

FUTUREFIT

FINAL REPORT PART TWO

An insight into the retrofit challenge for social housing

July 2013



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FUTUREFIT FOREWORD



A great deal has changed since the release of the first FutureFit report. Instead of being eradicated, latest projections show fuel poverty is expected to affect 3 million households by 2016. The Green Deal is now live, as is the new Energy Company Obligation (ECO).

There are still a number of questions around retrofit in the UK, particularly for social housing providers. This report does not answer all those questions. It does, however, offer insight into the potential impact of retrofit at a key stage in the development of both ECO and the Green Deal, based on the indicative findings from a sample of Affinity Sutton properties.

The first FutureFit report showed us how difficult it can be to engage people on energy efficiency and the higher than anticipated costs to install works. It also showed us how well positioned the social housing sector could be to deliver wide-scale retrofit.

This second stage report highlights similar pitfalls and benefits with retrofit. On the one hand it confirms the unpredictability of an individual household's energy consumption and the challenge in tracking how much energy anyone actually uses from one year to the next. It also flags the potentially serious consequences of using the Standard Assessment Procedure (SAP) as a modelling tool for retrofit in existing homes. In terms of policy it adds to the evidence of under-heating in social housing and the vital need to include the sector in the Affordable Warmth element of ECO.

Crucially though, it shows that retrofit does work and that taking a fabric first approach can have a real impact on a household's gas bills. The results also start to support the use of lifestyle advice around reducing energy use in the home.

Very few studies of energy bills before and after retrofitting social housing are in the public domain. This report is a major step forward for the sector in showing how retrofitted properties actually perform and how residents find living with the effects. But it is very much a starting point from which much more investigation is required. And although the results make it clear why Affinity Sutton is not currently supporting the Green Deal in our homes, this report sets out why it is so important to find a way to make it work for the very people who need it most.

The social housing sector must respond to the issues raised by this project and look to the future of how retrofitting can be funded and made to work, reducing carbon emissions and energy costs for some of the poorest in society is a priority for us all.

Keith Exford
Group Chief Executive
Affinity Sutton

FUTUREFIT EXECUTIVE SUMMARY



We started the FutureFit project to give us evidence and real insight into the retrofit agenda, which is becoming an ever greater issue for government as they seek to achieve their carbon targets.

If we have homes that meet high energy efficiency targets, residents will have access to warm and comfortable housing that is affordable to run. Lower fuel bills for residents should mean less fuel poverty and more sustainable tenancies. In a time of economic hardship and welfare reform this is crucial.

The first FutureFit report attracted widespread interest and has been instrumental in driving our reputation as a leading force in retrofitting social housing. The second stage of the project was to monitor households where retrofitting work and/or energy advice had been given to understand the actual impact on residents' bills. This ran alongside our decision not to support the Green Deal, as we believe that debts being built up by residents for energy improvement work would not necessarily be matched by equivalent savings in their bills.

Retrofit can be successful, but overall savings were not across the board. Identifying these savings was extremely challenging; estimated bills, a warmer winter and energy bill increases are just some of the issues that made savings unclear for our team of analysts, let alone residents. Sixty per cent of households with valid results showed an increase in electricity usage after the works, something which is highly unlikely to be related to the largely fabric improvements we installed. Indications from our follow up visits with residents are that the reasons for this could be multiple, from being indoors more due to the weather to buying new appliances.

Also the actual savings often differed significantly from what the SAP model (used in FutureFit) predicted. In three out of four cases SAP over predicted the savings. Reasons for this were wide-ranging and included overestimating the household's existing energy use, which suggests that social tenants are likely to be under heating their homes. Although there have been updates to SAP since FutureFit and in-use factors are applied to the Green Deal assessment, these do not account for the scale of the difference. We welcome the role of the Occupancy Assessment in the Green Deal to try to further address this issue of variance. However, this evidence supports our concern that the Green Deal may still not realise the savings necessary for it to work for our residents. Furthermore the results suggest that for the impacts of retrofit to be equitable, social households must have access to the Affordable Warmth element of ECO.

These findings have helped Affinity Sutton create an informed policy on retrofit through an Energy Efficiency Standard – a target for all our homes to reach by 2020 in a bid to reduce fuel poverty amongst our residents. But a key aim is also to help inform the debate on the best way forward for energy efficiency policies in the social housing sector so that the full potential for wide-scale retrofit can be achieved – that is reaching the carbon targets, stimulating a workforce in our supply chain and starting to combat fuel poverty.

Jeremy Kape
Director
Affinity Sutton

THE FUTUREFIT APPROACH



The UK is legally required to reduce its total carbon emissions by 80% by 2050, with an interim target of 34% by 2020. More than a quarter (27%) of the UK's carbon emissions come from our homes. Making existing homes more energy efficient – retrofitting – has been identified as one of the biggest contributions we can make towards meeting these targets.

WORKS

Twenty-two common types of housing were identified across Affinity Sutton's stock, representing around 75% of England's total housing stock. A total of 102 homes fitting these archetypes were retrofitted around the country using one of three packages of work, led by budgetary targets, not CO₂, and following the energy hierarchy: low (£6,500), medium (£10,000) and high (£25,000). Existing supply chains were used to assess homes and carry out the works.

LIFESTYLE ADVICE

Half of the 102 homes, and an additional group of 50 homes, then took part in FutureFit Living, a programme of energy lifestyle advice delivered throughout the monitoring period, but with a focus on the heating season. The approach taken matched that of the works, in that advice was delivered through existing communication channels and, for this part of the project, no significant budget was used, in order to reflect a realistic future delivery scenario.

Interventions included:

- A welcome visit from a contractor resident liaison officer with our 'energy saving house' leaflet.
- Installation of an energy display meter.
- Installation of a thermometer card indicating optimum temperature for the home.

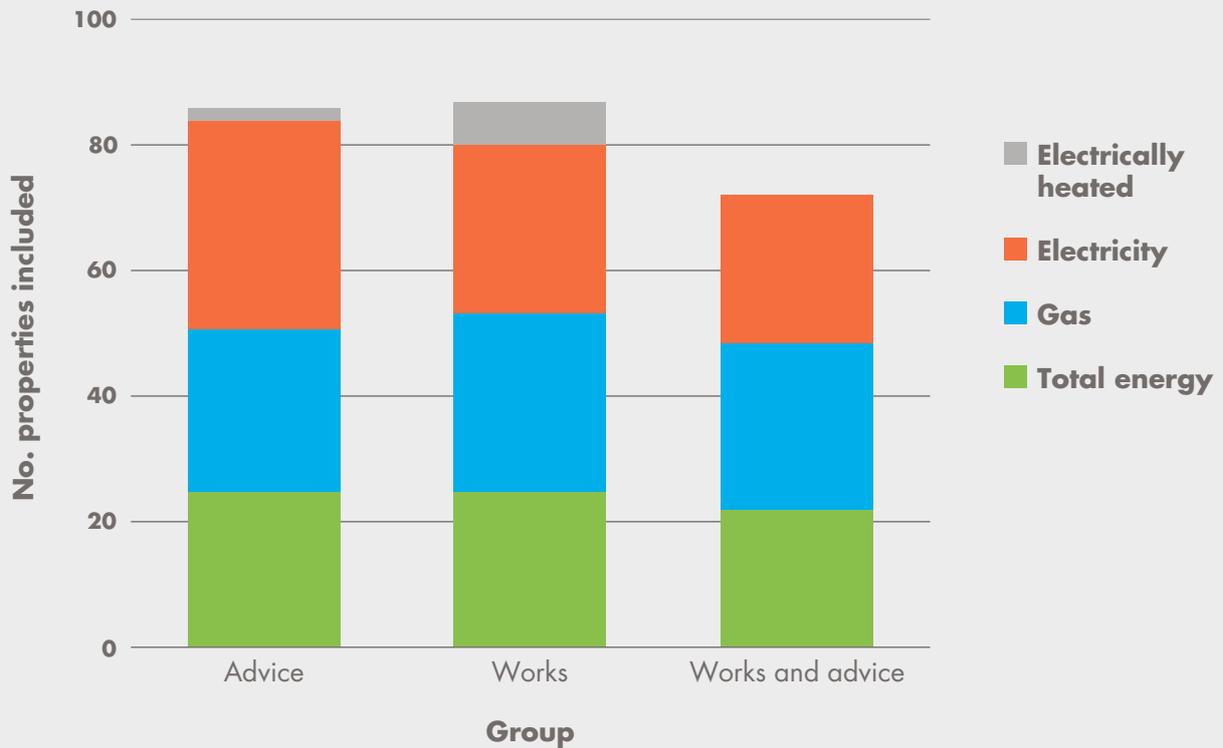
- Gas contractor visits, which would form part of their annual gas safety visits to ensure residents understood how best to use heating/hot water systems.
- A set of stickers to attach to appliances around the home illustrating how much money could be saved by switching these off.

MONITORING

All 150 homes taking part in the scheme have been equally monitored:

- Where possible, energy bill information from the year prior to the works or lifestyle advice programme was collected from energy companies, following signed consent from residents.
- A pulse gas meter, electricity meter, internal and external temperature gauge and data logger were fitted to all properties taking part.
- Data from all these sources was sent remotely to a website, which provided the main source of information for analysis.
- Residents completed questionnaires about their perceptions of any improvements or changes.
- Repairs for the properties and any calls from FutureFit residents were logged.

FIGURE 1: NUMBER OF PROPERTIES WITH VALID ENERGY USAGE DATA



ANALYSIS

The results were analysed in partnership with Verco, Baily Garner and Parity Projects. A rigorous and independent approach was taken to ensure the results were as reliable as possible. The previous year's energy bills (where available) were used as a baseline. Information from the monitoring equipment was adjusted, where necessary, to account for differences in location and weather (using degree days) and then compared with the baseline. These 'after' results were also compared to the predictions made during the first stage using SAP 2005 to see how theoretical savings compared to the reality. We are also currently carrying out follow-up visits with residents via our contractor, Keepmoat, to further investigate the results of the project.

A standard rate was used for energy costs, as individual household tariff information was not collected (4.43p/kWh and 14.48p/kWh for gas and electricity respectively, DECC Dec 2012). Temperature readings were used to understand potential under-heating trends. All of the energy use findings were then compared to

responses in the surveys to understand how residents' perceptions related to their actual usage.

Of the 150 properties that took part, only those with the most robust data possible were selected for analysis (full details of this process can be found on our website). Excluding properties where residents had moved during the monitoring period, we received **64** works responses and **74** lifestyle responses to the resident surveys. In terms of energy use, there were: **82** properties with reliable gas data, **94** with reliable electricity data and **81** with both. These break down as follows:

	Total energy	Gas	Electricity	Electrically heated
Total retrofitted	47	56	51	7
Total properties	72 (+9 electrically heated)	82	85 (+9 electrically heated)	9



This approach to analysis has resulted in a reduced number of properties whose findings have been included in this report. This means that we are confident that the results reflect reality as much as possible.

ENERGY USE FINDINGS



This section reveals the key findings in terms of savings: how hard these were to identify, what they were and whether they differed from the modelling

IDENTIFYING SAVINGS: THE CHALLENGES

This step in the process towards the final stage of FutureFit proved challenging. Identifying energy use before and after, then correctly and fairly comparing the two, was a difficult task, even with a project team of analysts.

This is an important learning point for a Pay as you Save (PAYS) scheme like the Green Deal, where individual householders will have to make these calculations themselves to find out if they have saved money or not.

KEY FINDINGS:

- Energy providers were unable to share all bills even with resident consent.
- **41%** of bills were based on actual meter readings, for the rest it was either unknown or estimated readings, introducing a level of potential inaccuracy to the results.
- Direct debit arrangements can mask actual energy usage.
- A warmer/colder winter period could have potentially distorted findings.
- **13%** of residents felt 'unsure' as to whether they saved on their bills or not, some explicitly stating it was because of the warmer winter.
- There were a few issues with residents switching off monitoring equipment.



Customers of a scheme such as the Green Deal would expect to see either savings on their bills or for their bills to stay the same once a charge has been added. Tracking the actual impact of any works in reality is very difficult. This means that people may end up feeling worse off after any works, even if they have in fact made savings. Until a clear and transparent method is implemented for customers to identify and understand their energy use, the success of a scheme like the Green Deal will be hard to measure.

LOCATION OF FUTUREFIT PROPERTIES

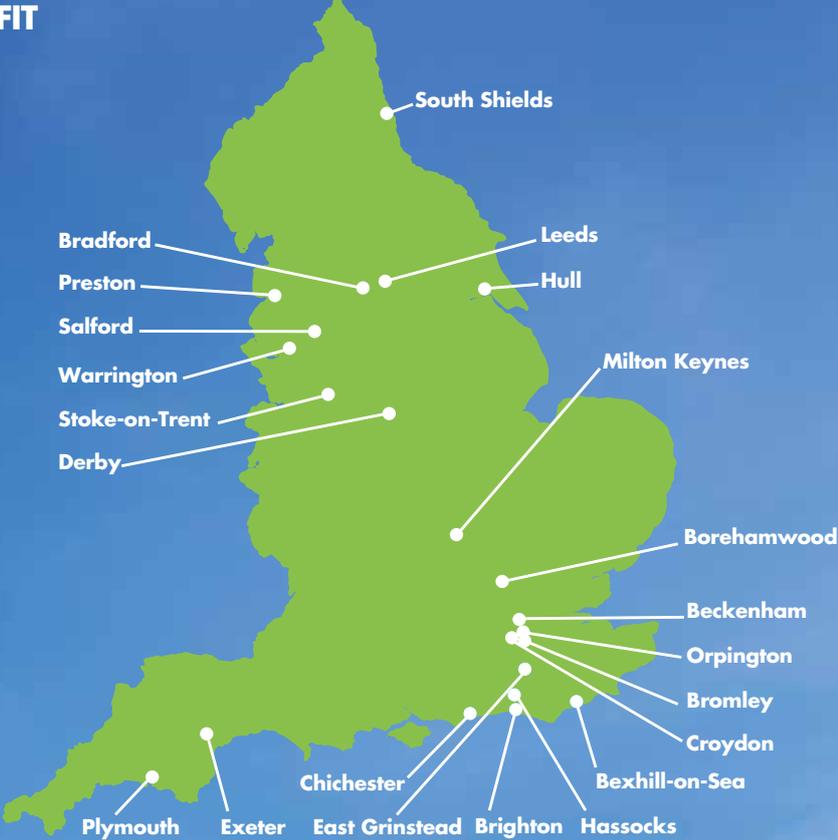
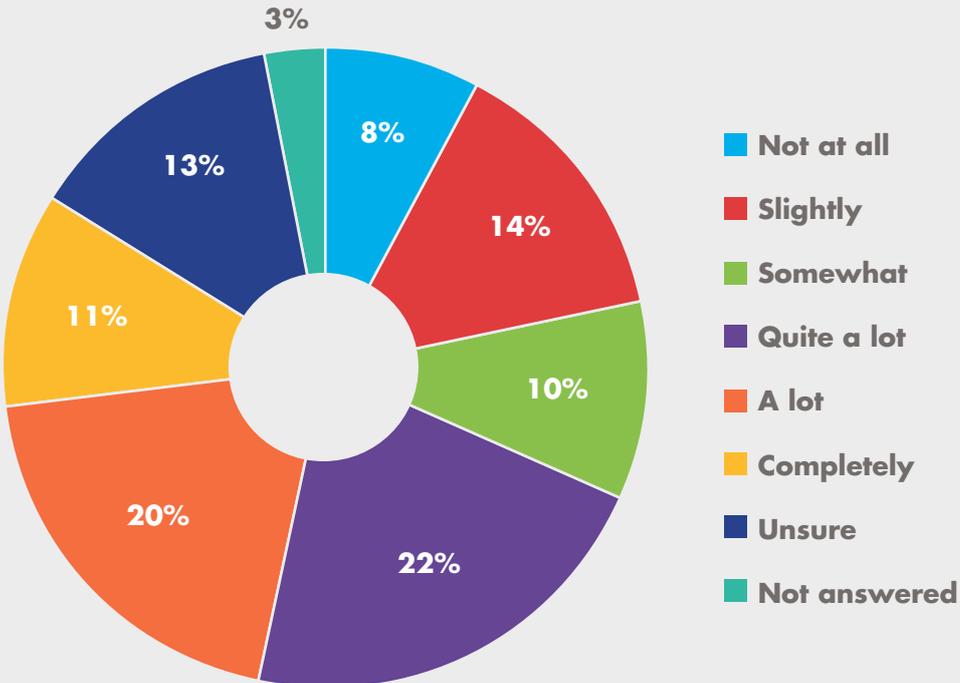


FIGURE 2: DO YOU THINK YOU'VE SAVED MONEY ON YOUR BILLS?



THE SAVINGS: DID THEY, DIDN'T THEY AND BY HOW MUCH?

Once identified, arguably the most crucial part of the project could then take place: finding out if residents saved and, if they did, by how much. For a PAYS scheme, this is the lynch pin. For anyone housing low-income residents already in, or on the cusp of fuel poverty, it's even more important because the consequences of not saving could be severe.

KEY FINDINGS:

Total energy

- **57%** of all FutureFit residents with valid data saved on their total energy bills.
- On average, the amount they saved was **£49 a year**.
- These figures were significantly affected by increased electricity consumption as electricity is more expensive than gas.
- Overall the results indicate that lifestyle advice has an impact:
 - Advice saved **5%**
 - Works saved **8%**
 - Works and advice saved **13%**.

Heating

- Taking a fabric first approach does work: **80%** of the works group saved on their gas bills, showing the reduced need for heating.
- On average the works group saved **15%** or **£72 a year** on their gas bills.
- The seven retrofitted electrically heated properties with valid data all saved, on average, **£557 a year**, with one household saving **£1,470 a year**.
- There were a number of properties that significantly increased their gas use. Further investigation of these is ongoing as there is no clear reason for this and the resident feedback suggests they felt they had made savings.

The lifestyle advice

- Lifestyle advice does seem to have an impact on gas bills:
 - Advice saved **6%**
 - Works saved **10%**
 - Works and advice saved **13%**.

The packages

- There appeared to be **no higher gas savings** associated with the medium packages of works. These packages contained more intrusive insulation (such as floor insulation) and/or new doors or windows.
- This highlights the issue of diminishing returns on additional works.
- On the whole, there was no trend in resident feedback to suggest that those who had the medium packages felt warmer than those who had the low packages.
- The majority of the high packages were installed to void properties, therefore baseline data was not available.

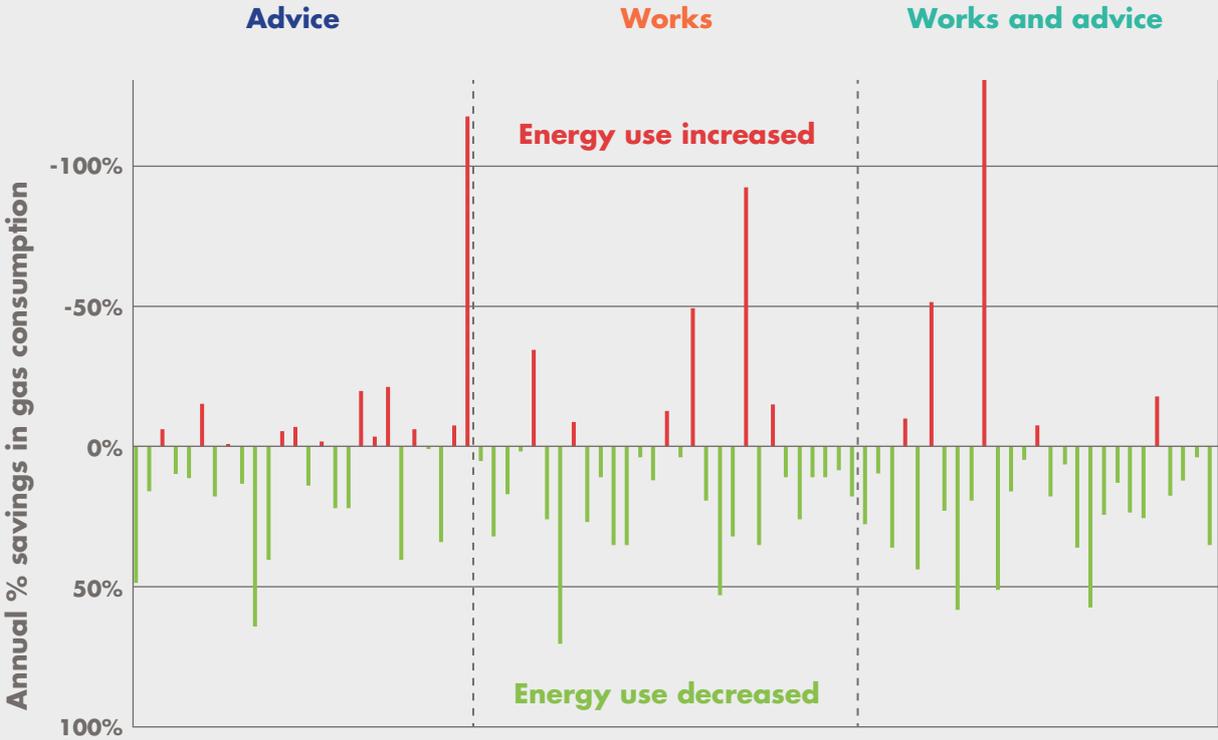
Archetypes

- Older, larger properties were the best performing.
- Archetype 7 (1930-1949 house with cavity walls), the only archetype to show a positive NPV in the first report's financial modelling, is included in this group.

Electricity

- Only **40%** of the FutureFit properties saved on their electricity bills.
- The remaining **60%** increased their usage.
- On average there was an increase of **£19 a year**.
- This is not the full story, as the spectrum was between **plus and minus £200**.
- Confusingly, the advice group, on average, did not save on their electricity bills, despite much of the advice being tailored to this end.
- Also, the works group did not save, even though the works installed aimed to reduce heat loss through fabric improvements and so would have had minimal impact on the electricity consumption:
 - Advice increased by **10%**
 - Works increased by **10%**
 - Works and advice saved **2%**.
- This shows the effect of advice cannot be guaranteed, based on electricity consumption, but that it is advisable to include advice alongside any works.

FIGURE 3: GAS USE IN GAS-HEATED PROPERTIES: ANNUAL SAVINGS IN %



These results show that retrofitting using a fabric first approach does work, with significant savings for electrically heated properties in particular. Lifestyle advice also appears to have an impact on gas bills. However, the fact that only just over half of the residents made savings is less encouraging. Also, the fact that electricity consumption increased highlights a challenge for reducing energy use in the home. It does appear to follow findings from other sectors, such as the EST's 'Powering the nation' report, showing higher than assumed electricity use in owner-occupier households.

DID SAVINGS MATCH THE SAP PREDICTIONS?

SAP is well established as the energy modelling tool for new build properties. It is now also the central tool in the Green Deal assessment process to predict what savings can be made in a home from energy efficiency improvements. Assessing how properties fared against the predictions of this model was an important part of the process.

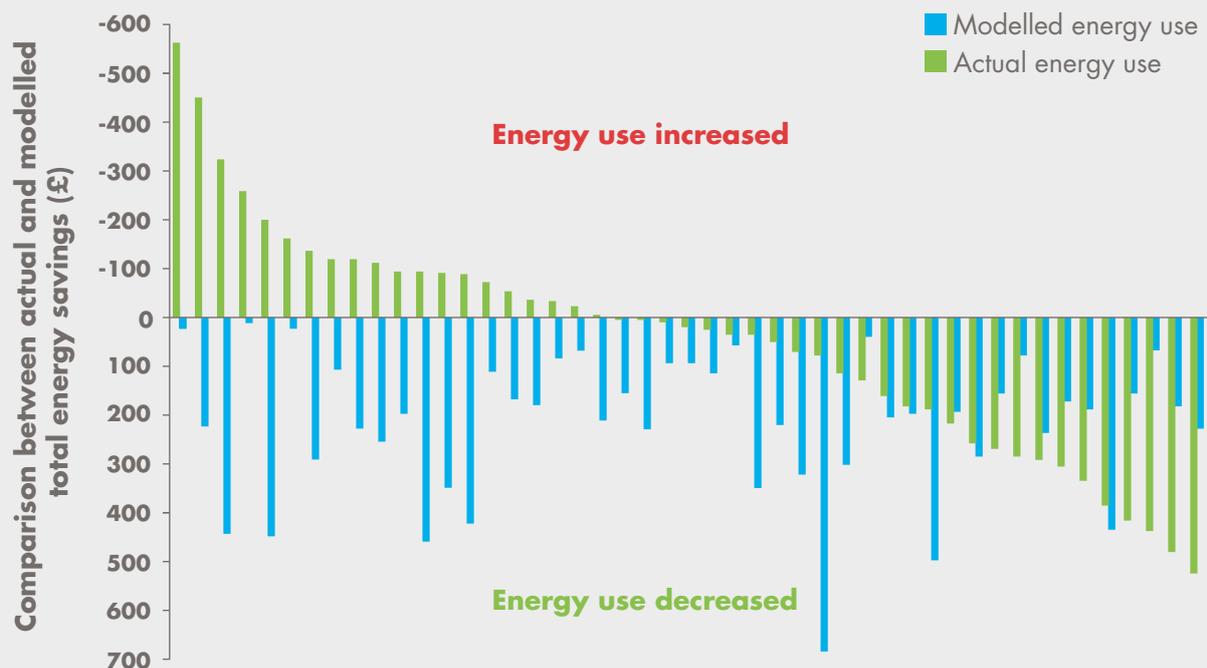
KEY FINDINGS:

- The SAP model used in FutureFit over-predicted the savings by an average of **77%**:
 - Average saving in gas heated properties was **£49 a year**.
 - Average SAP modelled savings in gas heated properties was **£217 a year**.
 - Difference: **77% less than predicted**.
- The overall difference ranged from over-predicting by **£759** and under-predicting by **£367**.
- For gas savings alone, the difference was lower, but still significant, at **53%**.
- Despite the potential mitigating impact of the Occupancy Assessment, this scale of variance suggests the 'golden rule' calculation the Green Deal rests upon is not entirely reliable, even when SAP model updates and the Government's in-use factors have been applied.
- If a weighted average is applied across Affinity Sutton stock in terms of electrically heated properties to gas heated properties, **61%** of our homes would save on their bills, but only **24%** would realise predicted SAP savings.
- This suggests that only **one in four** Affinity Sutton properties would be likely to benefit from the Green Deal.



FutureFit has found that SAP is not an accurate modeling tool for existing homes. Some steps have been taken to combat this inaccuracy in the Green Deal assessment process. But these are unlikely to fully resolve the issue. This makes the Green Deal a lottery for our residents. A few may benefit, and even fewer may do even better than expected, but the majority are likely to lose out with energy savings less than the annual Green Deal payments.

FIGURE 4: OVERALL ENERGY USE: MODELLED ENERGY SAVINGS VS ACTUAL ENERGY SAVINGS (£)



IF NOT, WHY NOT? UNDER-HEATING, TECHNOLOGY AND SAP OVER-PREDICTIONS

Further analysis has found a number of potential reasons why the projected savings did not match reality. We are looking into other possible reasons via follow-up visits with residents. The first ones carried out have already revealed insights, such as increased use of tumble dryers due to wetter weather. But no single reason appears to explain the extent of the performance gap between theory and reality.

KEY FINDINGS:

- SAP's 'standard usage' does not reflect low users of energy: in FutureFit it over-predicted baseline gas use by **50%**.
- The latest version of SAP is not expected to change this baseline.
- For the gas figures, the application of the Government's in-use factors reduce the predicted savings by **15% to 25%**.
- This is less than half the gap identified in FutureFit between SAP modelled gas savings and actual gas savings, which was **53%**.
- This suggests that performance of the measures could be only part of the picture.

- Based on resident surveys, one potential reason for the unrealised heating savings could be the difficulty experienced in using some of the installed equipment (eg zoned heating).
- Potential lifestyle changes in the household could also have resulted in increased energy usage – for example, one property underwent a mutual exchange between a single person and a family.
- There was some evidence of under-heating for certain properties: **three of the properties** that had the highest unrealised SAP savings were also in the bottom third of households that were keeping the heating on the least time and to the lowest temperature.

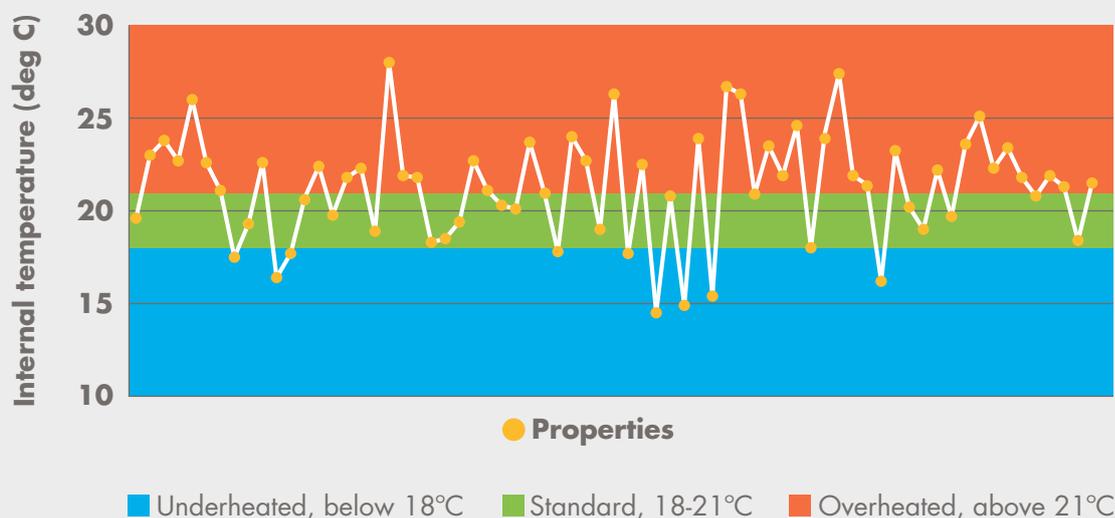
	Average (Dec 2011-Feb 2012)	Range
Max internal temperature	21.6°C	14°C to 26°C
Time heating on	26%	10% to 45%

- One reason could be that residents were over-heating homes after the works (ie comfort take). Pre-works internal temperature was not recorded, so this cannot be confirmed, but the upper end of the temperature range does suggest that some homes are maintained at a high temperature.



The reality is likely to be that a combination of all these factors has contributed to the over-predictions of SAP. This confirms the first report's findings that there is no such thing as a 'standard' energy user, making accurate predictions of savings a challenging task.

FIGURE 5: AVERAGE PEAK INTERNAL TEMPERATURE DURING WINTER MONTHS



LIVING WITH RETROFIT



The savings only tell part of the story, the residents' perspective is also crucial. This section covers resident feedback about the effects of the project and identifies some unintended consequences.

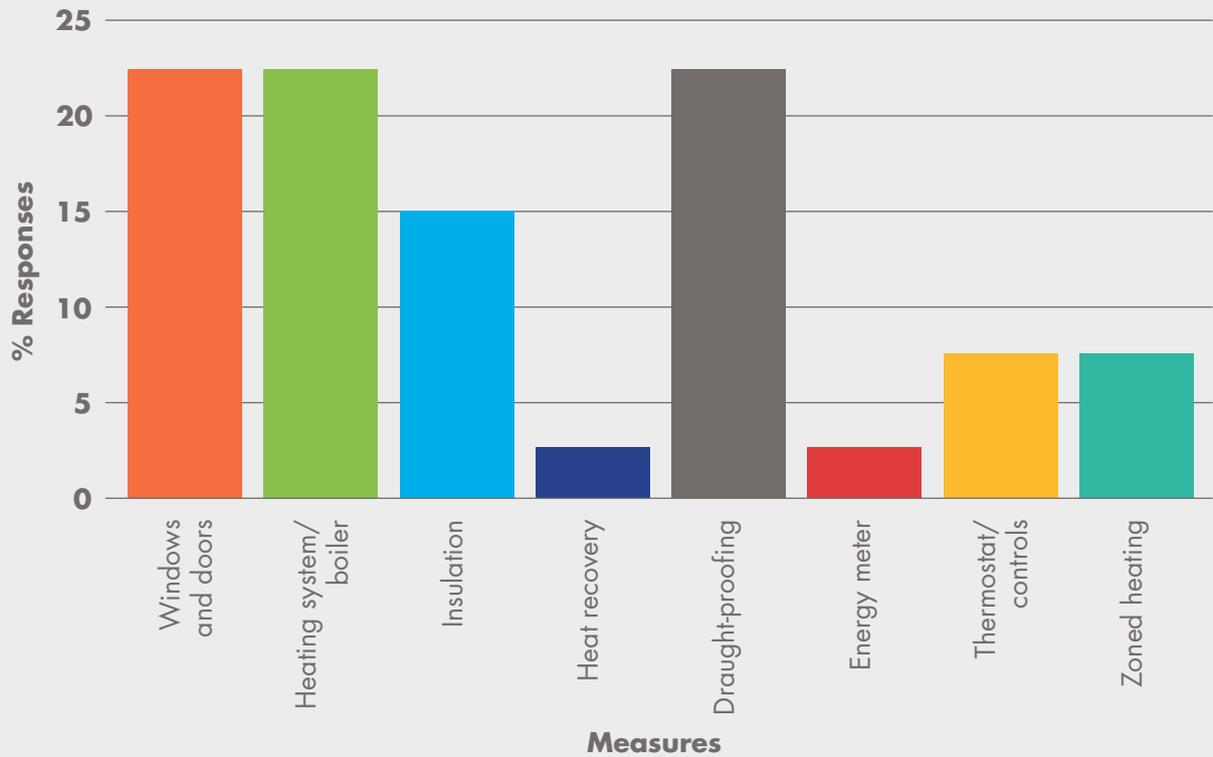
HOW WAS IT FOR RESIDENTS?

Understanding residents' perceptions was key to the analysis. As well as gaining an insight into how perceptions matched reality, it started to show us how residents felt about living in a retrofitted home.

KEY FINDINGS:

- The majority of all groups felt 'completely' that the project was worthwhile.
- **73%** felt their homes were warmer since the works took place.
- **59%** of the reasons given for feeling warmer were related to fabric improvements (windows/doors, insulation, draft proofing).
- **80%** felt better equipped to live in a more energy efficient manner after receiving lifestyle advice.
- In contrast to actual results, **77%** of the works respondees, and **65%** of the lifestyle respondees, felt they saved at least some money on their bills.
- The survey responses for the properties that increased their gas bills the most, showed that even these residents tended to feel they saved money post intervention.
- This could be a reflection of the adjustments made for weather in the FutureFit results, as actual bills costs were not recorded. This just reinforces the difficulty in identifying savings: even if energy savings are made, due to varying costs, it does not necessarily follow that there are bill savings.

FIGURE 6: RESIDENTS' PERCEPTIONS OF WHICH WORKS WERE THE MOST EFFECTIVE IN MAKING HOMES WARMER



A resident's perception of their energy use pattern can be very different from reality. Where a charge is attached to the works this may differ, as residents might be more conscious of what they are paying. This supports the earlier findings about the difficulties in identifying savings. But it's also clear that residents have, on the whole, felt a positive impact from the works, even where savings weren't made.

WARM, AIR TIGHT BUT UNHEALTHY HOMES?

As well as understanding any benefits residents felt, it was important to know if there were any other consequences of the project. All FutureFit works properties had air tightness measures carried out. These were paired with appropriate ventilation systems, an approach that will not necessarily be taken under the costs-led Green Deal. Despite this, there were still some issues with damp, mould and condensation in certain properties. For one particular household, this led to all the works being removed, despite several weeks of engagement around their lifestyle.

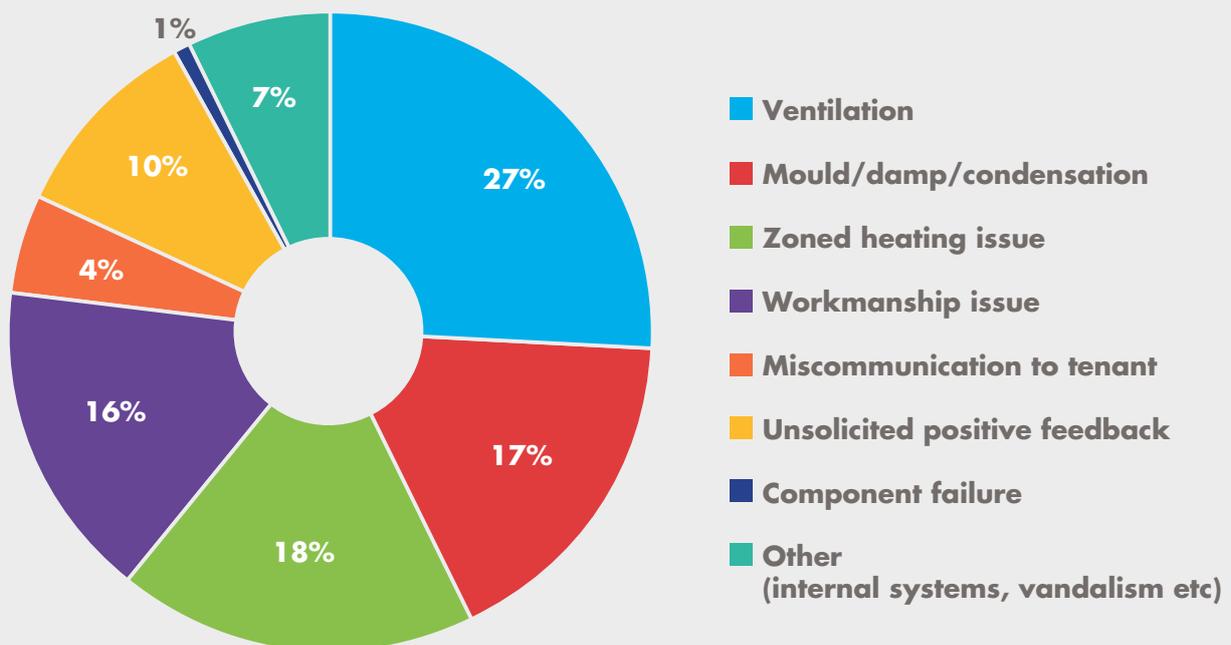
KEY FINDINGS:

- Total of 78 issues reported at 55 properties.
- **27%** were issues related to ventilation systems.
- **17%** directly related to damp, mould or condensation.
- These issues were often reported together.
- Perception that heat recovery ventilation was "too noisy" and used more energy.
- Ventilation is a complex topic, with ingrained behaviours attached.
- One resident specifically stated that the ventilation was not sufficient and that making her home warmer had only made it unhealthy, as all the fresh air could no longer come in.



Residents must be engaged when we are carrying out energy efficiency works that might alter the environment of their home in any way. Otherwise, there is a strong possibility that PAYS schemes will leave a legacy of damp, unhealthy homes that cost significant amounts in repairs and maintenance.

FIGURE 7: POST WORKS ISSUES LOG



UNDERSTANDING TECHNOLOGY AND UNDERLINING THE SKILLS GAP

Alongside the specific issues with air quality, it was important to know if there were any trends in the repairs required in the properties after the works. Performance of individual measures was not monitored. But, by logging repairs and resident contact after the work, we were able to find out how the installation of the measures fared and how residents found living with them. By far the main issue in this area was around zoned heating.

KEY FINDINGS:

- **18%** of issues reported were due to problems working the zoned heating.
- **16%** were as a result of incorrect installation.
- This supports the first report's findings that installing zoned heating is not as straightforward as first assumed.
- Issues were often not reported until the start of the heating season.
- Residents reported problems working the systems, especially wireless Thermostatic Radiator Valves (TRVs).
- Zoned heating often had to be re-set when other gas works/checks were being carried out and heating engineers unfamiliar with the system sometimes replaced them with older versions.
- Wireless TRVs require battery replacements and resident expectations for replacement needed to be managed.



This lack of understanding of technology was flagged during the first report, both in terms of resident and workforce engagement. The findings throughout the monitoring period underline this issue, and the need to ensure end-to-end education of any form of technology that is fitted, from installer to maintainer through to the resident. This is especially true when considering that arguably no highly complex technology was fitted during FutureFit, with zoned heating being the most complicated.

FUTUREFIT FINAL CONCLUSIONS



A lot has been learnt from FutureFit, from the issues with SAP to the clear benefits of fabric improvements. Here we lay out our conclusions.

- A fabric first approach does work and residents, on the whole, have felt benefits from living in a retrofitted home.
- Identifying energy savings was challenging and there needs to be more transparent mechanisms to show energy usage in the home.
- Electricity use is unpredictable. Adding the Green Deal charge to the electricity bill will make identifying savings even harder and could result in bad press for the policy.
- Condensation can increase after retrofit works, even when appropriate ventilation is installed, due to lifestyle. Knock-on effects of improving air tightness must be considered in any lifestyle advice/resident engagement to prevent these issues.
- There are repairs considerations to be taken into account up to, and beyond, a year after works due to skills gaps among installers and lack of consumer understanding of technology.
- Lifestyle advice around energy usage is low cost and can be effective, but may need to be tailored more to reducing electricity usage, since this is only minimally affected by any retrofit works, if at all.
- SAP is not an appropriate tool for a PAYS model and could result in negative consequences for three out of four Affinity Sutton residents if they were to take up the Green Deal.
- The funding gap between what energy savings would pay for in a PAYS model, and how much retrofit costs (as identified in Report 1) increases, as does the carbon gap¹:
 - Funding gap  from **£130m** to **£221m**
 - Carbon gap  from **26%** to **30%**

¹ Gap that needs filling to reach the 80% carbon reduction by 2050 when taking into account: 20% carbon savings from works already carried out on AS stock, greening of the grid and applying the low package of works adjusted to meet the golden rule across our general needs stock

FIGURE 8: MODELLED FUNDING GAP (FUTUREFIT PHASE 1 REPORT)

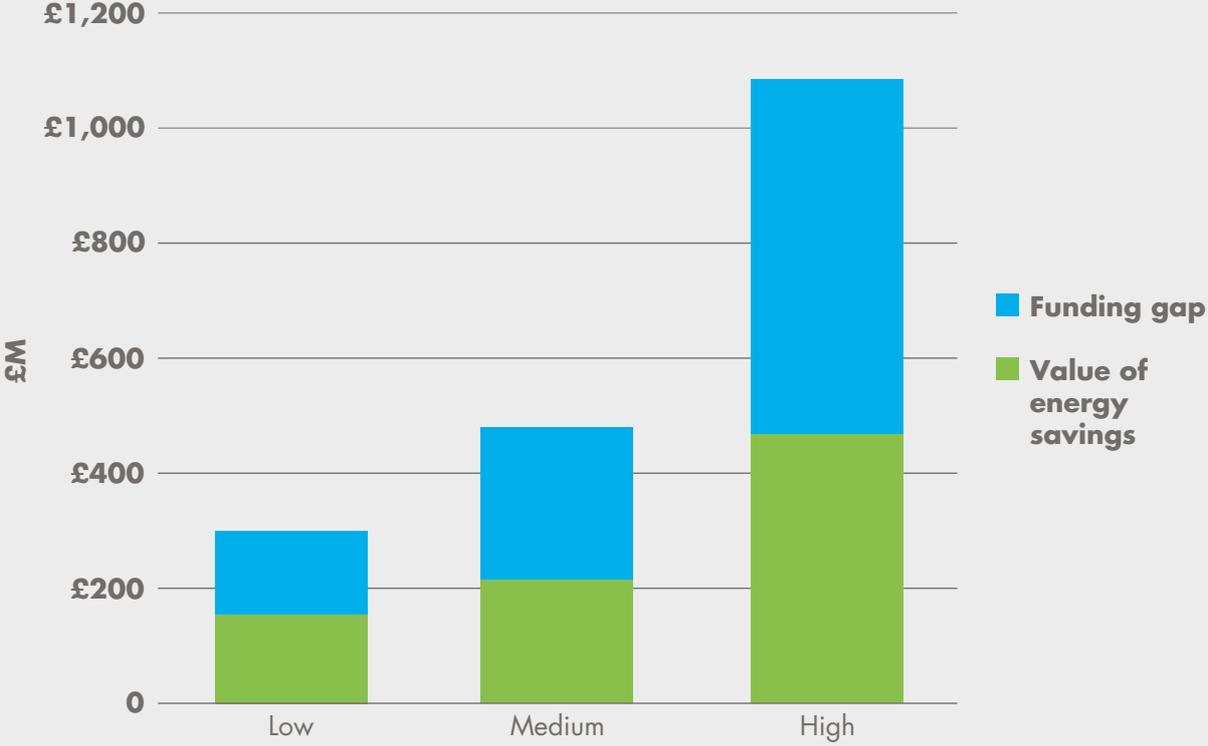
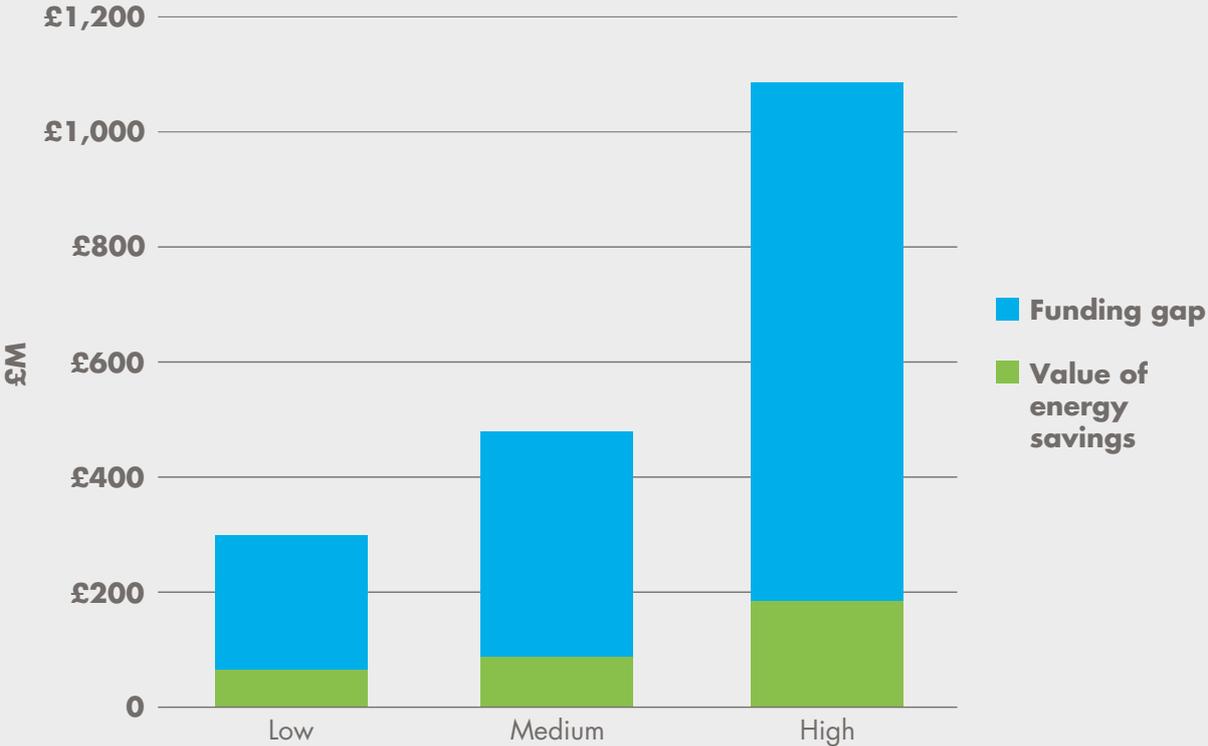


FIGURE 9: REVISED FUNDING GAP BASED ON MONITORING RESULTS



FUTUREFIT NEXT STEPS



This report has helped Affinity Sutton gain an informed position on retrofit. But this is just the start and there is lots more work for us to do to ensure our residents can afford to be warm and comfortable in their homes.

FutureFit's first report showed that the social housing sector offered a great opportunity to deliver wide-scale retrofit programmes to help combat fuel poverty and reduce carbon emissions from domestic housing with its established supply chains and on-going engagement with residents.

This second report has underlined the benefits of taking a fabric first approach, illustrating the often substantial savings that can be achieved on people's gas bills from retrofit. This will now shape our approach.

OUR HOMES

We will continue with our planned £4 million programme of works to install cavity and loft insulation in our properties, which will not be covered by the current ECO regime.

Our boiler replacement programme will be adjusted to maximise energy efficiency in our homes and will make the most of any ECO opportunities to ensure that none of our homes lose out by not taking up the Green Deal.

We will also work with the ECO funding scheme to maximise options to improve our hard to treat homes.

OUR RESIDENTS

We will further develop our energy lifestyle programme – EnergyFit. This will be enhanced and adapted to focus more on electricity usage in the home, following the

FutureFit findings, and will also incorporate learning from FutureFit Living. In addition we will integrate advice into the delivery of any works we carry out in residents' homes.

Linked to this will be our CommunityFit programme of community-centred energy lifestyle engagement, where a number of our community centres have undergone stakeholder-led energy upgrade programmes. These will provide energy learning centres for residents, local communities and the business.

AFFINITY SUTTON ENERGY EFFICIENCY STANDARD

All of these steps, taken together, will form an Affinity Sutton Energy Efficiency Standard, which we aim to achieve in all our homes by 2020.

GREEN DEAL

It is clear from these findings why Affinity Sutton has decided not to allow consent for the Green Deal, as it currently stands, in our homes. But this is not the end of the road for our relationship with this policy. As well as our Energy Efficiency Standard, Affinity Sutton will continue to work with the Government on forming a PAYS mechanism that works in social housing. We also recognise the key role that the Green Deal has to play in funding retrofit in the future and, despite our current concerns, we remain open to working with the policy in the future.

FUTUREFIT REPORT GLOSSARY



Carbon emissions: The carbon emissions factors used are 0.487 kgCO₂/kWh for electricity and 0.194 kgCO₂/kWh for gas consumption.

Energy Company Obligation (ECO) funding: ECO funding is available through energy suppliers and sits alongside the Green Deal, to provide financial uplift for hard to treat homes and vulnerable households where the Golden Rule will not work alone.

Energy unit costs: All energy cost savings are based on unit costs of 4.43p/kWh for gas and 14.48p/kWh for electricity (DECC Dec 2012).

Fabric first approach: When installing retrofit works, the energy hierarchy is followed meaning that works to the fabric of the building (air tightness, insulation) are carried out first, before addressing heating and hot water systems or installing any renewable technology.

Fuel poverty: A household is currently defined as being in fuel poverty if it needs to spend more than 10% of its annual income on fuel bills to maintain a satisfactory level of comfort in the home.

Green Deal: The Green Deal is the government's flagship energy efficiency policy. It is essentially a funding mechanism that will allow people to access a loan to install energy upgrade works to their homes. This loan is then repaid over a period of years through a surcharge on the home's energy bill, with the idea that the upgrade works will reduce the bills enough that the resident will still save money.

In-use factors: Adjustments applied to potential savings identified by SAP to allow for differences in performance of works between theory and reality. These have been applied to the Green Deal Assessment process.

Monitoring and analysis: The detailed monitoring and analysis report carried out with Verco is available on our website.

Occupancy Assessment: The Occupancy Assessment is a secondary part of the Green Deal assessment process which collects information about the household's specific energy use and behaviours. Its aim is to gain a better understanding of how the property is used and to provide a better indication of whether the recommendations in the SAP-based EPC (which are based on typical energy usage), reflect individual usage.

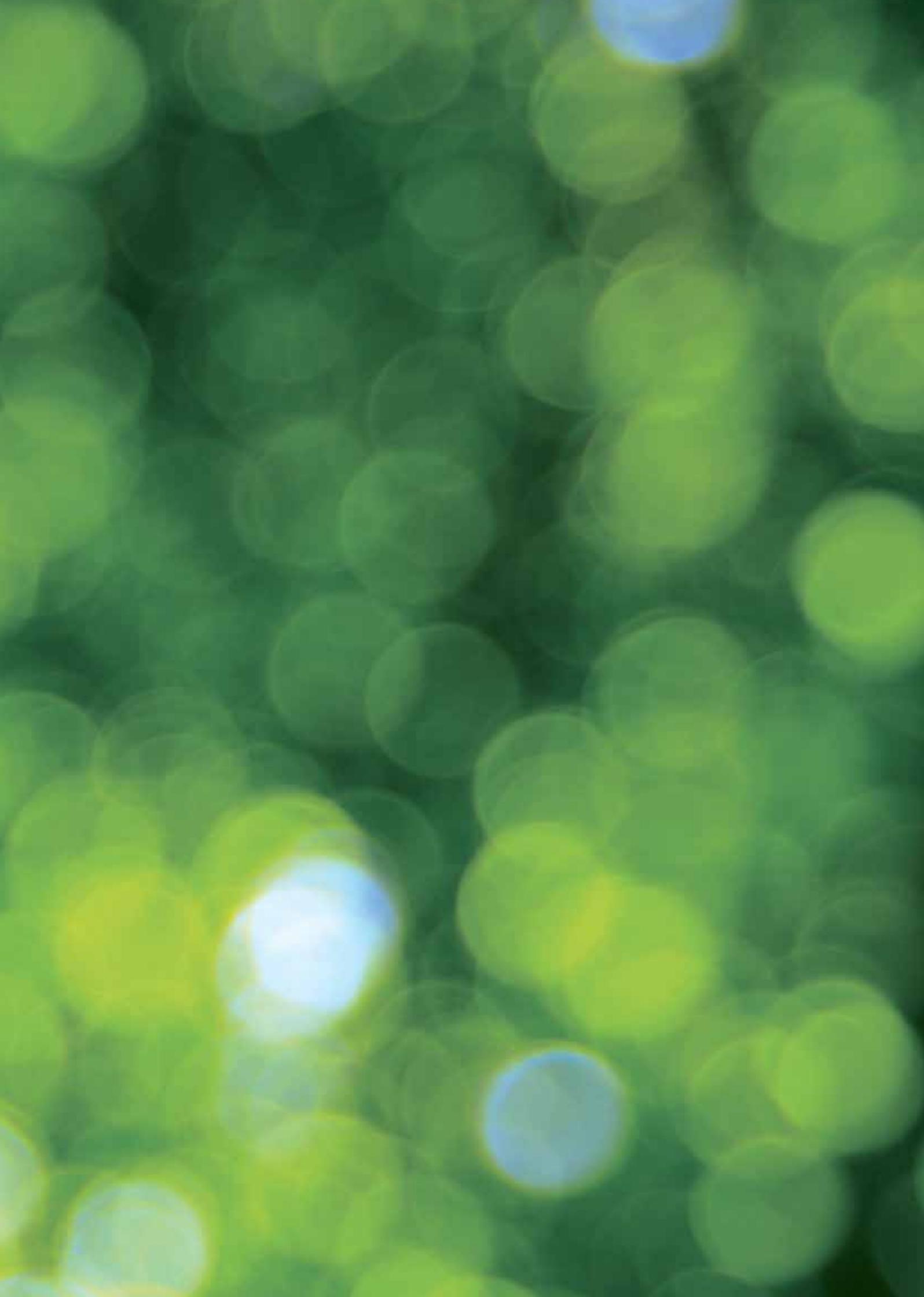
GLOSSARY (CONTINUED)

PAYS: Pay as you save – a scheme whereby a householder uses the savings from energy efficiency works to pay for the works over a period of time.

SAP: Standard Assessment Procedure.

Surveys: Examples of all surveys used in FutureFit are available on our website.

Warmer winter: A 'warmer winter' refers to the fact that, compared to the previous year, temperatures were relatively warmer. This was calculated by using 'degree days' which are a measure of how much (in degrees) and for how long (in days), the outside air temperature was below a certain reference level.



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