

RENEWABLE ENERGY GETTING THE BENEFITS RIGHT FOR SOCIAL HOUSING

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This report examines how the benefits of Feed-in Tariffs (FITs) and new and innovative funding mechanisms for energy efficiency can be accessed by social landlords.

Although some social landlords have been able to access FITs to install solar panels, the policy was not designed with the social housing sector in mind or intended to address social benefits more generally. This research explores how social landlords can secure the benefits from FITs, the forthcoming Renewable Heat Incentive and Green Deal to reduce tenants' fuel bills and meet climate change objectives.

The report explores how social landlords can best exploit FITs, the Renewable Heat Incentive and Green Deal to:

- create income for financially sustainable communities;
- tackle fuel poverty;
- promote social equity;
- engage tenants and empower local communities;
- tackle climate change.

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EXECUTIVE SUMMARY

Introduction

Public spending cuts pose significant challenges to the creation and development of strong, sustainable and inclusive communities. New and innovative forms of funding to promote renewable energy present both opportunities and threats for disadvantaged areas. This report for the Joseph Rowntree Foundation's New Insights Programme explores how social housing providers have sought funding for solar PV panels via Feed-in Tariffs (FITs) and the barriers they faced in doing so. Focusing on FITs, the report reviews a rapidly developing area of policy as the government sets out radical reforms in how household renewables and energy efficiency are encouraged and supported.

Context

Fuel poverty is a significant problem in the UK. The social housing sector faces challenges in finding the investment necessary for retrofit programmes, including renewables, to help cushion tenants from the worst impacts of rising fuel bills.

Traditionally retrofit strategies have been supported through energy company grants for low-cost measures and government grants to pilot renewable technologies. The advent of FITs marked a significant change in approach, with a move to support payments over a 25-year period, which would be used to recoup the upfront investment costs. FITs are paid by energy companies and funded through a levy on everyone's fuel bills. Low-income households face challenges in meeting the upfront costs to install the technologies and therefore stand to lose out.

Responding to these challenges, social landlords developed FITs-supported PV projects that ranged in their type and scale. Rapidly falling installation

costs and generous levels of FITs payments led to a boom in installations by both householders and investors. This triggered major change in government policy, which in many cases had significant and negative implications for the schemes planned by the social housing sector. At the same time the government proposed a FITs-style payment support mechanism for renewable heat technologies, the Renewable Heat Incentive (RHI). Meanwhile, grants for energy efficiency will soon be replaced by a pay-as-you-save mechanism as part of the Green Deal, which includes subsidies for more expensive measures through the Energy Company Obligation (ECO).

Method

The methodology adopted comprised a literature review of previous research and policy documentation, an online survey of 100 organisations, and in-depth interviews and roundtable events with social landlords. This was explored further by action-based research with social landlord staff and tenants to produce three case studies in Wiltshire, York and Edinburgh.

Findings

Creating income for financially sustainable communities

High FITs returns provided a self-funding mechanism for improving housing stock and reducing tenants' bills, which social landlords were keen to exploit. Delays whilst resolving procurement, legal and State Aid issues were prevalent, which often meant long lead times. Installing PV panels proved relatively straightforward, with few social landlords reporting technical issues, although connection to the electricity grid was an issue for larger projects. Once in operation, PV panels operated as well as or better than expected.

A survey of social landlords found that, at the point where FITs rates were cut in response to the installation boom, only a minority had progressed schemes to the installation stage. Uncertainty over future FITs rates meant many schemes were either in abeyance or abandoned, particularly those funded through a 'rent-a-roof' model. The Department of Energy and Climate Change (DECC) decision to reduce payments was particularly damaging. Payments were reduced to 80 per cent (revised in May 2012 to 90 per cent) for multi-installation schemes of more than 25 houses. Social landlords who missed the early window of opportunity to access higher tariffs incurred the loss of future long-term revenue and suffered more immediately from wasted staff effort and resources to develop schemes that did not go ahead. The impact of these policy shifts is that many social landlords are now very circumspect about future involvement in programmes such as the RHI and Green Deal.

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Tackling fuel poverty

Interviews, case study evidence (both modelled and actual performance) and feedback from social landlord staff attending the roundtable discussions indicated reasonable savings on tenants' electricity bills after PV installations. Research suggests savings of anywhere between £50 and £220. The benefits were dependent on two factors: size of the installation and, more significantly, tenant behaviour in the timing and pattern of use for electrical appliances. The cut in the FITs rate meant that payback times were extended and the amount of surplus revenue available to reinvest was reduced.

The case studies and anecdotal evidence gathered from housing officers confirmed that under-heating is a significant problem and that high electricity bills related to use of appliances is also an issue for certain tenants. This means

that benefits of PV panels could be underestimated because tenants have more scope to draw down more free electricity. Meanwhile, the potential failure to use heating systems effectively and efficiently means benefits from RHI and Green Deal could be overestimated. Given that Green Deal is based on predicted tenants' savings, this could be problematic. Alongside issues of basic equity, social landlords were very concerned with DECC's initial (subsequently reversed) proposals not to offer the sector the affordable warmth component of the ECO.

Promoting social equity

A drawback of solar PV technology is that, unlike most basic insulation measures, only a minority of tenants can benefit from it – for example, those with south-facing roofs. Solar PV is also distinct because of its high upfront cost and its visibility. Tenants' perceptions of the fairness of investment decisions therefore need to be carefully managed. The best approaches suggested by social landlords were those that brought all properties up to similar levels of performance in terms of energy use. By ring-fencing funds, tenants who did not benefit directly from reduced electricity from PV panels would instead benefit through a wider retrofit strategy.

The majority of social landlords involved in this research perceived that there was a funding gap in relation to rolling out retrofit measures. Some social landlords were exploring options for additional rent increases or service charges for properties with solar panels and there was a range of views about whether this approach was practical and desirable. The Green Deal was seen as presenting similar challenges. A major concern was ensuring that all tenants experienced a net benefit although such benefits may not be visible in an era of rising energy bills. Some social landlords identified a longer term equity issue related to their older stock; retrofit costs could be high and in some cases were difficult to justify. This challenge was explored in two of the case studies which illustrated the need for new funding to make it cost effective to invest in energy efficiency improvements. Given the various funding pressures, some social landlords will face challenges in maintaining this type of older property within their portfolio.

Engaging tenants and community empowerment

The level of tenant involvement in the development and implementation of PV schemes varied significantly. To date, most PV projects have not been tenant instigated or led. This is in part because of the exacting timescales that social landlords had to meet to access favourable FITs rates. So far, social landlords have reported that tenant feedback on the completed schemes has been very positive. Meanwhile, evidence from two case studies in York and Edinburgh showed tenants were much more focused on basic fabric improvements such as windows and draught proofing.

Knowledge and understanding of solar PV systems seems limited and some tenants struggle with using existing heating systems efficiently. Most social landlords were aware of the need to ensure tenants benefited from behaviour change advice to optimise the benefits of capital investments. These issues will be even more critical in the context of the RHI and Green Deal-style pay-as-you-save funding models.

Tackling climate change

Climate change has not been the primary motivator for social landlords in taking forward PV schemes. Instead, their motivation has been to reduce tenants' bills, access the long-term financial benefits of FITs and, in some cases, meet housing standards. An advantage of PV schemes is that the FITs subsidies will pay back the cost of the measure, including interest, over time. Although payback takes many years to achieve, there is a direct and immediate financial benefit to tenants through lower electricity bills and there are also predictable CO₂ reductions. PV technology helps to reduce emissions from appliance use, which for some tenants is disproportionately high compared with heating.

Other benefits

Another advantage is that PV schemes are relatively quick to commission and are not disruptive to install compared with measures such as solid wall insulation. Through FITs, PV schemes are self-funding. Other measures will need similar subsidies if they are to be adopted by social landlords, unless they can be justified on the basis of significant bill savings for tenants or meeting minimum housing standards.

Conclusions and recommendations

Through a focus on affordable housing, social landlords invariably direct investment to low-income households and therefore can help to ensure social equity from funding mechanisms like FITs. So far, the government has not properly recognised or supported this role. Meanwhile social landlords need to work more closely together to respond to the opportunities and threats posed by changes in funding regimes.

Lessons for government

Policy stability

Significant cuts in the FITs rates undermined many social landlords' efforts to develop projects that would have benefited tenants had they gone ahead. To avoid wasted effort and instil confidence, social landlords need funding through FITs or similar mechanisms to be stable and predictable over a period to enable them to plan and deliver retrofit programmes.

Policy clarity

Delays and legal costs are incurred where policies such as State Aid or those related to the tax implications of schemes are unclear. Social landlords need clear and definitive guidance on policies such as the RHI and Green Deal, related to rules governing housing management and finance.

Early engagement

The needs of low-income communities are distinct and understood by social landlords. Social landlords should therefore be engaged at an early stage to inform the design of policies and funding streams.

Embedding social equity

FITs were designed to meet economic aims, stimulating the market in PV panels. If the government is serious about the concept of sustainable development, wider social goals should be reflected in design of these policies – for instance, directing funding to tackle problems such as fuel poverty and climate change.

As a minimum, the government should be proactive in supporting social landlords so that they can access a proportionate share of resources from FITs, RHI and ECO. If necessary, ring-fenced funds should be established to ensure low-income households see a fair share of the benefits of these policies.

Social landlords can generate economies of scale that deliver benefits to their tenants and the areas they serve. For this reason, the decision to increase the multi-installation tariff from 80 per cent to 90 per cent is welcome.

The high costs of retrofit and the funding gap for social landlords need to be explored and addressed. A failure to do this could see social landlords selling their least energy efficient stock and exiting some communities, which would reduce social diversity.

Lessons for social landlords

Social landlords could help to overcome uncertainties associated with new policies such as FITs by working more closely together – for instance, sharing best practice on technical, legal and procurement issues. This would avoid delays associated with solving the same or similar problems.

In the interest of fairness, social landlords should ring-fence surplus funds generated from PV projects and use this to target their least energy efficient properties.

Behaviour change and training for tenants should be built into future retrofit programmes to maximise the benefits. Using PV installations effectively means using appliances at the right time of day when the panels are generating free electricity. Similarly, the RHI and pay-as-you-save mechanisms such as Green Deal make assumptions about behaviour that might not reflect the actual lifestyles of social housing tenants.

The importance of under-heating and high electricity use for appliances needs to be factored into fuel poverty strategies.

Disclaimer

Subsequent to the completion of our research in May 2012, DECC finalised changes to some of the policies discussed in this report, including Feed-in Tariffs and the Energy Company Obligation. Therefore some of the figures and policy detail in the report are now out of date. However, these changes are not sufficiently different to alter the conclusions of this research and remain relevant in relation to the development of future policy.

1 INTRODUCTION

In April 2010, the UK government launched the Feed-in Tariffs (FITs) scheme to provide payments to any householder or business that generated electricity through microgeneration. Whilst the policy aimed to kick-start the renewables market within the UK, addressing fuel security and reducing CO₂ emissions, it may also increase social inequality. Wealthier households, which could afford to pay for the high capital costs of technologies such as solar photovoltaic (PV) panels, would receive tax-free payments for 25 years, generating a high rate of return and profit. This would be funded through a levy on energy bills.

A regressive impact was therefore likely because low-income households would effectively be subsidising high-income households. The Department of Energy and Climate Change (DECC) even stated that social equity was not an aim of the policy. This project sought to redress this balance by identifying how social landlords (housing associations, local authorities and tenant co-operatives) could take advantage of FITs, benefiting low-income households.

The context of FITs changed dramatically from the outset of this research (see Chapter 3), with a very rapid adoption of solar panels driven by generous FITs rates. This brought about significant legislative changes to the FITs mechanism, creating long-term uncertainty about the scheme. Although FITs were not designed specifically for social landlords, many have sought to take advantage of it, which has offered significant learning opportunities relevant to the retrofitting of social housing and future government programmes.

This project aimed to explore how social landlords and the communities they serve could benefit from government policies on microgeneration and energy efficiency. One strand of the research explored how the revenues from FITs could be used to address fuel poverty and reduce CO₂ emissions. These lessons are useful both for future FITs projects and other policies, such as the

Renewable Heat Incentive (RHI) and Green Deal. Building on this theme, the research explored these forthcoming policies and how social landlords could use them to retrofit their properties to meet climate change objectives and offset projected rises in fuel prices. In a policy landscape where grants for social landlords are increasingly constrained, looking at how organisations can take advantage of such policies is vital to meeting these objectives. Social equity is also addressed by identifying the mechanisms that could be implemented to reduce inequalities arising from policies and retrofit programmes.

This research project was supported by the Joseph Rowntree Foundation (JRF) New Insights programme. Whilst it was not commissioned through JRF's Climate Change and Social Justice programme,¹ the purpose of the research closely aligns with some of the programme's objectives. These include seeking to ensure that people facing poverty are not disproportionately affected by policy responses to climate change and supporting the development of fair responses to climate change.

Report structure

The next section outlines the methodologies used in this research and Chapter 3 provides an overview of the research context. The main research findings are presented in the subsequent five chapters (Chapters 4 to 8). Each chapter provides the findings aligned to a key theme of the research: creating income for financially sustainable communities; tackling fuel poverty; promoting social equity; engaging tenants and community empowerment; and tackling climate change. All these chapters source and analyse findings from multiple research methodologies including a survey, action research case studies, interviews and roundtable discussions. The final section provides conclusions, recommendations for government and social landlords, and areas for further research.

2 METHODOLOGY

Research for this project was carried out through:

- a literature review;
- an online survey for social landlords;
- in-depth interviews with social landlords;
- roundtable events with social landlords;
- interviews with finance providers;
- ‘action-based’ case studies (consisting of stock analysis, tenant focus groups, interviews with housing officers).

Further detail is given below for each of these methodologies. Findings from all the methodologies are presented in Chapters 4–8, which have been categorised by key themes rather than by methodology.

Literature review

A review was carried out of relevant literature relating to FITs, RHI, the Green Deal and social housing. This literature included a number of media articles, research reports and current government policies.

Online survey

A survey was designed and distributed to approximately 1,900 social landlords via national representatives for housing associations in each country: the National Housing Federation (NHF) in England, the Scottish Federation of Housing Associations (SFHA) and Community Housing Cymru in Wales,² and by email to housing departments in UK local authorities.³ A total of 103 responses were received. The survey was distributed in November 2011 and remained live until late December 2011. Distribution began before DECC announced a consultation on FITs rates, and therefore some respondents completed the survey prior to the consultation announcement, and some afterwards. Reminders were sent to encourage participation.

Social landlord interviews

Nine organisations were interviewed.⁴ This selection of interviewees contained a mix of local authority landlords, housing associations and one arm’s length

management organisation (ALMO). These organisations were from across the UK and represented a mix of rural and urban locations. They also represented social landlords operating from 1,600 to 33,000 properties, though most of the organisations were at the high end of this scale. Interviewees also represented a full range of property types, including stone cottages, terraced properties and flats.

Interviews took place in January 2012 (after the DECC consultation on reducing the FIT tariff had been announced but before the Court of Appeal's announcement that found DECC's final decision unlawful). Interviews were in-depth and semi-structured, lasting around an hour each.

Finance provider interviews

Semi-structured, in-depth interviews were carried out with three finance providers to understand the offerings to social landlords concerning retrofit projects and the relevant government policies. The broad conclusions from these discussions were verified by social landlords at the roundtable events.

Roundtable events

Three roundtable events were held: one in Edinburgh (November 2011) and two in London (December 2011 and March 2012). An agenda was created before each event to provide structure and some preliminary questions for the group. However, discussions allowed participants to raise other important issues and concerns. Between six and ten social landlords attended each event.

Case studies

Three action-based case studies were carried out with Port of Leith Housing Association in Edinburgh, Joseph Rowntree Housing Trust in York and Wiltshire Rural Housing Association in the south of England. For each study, data was collected on the housing stock to analyse the measures that could be (or had been) installed. A PV financial calculator was developed to calculate the returns from FITs modelling different size systems, FITs levels and use of generated electricity. Data was gathered from tenants via a focus group, and interviews were held with social landlord staff. A brief summary of each case study is provided below and a fuller summary is available in the Appendix.

Case study: Port of Leith Housing Association

Port of Leith Housing Association provides housing for 2,500 tenants in Leith, Edinburgh. Combinations of energy efficiency and microgeneration measures were modelled for four blocks of its properties, using Energy Performance Certificate (EPC) data and National Home Energy Rating (NHER) software. Three blocks of properties were historic tenements, one of which was in a conservation area. The final properties were flats built in the 1980s. For each of the four blocks, improvements to ground-floor, mid- and top-floor flats were modelled.

The improvement measures included double glazing, boiler replacements, dry-lining, solar PV and solar thermal panels. A focus group was held with tenants, and staff members were interviewed.



Case study: Joseph Rowntree Housing Trust

Joseph Rowntree Housing Trust provides housing in York and the north of England. Three streets were modelled in New Earswick, the garden village in York, which includes early twentieth century solid-wall properties, 1950s construction and a new-build development. Combinations of energy efficiency and microgeneration measures



(similar to those used in the Port of Leith Housing Association) were modelled for archetypes on each street, using EPC data and NHER software. Many of these properties are challenging to retrofit because they are listed buildings or in a conservation area. A tenant focus group was also held.

Case study: Wiltshire Rural Housing Association

Wiltshire Rural Housing Association has 239 dwellings in various locations across Wiltshire and Swindon. Most of its stock is reasonably new and the average Standard Assessment Procedure (SAP) rating is high. In 2011 the association installed solar PV panels on 59 properties that were more expensive to heat or less energy efficient. A number of scenarios for solar PV installations were modelled,



using the solar output from different calculators and different financing models (self-funding/borrowed finance). Interviews with staff identified lessons learnt from the PV installations and priorities for the future.

3 CONTEXT

Fuel poverty context

Around 18 per cent of households in the UK are in fuel poverty,⁵ defined as when a household spends 10 per cent or more of its income on household energy bills. This figure varies widely between the countries within the UK: 15.6 per cent in England,⁶ 20 per cent in Wales, 27 per cent in Scotland and 34 per cent in Northern Ireland. Whilst the number of fuel-poor households reduced during the late 1990s and early 2000s, there has been an upward trend since 2004 due to rising fuel prices.

According to 2011 data,⁷ 17 per cent of tenants in social rented housing are in fuel poverty. In comparison, 15 per cent of private rented tenants and 20 per cent of owner-occupied households are in fuel poverty. However, as the Hills Fuel Poverty Review (March 2012) suggests, the definition of fuel poverty encompasses households that may not be on low incomes (for example, pensioners living in very large houses with large heating bills). This is not to suggest that some owner-occupiers are not on low incomes, but average household income in social housing is lower than for owner-occupiers in England (£17,201 compared with £31,127).⁸ The same data suggests that household incomes for those living in fuel poverty are lower in social housing than either private rented or owner-occupied housing.

The Hills Fuel Poverty Review proposes a new fuel poverty definition as people who are 'living on a lower income in a home that cannot be kept warm at reasonable cost', which would avoid the problem of higher income households being counted as fuel poor. 'Lower income' and 'reasonable cost' would be defined from national averages. Such a definition would allow the government to calculate the depth of fuel poverty, as well as the extent (as currently measured). It also means that the statistics on fuel poverty are less sensitive to changes in fuel prices.

Energy price rises

One of the problems underlying fuel poverty in recent years has been the increase in energy prices. Since 2008 these have risen by over 20 per cent for a combined electricity and gas bill.⁹ Off-gas fuel prices are more volatile: for example, between May 2009 and May 2011, prices of heating oil increased by 75 per cent.¹⁰

Government targets and policies

National targets within the UK have been set to eradicate fuel poverty: by 2010 in England (but this was not met), by 2016 in Scotland and by 2018 in Wales (both of which appear ambitious).¹¹ The UK Fuel Poverty Strategy (2001) outlines a number of policies and programmes to tackle fuel poverty. Each country has its own grant scheme, which offers vulnerable groups (such as elderly people and those who have long-term illnesses) free or discounted measures (such as loft insulation), as well as providing energy advice.¹² This scheme is coming to an end in late 2012, at least in England. Energy suppliers provide funding for energy efficiency measures through current government obligations: the Carbon Emissions Reduction Target (CERT) and Community Energy Saving Programme (CESP).¹³ However, these policies will be replaced by a new commitment for energy suppliers, Energy Company Obligation (ECO), which will be introduced as part of the Green Deal in late 2012 (see later in this chapter).

Current and future challenges for the social housing sector

Housing standards

Installing renewable energy technologies can help social landlords boost the energy rating of their housing stock and help to achieve compliance with minimum housing energy standards. Social landlords in England had a target to bring all their properties up to the 'Decent Homes Standard' by 2010; 92 per cent of housing met the standard by this date and the remainder is now under improvement. Similarly, all Scottish social housing must meet the 'Scottish Housing Quality Standard' by 2015 and Welsh social housing must meet the 'Welsh Housing Quality Standard' by 2016. Whilst the exact requirements within each standard differ, each requires minimum SAP ratings and a number of energy efficiency measures, such as loft and cavity wall insulation, to be installed where possible.

Installing renewable energy technologies can help social landlords boost the energy rating of their housing stock and help to achieve compliance with minimum housing energy standards.

Other policies and drivers

In addition to meeting housing standards and alleviating fuel poverty, social landlords may have obligations to reduce CO₂ emissions from their stock through the Climate Change Act 2008. This defines a legally binding target to reduce greenhouse gas emissions by 34 per cent by 2020 and 80 per cent by 2050, based on 1990 levels.¹⁴ The target applies to new-build properties through the requirement to meet building standards, and to existing stock. Many social landlords have their own climate change and sustainability agenda and targets, and local authority landlords may be subject to organisation-wide targets.

Financial pressures

For both private and social housing, financial support for energy measures is moving away from grant support (such as the previous Low Carbon Buildings Programme and CERT) to more innovative finance mechanisms. FITs and RHI provide payments over a long period and the Green Deal allows customers

to pay for the upfront costs of installation over a number of years. Grants for social landlords' retrofit programmes are also becoming scarcer.

Simultaneously, changes in Housing Benefit mean that tenants have less disposable income. For example, the UK government is capping the overall benefits households can receive, and reducing the level of Housing Benefit for certain households.

Against a backdrop of national and international financial crises and recessions, the combination of increasing fuel poverty, requiring improvements to stock and reducing Housing Benefit means that financial pressures for social landlords are high and increasing. Thus, any opportunity that reduces the need for upfront capital – for example, by sourcing income through RHI and FITs or seeking innovative financing – is worth exploring.

Background to FITs

Since April 2010, homes, businesses and organisations with an installed renewable electricity technology have received FITs for the electricity generated from it. FITs consist of two payments: a 'generation tariff' which is a set rate for each unit (kWh) of electricity generated from the technology, and an 'export tariff' for each unit of electricity that is not used by the building occupier, and is therefore exported to the grid. The latter is set at a much lower rate and in practice is often not measured, but 'deemed' to be 50 per cent of the generation. Additionally, the building occupier benefits from some free electricity if they use electricity directly generated by the PV panel.

The FITs scheme, also known as the Clean Energy Cashback scheme, is operational in England, Wales and Scotland, but not Northern Ireland. All technologies must be under 50 MW to be eligible to claim FITs, and the rate of tariff varies between technologies and between generating capacities of the technology. FITs are tax-free and are funded via a levy on energy bills. Once the renewable technology has been registered for FITs, the tariff is guaranteed for a number of years: 20 years for all technologies except PV, which is guaranteed for 25 years. FITs are linked to the Retail Price Index, meaning the price of the FITs will change with inflation and stay constant in real terms. The FITs tariff will reduce over time for new installations registered under the scheme. This is known as 'tariff depression' and has been set because the scheme aims to stimulate the market early on, and it is assumed that capital costs of technology will reduce over time. In order to claim FITs (for technologies under 50 kWp), the technology and installer must be certified under the Microgeneration Certification Scheme (MCS).

Renewable technologies that are eligible for FITs are:

- solar PV panels
- wind power
- micro-hydro power
- anaerobic digestion (to produce biogas for electricity)
- micro-CHP (gas powered, up to 2 kW)

The generation tariff for a typical size domestic solar system (4 kW or less) is 21p per kWh and the export tariff is 3.2p per kWh (as of 1 April 2012).¹⁵ Free electricity is worth approximately 14.3p per kWh,¹⁶ depending on tariff and payment method for electricity bills. Its value will also rise as fuel prices rise.

FITs review and consultations

When FITs were introduced in April 2010, the tariffs were expected to reduce in April 2012 and then annually.

In March to May 2011, the government held a consultation, the 'Fast-track review of FITs' on stand-alone solar PV panels and farm-scale anaerobic digestion. This led to the reduction in tariffs for these technologies from August 2011. It also created a level of uncertainty as to the long-term rates.

In October 2011, the government launched another consultation on solar PV FITs tariffs as a result of concern about the high uptake rate which was significantly reducing the FITs budget. Although FITs are paid through consumers' electricity bills, they are effectively classed as a subsidy paid for by consumers and are therefore controlled by HM Treasury and allocated a 'budget'. The consultation proposed halving the FITs rate from mid-December 2011 in addition to reducing the tariffs in April 2012, the anticipated date for reduction. This would reduce the generation tariff for PV systems below 4 kW from 43.3p per kWh to 21p per kWh.

Many organisations and individuals rushed to complete projects before the 12 December deadline, or abandoned projects. This situation was further exacerbated for large organisations, including social landlords, by the proposal of a multi-installation tariff because capital costs are lower per unit for large projects than for smaller ones. Such projects would only receive 80 per cent of the FIT rate, and this is now in force for projects with installations on 25 properties or more.¹⁷

The government's consultation was legally challenged because the proposed change would have taken place before the consultation ended. It was found to have acted unlawfully (a decision which the government twice appealed unsuccessfully). Following this, the government implemented new FITs rates for PV installations installed from March 2012 onwards.

DECC launched a second consultation in February 2012 and the response was published in May 2012. New tariffs with an eligibility date of 1 August 2012 have been announced, as shown in Table 1. There is a requirement for a minimum energy efficiency rating (an EPC 'D' rating) for the property to be eligible for full FITs. The multi-installation tariff has also been changed from 80 per cent of full FITs to 90 per cent from August 2012. The government has also introduced a cost-control mechanism which means that future FITs rates will be determined by the level of deployment in the months before, to ensure that the FITs budget is not overspent. Tariffs will change every three months, with a baseline degression of 3.5 per cent and a maximum cut of 28 per cent depending on the rate of deployment.

Table 1: Full tariff from 1 August 2012¹⁸

Band (kW)	Standard generation tariff (p/kWh)	Multi-installation tariff (p/kWh)	Lower tariff if energy efficiency requirement not met (p/kWh)
4 kW (new build)	16.0	14.4	7.1
4 kW (retrofit)	16.0	14.4	7.1
> 4–10 kW	14.5	13.05	7.1
> 10–50 kW	13.5	12.15	7.1
> 50–100 kW	11.5	10.35	7.1
> 100–150 kW	11.5	10.35	7.1
> 150–250 kW	11.0	9.9	7.1
> 250 kW–5 MW	7.1	N/A	N/A
stand-alone	7.1	N/A	N/A

FITs allow private companies to generate large profits while the building occupier receives relatively little benefit.

The cost of installing PV panels has reduced dramatically over the course of FITs. A study undertaken for DECC in summer 2011 suggests that PV costs had fallen by at least 30 per cent since FITs were introduced. By early 2012, this was estimated to be a 45 per cent reduction¹⁹ since it was originally intended that FITs would provide a certain rate of return on investment. Many of the issues have arisen with the speed and surprise with which the changes have been implemented.

Another reason for the government's reduction in FITs was that private companies, such as 'rent-a-roof' companies, were getting an inappropriately high rate of return. 'Rent-a-roof' companies pay for and own solar PV installations on properties; they typically receive all or the majority of FITs, whilst the building occupier receives free electricity. Such schemes allow these companies to generate large profits while the building occupier receives relatively little benefit. Although the occupier incurs minimal inconvenience, there are risks attached. For example, some owner-occupiers have had difficulty remortgaging their property,²⁰ and occupiers may have to compensate the companies for the missed FITs income if, for example, there are roof repairs and the panels have to be removed for a period.

The original generation tariff for < 4 kW PV systems was 43.3p per kWh (41.3p per kWh at inception). Between March and July 2012, the tariff was 21p per kWh (and 16.8p per kWh for multi-installations). The full tariff from 1 August 2012 will be 16p per kWh (and 14.4p per kWh for multi-installations).

Renewable Heat Incentive

Similar to the FIT scheme, the RHI provides incentives for individuals and businesses to invest in renewable heat sources by providing payments over a number of years for each unit of heat generated by microgeneration systems. The RHI was introduced for businesses in November 2011 and covers technology such as biomass, solar thermal and ground source heat pumps. Air source heat pumps are currently not covered. The RHI is set to be introduced in summer 2013 for domestic properties.

Although the RHI will function in a similar way to FITs, there are some key differences. Firstly, the RHI is designed to provide a higher rate of return on investment than FITs (except for solar thermal), because most of the renewable heat market is at an earlier stage of development in the UK than the renewable electricity market. Secondly, in most cases, all of the renewable heat generated will have to be used on-site whereas, for electricity, much of what is generated is exported to the grid. Thirdly, the RHI will be funded through government spending rather than from a levy on fuel bills. Lastly, RHI payments will be made on deemed (assumed) heat generation rather than FITs which are made on metered (actual) electricity generation. This provides less of an incentive to make sure the technology is performing well.²¹

Prior to 2013, the Renewable Heat Premium Payment (RHPP) provides one-off payments to households to install certain technologies (households must be off-gas, except for solar thermal installations). The RHPP includes competitions for social landlords to get funding for renewable heat projects. If social landlords install individual technologies into homes, such as a solar thermal panel or heat pump, these are classed as domestic (and are therefore not RHI-eligible yet). District or communal heating systems are classed as non-domestic. Technologies installed after 15 July 2009, but before the tariff is introduced, will still be eligible for the tariff unless grant funding was used for the installation costs.

The Green Deal

The Green Deal, due to begin in autumn 2012, is the UK government's flagship energy efficiency policy which will replace existing initiatives such as CERT and CESP. Under the Green Deal, households will not pay for the upfront costs of measures, but instead make regular payments on their electricity bills over a specified period. Energy efficiency measures will be those advised by an accredited energy adviser and will be installed by accredited installers. Green Deal providers will guide households through the process, managing these bodies and providing the loan finance. The 'golden rule' of the Green Deal is that repayment charges on the bill should not exceed the expected savings (although the government cannot guarantee these savings since they will depend on occupant behaviour). As payments will appear on electricity bills, they stay with the property and transfer to a new resident if the existing resident moves house. Tenants and landlords will both be eligible to sign up to the Green Deal, as long as they have permission of the other party involved.

As well as the Green Deal, the ECO will come into force in late 2012, replacing existing obligations on energy companies. ECO has two strands: the affordable warmth stream which will fund measures in low-income households; and the carbon reduction stream which will fund measures such as solid wall insulation in hard-to-treat properties. Without grant funding, measures in low-income households may not meet the 'golden rule' since households are likely to benefit from improved temperatures in their homes, rather than fuel bill savings. It was initially proposed that social housing would not be eligible to gain funding through the affordable warmth stream of the ECO and would instead focus on private sector housing, since social housing has higher energy efficiency ratings. However, in April 2012 DECC announced a smaller pot of funding specifically for social landlords. This research was carried out before that announcement.

Summary

- Fuel poverty is a significant problem in the UK with 18 per cent of the population suffering from it. This proportion is expected to increase with future long-term price rises.
- The social housing sector faces a huge challenge in retrofitting properties to meet housing quality standards, reduce carbon emissions and tackle fuel poverty. This is combined with reduced available funding for retrofit measures.
- FITs and RHI aim to stimulate the microgeneration market (renewable electricity and renewable heat, retrospectively) by providing regular payments for energy generated. This provides a long-term incentive to invest in such technologies.
- The FITs scheme was oversubscribed in its first two years of implementation. In response, the government has dramatically reduced tariffs, leading to abandonment of many planned projects.
- The landscape of funding for energy efficiency measures is changing as the government moves away from providing grants. From autumn 2012, the Green Deal allows households and businesses to pay for the upfront costs of measures over a specified period.

4 CREATING INCOME FOR FINANCIALLY SUSTAINABLE COMMUNITIES

FITs projects

FITs uptake among social landlords

FITs uptake has far exceeded the government's target. Before the scheme, DECC estimated that solar PV capacity would reach 137 MW by April 2012.²² However, by the end of 2011, 661 MW of total installed capacity was registered under FITs, 90 per cent of which was solar PV).²³ This accounts for over 145,000 renewable installations. It is not known how many social landlords have accessed FITs, but a Camco study suggests that around 10 per cent of FITs payments are going to social landlords.²⁴ Social housing represents 16 per cent of UK housing, which suggests that social landlords have benefited less from FITs proportionally than the other sectors.

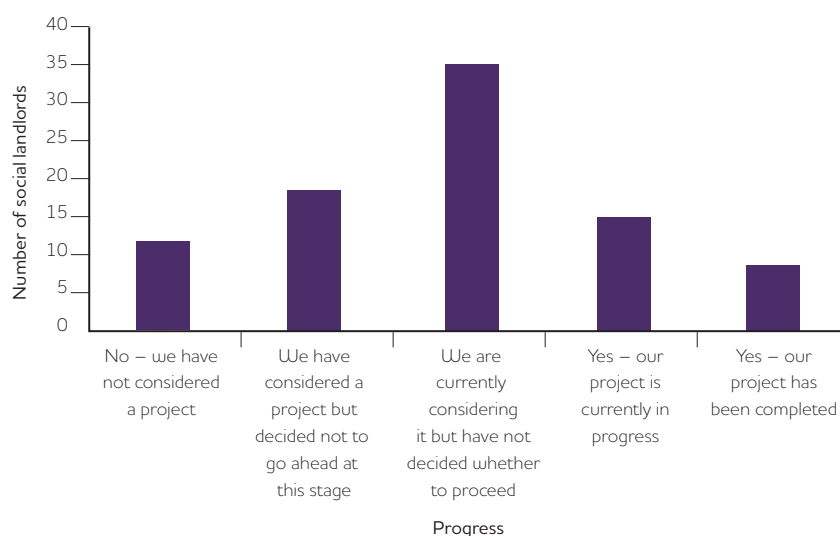
As part of this research, over 100 social landlords completed a survey in late 2011 and outlined their progress with FITs. The largest proportion of respondents (36) were 'considering whether to proceed with a project'. Nine respondents had completed a FITs project and 27 had projects in progress. Where organisations had developed more than one project, they were asked to refer to the project at the furthest stage of completion.

Since the survey was completed at the time of DECC's FITs consultation, the number of respondents in the 'considering whether to proceed with a project' category is likely to be larger than it would have been before the consultation. This suggests that around a third of organisations surveyed had a project in progress or completed at the time. These findings are similar to those from a survey carried out by the NHF in summer 2011 in which it found that fewer than 50 respondents (about 4 per cent of English housing associations) had installed PV.²⁵

As outlined in the introduction, the FITs scheme was not designed specifically for the social housing sector (or to provide social benefits more generally). The survey results show that the number of social landlords accessing FITs was not large. However, the in-depth interviews, roundtable events and Wiltshire Rural Housing Association case study show that those who have installed PV panels have benefited greatly from them, generating an income stream and providing a self-funding mechanism for microrenewables and a good return on investment.

Social housing PV projects are more complex than PV installations on single households because of their scale and because they involve extra complexities such as consulting tenants. They take longer to develop and social landlords have therefore been more vulnerable to the unexpected cuts to FITs. More could have been done to help social landlords to benefit from FITs, particularly by the government assessing equity issues and working with social landlords to ensure that a fair share of funding reached low-income households. When it becomes obvious that the sector is losing out, actions should be taken including raising awareness, and consideration of ring-fenced funding. Perhaps the most important lesson is that social landlords need a reasonable degree of certainty to decide to proceed with projects and need stability until their projects are completed. Interviews and roundtable research revealed that the social landlords who benefited most were the least risk averse. Wider sharing of knowledge by pioneering social landlords on issues such as technical specifications, tendering guidelines and legal advice might have given counterparts the confidence to proceed.

Figure 1: Progress made by social landlords with FITs projects

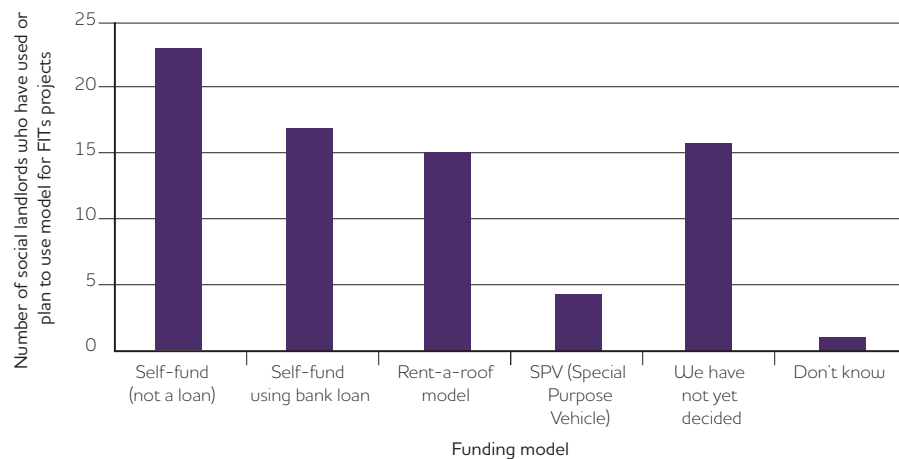


Funding models

Using survey data, Figure 2 shows which financial models were adopted by social landlords for FITs projects; most commonly, social landlords have self-funded their projects. Interviews and the roundtable events suggest that this was only available to those who had sufficient capital reserves. Many other organisations interviewed relied on borrowing, or adopted 'rent-a-roof' schemes. Some organisations used a mix of methods, usually supplementing their own capital reserves with additional loan finance.²⁶

Survey respondents stated the pros and cons of the financial model they had adopted (see Table 2). Self-funding projects reap the most benefits since they receive FITs as well as free electricity. Under 'rent-a-roof' models, most or all of the FITs would be passed to the 'rent-a-roof' party and the only benefits are therefore free electricity for tenants. While 'rent-a-roof' models were considered a positive option by some (although not optimum), others perceived there to be too many risks attached. Issues include removal of the panels to allow essential roof repairs, insurance and selling properties. Such models are not likely to be viable with the new FITs rates (as found through interviews with finance providers).

Figure 2: Funding models for FITs projects



A Special Purpose Vehicle (SPV) is a company created solely for a financial transaction, or a series of financial transactions.

In the case of funding for FITs projects, funding from the social landlord and from a bank loan would be put into the SPV, which would then install and maintain the panels. Since the SPV owns the panels, FITs payments would be made to that body and then redistributed. An advantage of using an SPV is that it holds assets separately from the parties that set them up and therefore sits off the social landlord's balance sheet in terms of accountancy, tax and debt. This minimises risks and allows the debt to be secured against the FIT rather than against the provider. Furthermore, if the scheme establishes a track record, it can refinance – that is, replace the existing loan with a new loan, typically with better interest rates. SPVs are also useful where a number of organisations want to work in partnership.

A disadvantage of using an SPV is that it is time-consuming to set up. This is particularly relevant to FITs since tariffs fell for entrants subsequent to April 2012. Banks may also set less favourable terms because it is riskier to lend to a company set up as an SPV than to lend to an established social landlord.

Self-funded projects using bank finance will inevitably have less benefit than using reserves, since interest payments reduce the net value of FITs going to the social landlord. SPVs were also used to overcome the issue that profits from FITs can impact on the charitable status of social landlords.

All financial models have risks. Whilst the positive aspect of self-funded projects is that social landlords are in control of the project, this gives landlords responsibilities to ensure projects are delivered on time and generate sufficient electricity, and therefore finance, to cover costs. Risks in self-funding projects include those related to finding contractors and tender complexities.

Motivations

Interviews with social landlords who have installed PV projects illustrate that in social housing these have been funding-led. Social landlords explored and proceeded with solar PV projects because of the existence of FITs, and, in the main, would not have installed PV without FITs. Whilst the most important motivation stated by survey respondents was reducing tenants' bills

Table 2: Social landlords' perceptions of pros and cons of funding models for PV projects

Model	Pros	Cons
Self-fund (no loan)	<ul style="list-style-type: none"> • Full financial benefit • Full ownership and control • No debt • Earlier payback than taking a loan; low risk • Income generation allows income to be reinvested • Some perceived there to be no disadvantages 	<ul style="list-style-type: none"> • Financial risk • Timescale due to the potential reduction of FITs rate • Tying up resources • Tender complexity • Liability • Capital outlay adjusts other programmed spend
Self-fund (bank loan)	<ul style="list-style-type: none"> • Retain FIT income • Financially viable and profitable • Ease of delivery; simple • Control of PV installation: fewer complications • Better loan rates and buying power • Some perceived there to be no disadvantages 	<ul style="list-style-type: none"> • Risks, e.g. future maintenance costs • Legal issues attached to the loan • Initial outlay • Borrowing power may be limited • Ensuring income stream is sufficient to meet costs • Risks of FIT rate changing
'Rent-a-roof'	<ul style="list-style-type: none"> • Lower risk, e.g. fewer maintenance issues in next 25 years • Supplier responsible for long-term maintenance (which ensures installation is fully operational) • Limited impact on capital investment programme • No/lower capital outlay • Opportunity to buy at a later date • Simple 	<ul style="list-style-type: none"> • No/lower FITs revenue: another company takes the profits • Legal complexity
SPV	<ul style="list-style-type: none"> • Financial viability • Income generated • Allows dedicated resources and expertise 	<ul style="list-style-type: none"> • Complexities • Involvement of third parties • Limitations of finance • Change to FITs rate would change viability

(see Figure 3), many respondents stated that generating an income stream was a primary motivator. FITs allowed them to create a financially viable scheme and/or reinvest revenue into improving other stock. (Since it works towards the same aim, this motivation is therefore not in conflict with reducing tenant bills.) Whilst gaining guaranteed financial revenue for 25 years is positive, some roundtable respondents felt that FITs had led to social landlords 'chasing grants', which distracted them from identifying and carrying out projects that would meet their priorities.

Interviews with organisations considering or installing PV schemes by adopting the 'rent-a-roof' option revealed that the main motivation was reducing tenants' fuel bills, since this is the main benefit they would realise.

As shown in Figure 3, reducing CO₂ emissions and improving the quality of housing stock were still motivators, but on average were less important. The in-depth interviews showed that social landlords were able to proceed with PV since deployment is simple and does not disrupt tenants, which has advantages over some insulation projects.

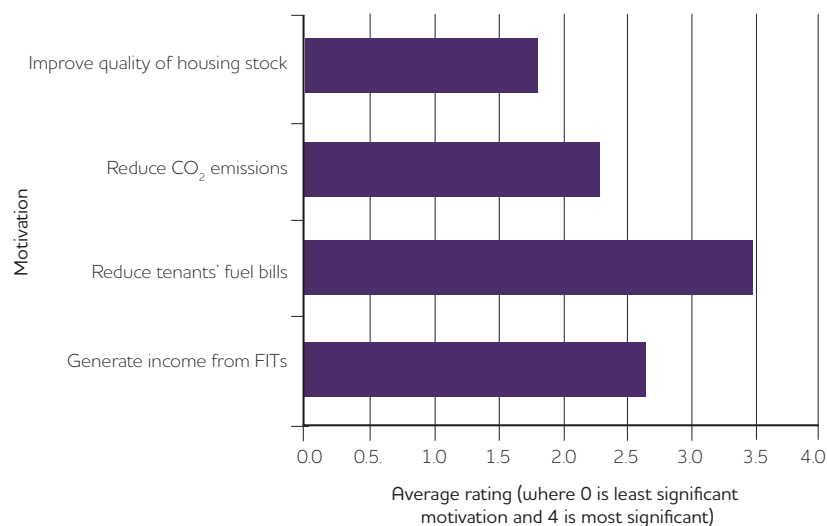
Timing, opportunity costs and pilot projects

The timing of the FITs scheme has been an important factor in determining whether social housing PV projects were successful. In part, success depended on social landlords' ability to commit to and undertake a project in the 'window' during which FITs rates were high.

As previously discussed, social housing projects are more complex than single-household ones and therefore have longer lead-in times. This issue was raised by many social landlords who had abandoned or reduced PV projects as a result of the FITs cuts. Some of the social landlords interviewed had carried out small pilot projects to gain experience of the technology before proceeding with larger, riskier schemes. Whilst sensible, this more cautious approach meant some social landlords were unable to roll out the PV project before the FITs rate unexpectedly changed. These organisations invested significant time and resources in projects but gained relatively little.

Other social landlords interviewed through this research, sensing that FITs were a short-term opportunity, implemented large projects straight away and are therefore likely to have benefited much more. There is insufficient data to gauge whether pilot projects would have led to more successful schemes – for example, by modifying technical specifications or engaging tenants differently. In general, it appears that PV technology has been successful, but interviews suggest that not enough attention has been paid to engaging tenants.

Figure 3: Social landlords' motivations for installing FITs projects



Wiltshire Rural Housing Association, which only has 239 properties, was able to install solar PV panels on a relatively large proportion of its stock. Although a tight installation timeline meant there was only limited scope for tenant engagement, follow-up monitoring and advice was put in place. Wiltshire Rural HA is an example of a small HA with proactive and knowledgeable staff who were able to press ahead with a project. Roundtables showed that other smaller social landlords were less well placed to take forward schemes because of a combination of limited staff capacity (time and knowledge) and financial resources.

Pursuing FITs has meant minimal opportunity costs for successful social landlords as this has not tended to displace other retrofit work. However, it is a short-term policy and these projects may have diverted staff from longer-term aims. There have been large opportunity costs for unsuccessful projects (entirely due to the government's changes in FITs levels).

Barriers and lessons from PV projects

Barriers to installing PV panels

Where survey respondents had not proceeded with PV projects, they were asked to provide reasons (as many as they wanted); results are shown in Table 3. Uncertainty over the future FITs rate was the largest barrier to installation. Lack of certainty about financial returns, and technical problems, were also significant barriers. In a small number of cases, social landlords invested the money elsewhere.

Project set-up costs and social landlord capacity

Interviews and roundtable events with social landlords demonstrated that project set-up costs can be intensive in terms of staff time to design and implement schemes. Not all social landlords were able to commit time and resources to such a project, particularly given the short timescales.

Very few of the social landlords interviewed who had installed PV technology have had time to consider properly or develop advice for tenants and staff to accompany the roll-out. This could have important implications for the benefits that tenants receive from the PV system. The FITs that social landlords gain are constant, but the level of benefit for tenants depends on their behaviour – that is, on how much electricity they use during day-

Table 3: Reasons social landlord did not proceed with PV projects

Reason	No. of responses
Future FITs rate is too uncertain	10
The financial returns are uncertain	6
Technical problems	5
Lack of organisational capacity	3
Upfront costs of renewable energy are too high	2
Legal issues	2
Decided to invest money in renewable heat schemes instead	2
Decided to invest money in energy efficiency schemes instead	2
Negative feedback from tenants	1
Properties were not suitable for the technology	1
Planning permission issues	1

Very few of the social landlords interviewed who had installed PV technology have had time to consider properly or develop advice for tenants and staff to accompany the roll-out.

time hours. This is not a lost opportunity since social landlords who have already implemented PV projects could still roll out such advice. However, the momentum is often at the beginning of projects.

The size of projects appears to have had an impact on the success and ease of implementation. Large projects have benefited from economies of scale with lower capital costs and better return on staff time. It may have been more difficult for smaller and heavily leveraged social landlords to invest resources in exploring FITs. However, to some extent larger projects have required longer lead times and may have suffered from the surprise change in FITs rate. Set-up costs of schemes and legal hurdles have also made it less attractive to smaller social landlords.

Legal issues

Legal issues can be complex and create uncertainties and risks. Social landlords required a level of tenant consent that waives the tenants' right to receive the FITs. Interviews show that social landlords undertook this in different ways, with some changing tenancy agreements whilst others asked tenants to complete a permission slip.

This created other potential problems for future ownership of the asset – for example, for certain social landlords under 'Right-to-Buy' or for 'rent-a-roof' schemes where the lender's consent is required but was difficult to obtain.

Finance issues

Finance issues may be complicated where lenders have to scrutinise project risks and returns. This favours larger projects or developing projects by extending existing covenants where possible.

FITs cannot be claimed if the capital cost of the installation is partly or fully met by public grant funding, as this would be a 'double public subsidy' which is not allowed under EU law on State Aid. There are some exceptions if the costs of installations are significantly higher than those on which FITs rates are based, or under 'permitted grants' (when the grant was made before April 2010, in certain circumstances). Many social landlords found these rules to be unclear, especially in the case of new-build properties where grants are used.

Tendering and contractors

Tendering was often difficult, especially for local authorities that must adhere to OJEU rules. Many of the social landlords interviewed felt this was a lengthy, time-consuming and complex process. Some social landlords found that contractors were not used to working with social landlords and social housing tenants, and therefore encountered problems. This is reiterated by findings from the NHF's survey of social landlords, which found that the main barriers to PV schemes were the challenges of procurement regulations and lender negotiations over charging.²⁷

Technical issues

Technical risks are low as PV output is reasonably predictable and technical problems tend to be minimal for those social landlords with a good understanding of the technology. Social landlords stated that they found PV installations easier than other retrofit projects as predicting solar output is reasonably straightforward. The only issues raised (by social landlords interviewed and those involved with roundtable events) were selecting technologies and avoiding problems associated with over-shading. Case study analysis shows that orientation and shading can have a large impact on where

PV is suitable. A few social landlords experienced problems with meters running backwards once PV was installed, but this was easily resolved.

FITs administration

A number of social landlords interviewed installed remote monitoring, which avoided the need to go into tenants' homes to read meters (which is required to claim FITs).

Other issues

Survey responses indicate that a further issue preventing uptake is the capacity of the distribution network operator (DNO). Organisations must get approval from their DNO before commencing installations, and this sometimes incurs costs per unit. It is often a lengthy process, causing delays and potentially preventing social landlords from installing PV technology before the FITs tariff reduces.

Working together

There are some examples of social landlords pooling resources and working together on FITs schemes. For example, Alliance Homes created a framework agreement that was used by other social landlords and the Scottish Retrofit Strategy Group. This is a positive way in which to share knowledge and reduce the risk of projects. However, the lead time was longer as a result, and this created its own issues in terms of taking advantage of shorter term opportunities. Fewer schemes therefore went ahead in Scotland before the FITs review.

The FITs review

As outlined in Chapter 3, DECC launched a consultation in October 2011, proposing to halve FITs in mid-December 2011. This has since been found to be unlawful and projects installed by 3 March 2012 received the original rate. However, this decision was not made until late March 2012 and the period was therefore one of great uncertainty. The government also introduced a 'multi-installation tariff', which means that any organisation installing more than 25 panels will receive 90 per cent of the full FITs rate.²⁸

Impact of the review

The timing and nature of this review in late 2011 had severe impacts on social landlords, with many abandoning planned projects or reducing the number of panels installed. Of the nine social landlords interviewed, two had effectively abandoned their projects and two had significantly reduced the number of PV panels installed. (These organisations were further advanced than the average.) Alliance Homes developed a framework involving twelve social landlords which planned for 75,000 installations. However, changes to FITs meant only 2,500 panels were installed.

Because social housing projects are more complex than those for single private properties, and technically more complicated than solar farm projects, longer lead times mean that social landlords have suffered disproportionately from the FITs review. A survey by the Renewable Energy Association (REA) and the Solar Trade Association (STA) in November 2011 found that the FITs review had led to the cancellation of PV installations on 31,522 social homes, with only 1,441 installations going ahead.²⁹ Taking these figures and applying a low average installation figure of £7,000 per house (for a 2.5 kWp system), means over £220 million of investment could have been lost. The law firm

Trowers & Hamblins estimated that the review would lead to a collective bill for social landlords of around £5 million of 'abortive costs'.³⁰

Viability of PV panels

PV technology is still viable with the new tariffs but payback times are greatly lengthened, making it much less attractive and in some cases, marginal. Case study work suggests payback periods of 16 to 23 years for self-financed schemes, depending on location and roof orientation. Where schemes are financed through bank loans, payback would be over 25 years.

Camco carried out a study for the NHF in January 2012, which suggested that FITs would need to be set at 32.4p per kWh (not the 16.8p/kWh for multi-installation tariff) for projects to remain attractive to social landlords. This is partly because free electricity is passed on to the tenant and not taken into account in the landlord's calculations.³¹ It was also suggested that 37p/kWh would allow the sector to finance schemes at 6 per cent.

The multi-installation tariff is felt to be particularly unfair on social landlords, who will reinvest surplus FITs revenue into their stock rather than generating profit, as is the case with the investors the changes sought to target. Case study analysis and interviews with social landlords indicated that the 80 per cent multi-installation tariff on top of lower rates made projects financially marginal.³² This was based on installation prices in early 2012.

With the lower rates, the productivity of panels is crucial and issues of roof orientation, quality of installation and shading are critical issues in terms of specifying viable systems.

The new lower FITs rate may affect which organisations install PV panels. Since installation will not create high financial revenue, those who are motivated by reducing tenants' fuel bills, rather than generating an income stream, may still proceed. The social landlords interviewed who are still progressing with PV tended to be in larger organisations and believed they could achieve the necessary economies of scale. Social landlords with off-gas properties were also continuing with PV projects to reduce bills for tenants with electric heating. Since PV technology increases SAP ratings, this may induce social landlords to install it as a means of meeting thresholds related to minimum housing standards.

Wider implications of the FITs review

The uncertainty and changes in FITs rates have had wider implications beyond PV projects. A majority of social landlords who were interviewed or attended roundtable events stated that the FITs review would make them more wary of future government policies such as the RHI and Green Deal – they would be less likely to rely on such policies and would expect that they might change. This is an extremely difficult position for social landlords who want to forward-plan retrofit programmes, and identify priorities and available funding. Social landlords need a level of certainty to avoid the need to chase short-term funding streams.

RHI and Green Deal

Motivations for RHI

The RHI mechanism is designed in a similar way to FITs in that householders or businesses will receive a payment for every unit of renewable heat generated from microgeneration. However, in practice there are a few key differences in the way that social landlords will access RHI. Renewable heat projects are more complex than solar PV ones because they depend on a number of specific

property characteristics such as insulation levels and a lack of access to the gas grid. In addition, tenant behaviour is more critical than for PV installations because tenants need to operate a new heating system correctly.³³

The motivations for social landlords installing solar PV panels were described earlier in this chapter. Whilst reducing tenants fuel bills was of central concern, FITs offered an opportunity to generate an income stream. However, RHI does not appear to be a motivator in the same way.

Most of the social landlords who were considering installing renewable heat technologies stated that the RHI would be a 'bonus' not a primary motivator. They would install technologies for other reasons, such as tackling fuel poverty or meeting housing standards. This primarily seems to be an issue for social landlords with off-gas housing as this housing has higher fuel bills. A small number of social landlords were considering converting existing communal or district heating schemes to biomass in order to generate an income stream from RHI.

A few social landlords who were interviewed or attended the roundtable events stated that they had not factored RHI revenue into their calculations since it was considered to be uncertain. In contrast, Figure 4 shows that a majority of social landlords surveyed will not proceed with renewable heat unless they get RHI. This may suggest that whilst RHI is not the motivator behind installing renewable heat, social landlords will find it difficult to install such technologies without financial support. This argument was reiterated during in-depth interviews in which many organisations cited the capital costs of renewable heat technologies as a major concern.

Green Deal

Less than 15 per cent of survey respondents think that the Green Deal will be a useful funding mechanism (see Figure 5). Interviews and roundtable events with social landlords show that there is a degree of scepticism and lack of confidence about the Green Deal, particularly in relation to the uptake from householders. A large proportion of social landlords appear to be unclear about how the policy will apply to the social housing sector. Despite this, a small number of social landlords interviewed are looking to become Green Deal providers. These tend to be the organisations with a larger property portfolio.

Figure 4: Social landlords who agree with the statement 'my organisation will only go ahead with these measures if they are funded through the RHI'

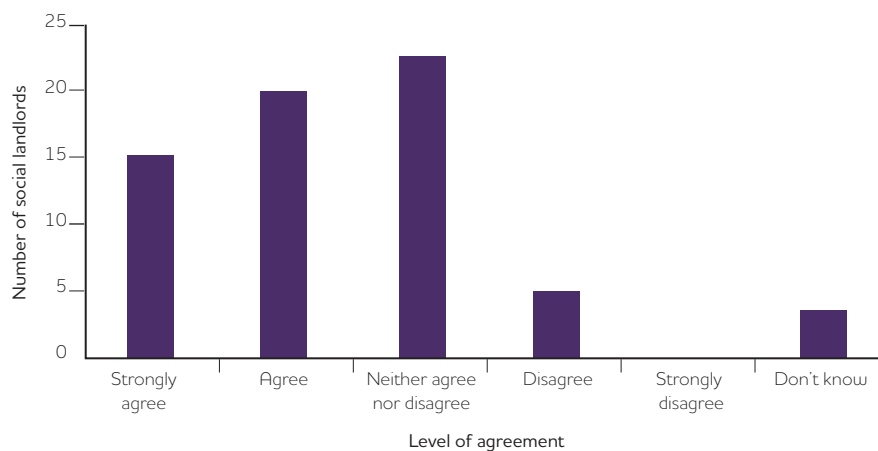
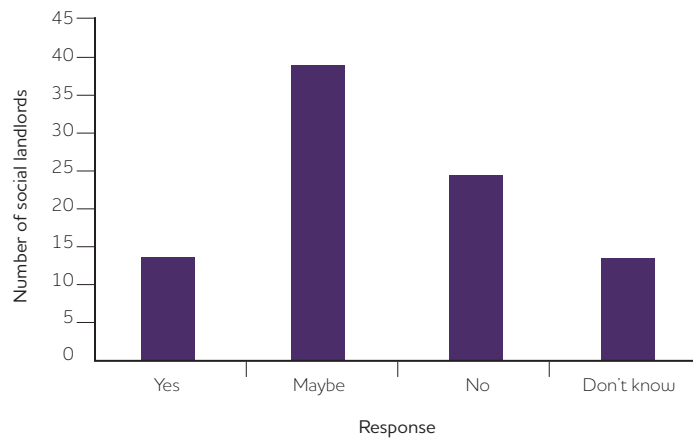


Figure 5: Social landlords who think the Green Deal may be a useful funding mechanism to allow them to install energy efficiency measures in their properties



Despite this, Figure 6 shows that a large proportion of social landlords are intending to install energy efficiency measures in their properties. These include easier measures, such as cavity wall insulation, and more complex ones such as solid wall insulation.

Figure 7 illustrates that the majority of social landlords will proceed with measures without ECO funding, but many will not. This difference may be because respondents were referring to different measures – that is, social landlords may be unable to proceed with expensive projects such as solid wall insulation without financial support, but would install cheaper measures using their own resources, if necessary to meet housing quality standards. The in-depth interviews also illustrated that some social landlords have installed all the ‘basic’ measures such as loft insulation and cavity wall insulation in all their properties. However, some still need to carry out a (usually small) number of installations to meet housing standards. The interviews also suggest that social landlords have few options in terms of financing retrofit projects and these will add to wider financial pressures.

Figure 6: Social landlords planning to install energy efficiency measures in the future

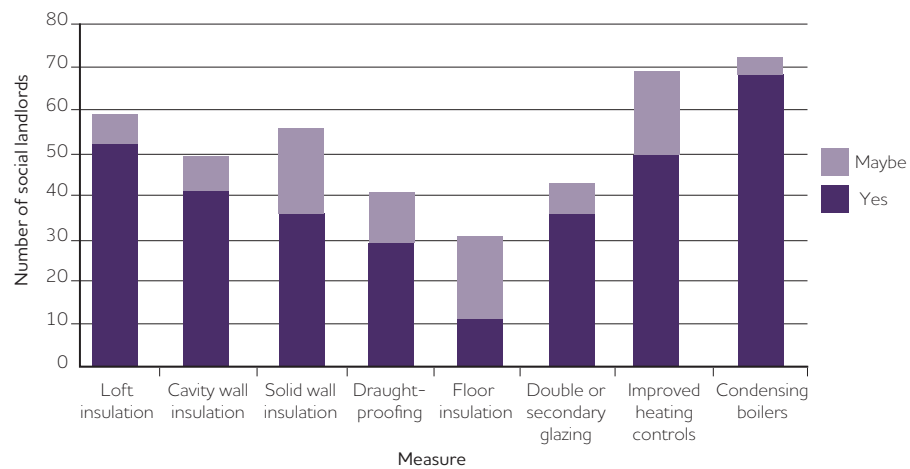
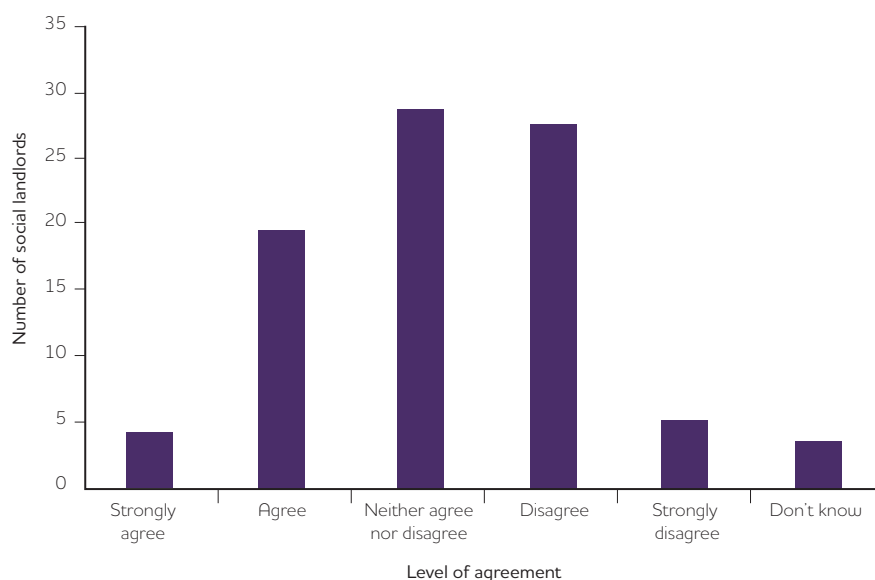


Figure 7: Social landlords who agree with the statement ‘my organisation will only go ahead with these measures if they are funded through the energy company obligation’



Summary

- Uptake of FITs among social landlords has not been very high, but it has been a positive scheme for those who did install PV panels. The FITs review late in 2011 reduced uptake. Other barriers included financial and technical uncertainties. However, the policy could have been designed better to encourage social landlords to install FITs.
- The FITs review has had wider implications, causing social landlords to be more wary of relying on promises of future subsidies by government and more cautious in future assumptions. Social landlords need future certainty to plan projects and suffered particularly from the FITs review because of the long lead times to develop projects.
- The multi-installation tariff (initially proposed at a reduced rate of 80 per cent of standard rate) was particularly damaging for social landlords. It made the business case for installing PV panels marginal and resulted in projects being abandoned or mothballed. An unintended consequence of a change that targeted private investors, it greatly hinders the mass roll-out of PV technology across the social housing sector. For social landlords, this means less scope to pass on economies of scale to low-income tenants.
- Technical issues were reasonably straightforward with PV installations, but legal, financial, State Aid and DNO issues created problems and delays to projects. The ability to commit staff time and resources to FITs during the ‘window’ of opportunity also determined the success of projects. To an extent, smaller organisations suffered from a lack of capacity.
- Some social landlords are looking towards the RHI, but mainly they are concentrating on installing renewable heat for other reasons (for example, to meet housing standards in off-gas areas). RHI therefore appears to be a bonus rather than a motivator for those already considering such technologies. However, the capital costs of renewable technologies are high, and social landlords may struggle to implement projects without financial support.
- There is much scepticism about the Green Deal and its success, and still much confusion about how it will apply to social landlords. Despite this, energy efficiency measures are high on the agenda for social landlords.

5 TACKLING FUEL POVERTY

Lessons from FITs

Impact of solar PV panels on fuel poverty

Social landlords who have installed PV projects believe they have had a positive impact on fuel poverty. This was primarily as a result of the relatively high proportion of their tenants who are in fuel poverty. None of the interviewees knew the exact proportion of their tenants in fuel poverty, but two organisations suggested it was 35–40 per cent of tenants, and another suggested around half.

Energy modelling for the case studies (see Appendix) suggests that a typical 2.5 kW system would generate fuel bill savings of approximately £50–210 per year per property. In addition to the physical characteristics of the system (for example, the size, which could be up to 4 kW for a domestic system, the location, angle and orientation of panels), the amount saved also depends on the proportion of energy used on-site, which itself is a function of tenants' lifestyles. The amount deemed by Ofgem to be used on-site is 50 per cent but could be as low as 25 per cent (especially where tenants are out of the house during the day) or as high as 75 per cent (where tenants are at home during the day and maximising use of electricity during these hours). The case study analyses predicted each household would realise savings of around £50 per year, which is based on a cautious assumption that tenants will use 25 per cent of electricity generated.

Table 4 shows the typical savings of a standard 2.5 kWp system. The amount varies according to the proportion of electricity that tenants use in the daytime and the table suggests that PV technology may be best placed in homes where tenants are present during the day (for example, in the case of unemployed or retired people). These figures are calculated for a south-facing PV system in York. They would be reduced where panels do not face south, and will vary with geographic location (see Figure 8).

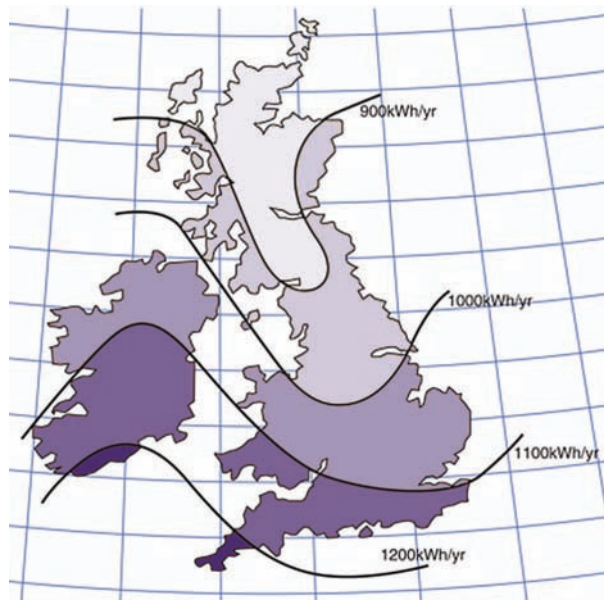
Table 4: Potential saving from a 2.5 kWp solar PV system³⁴

% of PV electricity used in home	Annual fuel bill saving
25%	£70
50%	£140
75%	£210

Table 5 illustrates the percentage saving achieved on an average household energy bill of £1,172.³⁵ If the tenant is at home during the daytime, they may use 75 per cent of the PV generated electricity. This represents an 18 per cent reduction in the overall energy bill and a 46 per cent reduction in the electricity bill. This is likely to have a significant beneficial impact on households experiencing fuel poverty. However, the figure for annual energy usage is based on the UK average whereas the average bill for social housing tenants is slightly lower so the percentage saved would be higher.

One social landlord interviewed reported fuel bill savings as high as £250 (per tenant per year). This would be possible where larger systems are installed and households use a high proportion of the generated electricity. Another study found that PV systems on a social housing system generated annual savings of £340–420 a year.³⁶ However, it is also possible that tenants save very little on their electricity bill if they are not at home during the day and do not adapt behaviour to maximise electricity use during the daytime (potentially under £50). This variation suggests more evidence is needed to quantify the exact savings from systems, and therefore the impact on fuel poverty. Such data could help to illuminate whether PV schemes are in fact one of the best ways to address fuel poverty. However, PV installation could potentially play a big role in reducing fuel poverty, especially as homes become more energy efficient in terms of heating and fabric upgrades.

Figure 8: UK map showing average solar radiation for panel on 30° angle, per year



Note: Radiation is highest in areas shaded dark purple, reducing to the lowest amount of radiation in areas shaded pale lilac
Source: www.ethical-power.com/solar.php

Table 5: Estimated savings from a PV installation as a % of the average electricity and total energy bills

	25% usage	50% usage	75% usage
Annual fuel bill saving	£70	£140	£210
% of electricity bill	15.5%	30.9%	46.4%
% of overall energy bill	6.0%	11.9%	17.9%

Under-heating and electricity use

Focus groups with tenants and analysis of tenant fuel bill data from the case studies suggests that tenants are often worried about high heating bills and under-heat their homes as a result. Two tenants had not switched their heating on for several years and their social landlord said that this was a common problem (though the tenants did not perceive their homes to be cold). Analysing actual fuel bill data showed that electricity bills tend to be as high as heating bills, or higher, when it could usually be assumed that the split is around 30 per cent electricity and 70 per cent heating. This suggests that approaches to tackling fuel poverty need to address both heating and electricity energy consumption.

The approach to fuel poverty often centres on heating and affordable warmth (for example, by focusing on insulation). The term 'affordable warmth' is used almost interchangeably with 'fuel poverty' and shifts the focus of fuel poverty onto heating energy, not electricity. PV technology has been almost unique for social landlords in tackling electricity usage rather than heating energy use. Not only could approaches (such as PV) reduce electricity bills in fuel-poor households, helping to tackle fuel poverty, but this may also enable households to devote more income to heating their homes adequately.

PV technology has been almost unique for social landlords in tackling electricity usage rather than heating energy use.

Minimum energy efficiency ratings for FITs

The government has now introduced a minimum EPC rating of 'D' for eligibility to access FITs. Case study analysis for Joseph Rowntree Housing Trust showed that only two of its oldest properties are at an 'E' rating (because bringing these properties to a higher level had been hindered by the area's conservation status). However, with planned investment even these challenging properties are likely to reach at least a 'D' rating in the near future. All other properties analysed were at 'D' level or above and therefore would not be affected by this new rule.

Broadly, this new rule was not perceived by social landlords interviewed to be an issue, and most stated that they would install energy efficiency measures before microgeneration, therefore agreeing with the underlying principle of this rule. However, a small number of these social landlords and the Wiltshire Rural Housing Association (see case study) stated that they wanted to choose the least efficient housing for installation of PV panels, as other properties had already been built at or improved to a very high energy rating.

Where such properties are expensive or difficult to retrofit, there could be a case for installing solar PV panels since it is a practical way to help tenants to reduce overall energy bills. Evidence from social landlords confirmed that, in general, installing renewable energy generation technologies was only cost-effective once properties have had energy efficiency improvements. An exception is where fabric improvement measures to meet energy efficiency requirements are costly and problematic. Waiting for these improvements to occur could delay, or even prevent, tenants getting the immediate benefits from PV installation, which is quicker and more practical to install.

Standard Assessment Procedure and energy modelling

SAP is an energy modelling tool that calculates the annual energy consumption and carbon emissions of properties. It is used for EPCs, building standards and minimum social housing standards. Solar PV has a very positive impact on the overall SAP ratings: case study modelling for Port of Leith Housing Association and Joseph Rowntree Housing Trust shows that where solar PV technology is installed, it brings the majority of properties in the case studies up to an 'A' rating. (Properties are rated on a scale between 'G' and 'A', where 'A' is the most efficient.) This improvement was achieved on top of a relatively high baseline in terms of the properties in the Leith case study. For this reason, some of the social landlords suggested they might consider installing PV panels as a cost-effective way of meeting minimum housing standard requirements. In this respect, solar PV has a disproportionate impact on ratings compared with other measures. Given the relative ease of installation, this has obvious attractions for social landlords seeking practical means of meeting standards. Tackling fuel poverty needs a focus on both electricity and heating energy usage and there is therefore a danger that PV systems could distract from reducing consumption of heating energy because of the operation of the SAP model.

Tenant behaviour

There is anecdotal evidence from some social landlords at the roundtable events that tenants are altering their behaviour to maximise the benefit of their PV systems. However, as outlined above, many social landlords did not have time or resources to educate tenants and staff fully about how to maximise the benefits. This was partly because of the short timescales for FITs, which meant social landlords had to rush projects in order to complete on time and receive the higher FIT rate. This lack of education means that the positive impact on fuel poverty will have been lessened.

This aligns with findings from recent research by Sheffield Hallam University,³⁷ funded by the eaga Charitable Trust, which found that solar PV systems could be an effective way to tackle fuel poverty, but were limited by the absence of clear, easy-to-understand guidance for householders.

A small number of social landlords interviewed had provided training to tenants on how to use their solar PV system, although in most cases this was relatively brief. Kingdom Housing Association (which was interviewed for this research) produced a guide for tenants detailing how the system works along with advice on changing habits – for example, putting the dishwasher on a timer to start in the middle of the day. Even here, however, there is contradictory advice about whether appliances should be left on timers when occupants leave the house because of fire safety concerns.

Although few social landlords have provided tenants with initial guidance on maximising the amount of free electricity they obtain from PV systems, there is an opportunity to implement such guidance retrospectively. This is likely to enhance PV technology's contribution to tackling fuel poverty. However, the imperative to invest in this area could be lost if social landlords are less minded to progress further PV projects or if the costs increase.

Prospects for RHI

Providing tenants with affordable warmth is paramount to social landlords. As a result, renewable heat is on the agenda for many social landlords, particularly those with off-gas housing, as fuel bills are higher for these properties.

Revenue from RHI, like FITs, offers the opportunity to reinvest in other properties and install even more measures. As tariffs are still to be announced, it is difficult to estimate revenue from RHI. The Port of Leith Housing Association case study analysis estimated that a typical solar thermal system might create an annual income of £97–228 for each property. (This is based on an average domestic solar thermal system production of 1,140 kWh a year, and an RHI tariff that lies between the RHI tariff for solar thermal in business systems – 8.5p/kWh – and the original RHI consultation document proposal of 20p/kWh for domestic properties.) This is much lower than the FITs revenue from solar PV systems but solar thermal has a lower installation cost and returns from RHI and FITs should therefore be comparable, based on current and forecast rates. Revenue from heating systems is difficult to determine at present because neither the tariffs nor the government's assumptions on performance have been finalised. This is a further area of uncertainty which hinders social landlords' ability to plan.

As findings from the interviews and roundtable events show, social landlords are already installing renewable heat technologies or are looking into them, but are doing so cautiously because the specification and tenant behaviour issues are complicated. In addition, social landlords are concerned about the high costs of technologies. Whilst installing PV panels does not affect the rest of the house (and could be considered as an 'add-on technology'), most renewable heat technologies replace existing heating systems and it is therefore very important to make sure they function effectively and at reasonable running costs. The only exception may be solar thermal panels which can be considered an 'add-on' because they are supplementary to the existing heating system. Even in this case, however, it is more complex since it can only be installed where a normal boiler and hot water tank are present. Some of the social landlords who participated in the research indicated that the sector had, for many years, been installing efficient combi-boilers as part of their capital programmes. These are well suited to the needs of smaller households but the lack of a hot water tank means they are usually incompatible with solar thermal installations. Despite these challenges, social landlords are undertaking pilots in order to understand the technology³⁸ – for example, the costs, ease of use, maintenance requirements and technicalities of installation.

Green Deal and ECO

Installing energy efficiency measures in social housing is essential to meet housing standards and address fuel poverty. However, many social landlords are sceptical about the Green Deal's potential for success and how it could work for the social housing sector (see Chapter 4).

Eligibility for Energy Company Obligation

DECC's initial consultation proposed that social housing would not be eligible for the affordable warmth strand of ECO, which would be directed at private housing since this is less energy efficient. (The average SAP rating of a dwelling in England is 53.2 but in housing associations it is 62.6.³⁹) This would have meant that social housing would only be eligible for the hard-to-treat strand of ECO. Social landlords seem likely to take up a large proportion of this, certainly at the start of the policy, since projects can be implemented on economies of scale, reducing installation costs and developing the market.

There was a strong feeling from the majority of social landlords who participated in the interviews and roundtable events that it was unfair to exclude them from accessing the affordable warmth stream of ECO. Many

expressed concern that grant funding for energy efficiency was essential to help them tackle fuel poverty. The DECC consultation on Green Deal and ECO suggests that one reason that social housing is more energy efficient than private housing is the significant investment achieved through the Decent Homes⁴⁰ programme in England. However, the social landlords interviewed felt that they had improved energy efficiency in their properties, partly through self-funding.

Social housing tenants tend to be those on lowest incomes and many social landlords interviewed in this research felt that should be taken into consideration alongside the physical characteristics of properties. As Table 6 illustrates, the average fuel bill in a housing association property in England is lower than that in a private rented property, and the average household income is a lot higher in the latter. However, rents will also be lower in social housing.

Further, a high proportion of social housing tenants are in fuel poverty (17 per cent) compared with private rented households (15 per cent). The figure is higher for owner-occupiers (20 per cent).⁴¹ However, this could partly be the result of a concern raised in the Hill's Fuel Poverty Review⁴² that households on reasonably high or high incomes can be in fuel poverty since the definition is 10 per cent of income on energy bills, despite these households not being 'poor'.

Golden Rule

Most of the retrofit packages in the case study analysis carried out for this report will not meet the Green Deal's 'Golden Rule' unless ECO subsidies are secured or installation costs fall rapidly in a similar way to solar PV panels. Focus groups with tenants from the case studies also confirmed that some tenants are commonly under-heating their homes and prevalence of this could undermine the 'Golden Rule' in the Green Deal. Annual energy savings from installed measures are based on energy modelling and lower-than-predicted heating consumption means that the savings are exaggerated and tenants could end up paying more than they can save on their existing energy bills. To avoid these consequences, measures will have to be heavily subsidised or, if possible, free.

The affordable warmth stream of ECO is designed for households that may be under-heating their homes. DECC states that its 'policy objective is to allow these households to heat their homes more affordably, enabling them (if they prefer) to live in a warmer home rather than necessarily make bill savings'.⁴³ It is therefore a positive move that some of the affordable warmth stream of ECO funding will be directed at social housing. Meanwhile, the carbon reduction stream of ECO funding will focus on hard-to-treat housing. Other research for JRF indicates that the government should seek, where possible, to direct this part of ECO funding at fuel-poor households, in addition to the affordable warmth stream.⁴⁴ Targeting the type of properties identified in the case studies demonstrates the opportunities in the social housing sector to do this.

Most of the retrofit packages in the case study analysis carried out for this report will not meet the Green Deal's 'Golden Rule' unless ECO subsidies are secured or installation costs fall rapidly in a similar way to solar PV panels.

Table 6: Average household income and fuel bill in private rented housing and housing association properties⁴⁵

England	Private housing, rented	Housing association
Average household income	£25,260	£17,201
Average fuel bill	£1,296	£1,040

Future projects

As shown in Figure 6, around half of the social landlords surveyed have some 'basic' energy efficiency measures left to install, such as loft insulation and cavity wall insulation. Interviews with social landlords illustrate that some organisations are nearer than others to installing such measures in all their suitable properties. These measures are likely to be the priority in terms of tackling fuel poverty since they are cost effective. The surveys and interview results show that many social landlords are looking at more advanced measures such as solid wall insulation and that some, particularly those with off-gas properties, are looking into renewable heat.

However, there is a gap between the finance that social landlords require in order to retrofit their stock and the actual funding available. This was identified in interviews with 'advanced' social landlords who have solid stock data and have identified the measures that need to be installed in the near future. It also backs up findings from an Affinity Sutton report⁴⁶ which shows that a social landlord with 55,000 properties would face a £150 million shortfall if it installed a 'low package' of energy efficiency measures in 45,000 of its stock (worth £6,500 per property). Per property, it was found that there was a gap of approximately £3,000 between the net cost of carrying out the works and the value of energy savings. Separate research for JRF highlights the need for this type of investment to target fuel-poor households because of rising energy prices and increased efforts to reduce carbon emissions.⁴⁷ This suggests that an ambitious retrofit programme is needed, and this is likely to go beyond just a 'low-cost package' of measures.

Social landlords are clearly at different stages of retrofit programmes, as identified in the in-depth interviews. For example, some have installed all 'basic' measures and are concentrating on more expensive measures on hard-to-treat housing and on microgeneration. Others still have many basic measures to install. In part, this depends on the social landlord's stock, which might determine its priorities – for example, social landlords with off-gas stock may prioritise this housing, whilst those with older, inefficient properties may focus on these instead. It also depends on how advanced the social landlord is with the sustainability agenda, which may be determined by a range of factors including previous projects, attitudes and support of the board or management.

The interview results indicate that some advanced social landlords have solid stock analysis data and detailed retrofit programmes for the next few years – some even with their own SAP targets. Whilst all will have some retrofit programmes, many are focused on planned maintenance (such as window replacements) and lack sufficient stock analysis data to determine a more long-term plan.

Interviews with social landlords in Scotland and Wales show that they are concentrating on meeting current housing standards, whilst also being aware that more stringent standards are likely to be in place for the future. The social landlords who appear to be much more advanced have carried out long-term plans and are realising how expensive it will be to make the changes needed for both fuel poverty and carbon reduction, and have identified a funding gap. As outlined earlier, the lack of certainty over government policies such as FITs and RHI is reducing social landlords' ability to determine a long-term future retrofit programme.

Summary

- Solar PV installation can be an effective way to tackle fuel poverty, reducing bills by £50–250. It is particularly effective where tenants are at home

during the day, and when they are provided with information about how to maximise daytime electricity usage (for example, by running appliances on timers but making sure not to put all appliances on at same time).

- Tenants are worried about high energy bills and often translate this by under-heating homes. More research is needed into the prevalence of this. It has important implications for the Green Deal and fuel poverty strategies may need to place more focus on reducing electricity bills.
- It is perceived as unfair that social landlords were previously ineligible to receive ECO funding. Whilst their stock is on average more energy efficient than private housing, social landlords still need to install a lot of 'basic' energy efficiency measures, such as loft insulation, and a high proportion of social housing tenants are in fuel poverty.
- A funding gap has been identified between the measures social landlords need to install and the availability of current funding.

6 PROMOTING SOCIAL EQUITY

The inequity of solar PV technology

Solar PV is an inherently inequitable technology for social housing because it is not suitable for installation in all types of property – for example, ground-floor flats or those without roughly south-facing roofs. This is a social equity issue since some tenants will benefit from reduced electricity bills whilst others will not. The problem is not unique to solar PV technology, but solar PV is much more visible than other measures such as insulation or a new boiler.

This equity issue is recognised by many social landlords interviewed or involved in the roundtable events. Some stated it as a reason for their hesitance at proceeding with PV projects and many of the interviewed organisations had had negative feedback from tenants who did not receive PV. There was therefore learning associated with this issue and social landlords said they would change how they communicated with tenants. Evidence obtained through the three case studies suggests that tenants do not resent improvements to their neighbours' properties but this might not hold up in practice, especially where tenants are waiting for basic measures whilst other tenants see immediate benefits from PV installations.

Where 'rent-a-roof' schemes have been applied, they have reduced electricity bills for the tenants with PV panels without knock-on impacts for wider capital programmes. However, without accessing FITs, social landlords cannot ensure that other tenants benefit from the scheme and it is therefore not equitable unless it is an integral part of a wider strategy to improve every property. Even with FITs there is an initial opportunity cost and resources are directed at the properties that can benefit from PV technology. Over time, this diminishes as reserves are replenished or loans paid back, with any surplus ploughed into the wider stock.

Strategies to equalise retrofit projects

Equalising the benefits from PV

There are strategies to minimise the inequity of solar PV technology. As Figure 9 shows, among the social landlords who have decided what to use FITs revenue for, the majority are reinvesting the money in meeting their energy efficiency and sustainability agenda. Some are even ring-fencing it for properties that did not receive PV installation (thus equalising the benefits). However, since social landlords do not see a profit from FITs for 10–15 years, this may cause a time lag.

A large proportion of organisations have not made any decision about the use of the revenue and there is a danger that it will not be used specifically for tackling fuel poverty or for the benefit of other tenants unless it is ring-fenced.

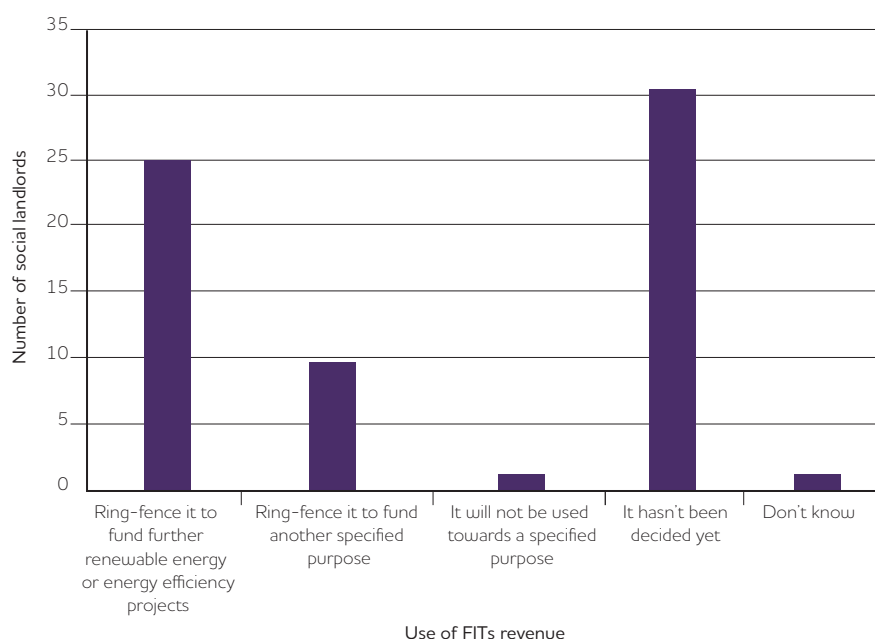
A few of the social landlords interviewed factored in tenant characteristics to the selection criteria when implementing a FITs project (by selecting properties in the most deprived areas or choosing tenants who would benefit most). Wiltshire Rural Housing Association also did this by selecting properties that were less energy efficient or were perceived by tenants to be expensive to heat. Most social landlords have been unable to take this individual approach as it is felt to be time consuming and difficult to carry out. One social landlord interviewed had increased rents for the tenants who received PV installations to reflect the electricity bill savings these tenants received.

Equalising benefits from future projects

Because all properties have different energy efficiency ratings, and some technologies can only be installed in certain properties, inequity is not confined to solar PV installation. At the heart of the fuel poverty problem for social landlords, is a desire to ensure all the tenants pay the same annual energy costs, and perhaps that these costs are the same across different social landlords' properties too. In this respect, the technology used to meet the aim is irrelevant, as long as energy costs per property are the same.

However, a different perspective takes rents into the same equation. Around half of social landlords surveyed or interviewed are considering rent increases

Figure 9: Social landlords' intended purpose for FITs revenue



With finite resources, social landlords may have to consider whether to invest in retrofit or concentrate on new-build programmes. This could necessitate disposing of the least energy efficient properties where substantial investment is needed.

to fund energy efficiency measures, and some have already implemented these. The vast majority of tenants involved in focus groups for this research appear in theory to be satisfied with such a proposal, if they see an overall saving. An increase in rents could be viewed as equitable if tenants' overall energy costs and rents are similar, across all property types.

In effect, such a scheme would form an 'in-house Green Deal' model, where the social landlord invests in energy efficiency measures through capital reserves or borrowing, and these are paid back through rent increases from the tenant. Case study analysis suggests that many retrofit options may not meet the Green Deal's Golden Rule since annual fuel savings are less than annual payments. This suggests that social landlords may not recoup all the financial outlay of retrofit measures through rent increases (unless calculated over a period longer than 10 years), but income from increased rents is likely to make a contribution. More analysis would be needed into how much rents are likely to increase, and whether such an increase is palatable to tenants.

Gentoo, a large housing association based in Sunderland, has carried out a pay-as-you-save (PAYS) pilot scheme,⁴⁸ which was intended to be a pilot for the Green Deal. A total of 139 properties were retrofitted, with a capital spend of just over £5,000 on each property. The average annual energy costs were expected to reduce by 19 per cent as a result of the installation of measures, but a reduction of only 12 per cent was realised. The gap between predicted and actual is assumed to be due to the difficulty in estimating tenant behaviour and the baseline assumptions for fuel bills being too high. At this time, the Green Deal was premised on average energy bills of £1,300, whilst Gentoo's properties had an average energy bill of £890 (actual data) and SAP data predicted £1,415. Gentoo suggests that many tenants are already frugal with their energy usage, and therefore savings are overestimated.

Such findings have important implications for the Green Deal and any in-house model that social landlords may consider adopting. It shows that the baseline energy use in social housing is less than expected and therefore that savings are overestimated. This potentially means that measures would not meet the Golden Rule and that tenants would pay more for them than they save on their energy bills. With subsidy funding from ECO, this imbalance could be addressed and the situation avoided.

Interestingly, the Gentoo research found that 46 per cent of its tenants would be willing to pay an additional £5 a week for the installed measures.⁴⁹ This fits with findings from this research that tenants are willing to consider rent increases for guaranteed benefit. However, the danger with rent increases is that whilst it reduces the prevalence of fuel poverty, savings on energy bills are negated by rent increases, meaning that tenants have the same disposable income. Therefore poverty is not really addressed. It is essential that rent increases or Green Deal payments are not higher than energy bill savings. This is very difficult to estimate but this research suggests that social landlords should be cautious in estimating savings.

Future issues

Interviews with social landlords highlight that fuel costs are a major concern for tenants and landlords, with many commenting that they are struggling 'to keep up' with rising energy prices. Despite investment in energy efficiency initiatives, there is often little or no real reduction in energy bills because energy efficiency is offset by rises in energy prices. Combined with housing benefit changes, this means big changes for the sector. More research is needed to identify the extent and depth of this problem, as well as the solutions. Simultaneously, there is a funding gap between what social landlords need to do to retrofit their stock and the availability of finance to do so.

With finite resources, social landlords may have to consider whether to invest in retrofit or concentrate on new-build programmes. This could necessitate disposing of the least energy efficient properties (including some desirable, older properties) where substantial investment is needed. Disposing of such stock would decrease the social diversity of these areas (for example, inner city areas with traditional properties that are costly and complex to retrofit). Whilst most social landlords interviewed had only disposed of a small number of properties to date, many stated that financial pressures meant they would give this greater consideration in future.

Likely targets for disposal are the properties like those in the Leith case study where multi-ownership issues and restrictions related to conservation status will lead to extra costs and complications of a retrofit programme. If these costs are significant, there will be a strong case for disposal and for concentrating on newer properties in other areas. If the objective of social diversity in housing is important to government, then a debate needs to take place about how these additional costs can be met. Without this funding, social landlords will face challenges in maintaining their presence in certain areas dominated by older property types.

Summary

- Solar PV technology is by its nature an inequitable way to improve social housing since only some households are eligible to receive it (for example, as a result of roof orientation). Although the inequity is not unique to this technology, a major and unique difference is that the panels are highly visible.
- A number of strategies can overcome this, of which using FITs revenue to invest in other properties may be the most appropriate. Many social landlords involved in this study are proceeding with this strategy.
- Some social landlords are increasingly exploring the strategy of higher rents in properties with energy improvements. A number have already taken this route and others are looking into it, but some seem unlikely to do so. Such a strategy could work, but caution must be taken to ensure that the strategy is fair and equitable and produces an overall increase in tenants' disposable incomes.
- With high retrofit costs, some social landlords are looking to dispose of their least efficient stock. This could lead to a reduction in the social diversity of areas, for example in an urban setting.

7 ENGAGING TENANTS AND COMMUNITY EMPOWERMENT

Lessons from FITs

Solar PV projects in social housing have not been tenant led but top-down. This may in part be the result of constrained timelines to access FITs, pushing social landlords to proceed quickly with projects.

All social landlords interviewed who had installed solar PV panels reported that feedback from tenants had been 'good' or 'very good'; the only negative feedback was from tenants who did not receive the PV installation.

Interviews with social landlords who have implemented projects show that varying levels of tenant permission are required, such as changing tenancy agreements or using permission slips to gain approval. Some social landlords reported this to be difficult, especially where a change in tenancy agreement was required, since it reduced the number of tenants who wanted the PV installation.

Whilst tenant uptake of PV technology was high, some social landlord staff were surprised that acceptance was not universal. For example, one social landlord noted that two out of 100 tenants did not give permission slips, and another that 100 out of 1,500 did not change their tenancy agreement. These are not large numbers, but are larger than expected by the social landlords who had assumed almost all tenants would be interested in receiving solar PV panels. These social landlords assumed that the need to change tenancy agreements had deterred tenants.

One social landlord had provided an open day for tenants as an opportunity to find out more about solar PV panels, see a display panel about solar PV and ask questions. As a form of consultation with tenants, this proved successful and the housing association was also able to get permission from tenants at the event. Most social landlords did not carry out such consultation, often due to limited timescales in implementing projects.

Future projects

The case study research with tenants (through focus groups and an interview) indicates that tenants are most often concerned with 'basic' energy efficiency measures such as draught proofing and upgrading single-glazed windows to double-glazed. These measures are noticeable day to day (without them, the tenant can feel a cold draught, for example), and tenants are already familiar with them. In contrast, measures such as solid wall insulation did not tend to be on tenants' agenda, sometimes because they knew little or nothing about them. Nevertheless, most tenants appeared to be open to suggestions of measures that would reduce their energy bills.

As above, although the uptake was high, not all tenants who were offered solar PV panels wanted them. This shows that tenants have different priorities, needs and preferences, and base their decisions on limited or perhaps inaccurate information. It also suggests that sufficient time and resources are needed for tenant consultation, if uptake is to be maximised.

A Green Deal style pay-as-you-save model was explained to tenants during focus groups, with the majority of tenants in both case studies preferring to pay higher rents to cover energy improvements than have a surcharge on their energy bills. Participants in one focus group were sceptical about energy suppliers, especially where they had previously tried to switch suppliers and encountered problems. One tenant expressed some scepticism about the government's motives behind the Green Deal. However, tenants are familiar with their social landlord and tend to trust their motives; they would therefore be more willing to be involved with a scheme initiated or managed through their landlord.

This suggests that social landlords have capacity to implement projects including rent increases. However, it may also suggest that social landlords need to be cautious with promises about energy savings from technologies, and should attempt to understand the technologies and savings.

Behaviour change

Social landlords acknowledge the need to raise awareness among tenants and encourage behaviour change,⁵⁰ but these are challenging issues to address. Although it is important that PV projects help tenants to maximise their benefit, this does not affect the FITs income received. Since many social landlords were motivated to install solar PV to generate an income, behaviour change was not the initial priority. However, under the RHI and Green Deal, it will be crucial in order that tenants receive the benefit.

The case studies and interviews with social landlords found evidence that some tenants did not know how to operate their current heating systems effectively. For example, two tenants using storage heaters said that they found them difficult to use and did not understand how they worked. Another tenant with a gas central heating system did not fully understand how to operate the controls and was keen that the social landlord preset the heating for them. Similar findings were found in recent research with social landlords and their tenants: many tenants struggled to use existing and new heating systems, and in some cases preferred the social landlord to preset the controls.⁵¹

As shown in Chapter 6, the difference between a householder using 25 per cent and 50 per cent, or 50 per cent and 75 per cent of the electricity generated by a PV installation is around £50 a year (assuming a 2.5 kWp as modelled in the case studies – a larger system would generate higher savings).

Training tenants in using solar PV systems could therefore make a significant difference to the savings they realise.

Whilst many social landlords involved in this research have so far been unable to devote resources to training tenants, this could be done retrospectively. Previous research into explaining to tenants how to use renewable heat microgeneration systems⁵² shows that clear, easy-to-understand user guides are helpful, but also that tenants often need regular reminders about what they can do. Training social landlord staff is also key to ensuring long-term guidance can be provided, especially as they may have little personal experience of using the technologies. Finally, some social landlords cited anecdotal evidence of word-of-mouth tenant-to-tenant sharing of information.

Working with external parties

Some pioneering social landlords interviewed in this research are working with local communities as well as on their own housing stock. For example, a few who had set up a solar PV project for their own tenants had also offered the technology to private houses in the area. The price of the installation was reduced as a result of bulk buying and the social landlords had offered it at this same price. Orbit Housing Association is one example.

Others are involved in the local community: for example, United Welsh Housing Association is working on a project for the local school and also setting up a community-interest company to install a wind turbine. Whilst their own stock will always be the priority, this moves social landlords beyond their traditional remit and such projects may provide new opportunities, revenue and an enhanced reputation.

Similarly, some social landlords discussed their experiences of working on research or pilot projects with academia. They were very positive about this, saying that it had increased their experience or understanding of technologies and behaviour, and put them at the forefront of new technologies and ideas. One commented that it had been financially beneficial because the social landlord would otherwise have needed to find resources to pay consultants to carry out such research.

Summary

- PV projects in social housing have not been tenant led, but top-down. Whilst feedback from tenants who have had PV installations has reportedly been very good, some social landlords were surprised about the number of tenants who did not actively take it on. Some other tenants had also complained that they had not been offered PV panels.
- The installation of PV panels has required varying levels of tenant permission, such as permission slips and a change in tenancy agreement, and this has caused issues in some cases. Tenant consultation is needed as early as possible and methods such as open days appear to be more successful.
- Tenants are often most concerned about the more 'noticeable' issues that require improvement in their homes, such as draught-proofing, and are likely to want these seen to before other measures. On the other hand, this research suggests that tenants are open to suggestions about measures that could reduce their fuel bills and that priorities differ between tenants. In this respect, tenants' wants and needs should not be assumed.

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- It is essential to provide information and training to tenants on using heating and microgeneration systems. Research suggests that tenants often struggle to use existing heating systems and that a focus on behaviour change can help to determine the success of projects for social landlords.
 - Some pioneering social landlords are carrying out projects with local communities beyond their own housing stock and are collaborating with universities on pilot or research projects. Whilst their own housing stock will always be the priority, social landlords stand to benefit from this collaboration, as does the wider community.

8 TACKLING CLIMATE CHANGE

Lessons from FITs

Carbon reduction was not the main focus for social landlords installing solar PV technology (see Chapter 4). It appears to be a more important motivation for larger organisations, for which it may form part of a wider strategy. Larger organisations may also have more capacity to address carbon reduction than smaller organisations.

Energy modelling for the Joseph Rowntree Housing Trust shows that a 2.5 kWp PV installation (per property) would reduce CO₂ emissions from energy use by 0.9 tonnes per year, with a lifetime (25-year) saving of 22 tonnes. Baseline emissions of properties vary enormously based on size, efficiency and so on, with a range of 4.9–9.3 tonnes of CO₂ per year. It was possible to achieve carbon savings of 10–18 per cent on this baseline, which is a higher saving than the annual saving from cavity wall insulation, loft insulation or double glazing.

Solar PV projects have been deployed quickly by social landlords to take advantage of high FIT levels. This was possible because the technology is relatively easy and quick to install and has therefore also been a relatively quick and easy way to reduce CO₂ emissions (albeit not an inexpensive one). It is, of course, important to note that the FIT income, rather than carbon reduction, was the driver for installation in the vast majority of cases (see Chapter 4).

Research described in Chapter 5 indicates that tenants are often under-heating their homes because of concern over high energy bills. It also suggests that electricity bills are unexpectedly high: as high as or higher than heating bills (perhaps because tenants do not switch on heating but continue to run electrical appliances). This may reiterate a trend found in an Energy Saving Trust report⁵³ that electricity consumption from household electrical appliances doubled between 1972 and 2002 because of the increasing number of household appliances.

These findings indicate two useful points. Firstly, that insulation or heating improvement measures reduce CO₂ less than expected, since savings are based on estimated energy usage, and this is lower where tenants under-heat their homes. Secondly, since electricity usage is high, it suggests that interventions should focus on this as well as on heating, and therefore that solar PV and other renewable electricity technologies could play an important role in tackling climate change. However, the sample size of tenants in this research was small and more research would be needed to support such findings.

Prospects for RHI and Green Deal

Case study work shows that the costs of retrofitting older housing stock can be very high. For example, the Port of Leith Housing Association case study in Edinburgh showed that upgrading tenement one-bedroom flats from 'D' and 'C' EPC ratings to 'B' ratings would cost in the region of £7,000–9,000 per property.

Table 7 shows the costs of three scenarios for these properties, where Scenario 1 is a basic upgrade and Scenario 3 represents a full retrofit. The UK's climate change target is to reduce emissions by 34 per cent by 2020 and 80 per cent by 2050 (Scotland has a more ambitious target of 42 per cent by 2020). Scenario 2 would achieve a 31–40 per cent CO₂ emissions cut in the tenement flats, which is comparable to the 2020 Scottish target. Only Scenario 3 on the top floor comes close to the 2050 target as it creates a 70 per cent saving, largely because of solar PV panels. This shows that such emissions reductions are very challenging and that solar PV has a role to play, especially where options for installing microgeneration technologies are limited, such as in flats.

Table 7: Costs of retrofitting scenarios for Port of Leith Housing Association

Archetype	Scenario	Cost	Measures	CO ₂ reduction from baseline	
Ground floor	1	£3,422	Boiler	0.5	14%
	2	£8,977	Boiler, floor insulation, internal wall insulation, low e-glazing	1.2	36%
	3	£13,477	Boiler, floor insulation, internal wall insulation, low e-glazing, solar thermal	1.3	39%
Mid-floor	1	£4,033	Boiler	0.4	13%
	2	£7,186	Boiler, internal wall insulation, low e-glazing	0.9	31%
	3	£11,686	Boiler, floor insulation, internal wall insulation, low e-glazing, solar thermal	1.0	36%
Top floor	1	£4,400	Boiler	0.6	19%
	2	£7,789	Boiler, top-up loft insulation, internal wall insulation, low e-glazing	1.4	40%
	3	£17,289	Boiler, floor insulation, internal wall insulation, low e-glazing, solar thermal and solar PV	2.4	70%

The case studies and interviews with social landlord staff suggest that a large amount of additional finance will be needed to meet ambitious climate change targets and future housing standards. In the light of receding grant availability, and for those with little option to self-finance, Green Deal finance or similar schemes (such as an in-house, rent-based pay-as-you-save scheme) may be attractive. This reiterates the importance of ECO funding to social landlords in being able to deliver carbon savings and ensure tenants are better off.

A potential significant problem for the Green Deal may be under-heating in social housing, which this research has suggested is prevalent. This means that the energy savings and therefore carbon savings achieved would be overestimated, since baseline emissions are lower than expected.

Summary

- Whilst PV projects have reduced CO₂ emissions in social housing, carbon reduction was not a prime motivator for social landlords installing PV. Tenants' bill savings were more significant.
- There is evidence that social housing tenants often have higher electricity bills than expected, suggesting that measures to tackle electricity usage, such as solar PV installation, may be an effective measure to reduce CO₂.
- Under-heating appears to be prevalent, suggesting that predicted CO₂ savings from insulation and heating measures could be overestimated. There is more certainty in relation to solar PV, although tenant behaviour can significantly increase the level of savings.
- Case study research shows that the costs of upgrading social housing properties to a high EPC rating with low CO₂ emissions will be significant. Significant and additional sources of funding for social landlords will be needed for this purpose.

9 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Solar PV and FITs

FITs provided a time-limited opportunity for social landlords to generate an income stream through installing PV schemes, which also reduced tenants' fuel bills. The FITs review had a very damaging effect as many social landlords either abandoned or significantly reduced their projects. Social landlords incurred costs that cannot be recovered, especially in terms of time or consultancy fees. The review also had wider implications and is likely to make social landlords more wary of building the business case for future projects on funding mechanisms developed by government.

Whilst some financial and technical uncertainties associated with solar PV schemes were cited as problems, the biggest barrier was uncertainty regarding future FITs rates. Lesser but significant issues included problems and costs of strengthening the local grid (DNO capacity) and confusion over State Aid rules. Overall, the general feeling is that FITs provided strong financial incentives for social landlords to install PV systems if they had means of meeting the upfront costs. However, there is little or no evidence, apart from efforts by the devolved government in Scotland, to work proactively with the sector.

Solar PV can be an effective measure to reduce fuel poverty, with annual savings per household of £50–250, depending on the size of panel, productivity (which varies with location, orientation and technology) and electricity demand. If tenants are in their homes during the daytime, this appears to make a significant difference to electricity demand. However,

Aside from installation of low energy light bulbs, PV is one of the readily deployable measures that can tackle the electricity component of bills.

tenants also need advice on how to maximise benefits from PV – for example, by putting appliances on during the daytime, but doing this steadily over the day instead of simultaneously. Advice on behaviour change was not always offered because of the timescales of projects and the FITs review. However, it could be carried out retrospectively to ensure tenants benefit more fully in the future.

Electricity bills for tenants involved in this research seem high compared with their heating bills. This could suggest that tackling electricity usage is an important element in tackling fuel poverty. In this respect, PV technology has been relatively unusual because most measures tackle heating energy and few other microgeneration technologies that generate electricity are applicable to a wide range of properties. Meanwhile, there are limited opportunities to roll out further traditional fuel poverty programmes focused on insulation and upgraded heating systems or controls. Therefore, aside from installation of low energy light bulbs, PV is one of the readily deployable measures that can tackle the electricity component of bills.

Tenants were reportedly very happy with PV installations. Different social landlords required different levels of tenant permission, such as a change in tenancy agreement or permission slip. Social landlords were sometimes surprised that tenant agreement to PV installations was not universal, which indicates that it is not possible to assume what tenants want. There was negative feedback from tenants not receiving solar PV panels and this reflects the social inequality that they cannot be installed on all properties because of roof availability and orientation. Many social landlords were aware of this issue and had strategies to reduce inequalities, most commonly by reinvesting FITs revenue to retrofit other properties. Other organisations selected properties for PV that were least efficient or had highest energy bills.

Renewable heat and RHI

RHI does not appear to be a motivator to install renewable heat in the same way as FITs. Social landlords wanting to install renewable heat technologies need to do so for reasons other than generating an income stream – such as to meet housing standards or reduce heating costs. It seems especially important for social landlords with off-gas properties, which otherwise have high heating costs. PV is almost unique in being an ‘add-on’, whereas most renewable heat technologies replace existing heat technologies (even solar thermal, which can be considered an ‘add-on’, is dependent on the availability of a hot water tank, not a combi boiler). In this respect, the technology specification of renewable heat is more complicated.

Despite RHI not being a primary motivator, a significant concern to those wanting to install renewable heat technologies is the high capital cost. The RHI is therefore likely to enable many social landlords to install more. Many social landlords have installed renewable heat technologies, often as small pilot projects. As well as high capital costs, there are concerns about how well the technology works. Training tenants in using technologies is recognised as very important, since technologies may be unsuccessful if tenants use them incorrectly. This is even more of a challenge than for solar PV installation. Working with other social landlords or with universities can help to share best practice and experience in a new area of tenant engagement.

The RHPP provides one-off payments to households and social landlords to install certain renewable heat technologies; this is provided via a competition for social landlords. RHPP is considered to be a positive aspect of policy design since it ring-fences funding for social landlords only (as many felt should have happened with FITs). However, the uncertainty and time delays in implementing RHI were viewed negatively by social landlords involved in this

research, potentially preventing projects proceeding as social landlords wait for confirmation.

Energy efficiency measures and the Green Deal

The majority of social landlords involved in this research have some 'basic' energy efficiency measures, such as loft and cavity wall insulation, yet to install. For most organisations, this appeared to relate to a small number of properties. Many are now looking to install measures in hard-to-treat properties, particularly solid wall insulation.

There is a lot of scepticism as to the success of the Green Deal from social landlords involved in this research. Concern over uptake was paramount, and many were unclear as to their role within Green Deal. Nevertheless, some social landlords, particularly large organisations, felt they would have a significant role as Green Deal providers, both for their own stock and private stock. This marks a change in the role of social landlords as they play a larger role in local communities.

There was a very strong feeling that social landlords should be eligible to receive the affordable warmth strand of ECO (which at the time of conducting this research was expected only to be accessible to the private sector). Whilst social housing is more energy efficient than private housing, social landlords point out that they have partly had to self-fund retrofit projects to meet housing standards. There was also a strong perception that it would be unfair to prevent social housing tenants from receiving this funding since they have, on average, lower incomes than private housing tenants or owners. The affordable warmth stream is intended for households that under-heat their homes, as it is recognised that these households may not make a financial saving from measures being installed. This research indicates that many social housing tenants are under-heating their homes, suggesting that Green Deal finance would not work in practice in these households as they would not realise the predicted savings (which are based on average heating patterns).

Whilst there is scepticism about the Green Deal, social landlords are increasingly recognising that they do not have sufficient funding to retrofit their properties to a standard that will meet climate change targets. A key part of discussions with individual social landlords and at the roundtable events concerned the funding gap between what social landlords need to achieve, in terms of housing standards and ambitious climate change targets, and the finance available to do so.

Social landlords stated that they would first seek grant funding. Since this is becoming more scarce, others may rely on borrowing or on 'innovative financing' such as the Green Deal or a similar in-house scheme in which tenants contribute to retrofitting through a rent increase or environmental service charges (as Gentoo have piloted, see Chapter 6). Some social landlords said they would be unlikely to implement a similar scheme but others are seriously considering it or have already implemented it. However, social landlords' ability to self-fund projects depends on their reserves. This funding gap could lead to some social landlords disposing of their least energy efficient stock, which could have wider social implications for the local area.

Focus group research suggests that tenants are most concerned about 'noticeable' issues in their home such as double-glazed windows and draught proofing; such measures can make a difference to the level of warmth perceived in the home. From social landlords' perspectives, double glazing can be particularly difficult to install because of its high costs and long payback periods, and the difficulties of planning permissions in conservation areas or for listed buildings. Many tenants appear to struggle to operate their current heating system adequately, which reinforces the need for guidance and advice.

Recommendations for government

Much has been learnt from the introduction and early stages of the FITs policy, providing useful lessons for future design and implementation of FITs as well as the RHI and Green Deal.

The following recommendations for government (specifically DECC and Ofgem) are concerned with future policy design and implementation for FITs, RHI, Green Deal and other relevant energy policies.

Embedding social equity in policy design

- The government needs to engage earlier and better with the social housing sector to implement policies such as FITs, RHI and Green Deal successfully and avoid unintended consequences or sub-optimal outcomes. Although social landlords manage a relatively small proportion of the housing stock compared with the private sector, they have significant experience of large retrofit programmes and using new technologies to tackle fuel poverty and reduce CO₂ emissions. Furthermore, the sector supports low income and vulnerable households whose needs should be a consideration of all energy policies, given rising levels of fuel poverty.
- Issues of social equity should be an inherent part of all government policies in the sphere of climate change and developing the low-carbon economy. The lack of social equity objectives and means of achieving it within the FITs policy is a significant omission. Social landlords provide an effective route by which to spread the benefits of this funding mechanism to low-income households, yet were not supported in this role. The social housing sector has been badly damaged by sudden changes in policy, wasting resources that would otherwise have been available to help low-income households. Issues of social equity should be specifically considered in impact assessments for this type of policy. This is a conclusion found in other research for JRF, which suggests that all aspects of energy-related policy should assess and address the implications for fuel-poor households.⁵⁴ As a minimum, the equity implications of policies such as FITs should be understood and DECC should plan to mitigate negative impacts from the outset.
- More clarity is needed up front in relation to tax and regulatory issues. For example, FITs income could affect an organisation's charitable status or be subject to EU State Aid rules. In future policies, DECC should establish and set out a definitive interpretation of such issues at the outset, and provide updated guidance when new issues arise. This will reduce the uncertainties, legal costs and risks of projects not proceeding.

Providing confidence to invest in low-carbon technologies

- In future, DECC should set aside a ring-fenced funding pot (RHI and ECO) for social landlords to draw down in the same way that targeted funds have been made available through the RHPP. This should be proportionate to the size of the sector to ensure tenants on low incomes have access to low-carbon technologies. The FIT depreciation strategy provides a degree of certainty for social landlords but it will be some time before the sector has confidence that the government will stick to its plans. If capital costs fall during the lifetime of policies, giving greater returns, this should not necessarily be seen as a problem for social landlords if it bolsters other aspects of their capital programmes.
- Whilst mechanisms are needed to reduce excessive profits from 'rent-a-roof' energy schemes, the multi-installation tariff within FITs is too crude an instrument to achieve this and requires more consideration. It has had a

particularly harsh impact on social housing and the community sector since these sectors reinvest revenue from FITs to retrofit their stock, rather than generating profit. In many cases, the planned 20 per cent reduction made the payback times for socially beneficial projects longer and the business case marginal. This compounded the previous failure of DECC to factor social equity into the design of FITs. The move to a 90 per cent multi-installation tariff is a belated step in the right direction.

- This report has highlighted some shortcomings of SAP, namely that the high rating that solar PV technology achieves can bias investment decisions. In general, there is evidence to suggest that the software does not deal well with microgeneration. This is a problem as SAP ratings are used as a means of determining whether housing standards are being met. These issues need addressing, particularly in the light of housing standards, and this is something that DECC, in partnership with the British Research Establishment (BRE), needs to consider.
- Achieving lower energy ratings in properties is a good proxy for lower energy costs for tenants. It is therefore important that minimum ratings are better linked to rising energy costs because existing standards can be achieved relatively easily. This means setting tougher minimum standards that better reflect fuel poverty and climate change goals. This will be important in helping social landlords shape and justify future retrofit programmes.

Removing barriers to investment

- For larger multi-installations of PV technology, the DNO infrastructure needs to have sufficient capacity. This was a significant barrier for some social landlords in installing solar PV, as they require approval from DNO and there are potentially additional costs before installation, which creates further time delays. Such issues are unlikely to affect an individual household but can be challenging for a social landlord installing technology for an entire neighbourhood. Ofgem should work with utilities and social landlords to ensure that investment is targeted in low-income areas.

Getting RHI, Green Deal and ECO right

- Lack of certainty about government policies is reducing social landlords' ability to plan and develop long-term retrofit programmes. Therefore, as with FITs, efforts should be made to create long-term certainty about the availability and level of payments from other policies. This should take account of the longer lead time for RHI projects, giving social landlords time to develop and commission their projects without fear of the business case changing.
- The government has already reduced the time frame for the receipt of renewable incentives, reducing FITs from 25 to 20 years.⁵⁵ If the RHI lifetime were reduced to ten years and annual payments increased accordingly, social landlords would welcome this change as it corresponds with capital programmes based on 10–15 year cycles and loan terms of up to ten years. The critical issue is certainty that the RHI rate will be maintained from the time of project inception to installation.
- The benefits of the Green Deal may not be available to large numbers of social landlord tenants and low-income households because they do not properly heat their homes (and therefore measures would not meet the Golden Rule). The predicted savings from measures will therefore be exaggerated so that bills could rise rather than fall. More research is needed in this area. However, there is sufficient concern to justify the focus on delivering free measures funded through the affordable warmth stream of ECO to avoid this negative impact.

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- There is an emerging social case for specific support mechanisms to ensure social landlords can improve the energy efficiency of older properties and therefore retain them. Otherwise, social landlords will sell older properties and move out of some areas because the costs of retrofit programmes are too high. The social consequences of social landlords exiting these areas need to be researched.
 - The current approach to fuel poverty focuses on creating affordable warmth (installing insulation and upgrading heating systems and heating controls) whereas this research suggests that fuel-poor households may have high electricity bills. It is therefore necessary to tackle electricity as well as heating energy use in order to tackle fuel poverty. The government needs to incorporate this into policies and fund streams such as ECO, which are aimed at tackling fuel poverty, effectively.

Recommendations for social landlords

This research has shown that the upcoming decade will be challenging for social landlords, with tightening budgets, lack of available grants, increasing energy prices and increasing fuel poverty. Prioritisation is required, and it remains incumbent on social landlords to drive forward new standards. From the experience social landlords have gained from FITs, and looking forward to new policies, a number of lessons and recommendations can be drawn.

Maximising the benefits of FITs projects

- In the interest of fairness, social landlords should ring-fence revenue from FITs to use on properties that did not receive PV panels, or on the least energy efficient stock, wherever possible. Social landlords' exact circumstances will determine what they are able to do.
- Social landlords who have installed PV panels should consider providing training to tenants on maximising the benefit – for example, through face-to-face sessions and by producing simple user guides. These communications would focus on maximising electricity usage in daylight hours but ensuring that it is spread throughout the day. Such advice could make a significant difference to the reductions that tenants realise on their electricity bills, and thus the impact on fuel poverty.
- Collaboration between social landlords to develop FITs projects or share knowledge has been shown to reduce costs and time, and help develop better projects. With increasing pressure for retrofitting and new technologies, social landlords need to share best practice and experience of technologies, legalities and financial models. Umbrella bodies, such as the housing federation in each UK country,⁵⁶ have a role to enable and promote such collaboration.

Maximising the benefits of RHI and Green Deal

- RHI technologies are even more sensitive to tenant behaviour than those supported by FITs. It is therefore an essential part of any project to ensure that tenants know how to use their heating system and how to maximise the benefit from microgeneration systems. Time and resources need to be factored in from the beginning of a project for training staff and supporting tenants. This reinforces the need to avoid the rushed delivery that has been the case with FITs.
- Experience of solar PV projects shows that tenant acceptance of retrofit measures, especially more novel technologies, varies. The value of a technology to tenants not only reflects tenants' knowledge but also their

needs and preferences. Holding open days was one way of engaging tenants with projects, allowing them to gain sufficient information about new technologies and pose questions easily. Best practice is needed in this area as the level of tenant engagement varies markedly between social landlords.

- To tackle fuel poverty effectively, social landlords need to tackle electricity use in properties as well as heating energy use. Electricity usage is connected both to physical improvements and to tenants' awareness and behaviour change.
- Tenants tend to trust their social landlord and the landlord's motives. It is important to be cautious with promises and understand the technologies, finance schemes and promised savings. Whilst environmental service charges or rent increases could be used to contribute to improvements, such charges need to be carefully implemented to ensure that tenants gain financially overall. Considering the predicted savings from measures is especially important, since energy modelling is not always accurate – for example, predictions need to take into consideration that tenants may under-heat their homes.

Areas for further research

This research has highlighted that the following issues would greatly benefit from further research.

Solar PV

- The benefits of solar PV technology can be very low if daytime electricity use is low and tenants are not instructed in maximising it. However, if the project is implemented well, tenants can realise benefits of up to £250 a year. Now that many projects have been installed, further research is required into the direct benefits of solar PV panels for low-income tenants, including those with high daytime energy use and those out of their home during the day.
- Tenants are more likely to increase their benefits from PV installations where they are trained in maximising usage. Whilst this has been neglected by some social landlords because of tight timescales, it could be done retrospectively. A better understanding is needed of what forms of communication and engagement work best.

Under-heating

- Focus group research suggests that some social housing tenants under-heat their homes, including instances where heating has not been on for several years. Further research is required to assess the prevalence of this habit. It has wider implications for the affordable warmth stream of ECO, which has only recently been proposed as accessible to social landlords. It suggests that Green Deal finance is not always suitable for social landlords since many tenants would not realise expected savings. More data is needed to assess the extent and consequences of under-heating, especially in relation to the Green Deal's Golden Rule.

Housing benefit changes

- The recent and forthcoming changes in housing benefit, together with rising fuel prices, will have a significant impact on low-income households and a consequent knock-on effect. For example, higher rent arrears could make it more difficult for social landlords to borrow for retrofit

improvements. The scope available to social landlords to alter rent levels will influence the level of resources available to accelerate retrofit programmes. Housing benefit changes must be factored in alongside the growing need for more investment and the reduction in tenants' disposable incomes as a result of fuel price rises. More research is needed to explore these interrelated issues and the challenges they present to social landlords.

Stock disposal

- Many social landlords will consider disposing of the least efficient stock, including 'desirable' older properties that are costly to retrofit for the purpose of minimum standards and tenant affordability. Further investigation is needed into the extent of this issue and its geographical and social implications.

NOTES

Chapter 1

- 1 <http://www.jrf.org.uk/work/workarea/climate-change-and-social-justice>

Chapter 2

- 2 FITs are not available in Northern Ireland
- 3 The exact number of social landlords in the UK is unknown. Community Housing Cymru has around 70 members; NHF has around 1,200 members; there are approximately 200 social landlords in Scotland. The survey was distributed to over 400 local authorities across the UK although it is not known how many hold housing stock
- 4 Radian Housing Association, Camden Council, Castlehill Housing Association, Stockport Homes, Orbit Housing, Kingdom Housing Association, United Welsh Housing Association, Alliance Homes, Cornwall Council

Chapter 3

- 5 'Annual report on fuel poverty statistics', Department for Energy and Climate Change, 2010
- 6 'Energy statistics', statistical press release, Department for Energy and Climate Change, March 2011
- 7 Department for Communities and Local Government, 2011
- 8 Ibid.
- 9 Based on an analysis of Consumer Focus data on the big six energy companies' prices <http://www.consumerfocus.org.uk/get-advice/energy/energy-pricing-information>
- 10 34.49p per litre in May 2009; 60.41p per litre in May 2011, Department for Energy and Climate Change, 2011 http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/prices/prices.aspx
- 11 The English target was to eradicate fuel poverty 'in vulnerable households' and in Scotland it is to eradicate fuel poverty 'as far as reasonably practical'
- 12 In England, Warm Front; in Scotland, Energy Assistance Package; in Wales, Nest (previously Home Energy Efficiency Scheme [HEES]); in Northern Ireland, Warm Homes
- 13 Active in all countries except Northern Ireland
- 14 Similarly, the Climate Change (Scotland) Act 2009 applies the same target for 2050 and an interim reduction of 42 per cent by 2020
- 15 This represents a 'floor price' and owners of FIT-registered technologies can, in theory, negotiate a higher rate with their energy supplier who pays the FITs, although most do not.

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- Good Energy will give 5.3p per kWh where the technology is fitted with an export meter so that the amount of electricity exported is known rather than estimated, as is usually the case: <http://www.greenenergy.net.com/anaerobic-digesters/articles/fit-registration-opt-or-opt-out>
- 16 This is the average price for electricity in the UK for customers on credit, 'Quarterly energy report', March 2012, Department for Energy and Climate Change. Prices vary depending on the type of tariff and supplier
- 17 From 1 August 2012, this will be 90 per cent of the full FITs rate
- 18 Government response to consultation on Comprehensive Review Phase 2A: Solar PV cost control, 2012, DECC <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/5386-government-response-to-consultation-on-comprehensi.pdf>
- 19 'Solar PV cost update', January 2012, report by Parsons Brinckerhoff for Department for Energy and Climate Change <http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/4290-solar-pv-cost-update-report--3-feb-2012-.pdf>
- 20 <http://www.guardian.co.uk/money/2012/mar/23/solar-panels-dim-mortgage-prospects>
- 21 The export tariff for FITs is typically deemed but the generation tariff is measured on actual generation

Chapter 4

- 22 Feed-in tariffs scheme: consultation on Comprehensive Review Phase 1: tariffs for solar PV, 31 October 2011, Department for Energy and Climate Change
- 23 Ofgem 'Feed-in tariff update', Issue 7, March 2012
- 24 <http://www.insidehousing.co.uk/eco/social-housing-pv-unviable-unless-fit-rates-double/6519938.article>
- 25 <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/writev/1605/fit41.htm>
- 26 This approach was taken by one of the case studies, Wiltshire Rural Housing Association
- 27 <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/writev/1605/fit41.htm>
- 28 This was originally set at 80 per cent and changed in May 2012 to 90 per cent
- 29 http://www.solarpowerportal.co.uk/news/fit_cut_aftermath_11000_jobs_face_axe_33_companies_face_closure_says_rea_su/
- 30 <http://www.insidehousing.co.uk/ihstory.aspx?storycode=6518815>
- 31 <http://www.insidehousing.co.uk/eco/social-housing-pv-unviable-unless-fit-rates-double/6519938.article>
- 32 The government has now announced that this will be increased to 90 per cent
- 33 <http://www.consumerfocus.org.uk/scotland/files/2012/03/21st-century-heating-in-rural-homes.pdf>

Chapter 5

- 34 Electricity generation calculated through <http://re.jrc.ec.europa.eu/pvgis/apps4/pvest.php>. Financial calculations based on Changeworks PV calculator using electricity prices of 13.52p/kWh. Assumes south-facing PV system based in York
- 35 Average household bills are £453 for electricity and £719 for gas, 'Quarterly energy prices', March 2012, Department for Energy and Climate Change
- 36 'The role of micro-generation in alleviating fuel poverty', 2011, O'Flaherty and Pinder, eaga <http://www.eagacharitabletrust.org/sites/default/files/EagaProjectReportr2%28Dec11%29.pdf>

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- 37 Ibid.
- 38 This is shown through the interviews for this research and by previous Changeworks research that looked directly at social landlords' experiences of renewable heat <http://www.consumerfocus.org.uk/scotland/files/2012/03/21st-century-heating-in-rural-homes.pdf>
- 39 English House Condition Survey, 2009
- 40 The Green Deal and Energy Company Obligation consultation document, 2011, Department for Energy and Climate Change <http://www.decc.gov.uk/assets/decc/11/consultation/green-deal/3607-green-deal-energy-company-ob-cons.pdf>
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Appendix

- 57 Average SAP rating: England 79.9; Wales 78.5
- 58 Average of £524.05 per installation based on 53 systems being installed in March, April and May 2011 and a further six in November. Actual electrical energy generated and read by meter
- 59 Wiltshire Rural Housing Association's investment business case predicted the payback period was 10–12 years

APPENDIX: CASE STUDIES

Port of Leith Housing Association

Introduction

Port of Leith Housing Association provides housing for 2,500 tenants in Leith, Edinburgh. Energy efficiency and microgeneration measures were modelled in 'scenarios' within three blocks: Balfour Street and Prince Regent Street (tenements) and Lochend Road South (newer build). See Figure A1.

Modelled scenarios

Using NHER software, three retrofit scenarios were modelled for these properties (as shown in Table A1) with three archetypes in each block: ground floor, mid-floor and top floor. Solar PV as a stand-alone measure was also modelled.

Savings

All properties meet the SAP rating required for the Scottish Housing Quality Standard (SHQS) in the baseline scenario with EPC ratings of 'D' in the tenement, and 'D' and 'C' in the newer build flats. Under Scenario 3, EPC ratings increase to 'A' for the top-floor flats in all blocks, and 'B' for all other flats. Solar PV panels, which can only be installed on top-floor flats, account for this high rating.

Figure A1: The three blocks used for modelling



Balfour Street



Prince Regent Street



Lochend Road South

Table A1: Retrofit scenarios modelled

Scenario	Tenement scenarios	Newer build flat scenarios
1	Heating upgrade: condensing boiler and heating controls	Heating and fabric upgrade: fan assisted storage heaters, low e-glazing, floor insulation, double glazing, top-up loft insulation
2	Fabric upgrade: heating upgrade (as above), top-up loft insulation, floor insulation, internal wall insulation and low e-glazing	Communal heating: heating and fabric upgrade (as above) and gas community heating
3	Microgeneration: all measures above (heating upgrade and fabric upgrade), solar thermal and solar PV	Microgeneration: all measures above (fabric upgrade and communal heating), solar thermal and solar PV

Figures A2 and A3 show the average annual energy costs for the tenements and newer build flats, respectively, under each scenario. The tenements have higher energy costs in the baseline scenario than the newer build flats, and were therefore able to achieve higher savings in the improvement scenarios. Ground-floor flats in both types of property have higher fuel bills than the mid-floor and high-floor flats.

Figure A2: Average annual energy costs for tenements (per property) under each scenario

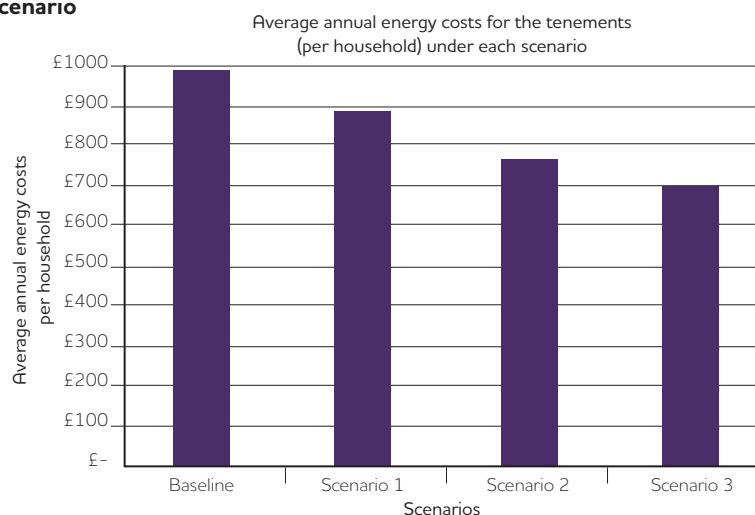
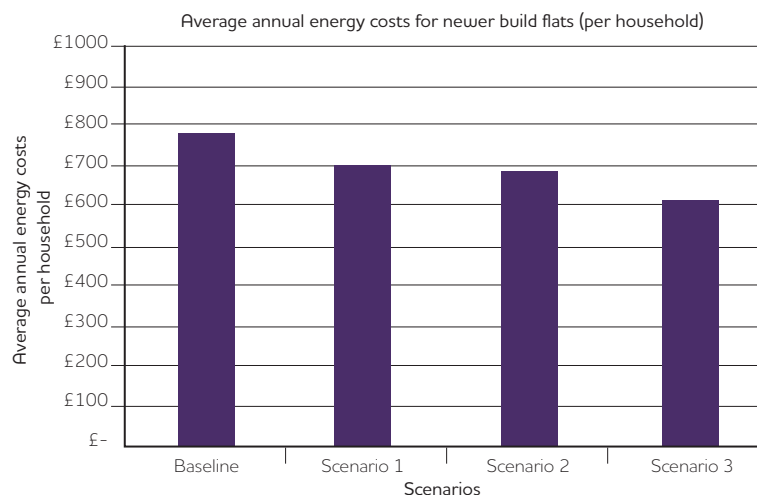


Figure A3: Average annual energy costs for newer build flats (per property) under each scenario



Scenario 3 reduces fuel bills in the tenements by 22–39% and CO₂ emissions by 36–70 per cent. Scenario 3 in the newer build properties reduces fuel bills by 10–30 per cent and CO₂ emissions by 36–74 per cent.

Installation costs in the tenements (per property) are estimated to be £3,000–4,500 in Scenario 1 and £11,500–17,500 in Scenario 3. In the newer build flats, costs for Scenario 1 are £3,500–7,500 while Scenario 3 costs are £15,000–20,500. Installation costs do not vary enormously between flats in each block except when the top flats receive solar PV panels and when the ground floor of the newer build has floor insulation.

None of the scenarios meet the Green Deal's Golden Rule since annual payments would be higher than annual fuel bill savings. They would therefore not be eligible for Green Deal finance without ECO subsidy or the housing association meeting some of the upfront costs.

There is an opportunity to raise revenue from FITs and RHI by installing solar PV and solar thermal technology. However, planning and technical feasibility issues for these building types mean that solar panels may not be suitable for many of the properties.

Social equity

As shown above, average energy costs in flats are not equal across or between properties. Strategies to ensure that retrofit programmes create social equity may include focusing on those flats with the highest energy bills (that is, tenements and newer build ground-floor flats), investing RHI/FIT income in improvement measures or raising rents to equalise rent and energy bill payments.

Tenant feedback

Tenant research via a focus group and telephone interview found that some tenants under-heat their flats: for instance, some tenants had not had their heating on for more than a year. Fuel bills are a concern for tenants, and some will deliberately switch off heating to save money. However, it was found that electricity bills tend to be high. There were few energy efficiency measures that tenants were keen to have, aside from one tenant who wanted double glazing. It appears that there are some 'user issues' that need addressing, in particular showing tenants how to operate their heating systems correctly. Tenants would consider paying more in rent (to fund installations) if this would result in a larger saving in energy bills.

Housing Association feedback

Port of Leith Housing Association's sustainability policy emphasises a 'thermal efficiency first' approach, and the association is looking at PassivHaus. It is already installing condensing boilers through a refurbishment programme and looking to install double glazing in tenements where possible (although the location in a conservation area is problematic). Scenario 2 in the tenements is therefore of most immediate interest to the housing association. There are issues with some of the basic measures, such as installing loft insulation in blocks that are under multi-ownership. Solar PV technology is not considered to be a very attractive option since returns are marginal and the payback period is long. However, the association will make a decision once it has more experience with PV installations. It is currently installing solar PV panels on a new-build property.

Wiltshire Rural Housing Association

Introduction

Wiltshire Rural Housing Association provides a housing stock portfolio of 239 dwellings in 37 locations in the county of Wiltshire and borough of Swindon. With a property average SAP rating of 88,⁵⁷ it positions itself as offering local people relatively high quality dwellings with an above average living space, but at an affordable level of rent.

The association installed 59 domestic solar PV systems during 2011, focusing primarily on properties that:

- had yet to achieve BREEAM Eco Homes level 'good' or above
- had electric heating
- were perceived by tenants to be particularly expensive to heat

Analysis of solar PV generation data shows that the systems have so far generated total solar PV energy of 65,725.84 kWh (average 1,173 kWh per system) and total income of £29,347 (average £524.05 per system).⁵⁸

With an initial cost to the housing association of £423,475 and based on an average generation income of £524.05 per system (equating to £571.69 for the full year), together with an average CAPEX cost of £7,152 (£3,527/kWp), the payback period can be projected to approximately 12.5 years.⁵⁹

Modelled scenarios

Using a bespoke social housing PV calculator, three scenarios were modelled onto these 59 properties, encompassing solar PV as a stand-alone installation. See Table A2.

Table A3 shows the lifetime cash flow, CO₂ savings and CO₂ lifetime savings of the installed systems.

Figure A4: Installation of PV microgeneration systems



Table A2: The three scenarios modelled

Scenarios	
1	100% self-funded: utilising solar contractor predicted yield data @ 41.3p/kWh FIT, deemed usage/exported to grid @ 50%:50%
2	100% self-funded: utilising PV GIS yield data @ 41.3p/kWh FIT, deemed usage/export @ 50%:50%
3	50% self-funded/50% loan-funded: utilising PV GIS yield data @ 21p/kWh FIT and reduced CAPEX (£2,500), deemed usage/export @ 50%:50%

Table A3: Financial and CO₂ effects of the scenarios

Solar PV Systems	Actual cost (£)	Lifetime cash flow (£)	CO ₂ savings per annum (tonnes)	CO ₂ savings/25-year life-time (tonnes)
Scenario 1		£1,789,252	104.73	2,618
Scenario 2	£423,475	£1,047,679	72.45	1,811
Scenario 3		£393,468	72.45	1,811

Scenario 1 equates to an average payback period of 6.71 years with an average Internal Rate of Return (IRR) of 17.36 per cent. By comparison, Scenario 2, using lower predicted kWh/annum yield figures obtained from PV GIS (26 per cent lower on average), equates to a slightly longer average payback period of 8.79 years and a lower average IRR of 11.82 per cent. Using the reduced FIT rate of 21p/kWp and reduced CAPEX cost of £2,500, Scenario 3 equates to an average payback period of 13.71 years and an average IRR of 7.15 per cent.

Social equity

FIT revenue was earmarked by the Board for other energy efficiency improvements once all the loans had been repaid. The association intends to use income generated by the FIT to target properties that did not benefit from having solar PV installed or properties that will require improvements to the building fabric, including energy efficiency measures, in order to improve SAP ratings.

The housing association confirmed its intention to focus on dwellings that would benefit from having existing inefficient heating systems replaced with low/zero-carbon renewable energy systems, including but not limited to a further roll-out of air source heat pumps.

Tenant feedback

Most recipients have welcomed the installation of solar PV technology, given the prerequisite that the property had to be both electrically heated and perceived by the tenants as particularly expensive to heat. However, there were a few energy efficiency measures that tenants were keen to have fitted in place of solar PV microgeneration, including new windows and doors, and the housing association has addressed these as part of a ten-year retrofit programme.

Housing association feedback

Homes are owned by Wiltshire Rural Housing Association for the benefit of both current and future tenants. This means that expanding families that require more space are offered new premises rather than extensions to their existing homes. It also limits the amount of tenant engagement in the decisions about ongoing maintenance and upgrades. The association views the homes as its assets that it will maintain as it deems necessary.

The Board has a positive attitude to maintenance and upgrade works generally, but uses the criterion of a reasonable payback time to establish whether it is making a financially viable decision. This benchmark is currently set at ten to twelve years. When the FIT for solar PV was announced, this proved to be a distraction from planned activity, but provided a perfect upgrading opportunity for stock that would also provide an income stream for the future.

For the proposed RHI, Wiltshire Rural Housing Association is patiently waiting to hear whether air source heat pumps are likely to be included. Where Green Deal is concerned, the association does not expect to benefit greatly. Its

housing stock already has an above average SAP rating of 88. All cavities and lofts have been insulated and boiler upgrades have been installed on a strict rotating programme.

Because of Wiltshire Rural Housing Association's business objectives and as a result of its small size, it is able to manage its stock portfolio efficiently and effectively to the benefit of tenants, which in turn enables it to charge a higher than average rental. Furthermore, it is clear that the housing association is well connected both in terms of benchmarking against peers and others, and seeking and giving advice. This continual information flow around different groups is a benefit to all parties.

Joseph Rowntree Housing Trust

Introduction

Joseph Rowntree Housing Trust provides social housing for a number of communities in northern England, particularly in York. Energy efficiency and microgeneration measures were modelled in scenarios in three streets in its New Earswick model village, and potential FITs revenue from PV installations were modelled in a new-build development.



Modelled scenarios

Using NHER software, three retrofit scenarios were modelled for these properties, as shown in Table A4, with a number of archetypes in each street (such as mid-terrace house, mid-terrace bungalow, semi-detached house).

Table A4: The three scenarios modelled

Scenario	Hawthorn Terrace (early 20th century)	White Rose Avenue (1950s build)
1	Heating and fabric upgrade: condensing boiler and heating controls, double glazing and dry lining	Heating and fabric upgrade: top-up loft insulation (where not already present), double glazing, condensing boiler
2	Additional insulation: all the measures above, and floor insulation	Additional insulation: all the measures above, and floor insulation
3	Microgeneration: all the measures above, and solar thermal and solar PV	Microgeneration: all the measures above, and solar thermal and solar PV

Savings

The three scenarios modelled achieve considerable savings. Scenario 3 in Hawthorn Terrace reduces fuel bills by 46–51 per cent and CO₂ emissions by 53–60 per cent. Scenario 3 in White Rose Avenue reduces fuel bills by 47–60 per cent and CO₂ emissions by 57–70 per cent per year. This relates to potential annual savings per property of £648–1,372 on fuel bills and 2.8–6.4 tonnes of CO₂ emissions.

Both archetypes in Hawthorn Terrace would reach an EPC rating of 'C' in Scenario 1 and a 'B' rating under Scenario 3. In White Rose Avenue, all properties meet a 'C' rating in Scenario 1, one archetype reaches a 'B' rating in Scenario 2, and all reach 'A' or 'B' ratings by Scenario 3.

The mid-terrace houses in both streets perform best. The end-of-terrace bungalow and house perform worst in White Rose Avenue, and the semi-detached performs best in Hawthorn Avenue.

PV savings

PV panels alone would generate annual fuel bill savings of £59–83 per property (assuming 25 per cent of electricity generated from the panels is used).

Costs

Installation costs per property for White Rose Avenue are £10,000–23,000 and for Hawthorn Terrace they are £13,000–28,000. Because of these high installation costs, none of the scenarios could be wholly met by Green Deal finance (which has a limit of £10,000). However, installation costs in Scenario 1 for the mid-terrace house and mid-terrace bungalow are only marginally above the threshold of £10,000; based on £10,000 installation costs in this scenario would meet the Golden Rule.

RHI and FITs present an opportunity to raise revenue which is comparable per property with the fuel bill savings made under the scenarios (per property savings of £100–200 for RHI and £200–300 for FITs). However, New Earswick has conservation area status and planning permission would be needed for some measures.



PV schemes tend to pay back within 16 to 23 years, depending on whether they are funded through capital reserves. In some cases, a commercial loan makes the scheme financially unviable.

Social equity

Strategies to ensure that retrofit programmes create social equity may include focusing on those properties with the highest energy bills: the end-of-terrace bungalow and mid-terrace bungalow on White Rose Avenue and the semi-detached houses on both streets. However, Scenario 1 would reduce the variation in annual fuel bills across the archetypes substantially. Other methods could include investing RHI/FIT income in improvement measures or raising rents to equalise rent and energy bill payments.

Tenant feedback

Research shows that tenants are most concerned with double glazing and draught proofing. One tenant had recently refused dry lining because of the expense of redecoration and the reduction in room size. The majority of tenants were happy to contribute to the installation costs of energy efficiency measures if this was administered through the housing trust.

Housing Association feedback

Joseph Rowntree Housing Trust's main focus in the next three years is retrofitting the hard-to-treat stock and looking at other properties that have low SAP ratings. This includes solid wall properties in New Earswick, and the trust is currently carrying out a programme of refurbishment in some of these properties, including the installation of dry-lining wall insulation and double glazing.

Other than that, the renovation of properties has to date focused on 'basic' measures such as loft and cavity wall insulation. Much of the New Earswick site is in a conservation area and there are a number of Listed Buildings, making the energy efficiency and microgeneration options limited. The housing trust's target for its existing improvement programme is for properties to reach a SAP rating of 74 ('C' rating). An advanced programme may look at improving stock to a 'B' rating (SAP of 81).

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