made to correct both market and policy failures, while policymakers and regulators are driving reallocation of capital, improved risk management and transparency (UNEP 2016).

The academic literature has begun to address the challenges associated with reorienting finance towards sustainable and low carbon investments. One of the challenges to sustainability is increasing short-termism in the finance sector (UNEP 2015), limiting the role venture capital can play in a transition; however the huge investments required mean public investment cannot bridge the gap on its own (Mazzucato & Perez 2015). Nonetheless, public

finance has an important role in a transition, for example as a catalyst for ‘crowding in’ private finance (New Climate Economy 2016). Mazzucato and Perez (2015) argue that there is not a shortage of finance, but rather it is the quality, not quantity of finance which matter.

Climate change mitigation action has come to be associated with private profitable business (Madi 2017a), with policymakers looking to the private sector to fund the transition to a low-carbon economy (Standard & Poor’s 2010). However, Battiston et al. (2017) suggest that an impasse has emerged, with policymakers hoping that financial markets will mobilise capital into low-carbon investments, while market actors have no incentive to do so without credible action towards longer-term, stable policies.

It has also been argued (Della Croce et al. 2011; Hall et al. 2016; Hall et al. 2017) that there are structural constraints relating to the nature of the financial system, including immaturity of asset classes, lack of liquidity of long-term investments, short-term drivers pressuring fund managers and lack of secondary market vehicles, that are delaying increases in investment in renewable energy supply.

Other researchers have pointed to a lack of coherence and consistency in policy in the UK, which fails to deliver a stable environment, and creates uncertainty that hinders private sector investment (Uyarra et al. 2016). An international review of policies for energy efficiency suggests “policies should be kept in place for a decade or more in order to ensure an orderly development of energy efficiency markets” (Geller et al. 2006, p.571) while standards, targets and incentives be revised periodically.

Furthermore, the centralisation of control and the loss of local and regional capacity has reduced the effectiveness of policies (Uyarra et al. 2016), with evidence suggesting that for households, local delivery of energy efficiency measures can be more effective, as local institutions and businesses, as well as community groups, are more widely trusted than central government and large energy corporations (Mallaburn & Eyre 2014).

However, relatively little attention has been paid to reorienting global finance and investments towards energy demand reduction measures, specifically energy efficiency. Energy efficiency measures are especially relevant to questions of finance, as deploying them is capital intensive and requires upfront investment, be it from household savings, business equity or debt finance, often with the aim of reduced energy bills or increased revenue in the future (European Commission 2016). The G20 Energy Efficiency Task Group has argued that energy efficiency financing is a mechanism that could accelerate the growth of energy efficiency business models, enabling scaling up of energy efficiency investments for projects that don’t have easy access to the necessary capital (EEFTG 2017). However, financial investors and energy efficiency practitioners have qualitatively different perspectives, and linking finance to projects is not trivial; it is this gap and the role of government and policy within it that we seek to address.

### 3 Methods

To analyse these issues, we undertook a review of policy documents and research reports on the challenges of financing housing energy efficiency improvements in the UK. This

literature review was followed up with semi-structured stakeholder interviews, which in turn led to a second review and analysis of further recent relevant reports and documents.

A total of 12 expert interviews were undertaken between March and July 2017<sup>1</sup> with stakeholders from the finance and banking sectors, policy researchers and experts, consultants and analysts and practitioners in energy efficiency, and local authority workers. These stakeholders were identified as they were experts in this area, including some occupying senior positions, and covering a range of perspectives. A set of interview questions was developed to investigate investment options for energy efficiency, policy and regulatory drivers, and financial institutions, tools and business models. Interviewees were also asked about attitudes towards financing energy efficiency in their sector, as appropriate, and about specific policies and institutions such as the Green Deal and the Green Investment Bank. The list of interviewees is in Table 1.

This analysis identified three key aspects around which we explored the issue of financing domestic energy efficiency: *energy efficiency as infrastructure, new business and financing models for energy efficiency provision and decentralised financing institutions for energy efficiency investment*. The first of these emerged from our initial literature review, and interviewees were asked specifically about the framing of energy efficiency as infrastructure. In the following sections, we discuss how these aspects can inform policy and action challenges of linking available finance to energy efficiency projects needing financing.

*Table 1 list of interviewees*

interviewee	profession
#1	analyst in a sustainability-focused think tank
#2	investment bank research analyst
#3	independent investment consultant
#4	senior academic researcher of energy and climate change
#5	senior economist in a fossil fuel corporation
#6	chief investment officer of a large pension scheme
#7	head of energy efficiency NGO
#8	independent energy policy expert
#9	programme officer at international energy efficiency partnership
#10	director of an energy advisory company
#11	non-executive director of retrofit company
#12	sustainability officer in local authority

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<sup>1</sup> For context, the interviews took place after the 2016 Brexit vote, and after the publication of the government's 2017 Industrial Strategy Green Paper (HMG 2017a), but before the publication of the 2017 Clean Growth Strategy (HMG 2017b).

## 4 Energy efficiency as infrastructure

Investing in energy efficiency in housing requires a long-term perspective, is relatively capital-intensive and brings social as well as private benefits. Some policy analysts therefore argue that this should be considered as a type of infrastructure investment, comparable to national investments in transport or energy supply infrastructure (UKGBC 2014; Frontier Economics 2015; Amon & Holmes 2016). This relates to both to the time it would take to retrofit millions of homes, and to the high expenditure per household this would entail, requiring potentially long-term loans for households. This is in line with the long-term nature of other sustainability related issues, and the idea of a transition to a low-carbon economy. However, the challenge arises of linking finance to projects, such as creating long-term finance mechanisms appropriate for householders.

In this section, we examine the implications for finance and policy of considering aggregated energy efficiency measures in homes as an infrastructure problem. We then discuss the role of pensions, as an example of an institutional investor, in terms of the supply of finance for investment in energy efficiency.

### 4.1 The case for framing energy efficiency as infrastructure

It has been argued that domestic energy efficiency, when suitably aggregated, could be seen as an infrastructure issue with investment priority (UKGBC 2014; Frontier Economics 2015; Amon & Holmes 2016). These reports argue that domestic energy efficiency investments fit the broad definition of infrastructure as capital investments in physical structures, which bring significant systemic benefits. Such investments free up capacity in the energy system; this is done via demand rather than supply, but that does not change the economic (or energy savings) outcomes. A retrofit company director (#11) argued that “that is exactly how government should see the whole energy network and energy conservation – as an infrastructure issue. Yes, and they should be investing in it in the same way because it’s in the public interest”.

This reframing would require the government to intervene in order to reward the social benefits of these investments. Its role would be both to lead with a strategy and to provide capital spending where an investment gap now exists. The government could thereby address failures of previous programmes, as well as overcome barriers to uptake, instilling confidence in the markets (UKGBC 2014; Frontier Economics 2015; Amon & Holmes 2016). Even where infrastructure is privately financed, government roles can include long-term commitment to securing patient capital, providing support or insurance to reduce risk, and creating reliable funding streams to ensure projects are financeable (NIC 2017), all roles with advantages for energy efficiency. There is strong support for the infrastructure approach from business and local authorities (Frontier Economics 2015), and potentially from public opinion, as a 2013 poll found that 57% of people believe energy efficiency should be in the government’s top infrastructure priority (Holmes et al. 2015).

In addition to energy efficiency benefits, the infrastructure approach has economic logic, as it could create jobs and stimulate local economies, and help poorer households (UKGBC

2014). It would enable subjecting energy efficiency projects to economic appraisals, raising their profile by highlighting their benefits, not only their costs (Amon & Holmes 2016), as a think tank analyst (#1) put it:

*“Using the same methodology that the government uses for other infrastructure, which it is going ahead with, in the age of austerity... We found that the refurbishment of buildings outperformed those other infrastructure investments [Hinkley, Crossrail and High Speed 2]. On a like for like basis, there is a strong economic rationale for doing this.”*

Therefore, the right energy efficiency policies could attract investors who currently invest in infrastructure projects. Nonetheless, doubt was expressed by an academic researcher (#4) about whether such investment would in fact yield the returns on investment that would make it attractive, as:

*“at the moment it just doesn't give the kind of return to private capital that private capital looks for. So if the government is not prepared to subsidise it, for want of a better word, in some way then I don't think it is viable, no. ... I think energy is just too cheap at the moment [for many energy efficiency measures to make economic sense].”*

EU State Aid regulations constrain public funding for energy efficiency measures to 30-50% of total costs, although energy infrastructure is allowed support of a full 100% of eligible costs (Amon & Holmes 2016). Defining energy efficiency as infrastructure would enable shifting energy efficiency to the capital expenditure budget. Amon and Holmes suggest this could unleash both the potential of public-private partnerships and the power of local and regional authorities to deliver energy efficiency and demand reduction measures, and more broadly help finance and deliver energy efficiency with multiple benefits to the energy system as a whole. However, allowing energy efficiency to compete with infrastructure projects rather than health or education needs (Amon & Holmes 2016) forces it into an area where hard choices about priorities must be made, as the government requires the National Infrastructure Commission to make recommendations as to what the most critical long-term infrastructure needs are (NIC 2017).

While there was support for the idea of treating energy efficiency as infrastructure from most of the interviewees, and some had in fact worked on the idea, concerns were raised by consultants, including the challenge of aggregating together a large number of small projects:

*“I think energy efficiency has a lot in common with infrastructure in that it's long-term, low risk investment. The way in which it differs very markedly from infrastructure, of course, is this whole issue of scale and aggregation because infrastructure funds typically want to invest very, very large amounts.... I have a friend who runs an infrastructure fund. Even if it's €1billion, they're kind of, 'It's a bit small.'” (#10)*

Another issue was that the idea isn't well known in mainstream investment circles, leading to concerns over lacking a concrete 'thing' to invest in:

*“I guess the issue is that with infrastructure projects, whatever happens, you know, I'm going to own a piece of a railway for instance, or a bridge. In energy efficiency projects*

*I'm going to own a sort of promise to pay the difference between what I would have otherwise spent on energy and what I now do because you've upgraded my capital. So, I don't think it is the same business case." (#3)*

These concerns suggest that there is a need for new business models and new financing models, which can help raise demand and link energy efficiency projects to available finance. Framing energy efficiency as infrastructure could help make these links, but does not in itself create innovative finance; in fact, new private financing models for infrastructure appear to have slowed in recent years (NIC 2017). Interviewees' views also support the need for a strong and consistent policy framing from government, as the long-term planning and investment required for infrastructure mean it cannot be provided by markets alone. Even if private finance can provide significant infrastructure investments, there is an important role for government and public finance in directing change and reorienting finance towards sustainable infrastructure markets (Mazzucato & Perez 2015; New Climate Economy 2016). We turn next to look at the drivers and constraints from the perspective of investors, using the example of pension funds.

## 4.2 Challenges for pension funds

Changes to the global finance system including the expansion of capital markets have led to pressure from financial markets to maximise short-term returns. In addition, since the 2008 global financial crisis, policies of quantitative easing and near zero interest rates led to expansion of liquidity, making it harder to source 'patient capital' to invest in long-term, low-return, low-risk projects (Madi 2017b; Mazzucato 2016). This increasing 'short-termism' means companies are less able to invest and build value for the longer term, reducing the stability of the financial system, and side-lining long-term issues such as sustainability (UNEP 2015; Mazzucato & Perez 2015; Madi 2017a; Barton & Wiseman 2014). Short-termism means venture capital can only play a limited role in a transition to a low-carbon economy, but given the huge investment required, public investment on its own cannot bridge the gap (Mazzucato & Perez 2015).

Institutional investors such as pension funds have traditionally been seen as sources of long-term capital. Pension funds are among the world's largest asset owners, and they invest on behalf of long-term savers. Della Croce et al. (2011) suggest that such institutional investors should be concerned with long-term performance, given their long-term liabilities, and that they can act as patient capital, investing in a counter-cyclical manner, including investment in riskier assets and at times when markets are weak, thereby increasing stability. However, Hall et al. (2017) argued that there are structural constraints on low carbon investment by institutional investors, including immaturity of asset classes, lack of liquidity of long-term investments, short-term drivers pressuring fund managers and lack of secondary market vehicles. This was confirmed by our interviewees from the finance sector, who pointed out that pension funds are now seen more and more as short-termist, investing more in liquid opportunities and less in infrastructure. Short-term strategies employed by fund managers include declining holding periods, reduced allocation to infrastructure and other long-term assets, and a failure to engage with corporations to shape long-term behaviour; these could

be due to pension funds either succumbing to political pressure or lacking the expertise to make long-term investment decisions (Della Croce et al. 2011; Barton & Wiseman 2014), as well as easier fund management, as an independent consultant explained (#3):

*“Illiquid assets, which [are] very hard to value, become this sort of big, quite volatile element on your balance sheet. And so pension schemes are generally encouraged by their sponsors to be more short-term. Not necessarily because the returns are better, but because the management process and the accounting process dovetails better.”*

The trend towards passive investing, especially with a growing trend towards defined contributions (DC) pensions<sup>2</sup> could also be responsible (Farrand 2016), as an investment officer of a large pension scheme explains (#6):

*“Defined contribution pension schemes, which are the growing ones at the moment, it's industry convention that they invest in investments that are daily priced, so you can trade them daily. So there's a problem for DC schemes investing in illiquid, longer-dated investments.”*

The independent consultant (#3) also suggested the culture of the finance world gives impetus to short-termism, and the regulation fosters this culture.

However, there are now signs that such institutional investors are starting to pay attention to these changes. Pension fund investors have begun calling out bad management practices and promoting responsible asset ownership since the 2008 financial crisis and the so-called ‘shareholder spring’ of 2012<sup>3</sup> (Farrand 2016). Pension funds are now more aware of their power, and some of the UK’s largest are ‘active stewards’ of their assets, bringing up issues with their asset manager (*ibid.*). Pension funds can sign up to voting instructions on a large set of environmental, social and governance (ESG) issues, and there are now ‘smarter’ schemes and indices that can enhance ESG considerations in investment decisions, making it possible to engage with climate finance and other issues (Buchner et al. 2015). As a programme officer at an energy efficiency partnership explained (#9), while some investors are governed by short-term interests, “many investors are working towards decarbonising their portfolios now, which is why they are becoming increasingly interested in investing in more energy efficient assets”.

Pension investments in energy efficiency schemes are largely off the radar, again suggesting that aggregation and linking investors to projects are key, as illustrated by a pension scheme officer’s (#6) experience:

*“We've also invested whereby people have aggregated all of the solar panels on houses in a certain area, and then we've supplied the debt for that. But we didn't go out and instigate that; they were looking for investors in that debt.”*

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<sup>2</sup> In direct contribution (DC) pensions, the pension paid is related to the total amount paid in and how well the investments have done, rather than to, for example, the final salary.

<sup>3</sup> A wave of shareholder activism brought about by anger over the escalation of executive pay.

Framing domestic energy efficiency as infrastructure and using the example of pensions as institutional investors suggests that it is theoretically feasible to link these investors to energy efficiency projects. However, it also highlights several potential problems with this type of investment. First, some institutional investors, like pensions schemes, which in the past were considered long-term investors, now take a de facto short-term approach with liquid assets, and are therefore less likely to invest in endeavours like energy efficiency as infrastructure. Second, even when institutional investors do invest in infrastructure schemes, the case for energy efficiency as such a scheme has not yet been made sufficiently, leaving investors either unaware or unconvinced of this avenue of investment. I.e., the links between financier and financeable projects still need to be made. Third, the question of scale is crucial, as institutional investors require large scale investment, and will not normally invest in small schemes. This raises the question of aggregation of energy efficiency projects into large, investable packages in order for them to be of interest to mainstream finance mechanisms. We will consider this further in the context of business models and market solutions that could enhance the ability of investment in energy efficiency measures.

## 5 Business models and markets

Policymakers, in the UK and elsewhere, are looking to the private sector to fund the transition to a low-carbon economy (e.g., Standard & Poor's 2010). Private actors' investment behaviour depends on policy and market signals, predictable and stable profit, and strategic potential. Therefore, shifting patterns of climate finance investment depends on managing project risks, as well as access to finance and gaining technical expertise (Buchner et al. 2015). In the context of energy efficiency, investments are hampered by split incentives, disaggregated scale and poorly understood performance (which increases risk), making conventional financing mechanisms a poor fit (EFTG 2017). All of this suggests considering what the current business models are for financing energy efficiency, and whether – in the context of the UK residential sector – energy efficiency retrofits can be supplied through market mechanisms.

### 5.1 Lessons from the failure of the Green Deal

The Green Deal was an ambitious initiative launched in 2013 by the UK Government to encourage (financially sound) households to invest in energy efficiency improvements. The 'pay-as-you-save' (PAYS) finance mechanism aimed to deliver large scale retrofits without public subsidies in an age of austerity (Rosenow & Eyre 2016; Hall & Caldecott 2016). The PAYS mechanism is based on the idea of a loan to finance energy efficiency measures, which is paid back over time, e.g. through energy bills, so that for the payback period, the cost savings are effectively shared between the householder and the financier. Along with the Energy Company Obligation (ECO), the Green Deal was intended to improve residential energy efficiency, replacing two previous policies for household emissions reduction based on obligations on energy suppliers, the Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP), as well as the fuel poverty reduction

programme Warm Front (Rosenow & Eyre 2013; Marchand et al. 2015). The Green Deal is widely regarded as a failure, with original intentions of refurbishing millions of homes by 2020 failing to materialise, as only around 20,000 home energy improvements were funded between 2013-2015 (Hall & Caldecott 2016).

There are various explanations of the Green Deal's failures to attract householders, with Rosenow and Eyre (2016) defining three areas to learn from. First, it was a poorly designed policy. There were no guarantees of level of energy savings and more expensive measures were effectively excluded. Frequent criticisms from interviewees were that it was overly complex and bureaucratic.

Second, the Green Deal had limited financial appeal, with interest rates above mortgage rates or high street secured loans. The high interest rates and lack of grants were mentioned by several interviewees. Furthermore, the upfront assessment costs (Green Deal Advice Reports), were more expensive than many households were willing to pay (Marchand et al. 2015). The Green Deal also failed to leverage private investment, resulting in a high cost to the taxpayer, when the political attraction of the Green Deal was private finance without government support (Rosenow & Eyre 2016; Hall & Caldecott 2016).

Third, there was narrow engagement with consumers, as evidence by the lack of awareness of the Green Deal (Marchand et al. 2015); the policy looked solely at financial savings, when effective engagement would consider home aspirations such as comfort, well-being and health. There is much research into the decision-making of homeowners who undertake energy efficiency retrofitting, and while financial concerns are important, so are context, routine and disruption, and social influences (for a good review see Wilson et al. 2015).

However, Marchand et al. (2015) suggest that saving money was in fact the primary motivation for participating households. This matches an academic researcher's (#4) view that while UK households might be interested in the Green Deal offer, "it is certainly the case that they're not prepared to finance it for themselves, except under rather special circumstances", pointing out that when grants were available for retrofitting, there was no shortage of demand.

Finally, the Green Deal did lasting damage to retrofits in the UK. A report on ECO and the Green Deal (ACE & Energy Bill Revolution 2014), found that not only had these mechanisms not led to an increased market for retrofits, but they "represent a significant loss of momentum in the deployment of energy efficiency measures compared to previous energy efficiency programmes, especially when considering the large energy efficiency potential still available in the housing stock" (p1). Their data show a fall in 2013/2014 of loft insulations (87%), cavity wall insulation (46%) and solid wall insulation (30%) on the previous year. Rosenow and Eyre even suggest that the Green Deal "resulted in a collapse of the domestic energy efficiency market" (p. 144). Interviewees also expressed concern about where the post-Green Deal policy left us, including shocks to the markets and putting off skilling people in appropriate retrofitting in the future, as an academic researcher (#4) explained:

*“There will be a lot of people who went through that training who now have skills that are not being used and will make other members of the profession much less likely to engage in that kind of upskilling in the future. So that was, in a way, a real tragedy.”*

These shortcomings highlight the scale of the energy efficiency challenge, both in the sheer number of diverse households that have to be convinced or helped to retrofit, and in the importance of a healthy energy efficiency sector with enough skilled labour to carry it out.

While some of the reasons for failure are disputed, we can conclude that the Green Deal did not engage successfully with consumers, and did not deliver a proposition attractive enough for many households. However, unlike the scathing criticisms cited above, most interviewees thought the PAYS mechanism was useful, with a sustainability officer in a local authority (#12) suggesting it would incentivise people if it had a low or 0% interest rate. Several interviewees said that the basic structure of the Green Deal was sound, as this analyst (#1) put it:

*“The Green Deal Finance Company was a really excellent initiative. The problem was there was never a focus on how you were going to charge demand at scale. Actually, that whole programme, the Green Deal, with a few tweaks around demand creation would have really nailed the issue on how we connect capital to projects.”*

While the head of an energy efficiency NGO (#7) suggested that the Green Deal did what many in the energy efficiency field expected, appealing to certain households only, and:

*“It was only a political decision to characterise the Green Deal as something that was going to solve every problem that meant that it failed. So I think it was mis-sold by the politicians.”*

Hall and Caldecott (2016) suggest the shortcomings of the Green Deal can be overcome while still following the principles of fiscal constraints on the government and leveraging private investments, e.g., a new programme including home improvement loans at lower interest rates provided by high-street banks, underwritten by the government.

In sum, the Green Deal has been critiqued as failing due to poor incentives, limited engagement with householders, and being overly bureaucratic, although the PAYS mechanism has much support. With this in mind, the next section considers on how new business models might be built, learning from the Green Deal.

## 5.2 New business and financing models

The discussion above raises the challenge of whether there are other ways of implementing the pay-as-you-save (PAYS) principle, which could learn from the failure of the Green Deal, in order to increase uptake of good quality energy efficiency measures in households in the UK. This section considers the prospects for new business and financing models that might follow the Green Deal more successfully. A sustainability officer in a local authority (#12) supported using ‘trigger points’ such as house conversions or when people are buying or selling to encourage energy retrofits. The government has suggested household energy performance certificates (EPCs) could be extended to trigger points (HMG 2017b). Other

ideas around trigger points include ‘green mortgages’, which recognise efficient houses have a lower risk of default due to lower energy bills. It has also been suggested linking Stamp Duty, paid on house purchases, to energy performance, to create an incentive for buyers to purchase a more energy efficient home (Howard 2016).

Another promising potential financing approach is the *revolving fund*, which is based on the idea of capital raised being circulated and used more than once: loans are repaid with interest, replenishing the fund and allowing for further loans to be made. Revolving funds are established with the intention of being self-sufficient for long periods, with initial capital coming from public sector or private sector loans (Akvopedia 2015). This model has been suggested for household energy efficiency (Gouldson et al. 2015). Initial funding, probably from private investors, is collected in a ‘special purpose vehicle’ (SPV), which invests funds in domestic energy efficiency measures. Participating households in turn make regular repayments to the SPV, allowing it to pay installers, and over the longer term, repay investors. Households benefit as they are offered a share of the energy savings generated as they repay the costs, and all the savings once the efficiency measures are paid off, and so should be supported by those who approve of PAYS mechanisms. The aggregation of many households offers a more attractive scale of investment to finance, while economies of scale would also reduce costs.

Gouldson et al. (2015) suggest a large scale domestic retrofit revolving fund could be made cost neutral over time, but they also discuss some important questions. For example, the model requires the government to underwrite loans to households, in order to mitigate investment risks. This could be seen as a reasonable incentive to create a low-risk, low-return investment, but equally this risk reduction could be interpreted as a subsidy to the private sector. Also, the market orientation means the fund might be limited to economically attractive measures, which might not suffice to meet climate change commitments, and market forces could mean local government and communities lose power over deciding local priorities.

While financial concerns are important, households are not motivated solely by energy bill savings when it comes to retrofits. Some interviewees mentioned comfort and long-term guarantees as crucial for a successful business model. The director of an energy advisory company (#10) highlighted the importance of a good value proposition (offer to customers):

*“Comfort and modern housing, or housing that’s fit for the 21<sup>st</sup> century, is a much better customer proposition than, ‘You might save a couple hundred quid on your energy bill.’ With the emphasis on might because you’re not actually that sure... You retrofit because you want a modern, comfortable, healthy house.”*

This aligns with another recent study of residential retrofits in the UK (Brown, forthcoming), which suggests a successful business model would include a value proposition which focuses on “aesthetics, comfort, health and wellbeing”; guaranteed energy savings; a simplified customer interface; and a low-cost financial model.

A more fundamental question is whether new business models are needed, and whether, in fact, the market approach is the right one, and here opinions differed. One policy expert

(#8) questioned the Green Deal focus on getting the interest rates right, “Or is it that it simply doesn't work effectively as an opt-in model, that you have to create a systematic model?”, which would require very different government intervention. Another point raised was how poorer households would be served by a Green Deal style business model. A programme officer at an energy efficiency partnership (#9) suggested the Green Deal's goals could be achieved by leaving it to energy planners, and that:

*“If you find a better way to benchmark, to evaluate, and monitor your projects then there you go, you don't necessarily need an innovative business model in order to make that work.”*

In contrast, the director of an energy advisory company (#10) believed a market approach was best:

*“If you came up with the right business model that was very popular in a particular market segment like single-family homes or large apartment blocks run by housing associations, if you have the right customer proposition, you would be overwhelmed by demand I suspect. Nobody seems to have come up with that customer proposition yet.”*

From a finance perspective, interviewees generally agreed that that lack of available finance for investment was not the main barrier to investment in energy efficiency. Rather, there needs to be demonstrable demand in place for the finance world to have the confidence to invest, as head of an energy efficiency NGO put it (#7):

*“We keep being told that the finance companies are keen on this, yet they're not pushing it. I can only conclude, from that, that they don't think there's a market at the moment. It's not worth them promoting this.”*

In summary, the consideration of new business models does not lead to simple, nor fully agreed on policy solutions. However, there is general agreement of a need to engage consumers beyond the financial reasoning to establish demand; and that in order to link finance and demand, trust must be built through guaranteed savings for householders, and returns for financiers. We turn next to the role that more trusted institutions could play in successful energy efficiency programmes.

## 6 Decentralisation, local and regional solutions

Another route for financing energy efficiency would be through dedicated institutions such as banks, which can provide investments that target policy priorities, or initiatives that might come from local authorities or local and regional partnerships.

### 6.1 Dedicated banks

The German public development bank KfW is considered a success in investments for energy efficiency improvements, having financed retrofits in 9 million homes (as of 2010) to higher energy efficiency standards as of 2010 (Schröder et al. 2011). KfW uses its strong credit rating to source capital with which it offers refinancing options for energy efficiency loans and renewable energy projects, enabling the local energy sector to grow. Schröder et

al. suggest there are several lessons relevant to the UK from the German government policy's 'three-pillar' approach for energy efficiency: regulation, financial incentives and information. The financial pillar includes favourable loans from KfW, with performance-linked investment subsidies. Policy supports a whole house approach, even if measures are adopted bit by bit. Further, it requires energy efficiency investments to be made before renewable subsidies are paid, sending a clear message about demand (and emissions) reduction. An academic researcher (#4) explained that households had to put up a considerable part of the money for retrofits, but the greater the level of energy efficiency they aspired to, the higher the grant they received.

*“And that seems, in the German context at least, to have been quite effective in encouraging householders who [wanted] to improve their energy efficiency, actually to go that one step further than they might otherwise have done, because they got a larger grant to do it.”*

In the information pillar, the German schemes provide expert advice and qualified installations, ensuring high standards of work and a positive customer experience. Policy aims to support innovation and experimentation in order to build familiarity with new approaches to energy efficiency. Finally, there is leadership through demonstration as many public buildings, including schools and nurseries, provide examples of ambitious retrofit schemes.

In 2012, the UK launched the *Green Investment Bank* (GIB) with the government as its sole shareholder (GIB 2017). This was in line with suggestions following the global recession of 2008 that such a bank could strategically use public finance to secure private investment in low carbon infrastructure (Holmes & Mabey 2009), and it has in fact been successful in lowering the cost of capital for more 'difficult' green infrastructure projects (GIB 2017).

The GIB has lent predominantly to private power companies or large public sector projects, and it has only financed energy efficiency measures for large scale consumers (GIB 2017; Hall et al. 2016). It has not played a major role in domestic (or other small scale) energy efficiency measures, in contrast to KfW, which uses promotional energy lending to fund smaller scale loans (Hall et al. 2016; KfW Bankengruppe 2012). This is an example of how the UK market based finance is structurally unsuited for supporting small scale energy projects, resulting in a 'finance gap' for projects below city level (Hall et al. 2016). Some think “there's a clear logic for the Green Investment Bank to get involved [in domestic energy efficiency], in the sense that it's a very cost effective way of reducing carbon”, as the head of an energy efficiency NGO (#7) put it, and therefore “surely, it should be high on the list of priorities for something like the Green Investment Bank”. Given the scale of the energy efficiency challenge, a central body like the GIB which can manage lower cost loans, as the KfW does, is worth consideration.

The GIB was sold to Australian investment bank Macquarie in early 2017 (BBC 2017), leading to concerns that it might lose its environmental purpose (e.g., Vaughn 2017) and its fundamental role in providing 'patient capital' (see Mazzucato 2015). The latter concern is all the more salient as the UK government's Industrial Strategy green paper (HMG 2017a)

suggests that a lack of patient capital might be reducing the UK's successful conversion of start-ups to successful businesses.

## 6.2 Local action

A study from the Cities Climate Finance Leadership Alliance (CCFLA 2016) looked at 80 local and regional initiatives around the world. They found that catalysing local (i.e., municipal) government can create new partnerships, which can help address local finance gaps and “mobilize the entire value chain of local climate finance. Through these partnerships, the creation of a ‘market place’ is enabled.” (CCFLA 2016, p.5). Moreover, local government involvement can ensure that environmental and social benefits of projects are internalised. So far, however, there are few initiatives which “focus on supporting Regional and Local financial institutions in identifying needs, opportunities and gaps.” (CCFLA 2016, p.5).

UK cities are taking up the cause. A director of retrofit company (#11) detailed how larger cities like Birmingham, Bristol and Sheffield have invested in energy or waste projects, often in partnership with the private sector. These authorities are thinking long-term and taking advantage of their ability to borrow money at low interest rates, especially in the current economic climate. This action might also reflect dissatisfaction with central government, as a think tank analyst (#1) explained, “there is a general trend for local authorities just being really fed up with governments flip flopping in policy and trying to drive this agenda forward themselves”.

In Birmingham, the centralised approach of the Green Deal failed to win the trust of homeowners or retain local knowledge of pre-existing supply chains (Localise West Midlands 2014). Localise West Midlands recommend shifting towards a variety of local, smaller providers better able to nurture local business, and to develop tailored marketing materials to form a local, trusted hub of (Green Deal) information.

One of the largest and most successful domestic retrofit schemes in the UK was the Kirklees Warm Zone (KWZ), which installed insulation in over 50,000 homes in the Kirklees area of West Yorkshire in 2007-2010 (Webber et al. 2015). The scheme was the initiative of the local authority (Kirklees Council), which funded just over half the £20.9m costs, with the remainder funded by private company Scottish Power, managed by a not-for-profit energy company, Yorkshire Energy Services (Butterworth et al. 2011; Webber et al. 2015).

The success can be seen in the high uptake (nearly 3 in 10 households), notably more effective in energy demand reduction than standard projections in middle and high income areas. Energy use savings are estimated at 14.8% across participating households, with additional health benefits from warmer houses, stimulation of the local economy and a rise in house price value (Butterworth et al. 2011; Webber et al. 2015).

Webber et al. attribute the success to an emphasis on quality of installations and significant consumer engagement, including household visits and sustained marketing. Also, in contrast to the Green Deal, KWZ offered free surveys and assessments, with free loft and cavity wall insulation installed where feasible (Marchand et al. 2015; Webber et al. 2015). This and other examples support the case for coordinated, local and regional initiatives to help

realise the potential of energy efficiency programmes; these can take advantage of local authorities' knowledge of fuel poor and vulnerable households that benefit the most from such investments (Frontier Economics 2015).

Hall et al. (2016) define the 'Civic Energy Sector' as energy systems owned by local authorities and civil society structures such as communities, cooperatives and citizens, and their role in a transition to a low-carbon economy. The local initiatives described above are examples of the UK's small but growing civic energy sector, which has a potential to play an important role in financing and supporting energy efficiency and demand side management activities. The recent government Industrial Strategy Green Paper (HMG 2017a) suggests stronger, better developed sectoral and local institutions are good for economic competition. The description includes local financial institutions and local enterprise partnerships, compatible with the idea of a strong civic energy sector, although the emphasis is on the private sector, for example, giving businesses "direct role in shaping the future of their local communities" (HMG 2017a, p.120). Our review here suggests local authorities and communities have an important role too.

## 7 Discussion

Various policies over the years have not succeeded in raising energy efficiency of the UK housing stock fast enough to meet ambitious climate change targets. We have considered the question from the perspective of financing energy efficiency retrofits, and now highlight three emerging themes.

***Policy and leadership*** The most consistently emerging theme was the question of government action. While our interviewees had different opinions of the role of government and public finance in promoting energy efficiency, there was general agreement that the government lacks the direction or long-term vision needed for a major energy efficiency overhaul, with a chequered history of 'stop-start policies' in retrofits, as with renewable energy subsidies. The lack of continuity and changes in policy direction and agenda are damaging to the energy efficiency sector as investments in skills are not rewarded, and confidence in policy drops. A think tank analyst (#1) gave the example of the Zero Carbon Homes policy which was dropped, after which "companies that had been preparing themselves to deliver on that agenda were so angry because suddenly their market disappeared".

Further, there is a perceived lack of leadership, stemming partly from the fact that the low carbon transition in the UK is framed in terms of state-enabled competitive markets, due to a neoliberal political economy (Hall et al. 2016). Non-intervention policies stress that while there is a clear role for government, "[i]t is the private sector that will ultimately be the driving force behind our low carbon economy" (HMG 2017a, p.89). This approach was criticised by several interviewees who suggested more government intervention was necessary, in terms of regulation, leveraging private finance, or even more central programmes to improve the housing stock. Our findings support the view that even if the private sector is to be the driving force behind the energy efficiency markets, the market

cannot function and grow without government intervention and leadership through policy and public spending, in line with Mazzucato's (2015) message that public policy can affect the direction of innovation and change, including shaping and creating markets.

**Investment** Another recurring theme was the difficulty in linking financial investments to financeable projects, highlighting the qualitative differences in how financiers and energy efficiency practitioners view the challenge. The finance perspective is that energy efficiency investments are generally seen as uncertain, and considered unsafe, too disaggregated, or simply not interesting, i.e. similar structural constraints exist as identified for renewable energy investments (Hall et al. 2017) An investment bank research analyst (#2) explained that breakthrough technologies like electric vehicles are more appealing to investors, whereas regarding energy efficiency: "It's just not a theme which brokers or sector analysts are suggesting as an excitable investable theme at the moment compared to a few years ago". A proven, sustained demand for energy efficiency, which can be invested in with low risk, is needed for investors to be convinced. The combination of short-termism and risk avoidance in the finance world mean we cannot expect the markets on their own to solve the energy efficiency problem. We argue there is a need for intermediation between investors and energy efficiency projects, either through government policies, regulation and leadership; or through central or decentralised institutions in a civic energy sector. Likewise, active investors, beyond incorporating environmental considerations in funds, could move to improve information and coordination, and seek out innovative finance mechanisms and investments in innovative businesses seeking to achieve large scale domestic retrofits.

**Scale of challenge** Millions of households in the UK require energy efficient retrofits in order to meet climate change and affordability targets, suggesting this could be an investment large enough to interest mainstream finance. However, the scale of work required also poses challenges. First, most energy efficiency projects and schemes are too small, disparate or risky for many investors; there is a need to aggregate and standardise energy efficiency projects over very large numbers of different households in different houses if they are to interest financial investors. Second, there is a need for diverse and robust policies to support and convince a large number of diverse households in their decision to retrofit. It is hard to picture how a Green Deal style policy or a single, successful business model would appeal to *all* households, especially as the Green Deal was criticised for its lack of engagement with consumers. The combination of number and variety of households and houses is what poses the challenge. Local and regional initiatives can play an important part in this effort, building on local knowledge and trust. This finding supports previous research arguing that a comprehensive and well-targeted mix of policy instruments, based on a range of economic perspectives and analysis of what works in practice, is needed for energy efficiency policy (Rosenow et al. 2017).

## 8 Conclusions and policy implications

This paper has identified three aspects of a new framing for energy efficiency policy: *energy efficiency as infrastructure; new business and financing models for energy efficiency provision; and decentralised financing institutions for energy efficiency investment*, and

argued that these could help understanding of the needs of both householders and investors in creating investable opportunities that are appropriate and attractive.

Both the infrastructure framing and the new business and finance models point to an important and necessary role for government in any large scale energy efficient retrofitting of UK homes, *even if the mechanisms are to be market-based*. This role includes leadership, regulation and consistent policies which make the case for financial investment in energy efficiency and clearly signal that the issue is a long-term government priority. Framing energy efficiency as infrastructure is one potential route, sending the right signal and highlighting the systemic benefits and overall public good of energy efficiency.

Consideration of new business and finance models suggests that if private investment is to play a major role, mechanisms must be found to aggregate individual projects into larger, investable opportunities, with government acting to reduce investment risk, for example by underwriting household loans. This also points to a need for active engagement from interested finance sector actors, potentially partnering with local or national government.

Attention to new business and finance models and the potential for decentralised financing institutions point to a need for engagement with households beyond information provision and financial incentives. Institutions such as local government can play an important part through engagement with customers and building trust.

Finally, all of these aspects point to a need for intermediation between finance and energy efficiency projects. This could be a combination of national policy and regulation and local initiatives, including public private partnerships, but requires national government leadership.

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#### **Suggested citation:**

Noam Bergman and Tim Foxon (2018). *Reorienting Finance Towards Energy Efficiency: The Case of UK Housing*. SPRU Working Paper Series (SWPS), 2018-05: 1-24. ISSN 2057-6668. Available at: [www.sussex.ac.uk/spru/swps2018-05](http://www.sussex.ac.uk/spru/swps2018-05)

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