New Thames Valley Vision
Learning Outcome Report
Housing Associations
and Low Carbon Promotions
Scottish and Southern Electricity Networks (SSEN) is the new trading name of Scottish and Southern Energy Power Distribution (SSEPD), the parent company of Southern Electricity Power Distribution (SEPD), Scottish Hydro Electricity Power Distribution (SHEPD) and Scottish Hydro Electricity Transmission. SEPD remains the contracted delivery body for this LCNF Project.

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Executive Summary

The New Thames Valley Vision (NTVV) full bid submission [SSEPD 2011] defines the Successful Delivery Reward Criteria (SDRC) that must be met in line with the project milestones. This report addresses the criteria for SDRC 9.8(b)2 to promote Low Carbon Technologies (LCT) in local communities, specifically in the Thames Valley area.

The key topics covered within this report as defined by the SDRC evidence requirements are as follows:

- Funding issues and other vested interests;
- Strategy / objectives of the potential investor in LCT and the potential influence of the Distribution Network Operator (DNO); and
- Community benefits, including, but not necessarily limited to, energy and cost savings.

Scottish & Southern Energy Power Distribution (SSEPD) confirms that the SDRC has been met.

This report considers the view of different stakeholder groups with an interest in LCT. This includes LCT suppliers as well as those stakeholders who may invest in LCT. These potential decision makers may be divided into two distinct groups:

- Those who are responsible for managing a group of properties on behalf of tenants, such as professionals working for housing associations; and,
- Individual householders who are only able to make decisions which relate to properties in which they themselves live.

In reflection of this distinction, this report was produced based on information and insights gathered through two different types of activity:

1. A series of interviews was conducted with stakeholders with an interest in the implementation of LCT in social housing. These interviews were conducted with two groups:
   i. Providers of LCT-related equipment; and,
   ii. Representatives of housing associations which own and operate property in the Thames Valley area.

2. A number of events were held in the Bracknell area intended to promote LCT to domestic consumers and to small enterprises. The events took two principal forms:
   i. Low Carbon Promotion (LCP) events, which were open to casual members of the public and,
ii. Domestic Focus Group (DFG) events which were conducted with consumers who had agreed to engage in the NTVV project.

Whilst these activities were quite different in nature, the common theme was an attempt to understand the motivations behind implementation of LCT intended for use by small-scale energy consumers. This question is important to DNOs as the actions being taken by small consumers are having an increasing impact on the efficient and effective operation of the distribution networks. For this reason, DNOs have an interest in developing an understanding of the dynamics which affect these consumers as well as how these dynamics can be influenced. This is a complex question which requires an insight into the motivations and intentions of a wide range of consumers and other stakeholders. The lessons learned from this report will help DNOs to begin to answer these questions and give practical recommendations for further investigations and consumer engagement activities.

This work is being done in parallel with NTVV technical impact evaluation which is developing a model to determine the impact on the low voltage networks of a range of LCT uptake scenarios [SSEPD 2015(2)]. The trials reported on throughout this document will supplement that work; the information and insights gathered will support the process of developing future LCT uptake scenarios.

**Funding issues and other vested interests**

The interviews with technology suppliers and housing associations highlighted certain patterns. Funding is a consistent consideration with all housing associations and specifically any activities related to LCT are highly dependent on the availability and certainty of funding. A common source of frustration amongst housing association interviewees was recent inconsistency with respect to subsidies related to energy efficiency and LCT. Such inconsistency has made gaining approval for projects more complicated. This opinion was volunteered by two thirds of the interviewees, even though the questionnaire did not contain a specific question on this topic. The technology providers made a similar point in that they felt subsidy schemes needed to be more consistent in order to encourage investment in LCT. They also saw a need to target subsidies in a more intelligent way to encourage low-carbon behaviour.

For attendees of LCP and DFG events, the motivation to install LCT tends to be more complex and varied. These consumers may be motivated by a range of factors, which may be related to finances, emotions, ethics, social influences and awareness of the availability of technical options. It was found that, where promotional events try to appeal to economic motivations, it is important that consumers are given clear and simple information which helps them understand the financial benefits of LCT as well as the various support schemes available to them.

While LCT aim to reduce total net carbon emissions, this is not always the primary concern of the energy consumer. In the case of housing associations, this lack of alignment can result in consumer behaviour counteracting attempts to improve energy efficiency. For example, implementation of improved insulation can result in overheating of homes and inefficient temperature regulation rather than lower energy
consumption. For this reason, LCT installations should be simple and intuitive to use and accompanied by education and instruction to ensure effective operation.

**Strategy / objectives of the potential investor in LCT**

All of the housing association interviewees stated that they regard the comfort and wellbeing of their tenants as paramount. They see their objective as providing maximum comfort and utility to their tenants whilst keeping costs to a minimum. All decisions regarding the implementation of LCT should be seen from this perspective. Many of the housing associations interviewed stated that they follow a ‘fabric first’ policy, namely that their first priority is the improvement of the physical structure of their properties. This mostly takes the form of improved insulation measures. However, most housing associations are also implementing or considering more ‘active’ forms of LCT, including solar PV. Despite proposed reductions in feed-in tariffs (FiTs), many housing associations will continue to install solar PV, as in many cases this is seen as a cost efficient method of meeting building codes related to energy performance. There is a potential opportunity for DNOs to work together with housing associations to find ways to manage this aggregation of decentralised energy generation to meet the needs of the distribution network.

The technology providers noted the importance of energy storage technology to help facilitate the implementation of LCT on the network. The housing associations exhibited a more risk averse attitude towards new technology, however they were prepared to consider participation in energy storage trials where cost and technology risks were held by another body.

It is much less common for individual private consumers to have a clear strategy regarding LCT. Whilst some consumers are naturally interested in the technology or in environmental matters, for many others such considerations are not a high priority. For example, attempts to promote energy efficient appliances with consumers have shown that, even when they recognise the advantage of such technology, they are often not motivated to replace equipment which is still working. For this reason, the promotion of some types of LCT may only be successful if the customer is approached at the right point in the life cycle of their appliances.

The experience of the LCP events has shown that it is critical to gain the trust of potential consumers in order to influence their choice of appliances or energy-use behaviour. This can often be best achieved by DNOs working together with organisations which are perceived as being neutral, such as housing associations or local authorities.

**Community benefits**

For all consumers groups, the opportunity to save money through energy efficiency can be a potential benefit. This is particularly the case with the housing associations which often employ dedicated specialist personnel to consider the potential advantages of LCT schemes.
Most consumers appreciate the environmental benefits of LCT, although their commitment to achieving this benefit varies widely. Most housing associations have stated corporate goals which include general carbon reduction or environmental targets. However, these are generally seen as much lower motivators than achieving costs savings for tenants.

There are other less tangible benefits to promoting LCT. The Bracknell Low Carbon Day LCP event captured the imagination of a portion of the public and resulted in a sense of communal pride. Likewise housing association interviews have reported that their tenants often express pride in LCT implementations on their estates.
1 Introduction

The New Thames Valley Vision (NTVV) is a Low Carbon Network (LCN) Fund Tier 2 project awarded by Ofgem during the 2011 competitive selection process. Focussing on the low voltage network, NTVV aims to demonstrate how electricity distribution networks can better serve their customers by understanding, anticipating and supporting their energy use as they move towards Low Carbon Technologies (LCT).

1.1 Background

This report addresses the criterion in the NTVV Bid Successful Delivery Reward Criteria (SDRC) 9.8(b)2. It is concerned with the promotion of LCT in local communities. Specifically this study concentrates on understanding the drivers, benefits and challenges associated with the uptake of LCT in social housing, by domestic users and by small businesses in the Thames Valley area.

1.2 Aim and objectives

The NTVV project promoted existing Government Low Carbon Promotions (LCP) incentives to the local community. As part of this work, a range of issues pertaining to the promotion of LCT were considered, including:

- Funding issues and other vested interests;
- Strategy / objectives of the potential investor in LCT and the potential influence of the Distribution Network Operator (DNO); and
- Community benefits, including, but not necessarily limited to, energy and cost savings.

NTVV also has the aim of assessing fuel poverty and understanding how LCT can be used to alleviate this. This question was also considered during the conduct of the LCP events. Where appropriate, references are made to the SDRC 9.8(b)1 fuel poverty report [SSEPD 2015(1)].

1.3 Methodology and approach

The analysis contained within this report is based on information and insights gathered through two different types of activity:

1. A series of interviews were conducted with stakeholders with an interest in the implementation of LCT in social housing.

2. A number of events were held in the Bracknell area intended to promote LCT to domestic consumers and small enterprises.
1.3.1 Engagement with housing associations and technology providers

The NTVV team conducted interviews with six housing associations which operate in the Thames Valley area, so as to understand their experiences with LCT. Interviews were also conducted with technology suppliers to understand the latest state of industry thinking in LCT and how it could apply to social housing.

1.3.2 Low Carbon Promotion and Domestic Focus Group events

Domestic customers were directly engaged, concentrating on areas that were developed and identified in conjunction with Bracknell Forest Homes (BFH) and Bracknell Forest Council (BFC). NTVV conducted two separate programmes in the Bracknell area intended to communicate directly with domestic customers and discuss LCT:

- Low Carbon Promotion (LCP) events
- Domestic Focus Group (DFG) events

The LCP events each had a different theme, always related to the actions which will be required by domestic and Small and Medium-sized Enterprise (SME) consumers in the move to a low carbon economy. These events were held in different locations in Bracknell with a variety of presentational layouts and marketing methods. Through the lessons learned in these events it was possible for the NTVV team to better understand the most optimal method for engaging with such consumers.

The DFG was a selection of 250 households recruited from the community to fulfil the domestic monitoring requirements on NTVV (SDRC 9.2a). Members of the DFG are frequently referred to as NTVV ‘participants’. Each participant household had an end-point monitor which allows the remote monitoring of electricity over time. These participants were invited to a series of events which were separate from the LCP events.

LCP events were intended for casual members of the public who might not have any particular interest in energy. DFG events were aimed at a segment of society with a far higher level of engagement with and access to data which reflected their real consumption patterns.

1.4 Report Structure

The structure of this report is as follows:

- Section 2: Describes the interviews conducted with the technology suppliers and the housing associations. All of the interviews explore the implementation and potential of LCT from the point of view of social housing. The section also explores some of the main themes raised in these interviews.
• Section 3: Provides a description of the LCP and DFG events which were conducted in the Bracknell area. The section explains the lessons which were learned on the best approach to such events.

• Section 4: Conclusions and recommendations. This section considers how all of the information and insights gained during the interviews and events inform the overarching theme of this report, namely understanding the motivations which govern implementation of LCT intended for use by small-scale energy consumers. The report also makes some recommendations on future actions.
2 Engagement with housing associations and technology providers

2.1 Interviews questions and respondents

A series of interviews was conducted with representatives from 6 separate housing associations, including BFH. Some of these housing associations provide housing across the country, but all maintain some properties in the Thames Valley area. Interviews were also held with two technology suppliers, namely NTVV project partners Honeywell and General Electric. Both of these companies have interests in supplying LCT related equipment.

The objective of the interviews was to consider the implementation and potential of LCT in social housing. They were conducted in a semi-structured manner in the form of a free-ranging discussion which aimed to address the following questions:

1. Which LCT would you or have you already considered adopting (e.g. PV, heat pumps and insulation)?
   - How would you prioritise them?
   - Do you see greater potential in passive (e.g. insulation) or dynamic (e.g. smart thermostats) measures in your low carbon strategy?

2. Are there any incentives for your organisation (both financial and non-financial) to adopt any LCT?

3. Do you have or have you considered adopting a strategy that favours LCT?
   - If yes, what are your primary objectives?

4. What would you consider are the major barriers for your organisation to adopt LCT?

5. Have you faced any funding issues associated with the adoption of LCT?; and any other vested interest issues?

6. What kind of community benefits (both financial and non-financial), if any, do you envisage accruing due to the adoption of LCT?

2.2 Main themes of the interviews

Notes of the technology provider interviews and anonymised notes of the housing association interviews can be found in Annex B. An anonymised table of the LCT discussed with the housing associations is shown at Table 1.
### Table 1: LCT being implemented or considered by housing associations

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<tr>
<td><strong>Solar PV</strong></td>
<td>Currently most important form of LCT; implemented in flats and houses.</td>
<td>Currently highest priority LCT. Mainly being installed on new-build homes, less so as part of a refurbishment.</td>
<td>Highest priority is to make use of currently untapped resource: namely roof-ops as a location for solar PV</td>
<td>Has not been a high priority to date. Is however now in discussions with a solar PV installer.</td>
<td>Tried and tested technology. Straightforward method to improve environmental standards of housing stock.</td>
<td>Has implemented several schemes; mainly installed in properties where gas is not available.</td>
</tr>
<tr>
<td><strong>Insulation measures</strong></td>
<td>Has been widely implemented; although it is difficult to implement in older properties.</td>
<td>These measures have reached saturation point. Some investments are being deferred due to uncertainty with government policies.</td>
<td>Has done all actions which can easily be performed.</td>
<td>This is the main form of LCT implementation underway.</td>
<td>High priority. Has completed the loft and cavity wall insulations; now mostly left with solid wall properties.</td>
<td>Prioritises all forms of fabric improvements, including insulation, above all other forms of LCT.</td>
</tr>
<tr>
<td><strong>Heat pumps and solar thermal</strong></td>
<td>Some heat pump installations on refurbished properties.</td>
<td>Not preferred forms of technology.</td>
<td>Is considering air source heat pumps where gas grid is not available.</td>
<td>Not discussed as a technology under consideration.</td>
<td>Had a successful programme of trialling air and ground source heat pumps. Considering extending this.</td>
<td>Trialled ground source heat pumps and solar thermal in certain properties.</td>
</tr>
<tr>
<td><strong>CHP, district heating and biomass</strong></td>
<td>Some CHP implementations: mostly where there is no gas connection.</td>
<td>CHP installed at several large estates.</td>
<td>Not discussed as a technology under consideration.</td>
<td>Has a single CHP scheme. It has considered biomass, but regards this as impractical.</td>
<td>Not discussed as a technology under consideration.</td>
<td>Has trialled biomass as part of a district heating scheme. However prefers to connect properties to gas where it can.</td>
</tr>
<tr>
<td><strong>Geothermal</strong></td>
<td>One trial scheme.</td>
<td>Not discussed as a technology under consideration.</td>
<td>Not discussed as a technology under consideration.</td>
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The following sub-sections of this report summarise the key learning points from these meetings.
2.2.1 Funding issues

Two thirds of the housing associations interviewed expressed frustration at government subsidy programmes for energy efficient or low-carbon generation, even though this was not a specific question listed in the questionnaire. Some frustration was related to subsidy levels, although more commonly the source of complaint was a lack of regulatory consistency. Frequent changes to the various subsidy schemes make it difficult to obtain board approval for investments due to the added uncertainty this causes. In particular, there was frustration that schemes such as ECO and Green Deal, which had been intended to replace older energy efficiency programmes, were far less effective than their predecessors. However, there was some anecdotal evidence to suggest that the Green Deal assessments may have encouraged some leasehold tenants to self-finance improvements outside the Green Deal scheme.

One of the technology suppliers also expressed doubt as to the effectiveness of the ECO scheme in reaching its target of reducing overall energy consumption. The scheme tends to encourage energy efficiency measures such as improved insulation and boilers. However, it does not seek to influence consumer behaviour to move to a more energy efficient future. This interviewee stressed the need for dynamic LCT which react to customer behaviour and to environmental conditions to optimise energy use.

Housing association interviewees were also concerned that proposed reductions to solar PV subsidies, which were announced on 27th August 2015 [DECC 2015(1)], would greatly curtail this option. Notwithstanding this, some interviewees recognised that the reductions in PV costs in recent years represented an opportunity for them to continue to install some PV, although the proposed scope of such roll-outs varied across housing associations. There are other (sometimes local) subsidy schemes open to housing associations and these may help to support a limited number of LCT projects. However, such local schemes are also under pressure from government deficit reduction measures which are reducing local authority budgets.

Unsubsidised solar PV is installed in some cases where it is the most cost efficient manner available to achieve Energy Performance Certificate (EPC) and building regulations targets. Some housing association interviewees stated that under certain circumstances they knowingly implement unsubsidised LCT which result in a negative NPV in order to meet energy efficiency or sustainability targets. There are instances of solar PV schemes which were implemented under such circumstances losing potential income as the full value of electricity being supplied to the network was not always being monitored or claimed. An additional effect of this practice is that housing associations do not necessarily have information on which of the PV systems within its stock are operational at any given time. There is an opportunity for DNOs and housing associations to work together to improve their common understanding of the impact of distributed renewable energy on the distribution network.

The technology suppliers made similar comments regarding government support schemes for LCT, namely that their lack of consistency made investments more difficult. One of the interviewees felt that
subsidies should be applied in a more intelligent way and with a greater understanding of public behaviour and their application in real life. An example given was the tendency of solar PV subsidies to benefit already affluent consumers as they are more likely to be implemented by property owners with the space and the knowledge to take full advantage of them. This interviewee felt that aggregating bodies, such as housing associations have an important role to play in using their spending power to get a better deal for their customers.

2.2.2 Vested interests

A recurring theme with many housing association interviewees was related to the funding and benefits which could accrue from implementation of solar PV. There are evidently currently major marketing campaigns underway by 3rd party solar PV installers which make use of land or roof space of property owners. Under such schemes, the installer retains the ownership of the generation equipment. Whilst most of the interviewees have considered such schemes, many have rejected them as they feel that they are able to obtain a far better return by funding the schemes themselves. Furthermore the schemes have the added disadvantage that the 3rd party ownership of the panels can cause problems when properties are sold off.

A common theme amongst interviewees was that the objectives of the housing association in implementing LCT did not always coincide with those of the tenants themselves. Whilst tenants may have welcomed the opportunity to save money, they often see improved energy efficiency as an opportunity to increase their own energy consumption. This often took the form of homes which were overheated or where temperature was regulated in an inefficient manner. This was often found to be the case with older residents. This situation is sometimes exacerbated by a lack of appropriate equipment to conduct such controls. For example properties without a summer bypass may tend to be overheated. Residents often react to this by opening windows, which results in energy losses.

2.2.3 Strategy / objectives of the potential investor in LCT and the potential DNO influence

For housing associations, LCT should be assessed from a social and economic perspective rather than a purely technical perspective. All of the housing associations interviewed made similar points regarding the implementation of LCT, namely that their primary objective was the material and economic wellbeing of their residents. In most cases the interviewees were most interested in the cost savings which their residents could achieve as a result of these improvements. Other material benefits were increased comfort, health and convenience for residents. Implementation of LCT can also have an added benefit in that, if such measures are implemented correctly, they can reduce condensation within the properties. This in turn results in reduced damage to the properties and thus reduced maintenance costs.
Several interviewees mentioned this effect, although to date it has not been possible to quantify this benefit. Most of the interviewees referred to their organisations’ environmental or carbon-reduction policies. However, it was evident that these were of subsidiary importance.

Half of the housing association interviewees expressed a preference for more passive fabric based improvements over more active low-carbon technologies, such as solar PV. Many housing associations are driven by targets related to minimum building construction codes levels [DCLG 2006] and/or EPC levels. The EPC Standard Assessment Procedure (SAP) is seen as being useful on a macro level for understanding the progress of energy efficiency improvements in the entire stock. However, it is regarded by some housing associations as being of limited usefulness when looking at individual households. SAP evaluations are regarded as being somewhat subjective and do not consider how energy is actually being used.

Fabric first measures include passive energy efficiency improvements such as cavity wall and loft insulation and double glazing. For buildings without cavity walls, internal or external insulation was installed or considered.

Condensing boilers are the preferred form of low energy consumption heating device. These measures are however often dependent on their appropriateness to the property at hand. Housing associations with significant numbers of older properties or properties not on the gas distribution network often need to consider other solutions. Most housing association interviewees felt that it was preferable for properties to be on the gas distribution network. Properties which are not on the gas distribution network have an increased tendency to be in fuel poverty [DECC 2015(2)]. One interviewee however felt that electrification of energy could be a better long term strategy, as it would help to shield residents from future increases in gas prices.

Some housing association interviewees stated that they wished to avoid complicated control technologies which require high levels of tenant interaction. The preference is for automated solutions which are simple to use. Those interviewees who expressed this opinion felt that it was incumbent on equipment providers to provide this service. This market has been recognised by LCT providers and methodologies are being developed in order to address the need for more consumer friendly LCT.

Several housing association interviewees discussed the importance of balancing capital costs with longer term operating costs. For this reason, systems which required low maintenance were usually preferred where their application was practical. High maintenance systems can also tend to suffer from supply-chain problems, especially when there is a dependency on foreign-manufactured spare parts. This meant for example that solar PV was a far more desirable solution than solar thermal due to the perceived high maintenance costs of solar thermal systems. Another popular form of low maintenance LCT is low energy lighting, such as LED lighting.
Some housing associations have ambitious solar roll-out plans or have planned installations of solar PV on their properties. In many cases these solar PV projects were being installed on blocks of flats. In such cases, the most common model is for the electricity generated to be used to supply common parts. Excess electricity is sold onto the network and funds raised are used to reduce property management charges. However many housing associations also had programmes to install such solar PV cells on standalone houses, where the generator is often regarded as a fixture of that home. In such cases, the solar panels supply electricity to that home; excess generation is fed into the network.

A few housing associations have conducted small scale installations of trials of ground-source heat pumps, air-source heat pumps and biomass or geothermal district heating. Housing associations are increasingly looking at the potential of combined heat and power (CHP). This has been in part driven by regulations to examine the feasibility of this technology.

With regards to their interaction with the DNOs, the housing associations had little focus on the significance of energy use in so far as it had an impact on the distribution networks. Some of the interviewees had considered various forms of energy storage. However, there were very few cases of where this was actually being implemented as it was not considered to be financially viable.

For the most part, where housing associations had any interaction or opinion of the activities of the DNO, their interest was mostly related to access to the distribution network in the case of new developments or refurbishments. Housing association interviewees were not necessarily averse to working together with DNOs to undertake actions which would assist with network management. However, they needed to see a clear benefit to their tenants or the housing association in order to justify the effort or expense involved.

A particular example of a potential co-operation is better co-ordination between housing associations and DNOs related to the installation of solar PV. Several housing associations have ongoing solar PV projects. These are frequently funded through feed-in tariffs (FiTs). However some schemes have been subsidised through other support schemes and as a result are not eligible for FiTs. In such cases, electricity is not measured for the purposes of calculating FiTs and the housing associations have no oversight over the volumes of electricity being exported to the distribution network. This is an area where there is potential for housing associations and DNOs to work together to better understand the implications on the distribution network of potentially large numbers of decentralised generators.

Another possible area of cooperation between DNOs and housing associations could be in supporting various forms of energy storage. The ability of housing associations to aggregate large numbers of properties could be valuable in implementing sufficient volumes of energy storage to make a significant difference to the operation and management of the distribution network. This possibility was investigated during the interviews with the housing associations.

For example SSEPD has been running a trial of the Energy and Micro-generator Manager (EMMA) device which is being offered free to potential participants in the Thames Valley area. Some housing
associations expressed interest in this trial, assuming they were able to put forward suitable properties. However, it has proved challenging to find properties which meet the precise technical criteria for this device. The interviewees were not necessarily averse to trialling new technologies where the cost of this trial was being covered by another organisation. However, there was little enthusiasm amongst interviewees for implementing novel or untested technology where the technology risk remains with them. Many housing associations do not feel that it is their role to be a ‘guinea pig’ for new technologies.

Several of the housing associations conduct programmes to engage tenants on energy efficiency matters. These programmes normally take the form of advisers who engage with the tenants in order to help them understand how to get the best energy efficiency out of their home. In some cases, these advisers were directly employed by the housing association. However other housing associations engaged unpaid volunteers from the tenant community itself to fulfil this role. It was reported by one of the housing association interviewees that the best qualification for such advisers is not necessarily always a high degree of technical knowledge, but rather the interpersonal skills required to convince tenants to make the necessary changes to their behaviour.

These consumer engagement programmes could represent an opportunity for DNOs to make contact with residents through a trusted intermediary to promote LCT schemes and behaviour which provides benefit(s) to the distribution network. Possible DNO support could take the form of material and training courses for these advisers.

One of the technology providers felt that main challenge when promoting LCT in housing associations was the decision making structure within these organisations. Housing associations are subject to a number of pressures and influences when making home improvements, including government policy. Internal teams which have the responsibility to procure home improvements may not necessarily have an emphasis, experience or knowledge of LCT. Such functions may be subcontracted to external consultants.

A technology provider also made the point that housing associations need to implement LCT in a smart and integrated manner so as to ensure that tenants are able to obtain the full value of the equipment. This may for example involve ensuring sufficient energy storage to allow consumers to obtain full value from distributed generation schemes and react to price signals which change over the day.
2.2.4 Community benefits

The overriding concern of housing association interviewees was to reduce costs to their tenants whilst ensuring good standards of comfort. Any other community benefit was generally seen as being ‘nice to have’ and was not usually a deciding factor in implementation of LCT. In many cases interviewees felt that such savings have an indirect knock-on benefit to the housing association itself as it meant that tenants would have more cash available to pay their rent. However, some interviewees felt that this belief is based on anecdotal evidence and is not necessarily true. In fact these interviewees argued that where tenants had access to additional cash, paying off rent arrears was not always necessarily their highest priority.

Various potential community benefits were discussed. Some housing association interviewees saw that the roll-out of LCT might provide opportunities for training and job creation for tenants. However, this view was not universal. Different housing associations procure services (including LCT installation services) in a range of ways. Some housing associations procure services centrally, whilst others prefer sub-regions to conduct their own procurement. Where procurement occurs centrally, this restricts the option to employ local people to work on LCT installation projects, in which case local job creation is limited.

Another benefit of LCT was that the resultant improved living conditions help to improve the general health and wellbeing of residents. There was some mention of other more intangible benefits, such as community pride in their improved infrastructure and in the aesthetic improvements which can accompany certain LCT installations, such as external wall insulation.
3 Low Carbon Promotion and Domestic Focus Group events

3.1 Introduction

The LCP events were conducted as part of the NTVV project. These events were intended to gather information, knowledge and insight into public attitudes and receptiveness to LCT in the Thames Valley area. The objective of this exercise was to help DNOs, Ofgem and the Department of Energy and Climate Change (DECC) understand what methods of LCT promotion activities and techniques produce the best results.

The LCP events aimed to encourage the uptake of energy efficiency measures and LCT such as renewable generation and heat. By doing so, NTVV was able to evaluate the effects on promotions for types of LCT which have the greatest impact on the activities of DNOs. The DNOs have a particular interest in those LCT which are likely to have an impact on the Low Voltage (LV) electricity distribution network. As a result, the LCP events have tended to concentrate on technologies such as PV technology, heat pumps and electric vehicles.

The LCP events were intended to gain insights into customer acceptance of LCT and what can be done to address the challenge of market inertia to these measures. The events also have an overlap with parallel work being conducted as part of the NTVV project to address fuel poverty [SSEPD 2015(1)], as LCT has the potential to reduce costs to consumers at risk of fuel poverty. The LCP events were open events intended for members of the general public, who might not necessarily have a strong interest in or engagement with energy related matters.

The LCP events should be differentiated from those events which were conducted with the 250 members of the DFG, who are NTVV project ‘participants’. The participants are individual household consumers who were recruited to the NTVV project to have an end-point monitor installed in their homes in early 2013. The end-point monitor relays half-hourly readings of the household’s electricity consumption so as to feed data into modelling conducted by university partners. Participants receive a 6-monthly newsletter containing updates on the progress of the NTVV project and invitations to upcoming events.

3.2 Summary of events held

A series of public engagement events were conducted in the Bracknell area in the period from October 2013 to February 2015 to promote LCT. Different methods were used to promote the events. A variety of event formats and locations in Bracknell were trialled (see Table 2). This included the Your Energy Matters (YEM) outlet in the centre of Bracknell (Figure 1).
Table 2: Low Carbon Promotion and Domestic Focus Group events

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Location</th>
<th>Type</th>
<th>No. of attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficient lighting event</td>
<td>Oct 13</td>
<td>YEM</td>
<td>LCP</td>
<td>33</td>
</tr>
<tr>
<td>Mini exhibition</td>
<td>Nov 13</td>
<td>YEM</td>
<td>LCP</td>
<td>1</td>
</tr>
<tr>
<td>Social club event</td>
<td>Feb 14</td>
<td>Bracknell Leisure Centre</td>
<td>LCP</td>
<td>64</td>
</tr>
<tr>
<td>Bracknell low carbon day</td>
<td>Mar 14</td>
<td>Bracknell Forest Council</td>
<td>LCP</td>
<td>N/K¹</td>
</tr>
<tr>
<td>Your Energy Explained 1</td>
<td>Mar 14</td>
<td>YEM</td>
<td>DFG</td>
<td>30</td>
</tr>
<tr>
<td>Your Energy Explained 2</td>
<td>May 14</td>
<td>YEM</td>
<td>DFG</td>
<td>6</td>
</tr>
<tr>
<td>Waitrose store tour</td>
<td>Sep 14</td>
<td>Waitrose store, Bracknell</td>
<td>DFG</td>
<td>16</td>
</tr>
<tr>
<td>Efficient appliances event</td>
<td>Feb 15</td>
<td>Bracknell Leisure Centre</td>
<td>LCP</td>
<td>67</td>
</tr>
<tr>
<td>GE Grid IQ tour</td>
<td>Jul 15</td>
<td>GE Grid IQ centre</td>
<td>DFG</td>
<td>8</td>
</tr>
</tbody>
</table>

Figure 1: Your Energy Matters outlet, Bracknell

¹ No records were taken of visitors this all day event, which was characterised by large numbers of short-term casual attendees. However the number of attendees which engaged with this event was considerably greater than any other event.
Each event was reviewed and evaluated on completion by the NTVV team. The lessons learned were used to refine the strategy for future events.

A summary of the findings of each event are given below. These are presented in chronological order. A more comprehensive description of each event can be found in Annex A.

**Efficient lighting event**

**Location:** YEM  
**Event type:** LCP  
**Attendees:** 33  

The objective of this event was to increase public awareness of low-energy lighting options. It also aimed to understand public perceptions of low cost lighting through a mixture of staff-public interaction and formal questionnaires. The event took place both within and directly outside the YEM outlet featuring information displays, videos, free handouts and a competition to win three LED bulbs. All of these methods were intended to attract interest to the event.

It was apparent from this event that potential attendees are not likely to come into town especially to visit YEM or an efficient lighting event. As a result, marketing of the event was seen to have little effect; such events tend to be highly dependent on passing trade. Turnout was lower on the second day of this event as adverse weather limited the amount of material outside of YEM. This highlights the importance of placing material outside YEM in order to show that an event is occurring and to entice visitors into the outlet.

**Mini exhibition**

**Location:** YEM  
**Event type:** LCP  
**Attendees:** 1  

This event targeted SMEs, property developers and landlords. The principle objective was to inform these stakeholders of the usage of efficient appliances and the long-term benefits/savings that may accompany them. The mini exhibition gave LCT providers the opportunity to communicate directly with potential customers to inform them of low carbon alternatives that they may not have previously considered.

The event only attracted one visitor and had to close early. This was despite a mailshot to 200 local businesses advertising the event.
The reasons for this disappointing result were carefully considered in order to learn lessons for future events. Part of the reason appears to have been the lack of activity in the Bracknell High Street area. This was largely a result of renovation work which meant that many properties were deserted. This also had an effect on a number of local shops, which were subject to compulsory purchase orders, meaning such properties were unlikely to be considering improvements.

Many small businesses do not own the property from which they operate and the owners are not necessarily incentivised to invest in energy efficiency improvements. This is a factor which mirrors the situation in privately rented accommodation which was noted in the LCNF report on fuel poverty [SSEPD 2015(1)]. Note also that, for the large majority of small businesses, energy costs represent less than 10% of total costs [BMG 2015] and that other expenses are likely to have a higher priority.

**Social club event**

**Location: Bracknell Leisure Centre**

**Event type: LCP**

**Attendees: 64**

This event was originally planned to be held at the premises of a local social organisation. However, despite approaching a number of potential partners with the help of BFC, it proved difficult to secure a suitable venue. For this reason, the event was conducted at Bracknell Leisure Centre, a location which facilitates the activities of such groups.

The objective of this event was to develop an understanding of how the time of day at which people consume energy has an impact on the cost and carbon intensity of that energy. This was accompanied by information about renewable technologies and their costs and benefits to households (notably PV and heat pumps).

The stand for this event was trialled in several locations within the leisure centre, in an attempt to maximise footfall:

- Thursday: Leisure centre secondary exhibition area - located within the cafe away from the main entrance;
- Friday: Leisure centre primary exhibition area - located by the main entrance with greater amounts of footfall.
- Saturday: Secondary exhibition area; stand moved forward, to within sight of main entrance to attract greater attention and footfall.
Although this event was better attended than some other NTVV LCP events, it did not achieve the levels of interest anticipated. A clear lesson was the location of the stall. The most successful day from the point of view of engagement was Friday. On this day, the stall was located directly at the entrance with the largest footfall of potential attendees. The children’s activity corner of the event was a great success in drawing the attention of families.

**Bracknell Low Carbon Day**

**Location:** Bracknell Forest Council

**Event type:** LCP

**Attendees:** N/K

Bracknell Low Carbon Day was intended to be larger scale than other events, reaching a much larger cross section of attendees. This event was marketed as an opportunity for members of the local community to send a message to the rest of the UK about their commitment to taking practical action to reduce their carbon footprint. This message was comprehensively advertised through a leaflet in the local paper, school engagement, posters and online advertisements.

A number of events was held prior to and during the course of Low Carbon Day, including a live music performance, radio interviews and LCT exhibitions. This culminated between 17:00-18:00 when attendees were invited to reduce energy consumption for one hour. The NTVV team also organised an Automated Demand Response (ADR) load-shed with local businesses. This culminating electricity reduction exercise represented an important focus to the event and provided a clear objective to which participants could actively contribute.

The results of this effort were analysed by collating results from Bracknell Primary Substation and comparing the consumption profile from 17:00-18:00 on Low Carbon Day to that of the ‘average weekday’. This showed a noticeable reduction in energy consumption across the defined period on Low Carbon Day (Figure 2).
The ambient temperature on Bracknell Low Carbon Day was slightly higher than the average. This may have accounted for a slight reduction in energy consumption against average demand in the period leading up to 17.00. However, it can be seen in Figure 2 that this reduction was greater between 17.00 and 18.00, which indicates that the event had an impact on electricity demand.

**Your Energy Explained, Round 1 (YEE1)**

**Location:** YEM

**Event type:** DFG

**Attendees:** 30

This event was targeted solely at NTVV project participants, i.e. customers with an end-point monitor installed at their property. Project participants were informed of NTVV project progress and presented with the data which had been gathered to date. The energy usage data collected for each participant was analysed. Anonymised data was presented back to the participants showing their household electricity consumption and how this related to the NTVV consumer categories (based on analysis conducted by the University of Reading). This was intended to give participants insights into when during the day they use their electricity. The event gave the opportunity for NTVV members to talk directly to project participants to obtain a deeper understanding of their consumption patterns and to respond to any queries they may have about energy efficiency.
Participants were asked to complete two questionnaires covering the following: (i) general questions about energy consumption habits and (ii.) more specific questions about the attendees’ energy consumption and usage. During the course of the event, each attendee subsequently received a completed version of this second questionnaire with real data on their own consumption habits. More information and analysis on the data gathered in YEE1 can be found in Annex C.

This event was characterised by a very high level of engagement from the attendees. The attendees were left with a much greater understanding of their own energy consumption. One important insight to come out of the workshop was related to the habits of consumers with distributed renewable energy systems, such as solar PV. These consumers seemed to be motivated to consume as much of their own electricity as possible rather than exporting this to the network.

**Your Energy Explained, Round 2 (YEE2)**

**Location:** YEM

**Event type:** DFG

**Attendees:** 6

This event was an opportunity for those customers who could not attend YEE1 but had registered an interest to attend on an alternate date. The event followed a similar format, with some adaptations based on lessons learned from YEE1. Specifically YEE2 made more time available for group discussions as well as the one-to-one discussions which had characterised YEE1.

As in YEE1, attendees responded to the event in a very enthusiastic manner. They particularly appreciated the personalised nature of the data with which they were provided. There were suggestions as to alternative ways in which their data could be applied in a manner which was interesting and relevant to consumers. Customers were particularly interested in specific measures which could be taken in order to reduce electricity consumption.

Some attendees felt that there had been little engagement in the NTVV project since installation other than the six-monthly update. As a result of this feedback, the NTVV team decided to organize more events which would allow participants to more get more directly involved in the scheme. This included events described in the sections below (Waitrose tour and the Smart Grid IQ tour).
Waitrose store tour

Location: Waitrose store, Bracknell

Event type: DFG

Attendees: 16

The Waitrose flagship store in Bracknell was regarded as an ideal venue for the event due to its location in the centre of Bracknell and its close association with the community and local business in the area. It was felt that it would provide a very suitable facility to engage the NTVV participants on local sustainability issues.

The visit was intended to give participants a view of some practical measures being taken to improve energy efficiency in a local business and by the DNO. The event was also used as an opportunity to gather opinions and feedback on the NTVV project. The event had a specific emphasis on time of use tariffs, how these are structured, and looking at the pros and cons.

The Waitrose Head of Sustainability and Ethical Sourcing gave a presentation on the supermarket chain’s sustainability policy and targets. This presentation explained how their efforts link into the NTVV project and the wider national sustainability picture. This was followed an NTVV team presentation and a tour of the Waitrose store facilities, including a number of green measures.

Although the sustainable theme and location of the building in the heart of Bracknell meant that it was an ideal symbolic location from the point of view of the NTVV project, it did have certain limitations with respect to its suitability for hosting large groups of visitors. The store is not designed for engaging large numbers of visitors and would not necessarily be the right venue for LCP events with larger numbers of people.

Efficient appliances event

Location: Bracknell Leisure Centre

Event type: LCP

Attendees: 67

The purpose of the event was to inform customers of the energy savings that can be made from using more highly energy efficiency rated appliances. This was part of an effort to increase awareness of energy efficiency. It was also intended to educate customers on EU energy efficiency labels.
An additional objective was to help customers to understand why a DNO would be interested in encouraging uptake of efficient appliances.

The event was organised to run during half-term. This actually reduced the number of passers-by as Bracknell’s other swimming centre ‘Coral Reef’ was favoured by much more of the half-term trade that had been expected. With fewer classes and events than usual during half-term week the footfall of visitors to the leisure centre was somewhat reduced.

Attendees were offered places in a free raffle for which the prize was an efficient appliance. This activity had a surprisingly low take-up as there was a lack of trust amongst attendees, who believed that there was some kind of ‘catch’. General interest in this event was low and the efficient appliances theme did not excite people. Consumers often do not want to replace an appliance which is already working perfectly well. The motivator for people to consider efficient appliances was predominantly economic rather than environmental. The value is in reaching those customers who were engaged having taken away some learning which they may apply when next buying a household appliance.

GE Grid IQ tour

Location: Bracknell Leisure Centre

Event type: DFG

Attendees: 8

The objective of this event was to update participants on recent progress which had been made on the NTVV project. It commenced with a presentation of the project activities undertaken since the previous event. This included the monitoring and modelling being conducted as part of NTVV by its university partners. There was also a presentation on the technologies being used to manage the electricity network. The GE Technical Solutions Director conducted a 40 minute tour of the GE Grid IQ facilities. Participants were given the opportunity to discuss questions one-to-one over lunch. The relatively high ratio of NTVV members to participants allowed a more effective communication of information.

There was very positive feedback from attendees and it was felt that the presentation covered a very high level of technical detail. Whilst this was suitable for the DFG audience, it was felt by the NTVV team that this is not necessarily an advantage with presentations intended for the general public i.e. at an LCP event. The DFG attendees tend to be particularly technology savvy and have an interest in the energy industry.
3.3 Lesson learned from the LCP and DFG events

All of the LCP and DFG events were aimed at LCT which in some form would have an impact on the distribution network. Accordingly all lessons learned must always be considered from the point of view of the relationship between the DNO, consumers and other stakeholders. The future low carbon and highly decentralised energy market will only be viable if there is an effective and continuous interchange of information between the DNO and an array of stakeholders. For this reason, any lesson learned must consider how such events can most effectively facilitate this communication.

The lessons learned from the LCP and DFG events tend to be quite dependent on the intended audience, and the message being transmitted. The requirements for successful delivery of events aimed at members of the general public (i.e. the intended target of LCP events) tend to be quite different to those aimed at those with a particular interest and engagement in energy matters (i.e. the intended target of DFG events).

3.3.1 LCP events

Targeting of potential attendees: As was shown in the housing association interviews (see section 2), energy usage varies greatly depending on the type of consumer. Therefore thought should be given as to which group should be targeted in order to promote a particular type of LCT. For example families with children tend to have high hot water consumption. Events aimed at promoting LCT which are intended to reduce hot water costs or improve efficiency should be advertised in family-friendly publications or held in places popular with families.

The planning for any LCP event should always commence with a clear objective and consideration of the sorts of incentive which will tend to encourage attendees to take part. Different attendees have varying motivations for engaging in such events. Such motivations may include curiosity, self-interest, social conscience or a sense of community spirit.

A particular example of an event which failed to consider the needs of the intended target was the mini-exhibition (section 3.2), which was aimed at SMEs. The event was not successful partly due to the fact that it was held at a time when much of the centre of Bracknell was undergoing renovation and tenants were unlikely to be considering material upgrades.

Advertising: Some LCP events attracted disappointing numbers of visitors, despite considerable effort being put into prior advertising. Visitors are unlikely to travel into the centre of town specifically in order to take part in an LCP event. For this reason, events tend to rely largely on passing trade. As such, advertising may be more effective if it is geographically close to and immediately before or during the event.
However, in some cases, such as the Bracknell Low Carbon Day, prior advertising has been shown to be effective in increasing awareness and interest in the event. This particular event was successful due to the energy reduction target which provided an easy-to-understand unifying theme for the whole event. The event also featured some ‘fun’ attractions, such as live music, which may have helped to attract attendees.

**Venue selection and layout:** The venue has been shown to be one of the most important factors for the success of an event. As has already been mentioned, LCP events are very dependent on attracting passing trade. The location needs to be in a place and time with high footfall. This was demonstrated at the events held at Bracknell Leisure Centre. When the stand was sited far from areas of high footfall, potential visitors had little incentive to seek it out.

However, as has been seen, conducting events at the YEM outlet in the Bracknell shopping area on a weekend was not a guarantee of a high turnout. Aspects of YEM tended to discourage visitors; the function of the outlet was perceived as ambiguous. It was found that LCP events were better attended when some attractive or interesting display was placed outside the outlet.

**Event material and equipment:** Experience has shown that LCP event visitors tend to have little tolerance for very high levels of technical detail or confusing messaging. Electricity bill payers are likely to react well to clear demonstrations of money saving opportunities. Events aimed at children and families need to have an element of ‘fun’ to maintain the attention of the attendees.

Any materials intended to engage visitors who have chosen to attend an event must also be designed to maximise their attention. At some LCP events, attendees were asked to complete questionnaires in return for a reward (e.g. a free low-energy light bulb). It was found that such questionnaires should be kept short and to the point (preferably less than one sheet of A4) or many attendees will not feel it is worth the effort.

**Staffing and attendee interaction:** The number and type of personnel who staff such events is critical to the quality of the engagement with visitors. The presence of sufficient numbers of staff to speak to visitors is important. Experiments conducted during the LCP events showed that visitors are unlikely to engage with material if stands are unmanned. However visitors may also be intimidated by stands with staff present but no other visitors. Members of the public often feel most comfortable listening in as staff members speak to visitors already at the stand. For this reason, it may be helpful to pre-invite some visitors in order to ‘prime’ the event and thus attract more casual attendees.

It was noted in the housing association interviews (section 2.2) that good interpersonal skill is a more important quality for engaging consumers than deep technical knowledge.

Staff should be able to relate the material at hand to real-life situations in which LCT could be useful to the potential consumer in a straightforward and friendly manner. Such staff may be drawn from the DNO. However event organisers must always consider other options for staff from other organisations.
It is important that visitors trust the staff at the event. Experience at various events has shown that visitors may suspect that the event has some form of ulterior motive. It is useful for DNOs to work together with employees of organisations seen as being neutral, such as housing associations and local authorities when explaining the benefit of LCT.

It was seen in the efficient appliances LCP event that encouraging consumers to exchange their appliances for newer, more efficient replacements is complicated by the fact that consumers often do not want to replace an appliance which is already working perfectly well. For this reason, the effectiveness of such events in actually investing in LCT seems to be very dependent on catching consumers at the right place in the life cycle of their appliances.

3.3.2 DFG events

Targeting of potential attendees: The attendees at the DFG events were recruited and represent a group of consumers for which the NTVV team has access to a great deal of data and information. All DFG participants were invited to all DFG events.

Advertising: DFG event attendees were directly invited and such events were not intended for casual drop-in visitors. This was generally quite successful and these events were relatively well attended.

Venue selection and layout: The criteria for the type of venue for DFG events tend to be different to that of LCP events. DFG events involve the presentation of relatively detailed information and data. For this reason, a more formal presentation area is more appropriate. The GE Grid IQ centre was well suited to this purpose.

The Waitrose store in Bracknell was however not necessarily the most ideal location for a DFG event.Whilst the location contained many interesting examples of LCT, as a working store, it proved complicated to convey information to a relatively large group of visitors.

Event material and equipment: The more engaged DFG attendees may be attracted by a variety of information and data. These attendees were prepared to take part in more complicated data collection and analysis exercises than was the case with LCP events. This was an opportunity to gather data for the project team which would not have been available from LCP events. Good audio-visual equipment and other presentational tools are welcome at such events as they facilitate the dissemination of material.
**Staffing and attendee interaction**: DFG participants tend to be willing to engage in far more detailed discussion of LCT than LCP event attendees. They are also generally prepared to engage with greater volumes of information and complexity. For this reason, it was appropriate for more technically specialist staff to present at such events than was the case at the LCP events. Note however that the DFG participants are not necessarily technical specialists. The level of detail for DFG type events should therefore be designed to meet the level of a member of the public with a particular interest in low carbon matters.
4 Conclusions and recommendations

This NTVV project report makes use of information and insights gathered from two different kinds of research activity. These were the housing association and technology provider interviews (section 2) and the Bracknell LCP and DFG events (section 3). Although these activities were quite different, they were united by a unifying theme. Namely this project is concerned with the question of how to promote the use of LCT in residential and small business properties across the Thames Valley area.

The NTVV team used these different types of approach to engage with the key potential decision makers for investments in LCT. In the case of the housing associations these decision makers are professionals with influence over large housing stocks, located in the Thames Valley and other parts of Britain. In the case of the LCP and DFG events, participants were much more likely to be individual home-owners, tenants or small business-owners. These different groups of decision makers need to make comparable decisions, but are influenced in different ways to reach these decisions.

The housing association interviewees tended to be highly specialised with a high degree of knowledge and engagement with energy efficiency and LCT. DFG event attendees tended to be highly interested and engaged with the topic under discussion but could be perceived as ‘enthusiastic amateurs’ rather than trained professionals. Note however that the DFG participants represent a relatively small group of consumers with a particular interest in energy related matters. The LCP event attendees had the lowest levels of engagement and interest in the topic. For these, energy was likely to be only one of a large number of competing priorities when it came to their attention and expenditure. For these reasons, the various aspects of LCT investment which are discussed below vary according to the different groups.

4.1 Funding issues

The housing association interviewees had by far the greatest understanding of the funding issues related to LCT investments. For this group, obtaining funding from various different sources was a major part of their job. For this reason, this group was well aware of the costs and benefits of the various options for LCT and of the potential source of funding. Housing associations tend to be well aware of the different support schemes available to promote LCT and energy efficiency in general. A strong sense of frustration was expressed by most of the interviewees at the incoherency and inconsistency of LCT funding support which they felt was restricting potential investments.

LCP and DFG events tended to portray the cost-benefit of LCT in a much simpler manner, e.g. the potential savings from installing a low energy lightbulb. These consumers are not energy professionals and often made LCT investment decisions on the basis of intuition, social conscience or as a result of peer comparisons (e.g. where they had seen these investments had brought benefits to their neighbours).
Even where there are clear advantages to LCT, consumers are often unwilling to replace equipment which is still working well. This is because consumers evidently place a negative value on the inconvenience of exchanging appliances which needs to be overcome before they will take action.

4.2 Vested interests

Housing associations are subject to a range of different vested interests. However the primary group which they must consider are their tenants. Whilst these tenants are likely to welcome measures which result in cost savings to them, they can react unfavourably to some of the specific aspects of the scheme. For example some tenants in blocks of flats may not necessary welcome the disruption resulting from installation of improved insulation.

Funding is another source of potential clash in vested interests for housing associations. Some methods for funding LCT may represent a conflict for housing associations. For example use of 3rd party solar PV providers can represent a complication if the property on which the solar PV equipment is installed is sold.

The LCP and DFG groups are very diverse, including home owners, tenants and business owners. The members of these groups may be subject to a range of different interests. The DFG group is typical of users who have a strong personal interest in energy related matters. Members of this group may be motivated by personal financial considerations. However their decisions with respect to investments in LCT are likely to be influenced by their greater knowledge of the opportunities and their own level of fascination with the technology.

As was seen in section 3.2, small business owners tend to be a difficult group to convince to install LCT. Such businesses are likely to be operating out of rented premises and their landlords are less likely to be incentivised to make material improvements to their premises for which they will not receive the principal benefit. This tendency was also seen with private residential landlords in the NTVV fuel poverty report [SSEPD 2015(1)].

The needs and expectations of the residential customers who attend LCP events on a casual basis are many and varied. Some interests may be purely financial, but can also be based on personal values, priorities of effort, aesthetics and the influence of the community. This topic has been the subject of several other studies. Many of these have been cited in a comprehensive LCNF report into the efficacy of energy efficiency measures [SSEPD 2014]. This report considers the interests and motivations which have an influence on residential energy consumers as well as the ways in which energy efficiency measures can be tailored to different types of customer.
As has been shown [SSEPD_2014], such schemes are complicated and require a high level of understanding of the different parts of the intended participant cohort. Studies have shown that such measures are more likely to be successful when participants are set specific targets and goals. Also participants tend to be encouraged by peer comparisons where they are able to gauge their performance against comparable households.

4.3 Objectives of the LCT investor and potential DNO influence

The objectives of the housing association interviewees do not always match those of the attendees to the DFG and LCP events. The housing associations see a clear objective to work in the direct interest of their tenants. This means that their primary objective is reducing energy costs whilst ensuring a good level of comfort and wellbeing. These represent a sub-set of a range of possible objectives of the LCP and DFG attendees; other objectives may include environmental considerations, social pressure and personal interest in the technology.

Housing associations also see other benefits to the implementation of LCT, such as education and training opportunities and a sense of community pride. Many housing associations have targets related to sustainability or carbon reduction, however these are rarely regarded as the primary motivator behind implementation of LCT.

Most of the housing associations gave limited consideration to the effects of their activities on the electricity network. In as much as they considered the implications of the distribution network, this was normally related to the challenges of connecting new or refurbished properties. They were open to partnerships with DNOs which could help to improve network performance. However the general consensus was that this should be a partnership which also provided benefits to their organisation and, by extension, their tenants. Also many housing associations were quite resistant to the idea of accepting the risk of being a ‘guinea pig’ for innovative technology and felt more comfortable considering techniques which had been proven in other places.

DNOs are most likely to be able to engage with consumers through LCP-type events, conducted in collaboration with other agencies such as housing associations and local authorities.

4.4 Community benefits

The housing association interviewees all saw reductions in energy costs to their tenants as a community benefit in itself. Reducing energy bills gives the tenants of social housing access to greater cash. This means that they are less likely to fall into debt and thus can avoid resultant penalty charges. Energy efficiency also helps to address fuel poverty, which is more prevalent in low income households [SSEPD 2015(1)].
As outlined above, housing associations may see other community benefits to the implementation of LCT, such as education, training and a sense of community pride. However these are seen as strictly subordinate to their primary objective.

The majority of the lessons learned can also be applied to the LCP and DFG groups. Most of the benefits to potential users of LCT are ultimately financial. The Bracknell Low Carbon Day could be seen as an example of an event which encouraged a sense of joint purpose and pride within the community. However it is not clear if such events could continue to perform this function once their novelty wears off.

4.5 Key recommendation points

4.5.1 Housing associations

- Although policy related to LCT support is challenging and changeable, some avenues remain open for housing associations to continue to fund LCT projects. There is an opportunity for DNOs to work together with housing associations to help them to understand how they can most effectively derive value from LCT whilst integrating these into the distribution network.

- Housing associations need to manage potential conflicting interests when implementing LCT, namely that tenants are not necessarily incentivised to increase energy efficiency in their homes. DNOs can support this effort by providing staff training and information to the housing associations. This could help to encourage lower energy consumption, which would result in less demand on the distribution network.

- There are opportunities for housing associations to work together more effectively with the DNOs to better understand the implications of renewable electricity which is being fed back into the distribution network.

4.5.2 Consumers

- The financing of LCT is one of a wide array of consumer considerations when deciding to install LCT, albeit a very important one. The DNO can help this decision making process most effectively by producing and making available material which clearly demonstrates the potential costs and benefits to consumers of LCT.

- The experience of the LCP and DFG events has demonstrated the complex range of motivations and interests which influence decisions when investing in LCT. The understanding of these motivations would greatly benefit from partnerships between the DNOs and other organisations which have a greater insight to the behaviours and aspirations of consumers. Such partnerships may be with housing associations, but also with local authorities, consumer groups, trade bodies and residents associations.
• There is likely to be some overlap between the LCP event participants and the tenants of housing associations. For this reason, there is a strong case for conducting LCP type events aimed specifically at housing association tenants with the assistance of the housing association. LCP events could be improved through the cooperation of a DNO with a trusted partner such as a housing association or local council. Such events could be conducted at part of the various schemes operated by housing associations to educate and inform tenants on energy efficiency matters.

• The successful Bracknell Low Carbon Day event (section 3.2) could act as a model for the sort of initiative which could help to bring together members of the public to take collective action to help relieve stress on the network. Nonetheless the challenge of transforming this event into a regular habit amongst consumers can only be met through a careful incentive and community engagement scheme. It does however act as an example of what can be achieved through the correct interaction with customers.

4.5.3 Technology providers

• Technology providers should produce LCTs which are simple, intuitive and easy to use. This will help to overcome the inhibition of some consumers to engage with this technology.

• DNOs should work together with a range of technology providers to identify consumers who are most likely to be prepared to purchase new energy efficient appliances. In this way it will be possible to target material and events which encourage greater uptake of LCT.

• Technology providers have a role to play in providing data and information which will help consumers understand the costs and benefits of LCT.
5 Annex A: LCP and DFG event reports

This annex contains more detailed descriptions of the LCP and DFG events which were summarised in section 3.2.

5.1 Low Carbon Promotion events

5.1.1 Efficient Lighting Event

Date(s): Friday 25th October 2013 to Saturday 26th October 2013

Hours: 10am-3pm both days

Location: Your Energy Matters (YEM) outlet

Staff: 3 staff members on each of the exhibition days

Event objectives

This event concentrated specifically on increasing public awareness of efficient lighting options. A particular objective of the event was to demonstrate to potential users the economic implications of switching to low energy lighting. As well as gauging the public perception for efficient lighting, the event explored customer experience, knowledge and current rates of adoption. This was carried out both qualitatively through customer interaction and observation and quantitatively in the form of a customer questionnaire that was analysed to provide lessons for future events.

A secondary objective of the event was to encourage residents to visit the newly opened YEM high street outlet in the centre of Bracknell. Visitors were also asked to provide feedback which could be used to help improve future events at YEM.

Pre-event preparations

Various methods were used in order to publicise this event. These included a paid quarter page newspaper advertisement and posters in YEM and in Bracknell Town Centre. A post was made on the NTVV website [NTVV 2013(1)] and five other posts were made on social media in the 10 days leading up to the event. This event was intended to be relatively high-profile compared to the other bi-weekly events held at YEM, which was a deliverable detailed in SDRC 9.8(c)3 – Low Carbon Community Advisory Centre [NTVV 2012]. As such the level of advertising was higher than normal. Several efficient lighting providers were contacted in the build up to this event for material and to ask them to provide expert advice at the event. However the responses to this were very limited.

Execution and outcome
The event took place mostly within YEM, with some activities directly outside on the high street (Charles Square). The event featured information displays and continuously running videos which provided information on low energy lighting. This included the following:

- A screen and projector were used to display efficient lighting information and videos. On the first day this was located outside the shop front on the high street. However on the second day this had to be moved inside due to poor weather.
- Desk with free efficient bulbs provided by BFC. This was outside on day 1, but moved inside on day 2.
- Competition to win 3 LED bulbs.
- Information leaflets provided by GE.
- Information sheets provided by SSE.
- Efficient lighting advertising by 8point3.
- A separate questionnaire and quiz devised by DNV GL and SSEPD.

Visitors who registered an interest by completing either the quiz and/or questionnaire were offered a free compact fluorescent light bulb. Approximately 20 of these were given away across the two days. In addition visitors could take part in a competition to win three LED bulbs (RRP£40). Of the 33 visitors in total, 8 decided to take part in this competition.

The event attracted a total of 33 visitors, 26 on the Friday and 7 on the Saturday. Whilst this was an increase on a normal day at YEM, it was lower than had been anticipated. This was especially the case on Saturday, which is traditionally a day with high traffic through the shopping precincts in the centre of Bracknell. This seems to have been due to the weather and the fact that the exhibition was moved inside on day two.

It is apparent that YEM is not seen particularly as a destination for visitors to the centre of Bracknell and that passing shoppers see no particular reason to spontaneously go into YEM unless it is clearly apparent that something different to the norm (i.e. an event) is occurring.

Another contributory factor to low turn-out may have been the cold weather across these days, as shoppers may have been more interested in going home after completing their shopping.
Lessons learned

There is no reason to believe that customers will come into the centre of town in order to visit YEM or an efficient lighting event. For this reason, advertising was limited at future events of this format. This event relied mainly on spontaneous visits or an eye-catching difference within the high-street.

The specific lessons learned were as follows:

1. It is an advantage to have something to draw people in from outside the centre into the YEM. This lesson has been implemented in subsequent events where exhibits were placed outside the event venue so as to entice potential visitors to come in.
2. The large video screen was not found to entice visitors as anticipated. This may have been due to the cold weather, which meant that visitors were not inclined to browse outside YEM. It may be beneficial to try this again on a warmer day.
3. In order to get a free bulb, customers were told they must fill in a questionnaire form. It was later determined that this form should be not more than one page of A4 rather than two as customers were deterred by the time taken to fill this in.
4. Those visitors who attended the event displayed little initial engagement with efficient lighting and so showed limited initial interest; those who were more engaged have already made changes to efficient lighting.
5. There was a lot of ambiguity about the event (and the centre in general). Several people thought the YEM was selling energy efficient appliances/light bulbs. This is something that has been noted previously at the centre. A clear overview to the public that the centre is not a shop needs to be established.
6. As a result of the lessons learned from this event, an efficient water event was held on 14th January 2014. This event (not organised as a LCP) followed a similar structure, with free giveaways provided by the local water company. The efficient water event had 41 attendees across a Friday and a Saturday and the cost of marketing was zero £0 excluding man hours and material. Notably there was no cost in advertising in the paper.

Event Summary

<table>
<thead>
<tr>
<th>Event Summary</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising Effectiveness</td>
<td>2/10</td>
</tr>
<tr>
<td>Planning Required</td>
<td>6/10</td>
</tr>
<tr>
<td>Repeatability</td>
<td>7/10</td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>4/10</td>
</tr>
<tr>
<td>Number of Engagements</td>
<td>5/10</td>
</tr>
<tr>
<td>Quality of Engagements</td>
<td>7/10</td>
</tr>
<tr>
<td>Overall Score</td>
<td>6/10</td>
</tr>
</tbody>
</table>
5.1.2 Mini Exhibition

Date(s): Thursday 28th November 2013

Hours: 5pm-7pm (Scheduled from 5pm-8pm)

Location: Your Energy Matters (YEM)

Staff: 12 (4 Advisors, 8 exhibitors)

Event objectives

This event was targeted specifically at SMEs, property developers and landlords. The principle objective was to inform these businesses of the usage of efficient appliances and the long-term benefits/savings that may accompany them. It was intended to achieve this by publicising and encouraging the use of LCT and energy efficient technology. The exhibition concentrated on highlighting the potential benefits and savings which may be accrued through such technology.

A particular item of technology which was to be promoted at the event was the energy and micro-generator manager (EMMA). This is a hot thermal energy storage device being trialled as part of NTVV. An objective of the event was to recruit new participants to this trial and to forge contacts with potential users. This kind of technology is normally installed in conjunction with a distributed low marginal cost power generation system, such as solar PV.

The mini-exhibition gave providers of LCT the opportunity to communicate directly with potential customers to inform them of low carbon alternatives that they may not have previously considered.

Finally the event was intended to draw attention to and raise awareness of YEM and explain the advice it could offer business owners in Bracknell. At this event, there was a particular emphasis on the advice and information which YEM could provide related to solar PV.

Pre-event preparations

Given the number of external exhibitors intended to occupy this event and the audience of SMEs rather than high street footfall, this event was advertised/promoted heavily so as to raise its profile and maximise potential attendance. A number of methods were used to publicise this event in advance:

- ¼ page Newspaper Advert (21st November 2013)
- ½ page Newspaper Advert (27th November 2013)
- Banner Advert on Berkshire Media Groups web page (live-21st November 2013)
- Poster in YEM window (15th –28th November 2013)
- A-board (26-28th November 2013)
• 5 Social Media Posts (19\textsuperscript{th} – 28\textsuperscript{th} November 2013) - 8 ‘re-tweets’ – audience of approximately 3400 followers
• 8 letters and e-mails to property developers
• 45+ e-mails sent to local landlords
• Emails sent to local landlords, property developers and SMEs
• Approx. 30 Invites dropped at all local SMEs
• Website Post (live - 19\textsuperscript{th} November 2013)

Five providers of renewable or low-carbon technology committed to attend the event.

**Execution and outcome**

On the day four of the five technology companies which registered for the event attended. Each of these providers was given a display area, consisting principally of a desk and power supply in which to demonstrate their materials.

A competition was organised for attendees to win a mobile phone charger by leaving a business card, with winners to be selected by drawing a card at random. The visitors were also asked to complete a feedback form on the event.

The event only attracted one visitor and had to close early. This outcome was very disappointing and resulted in significant lessons which were taken forward to future events:

1. Although there was late night shopping in Bracknell in the period leading up to Christmas, after 4 pm, Bracknell High Street was mostly deserted. This resulted in very limited footfall near YEM.
2. This may have been exacerbated by a renovation project which had just started in Bracknell centre.
3. The planned improvements to Bracknell centre, which was due for commencement in March 2014, meant that many of the neighbouring businesses needed to be vacated. This meant they were less likely to be interested in any sort of improvements to their properties such as the installation of energy efficient technology. These local shops represented precisely the sort of SMEs the event intended to attract. Attempts were subsequently made by the NTVV team to engage with the Bracknell regeneration partnership so as to promote LCT at the new or refurbished premises, but with little success.
4. Some shops would have rented their premises, and as such the decision to upgrade the property would not have been that of the business owner. The landlords may not be incentivised to invest in energy efficiency as they are not responsible for energy bills. This finding is analogous to the lessons learned in the SDRC 9.8(b)3 report on fuel poverty [SSEPD 2015(1)]. This also highlighted the difficulties associated with encouraging the implementation of LCT in privately rented homes.
5. There seems to have been low general interest for LCT in the target group. It is likely that energy costs represent a relatively small part of the costs of such SMEs.

**Lessons learned**

It is clear that the methods used to advertise the event were not successful and should not be used again without first conducting a survey to assess the level of interest an event may be expected to generate. There seems to have been a lack of understanding as to the needs of the potential attendees. Although a great deal of time was expended on trying to contact SMEs, there was relatively little understanding of whether such consumers would regard LCT as being of particular importance to them. Future events may also consider a different time, the period from 5 – 8 pm on a week-day would seem to be a period when small shops are closing and conducting internal administration.

This particular event was very dependent on invitations and did not have any sort of installation designed to draw passing trade in from the Square. This seems to highlight the importance of having eye catching displays which are visible from outside YEM.

To avoid the problem of committed exhibitors not attending the event it may in future be advisable to tie participants into attending. This could take the form of a ‘stick’ in the form of a non-refundable participation fee, or a ‘carrot’ of some other form of inducement to actually turn up. Either way, it is important to ensure that any such method does not discourage companies, especially technology providers, from participating in these events.

**Event Summary**

<table>
<thead>
<tr>
<th>Category</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising Effectiveness</td>
<td>1/10</td>
</tr>
<tr>
<td>Planning Required</td>
<td>8/10</td>
</tr>
<tr>
<td>Repeatability</td>
<td>1/10</td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>1/10</td>
</tr>
<tr>
<td>Number of Engagements</td>
<td>1/10</td>
</tr>
<tr>
<td>Quality of Engagements</td>
<td>1/10</td>
</tr>
<tr>
<td>Overall Score</td>
<td>1/10</td>
</tr>
</tbody>
</table>

**5.1.3 Social Club Event**

Date(s): Thursday 13th February – Saturday 15th February 2014

Hours: 9am - 5:30pm

Location: Bracknell leisure centre

Staff: 2 energy advisors

**Event objectives**
The objective of this event was to develop an understanding into how the time of day at which people consume energy has an impact on the cost and carbon intensity of that energy. This was accompanied by information about renewable technologies and their costs and benefits to people at a household level (notably solar PV and heat pumps). This event also facilitated advertisement for the upcoming Low Carbon Day in Bracknell on the 6th March 2014.

Pre-event preparations

The event was planned for the half-term holiday period as it was felt that there would be more people at the leisure centre. As many of the anticipated visitors were families, many of the exhibits were designed specifically with children in mind.

It had been seen from earlier events that paid advertising has a relatively low effect on encouraging potential visitors to make the trip into the centre of town. Free and low cost advertising was used instead such as social media and posters positioned outside and around the leisure centre across the 3 event days.

Execution and outcome

The event exhibited the following (see also
Figure 3):

- One large screen with an interactive game two pop-ups advertising and explaining the NTVV project.
- Interactive children’s station with colouring templates and build-your-own wind-turbine activity.
- Information sheets on solar panels, heat pumps, and the upcoming Low Carbon Day - displayed across a table with giveaway lanyards and pens; as well as dispersed across the leisure centre.
- Completed questionnaires were entered into a competition to win a free iPad.
- Three A3 posters advertising the competition.
- Material spread across the leisure centre.
The NTVV stand was trialled in several locations within the leisure centre in an attempt to maximise footfall:

- Thursday: Leisure centre secondary exhibition area - located within the cafe around the corner from the main entrance (see
• Figure 3).

• Friday: Leisure centre primary exhibition area - located by the main entrance with greater amounts of footfall.

• Saturday: Secondary exhibition area; stand moved forwards, to within sight of main entrance to attract greater attention and footfall.

No of attendees: 64 (Thursday: 9. Friday: 37. Saturday: 18)

Lessons learned

Although this event was better attended than some other NTVV LCP events, it did not achieve the levels of interest anticipated. A clear lesson was the location of the stall. The most successful day from the point of view of engagement was Friday. On this day, the stall was located directly at the entrance with the largest footfall of potential attendees.
Event Summary

Advertising Effectiveness 3/10  Number of Engagements 6/10
Planning Required 7/10  Quality of Engagements 5/10
Repeatability 7/10  Overall Score 6/10
Cost Effectiveness 6/10

5.1.4 Bracknell Low Carbon Day

Date(s): Thursday 6th March 2014

Hours: 17:00-18:00

Location: Bracknell

Staff: N/A

Event objectives

Bracknell Low Carbon Day was intended to be larger scale than other events reaching a much larger cross section of attendees. It was advertised as an opportunity for members of the local community to send a message to the rest of the UK about its commitment to taking practical action to reduce their carbon footprint.

Pre-event preparations

This event was preceded by the most comprehensive advertising and marketing build-up for any low carbon event. The actions performed are summarised in Table 3. A number of events took place during the days building up to the event; these are also summarised in Table 3.

Table 3: Publicity actions for Bracknell Low Carbon Day

<table>
<thead>
<tr>
<th>Avenue taken</th>
<th>Location</th>
<th>Start date</th>
<th>End date</th>
<th>Size of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Media</td>
<td>Facebook</td>
<td>Fri 14 Feb</td>
<td>Thu 6 Mar</td>
<td>Minimal- no external likes and one person commented on the page.</td>
</tr>
<tr>
<td>Poster</td>
<td>Princess Square</td>
<td>Fri 28 Feb</td>
<td>Thu 6 Mar</td>
<td>Medium- four A1 posters in Bracknell’s main shopping centre and two A3 posters generating interest in the week building up to the event</td>
</tr>
<tr>
<td>Poster</td>
<td>Leisure Centre</td>
<td>Thu 13 Feb</td>
<td>Thu 6 Mar</td>
<td>Medium/Low- 5+ A4 posters around the sports centre- generating interest following the social-club event.</td>
</tr>
<tr>
<td>Poster</td>
<td>YEM</td>
<td>Tue 18 Feb</td>
<td>Thu 6 Mar</td>
<td>Medium/Low- 2 A3 posters in the window and an A1 billboard outside</td>
</tr>
<tr>
<td>Weights</td>
<td>Thames Valley Vision</td>
<td>Wed 26 Feb</td>
<td>Thu 6 Mar</td>
<td>Medium/Low- Full news story with advice on how people could reduce their electricity usage.</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>-----------</td>
<td>------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bracknell.com</td>
<td>Thu 27 Feb</td>
<td>Thu 6 Mar</td>
<td>Medium/High- Banner on the homepage of Bracknell town centres webpage; with a link to the full news story on the NTVV webpage.</td>
<td></td>
</tr>
<tr>
<td>Schools</td>
<td>Local school 1</td>
<td>Wed 26 Feb</td>
<td>Fri 28 Feb</td>
<td>High- Event day within the school playground over lunch break, with over 100 engagements and leaflets handed out to students and staff alike. School also e-mailed the information to parents of pupils and passed details around the school.</td>
</tr>
<tr>
<td></td>
<td>Local school 2</td>
<td>Fri 28 Feb</td>
<td>Thu 6 Mar</td>
<td>Medium/High-Posters in the School to advertise the Low Carbon Day, information disseminated to tutors to pass on to students and an event on Mon 3rd Mar in the cafeteria over lunch-break to disseminate information on the event- 20 engagements.</td>
</tr>
<tr>
<td></td>
<td>Local school 3</td>
<td>Wed 5 Mar</td>
<td>Thu 6 Mar</td>
<td>Low- Requested leaflets to be disseminated to tutors- unsure of delivery.</td>
</tr>
<tr>
<td></td>
<td>Local school 4</td>
<td>Mon 3 Mar</td>
<td>Mon 3 Mar</td>
<td>Low- Requested leaflets to be disseminated to tutors- unsure of delivery.</td>
</tr>
<tr>
<td>Leaflets</td>
<td>Local shop 1</td>
<td>Tue 4 Mar</td>
<td>Thu 6 Mar</td>
<td>Low- Leaflets left on store counter.</td>
</tr>
<tr>
<td></td>
<td>Local shop 2</td>
<td>Tue 4 Mar</td>
<td>Thu 6 Mar</td>
<td>Low- Leaflets left on store counter.</td>
</tr>
<tr>
<td></td>
<td>Local shop 3</td>
<td>Wed 5 Mar</td>
<td>Thu 6 Mar</td>
<td>Low- Leaflets left on pub counter.</td>
</tr>
<tr>
<td></td>
<td>Local shop 4</td>
<td>Tue 4 Mar</td>
<td>Thu 6 Mar</td>
<td>Low- Leaflets left on store counter.</td>
</tr>
<tr>
<td>Post</td>
<td>Leaflet drop</td>
<td>Wed 5 Mar</td>
<td>Thu 6 Mar</td>
<td>High- to 23,000 homes in and around Bracknell with mid-week free paper.</td>
</tr>
<tr>
<td></td>
<td>Letter to project participants</td>
<td>Tue 4 Mar</td>
<td>Thu 6 Mar</td>
<td>High- 250 letters to a future event, including Low Carbon Day leaflet.</td>
</tr>
<tr>
<td>Preliminary events</td>
<td>Leisure Centre</td>
<td>Thu 13 Feb</td>
<td>Sat 15 Feb</td>
<td>Medium- Engagement with around 50 people over the 3 days- see one pager for more details.</td>
</tr>
<tr>
<td></td>
<td>Princess Square</td>
<td>Tue 4 Mar</td>
<td>Thu 6 Mar</td>
<td>Medium-Build-up events on Tuesday and Wednesday 11am-2pm were a simple stand with one member of staff; minimal impact however provided the opportunity to learn demographic of shopping centre for main event on Thu. Thu (11am-2pm): Live acoustic performance from NTVV Customer Manager and three members of staff giving out leaflets to passers-by- larger impact, over 100 leaflets disseminated.</td>
</tr>
<tr>
<td>TV</td>
<td>BBC Local News - breakfast Show</td>
<td>Thu 6 Mar</td>
<td>Thu 6 Mar</td>
<td>Medium- Brief mention of Low Carbon Day.</td>
</tr>
<tr>
<td>Radio</td>
<td>BBC Berkshire Drivetime</td>
<td>Thu 6 Mar</td>
<td>Thu 6 Mar</td>
<td>High- 5 minute slot from 4:10-4:15 to discuss Low Carbon Day, encourage uptake and inform people on how to get involved.</td>
</tr>
<tr>
<td>Word-of-mouth</td>
<td>YEM</td>
<td>Tue 18 Feb</td>
<td>Thu 6 Mar</td>
<td>Low/Medium- Telling visitors about the upcoming day through everyday engagements that YEM provides.</td>
</tr>
<tr>
<td>Competition</td>
<td>n/a</td>
<td>Thu 13 Feb</td>
<td>Thu 6 Mar</td>
<td>Low- Competition to win a free iPad through filling out a demographics questionnaire or 'liking' the Facebook page. About 20 entries over 3 weeks; requires wider promotion next time.</td>
</tr>
</tbody>
</table>
Execution and outcome

Across the course of the day, the Thames Valley Vision customer and stakeholder manager performed a live acoustic guitar performance in Bracknell’s Princess Square shopping centre, whilst NTVV, BFC and DNV GL staff disseminated Low Carbon Day information. Later that day at 4:10 pm NTVV management talked live on BBC Berkshire around the Low Carbon Day event.

The day climaxed between 17:00 - 18:00 when attendees were invited to reduce energy consumption for one hour to raise awareness of the peaks that challenge the electricity network. The NTVV team organised an Automated Demand Response (ADR) load-shed with local businesses. The event was then left to the local community to act upon the marketing they had received.

The results of this effort were analysed by collating results from Bracknell Primary Substation and comparing the consumption profile from 17:00 - 18:00 on Low Carbon Day to that of the ‘average weekday’. This was calculated by taking the last 10 work-days, and comparing them with the load-profile on Low Carbon Day. These results were however not adjusted with regards to temperature, (average temperatures are shown in the key).

There was a measureable and noticeable reduction in energy consumption across the defined period on Low Carbon Day. The average reduction on Low Carbon Day was 0.74 MW between 17:00 and 1800 and peaked at 1.07 MW at 17:30 (Figure 4). This is equivalent to a 3.24% reduction against the average peak.

Figure 4: Electricity reduction on Bracknell Low Carbon Day
The higher ambient temperature on Bracknell Low Carbon Day may have accounted for a slight reduction on energy consumption against average demand in the period leading up to 17.00. However, it can be seen in Figure 4 that the gap was much wider between 17.00 and 18.00, which indicates that the event had an effect on demand.

Lessons learned

This was determined to be the most successful event conducted under NTVV. It was preceded by a concentrated marketing campaign which made use of a range of different media. There were a number of preliminary events which helped to attract and engage participants. The live acoustic build-up event was held in a public area with a high footfall, had a clear message and a guiding theme. The culminating electricity reduction exercise represented an important focus to the event and provided a clear objective to which participants could actively contribute.

Event Summary

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rating</th>
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</thead>
<tbody>
<tr>
<td>Advertising Effectiveness</td>
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<td>Planning Required</td>
<td>10/10</td>
</tr>
<tr>
<td>Repeatability</td>
<td>9/10</td>
</tr>
<tr>
<td>Cost Effectiveness</td>
<td>7/10</td>
</tr>
<tr>
<td>Number of Engagements</td>
<td>8/10</td>
</tr>
<tr>
<td>Quality of Engagements</td>
<td>3/10</td>
</tr>
<tr>
<td>Overall Score</td>
<td>9/10</td>
</tr>
</tbody>
</table>

5.1.5 Efficient Appliances

Date(s): Thursday 19\textsuperscript{th} February- Saturday 21\textsuperscript{st} February 2015

Hours: 10am-4pm Thursday and Friday, 10am-2pm on Saturday

Location: Bracknell Leisure Centre

Staff: Thursday: 3, Friday: 2, Saturday: 2

Event objectives

The purpose of the event was to inform customers of the energy savings that can be made through exchanging inefficient appliances for more efficient alternatives. This was part of an effort to increase awareness of energy efficiency. It was also intended to educate customers on EU energy efficiency labels.

In addition NTVV wanted customers to understand why a DNO would be interested in encouraging uptake of efficient appliances. This meant working to help consumers understand the peaks which shape the electricity network. Taking on board messaging from Low Carbon Day this was seen as a tangible concept to which customers could relate.
Pre-event preparations

Several locations were considered for this event, including: the town shopping centre, including large supermarket lobbies, community centres around Bracknell and the local leisure centre. Unfortunately after speaking with relevant contacts at the preferred locations of the shopping centre and supermarket it emerged the event could not be held at these locations. Following visits to each community centre in Bracknell it was deduced that, for a variety of different reasons (mainly related to footfall), these locations were not suitable for the event.

Following previous events at Bracknell Leisure Centre it was decided that this would be an appropriate location, with steady customer footfall throughout the day. It would also allow a direct comparison with the previous social club event.

Advertising was again limited and kept to free/minimal cost options.

Execution and outcome

No of attendees: 67 (25 on Thursday 31 on Friday 11 on Saturday)

The following exhibits were available on the day:

- Two display appliances, an A++ rated BEKO washing machine and an A+ rated BEKO dishwasher.
- Free raffle to win the two display appliances - 23 entrants.
- Free information hand-out on EU energy labels.
- 8 Thames Valley Vision Team efficient appliances posters.
- 4 pop-ups.
- Free NTVV lanyards.
- Free children’s activities corner with colouring and build your own windmills. Attendees were also asked to fill out a feedback questionnaire.
The event was organised to run during half-term. This actually reduced the number of passers-by as Bracknell’s other swimming centre ‘Coral Reef’ was favoured by much of the half-term traffic that had been expected. This in turn with fewer classes and events than usual during half-term week somewhat reduced the normal flow of visitors to the leisure centre. One member of staff event expressed the view that it was the quietest Saturday he had ever seen.

Thursday and Friday at the leisure centre were both similar days, with a largely steady flow of visitors throughout the day and a lunch hour rush. Both days had a similar amount of through-traffic as is largely reflected in the similar visitor numbers. Saturday on the other hand experienced lower footfall.

The appliance giveaway was less successful at attracting attention than anticipated. This is put partially down to a lack of trust; people are so used to being sold to that they did not believe the appliances were being given away for free. This lack of trust also deterred people from entering necessary details, such as phone numbers, to enter the competition. In addition there was a challenge in relaying the message to customers that the appliances could be won in a free raffle as a lack of trust prevented conversations with event staff.

As previously discovered at the leisure centre, having a ‘children’s activity table’ worked well in attracting families to the event. The opportunity for free giveaway wind turbines and lanyards was also of use for attracting people.
Experiments were conducted to see if passers-by were more likely to take information without having to talk with staff. Information sheets were left out on Thursday evening for passers-by after 4pm until the Leisure Centre closed at 9:30pm, however only one leaflet was taken.

It was noted that Leisure centre staff showed great interest in the event and were excited to take part in the raffle and learn about the event. It should therefore be noted that perhaps in future this sort of event could be held in a commercial setting, perhaps in a large company lobby area.

In conclusion, interest in this event was low and the efficient appliances theme did not entice people, despite the NTVV team’s best efforts. Consumers often do not want to replace an appliance which is already working perfectly well. The motivator for people to consider efficient appliances was predominantly economic rather than environmental. The value is in reaching those customers who were engaged having taken away some learning (59% said they had learnt a great deal or a lot from the event) which they may apply when next buying a household appliance. For this reason, the effectiveness of such events in actually incentivising the purchase of LCT seems to be very dependent on catching consumers at the right place in the life cycle of their appliances. For example it might be appropriate to conduct similar events at retail locations where consumers are likely to be considering replacement appliances.

**Lessons learned**

It was hoped that holding the event at the leisure centre during the half-term holidays would create a large audience. Bracknell Leisure Centre tends to be seen as an ‘everyday’ facility with gyms and a swimming pool patronised by regular users. However the ‘Coral Reef’ facility, also in Bracknell, with more child/family focussed attractions such as water slides and a model pirate ship, tends to be seen as the ‘fun’ destination. As such, the Coral Reef was much more likely to be a venue for a family holiday day-out and may have been a better location for this event.

Prior to arranging a date, it is advisable to talk to the staff at the event venue to find out the busiest days and times. It is important to try and consider what will be the through traffic at such events. Avoid setting the event at times of day when venue will be empty.

Organisers should also consider the availability of open areas in which to hold the event. At some locations classes are held in certain locations. This means that a large group of defined people would be present at that location, but that the space might be empty for the rest of the time. Future events could be held in a large commercial building so as to meet any future demand.

With regards to the execution of the event and taking on-board previous experience from YEM, it may be useful to have a member of the council on hand during events to establish trust with customers. This helps to bridge the gap between the public and the DNO.

**Event Summary**
Advertising Effectiveness 2/10  Number of Engagements 7/10
Planning Required 5/10  Quality of Engagements 4/10
Repeatability 5/10  Overall Score 6/10
Cost Effectiveness 5/10

5.2 Domestic Focus Group events

5.2.1 Your Energy Explained Round 1 (YEE1)

Date: Saturday 22\textsuperscript{nd} March 2014

Hours: 12pm-1pm

Location: YEM

No. of NTVV staff: 5

Attendees: 30 project participants

Event objectives

This event was conducted primarily for the benefit of project participants. Project participants were invited to inform them of the progress of the NTVV project and to present the data which had been gathered on the project since initiation. The event presented this analysed data back to participants detailing their consumer category (based on an analysis conducted by the University of Reading). This was intended to give participants insights into their data, considering factors such as household demographics, attitudes and knowledge. The event gave the opportunity for NTVV members to talk directly to project participants so as to obtain a deeper understanding of their consumption patterns and to respond to any queries they may have about energy efficiency.
Figure 6: Your Energy Explained – Agenda

Thames Valley Vision

Your Energy Explained - The Agenda

Brief Introduction from Mark Stannard, Customer Manager

A short presentation outlining the Thames Valley Vision project and what it means for Bracknell and the wider UK. Followed by an overview of how the project is progressing and how your data is helping us build a sustainable, cost-effective smart-grid for the future.

What are my consumption habits?

We will ask some volunteers to predict their energy usage over a 24 hour period, ranking which of your devices you anticipate to use the most energy in your home. We will then offer the opportunity to compare this estimation with your actual data, allowing a unique opportunity to see whether how you think you use your electricity matches with your actual usage.

Get your voice heard!

Your Energy Explained is a great opportunity to discuss with us and other project participants in and around Bracknell what motivates your energy consumption patterns. We will discuss whether you could ever change them and what we should be doing as a network operator to help you enable us to build a smarter electricity network for everyone in the future.

What does the future hold for the project?

We will provide an overview of the future plans for the Thames Valley Vision and what this means to you as a project participant.

Your data!

At the end of our event we will offer you the opportunity to collect your data, here we will illustrate to you:

• Typical daily consumption
• A comparison to the average daily consumption
• When your peak demand was
• Percentage of energy used in evening peak
• Which of our consumer groups your data falls within
Execution and outcome

The event commenced with an overview of the project including the results of the recent Low Carbon Day. Each participant was asked to complete two preliminary questionnaires. The first of these (Figure 7 and Figure 8) asked general questions about energy consumption habits.

Figure 7: Your Energy Explained – General Energy Usage questionnaire (1)
Figure 8: Your Energy Explained – General Energy Usage questionnaire (2)

The second questionnaire (Figure 9) asked more specific questions about the attendee’s energy consumption and asked them to estimate electricity usage over the day.
During the course of the event, each attendee subsequently received a version of the second questionnaire complete with real data relating to their actual electricity consumption (Figure 10).
Figure 10: Your Energy Explained – actual energy consumption

1. When do you use most electricity and for how long? Highest consumption between 17:30-22:00, peaking at 18:30 at 397W/hr.
2. When do you use least electricity and for how long? From 00:30-05:00.
3. How does this change between weekdays and weekends? Your weekday consumption is highest between 18:30-22:00; your weekend peak is between 17:30-19:30, and at 20:30.
4. How does this change through the year? (i.e. spring, summer, autumn, winter)?
   Winter Consumption: >300W/hr- 18:00-20:30; max at 18:30: 492W/hr.
   Spring Profile: >200W/hr- 19:30-22:00; max at 18:30: 316W/hr
   Summer Peak: >250W/hr- 18:30-22:00; max at 18:30: 332W/hr.
   Autumn Peak: >300W/hr- 18:00-20:30; max at 18:30: 456W/hr.

Your Average Daily Electricity Usage

Mr and Mrs X
This approach was adopted so that attendees were able to compare their perceived energy consumptions with reality. The attendees were encouraged to discuss their findings with NTVV energy advisors regarding their energy usage. This provided consumers with real advice on possible energy reduction measures which would be relevant to their specific circumstances.

This event was characterised by a very high level of engagement by the attendees. The attendees were left with a much greater understanding of their own energy consumption. One important insight to come out of the workshop was related to the habits of consumers with distributed renewable energy systems, such as solar PV. These consumers seemed to be motivated to consume as much of their own electricity as possible rather than exporting this to the network and buying it back at much higher rates.

The use of a questionnaire to encourage attendees think about their consumption patterns was successful at provoking thoughtful discussions about ways in which energy consumption could be reduced. The event was also a valuable opportunity to provide attendees with information on the projects being conducted in Bracknell related to NTVV.

One aspect of the event which some attendees felt was lacking was the opportunity to discuss electricity consumption as a group so as to ‘bounce (energy efficiency) ideas off each other’.

Some attendees found it difficult to understand how they were supposed to complete the questionnaire. This could have been improved by providing them with example versions of questionnaires which had already been filled in.

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5.2.2 Your Energy Explained Round 2 (YEE2)

Date: Saturday 3rd May 2014
Hours: 12pm-1pm
Location: YEM outlet
No. of NTVV staff: 4
Attendees: 6
Event objectives

This event was an opportunity for those customers who could not attend YEE1 however had registered an interest to attend on an alternate date. Invitations to the event were sent out to as detailed in Figure 11.

Figure 11: Your Energy Explained Round 2 – Invitation

![Image of the invitation form](image-url)

Before starting the event, attendees were asked to complete a questionnaire (Figure 12).
The event followed a similar format, with some adaptations based on lessons learned from YEE1. Specifically YEE2 made more time available for group discussions as well as the one-to-one discussions which had characterised YEE1. This was however somewhat limited by the fact that the number of attendees at YEE2 was lower than at YEE1.

**Execution and outcome**

The execution of YEE2 followed a similar format to that pioneered at YEE1. Again attendees responded to the event in a very enthusiastic manner. They particularly appreciated the personalised nature of the data with which they were provided. There were suggestions as to alternate ways in which their data could be applied in a manner which was interesting and relevant to consumers. Customers were particularly interested in specific measures which could be taken in order to reduce electricity consumption and how much reduction could be achieved by each method.

Two attendees felt that there had been little engagement in the NTVV project since installation other than the six-monthly update. They felt that they should be able to get more involved in the scheme and proposed various methods by which they could do this:
• Greater interaction/communication from the NTVV team.
• A comments section on the website news page.
• Push customers to visit twitter/website for project updates and events.
• Community based medium whereby project participants can discuss different themes and receive energy advice.

As a result of this feedback, the NTVV team decided to organize more events which would allow participants to more get more directly involved in the scheme. This included events described in the sections below (Waitrose tour, Smart Grid IQ tour).

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### 5.2.3 Waitrose store tour Bracknell

**Date(s):** Monday 15th September 2014  
**Hours:** 13:45-15:30  
**Location:** Waitrose store  
**Staff:** 3 (2 NTVV, 1 Waitrose)  
**No of attendees:** 16  

**Event objectives**

The Waitrose head office is based in Bracknell and it operates several outlets in the Thames Valley area. Waitrose is highly active in the region and in 2011 constructed a flagship demonstration store in Bracknell, which is equipped with an array of energy efficient and sustainable features [BDP 2011].

This store was regarded as an ideal venue for the event due to its location in the centre of Bracknell and its close association with the community and local business in the area. It was felt that it would provide a suitable facility to engage the NTVV participants in local sustainability issues. The attendees were invited to the tour through the regular six-monthly updates sent to all NTVV project participants.

The visit was intended to give participants a view of some practical measures being taken to improve energy efficiency in a local business and by the DNO. The event was also used as an opportunity to gather opinions and feedback on the NTVV project to date.
The event had a specific emphasis on time of use tariffs, how these are structured, pros and cons. The full agenda for this visit is shown at Figure 13.

Figure 13: Waitrose Sotre Tour Agenda
Execution and outcome

Attendees were given an initial presentation which explained some of the actions which had taken place in the period since YEE1 and YEE2.

Attendees were given a short questionnaire (Figure 14) which sought to obtain their views on various aspects related to electricity time of use charges. The intention of this questionnaire was to gather information and provoke discussion amongst the attendees.

Figure 14: Waitrose store visit questionnaire

The Waitrose head of sustainability and ethical sourcing gave a presentation on the supermarket chain’s sustainability policy and targets. This presentation explained how their efforts link into the NTVV project and the wider national sustainability picture. This was followed by a tour of the Waitrose store facilities. The Waitrose store has a number of features intended to promote sustainability and to promote the wider low-carbon energy:

- Green roof
- Sun pipes
- Bird/bat boxes
- The green wall
- LED lighting
- Water cooled refrigeration
• Electric charging point
• Biodiversity centre

Although the sustainable theme and location of the building in the heart of Bracknell meant that it was an ideal symbolic location from the point of view of the NTVV project, it did have certain limitations with respect to its suitability for hosting large groups of visitors. The store is not designed for engaging large numbers of visitors and would not necessarily be the right venue for LCP events with larger numbers of people.

Advertising Effectiveness  
N/A/10  
Number of Engagements  
6/10
Planning Required 
6/10  
Quality of Engagements  
7/10
Repeatability 
4/10  
Overall Score  
6/10
Cost Effectiveness 
9/10

5.2.4 GE Grid IQ tour

Date(s): Wednesday 16\textsuperscript{th} July 2015

Hours: 10:00-12:00

Location: GE Grid IQ centre

Staff: 4 (3 NTVV, 1 GE)

No of attendees: 8

Event objectives

The objective of this event was to update participants on recent progress which had been made in the NTVV project. Much of this progress was related to the recent installation of energy storage and management units (ESMU) and cold thermal storage units.

Customers were invited to the event via the 6 monthly project update that NTVV issued to all project participants.

Execution and outcome

The format of the event was informed by the successful YEE1 and YEE2 workshops which had been held in the spring of 2014.

The event commenced with a presentation of the project activities undertaken since the previous event including the monitoring and modelling being conducted as part of NTVV by its university partners. There was also a presentation on the technologies being used to manage the electricity network.
The Technical Solutions Director at GE conducted a 40 minute tour around the GE Grid IQ facilities. Participants were given the opportunity to discuss questions one-to-one over lunch. The relatively high ratio of NTVV members to participants allowed a more effective communication of information.

There was a very positive feedback from attendees; it was felt that the presentation covered a very high level of technical detail compared to previous events. However it was felt by the NTVV team that this is not necessarily an advantage with presentations intended for the general public. These attendees tend to be particularly technology savvy and have an interest in the energy industry. They may welcome a level of technical detail which would be regarded as excessive by average consumers.

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6  Annex B: Housing association and technology provider meeting notes

This annex contains notes of interviews conducted with NTVV members and external organisations. These external organisations fell into two types:

1. Suppliers of low LCT equipment.
2. Housing associations with properties in the Thames Valley area (although all of these housing associations also have properties in other parts of Britain). The responses to these interviews are presented in an anonymous format in which the housing associations are not identified.

6.1 Honeywell

Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners.

Currently the main vehicle for promoting LCT, particularly in low income homes, is the ECO scheme. The interviewee felt that this scheme was not structured most appropriately to achieve the aim of reducing energy consumption. The scheme tends to promote certain types of energy efficiency measures, such as insulation and new boilers. However it does not necessarily result in the consumer behaviour and energy use control which is needed to cause a drop in energy consumption. For example in some cases insulation is installed in homes without a thermostat. This means that household temperature increases (sometimes excessively), but no less energy is consumed. The interviewee acknowledged that insulation is a priority item when it comes to energy efficiency improvements, but felt that dynamic solutions are also of a high priority. The interviewee stated a need to move away from one-directional ‘box ticking’ mind-set and to a more multidirectional mind-set.

In addition to ECO, the Green Deal programme is intended to promote energy efficiency. This programme has a lot of issues, largely associated with the attractiveness of the financing terms offered.

The interviewee felt that the main challenge when promoting low-carbon technology in housing associations was an understanding of the decision making structure within these organisations. Housing associations are subject to a number of pressures and influences when making improvements related to home improvements. They may be influenced by government policy. Internal teams which have the responsibility to procure home improvements may not necessarily have an emphasis, experience or knowledge of LCT. Such functions may be sub-contracted to external consultants.
Barriers to LCT implementation include awareness and communication about the technologies available. Such awareness may pertain to the ease of installation, incentives available and availability of equipment. Also consumers do not have the information available to understand how their bill is made up. This shows the need for savings to be more tangible i.e. not in terms of kW but something consumers can relate to. There is a need for greater simplicity and an emphasis on savings.

Such barriers might be overcome if it could be possible to understand in more detail the effects of LCT in certain types of home. This represents an opportunity as far as housing associations are concerned as these will tend to administer a standardised type of technology.

The interviewee felt that DNOs should more actively engage with customers, including those in social housing, to promote LCT.

There are other non-financial benefits associated with LCT. Such benefits may relate to measures which remove the necessity for consumers to actively control their own environmental systems.

6.2 General Electric

1. Main priorities in LCT development

_Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners._

The interviewee felt that the main upcoming LCT, in order of priority are:

1. Solar PV;
2. Electric vehicles;
3. Electric storage.

Solar PV is already seeing significant uptake today and is making significant inroads into energy markets. The drivers for increased solar PV are a desire to control electricity bills and to be energy independent. These small independent generators would need to combine with other technologies, such as storage, in order to be viable. They would also benefit from the security of operating within a community of similar generators.

Larger energy storage solutions may be operated by communities which use this resource partly as a form of ensuring self-sufficiency, but also as a resource for the wider network. Such communities may sell back ancillary services to DNOs.
Electric vehicles are being increasingly used. However the next 18 months will be critical for their final market uptake. If they do not make a major breakthrough in this time, then another technology (e.g. hydrogen cell vehicles) may dominate the market.

The interviewee felt that the development of electricity storage and of electric vehicles should be seen as two separate markets. There may be some overlaps, but home electricity storage and storage built into electric vehicles are essentially serving two completely separate markets. EV drivers will not necessarily be willing to sacrifice the independence and mobility inherent in the private vehicle. Network operators will not be able to rely on the availability of a resource, which is by definition designed to move independently of any other market force.

As regards heat storage, the interviewee stated that it is necessary to move away from the 'electricity market' mind-set and to recognise the advent of an integrated energy market.

All of these developments have the potential to greatly change the business model of the DNO as network operator as well as the methods by which the network is regulated.

2. **Influence of subsidies**

The interviewee felt that subsidies need to be cleverer and not greater. Subsidies need to be set so as to ensure a kick off of a particular technology. Subsidies should also encourage people to 'do the right thing'. However this requires a greater understanding of public behaviour.

Currently many subsidy schemes have perverse outcomes and can unfairly benefit those who need least support. For example solar panels can benefit those with the understanding, wherewithal and space to install them. Subsidies should be developed to help the fuel poor. However in order to achieve this, it requires a local approach and know how (e.g. local councils) to ensure the right homes receive the help/guidance they need.

There is a case for making use of aggregating bodies, such as housing associations, to bring together the expertise and buying power which would allow poorer consumers to take greater advantage of LCT.

3. **Strategies for encouraging low carbon technologies**

The interviewee believed that, as far as providers of social housing were concerned, any strategy should be aimed at providing affordability to residents. This is a social and economic rather than a technical discussion.

For example in order to offer an integrated heating solution to a community, this needs to be set up so as to ensure that the equipment is integrated in a smart manner with sufficient storage. However it is also
necessary to ensure that each user is making optimal use of the system so as to derive maximum value for all.

4. **Barriers**

The main barrier to the implementation of LCT is the availability of capital and the mechanism for repayment of debts. Schemes such as Green Deal have not been successful in encouraging LCT as they do not offer attractive terms to potential customers and are not seen as being stable.

There is a role to be played by housing authorities to act as an intermediary between lenders and residents when obtaining finance.

Another important barrier is the knowledge of potential users of LCT. There is an important role for education, directed both at users of LCT and at school level. There is a role for both central and local government to ensure that this education is taking place.

There is a question of trust when implementing LCT. Consumers need to believe that any improvements are being implemented for their own benefit. Housing authorities have a role to play in building this trust. He added that DNOs often do not have this trust as their only interaction with customers is due to negative situations, i.e. power outages.

5. **Vested interests**

Retailers have an interest in retaining the status quo of the current electricity market. It is important that they accept the need to move from a business which supplies electricity in bulk to one in which retailers sell managed services.

There is a need to overcome the parochial view of some consumers who do not recognise the more global impact of their energy consumption activities rather than the current focus on price.

6. **Community benefits**

The interviewee believed that there were a number of external community benefits to the application of LCT. Allowing for increased self-sufficiency in energy could mean less disruption from roads being dug up. On the other hand alternative methods to produce low-carbon energy, such as nuclear or CCS, will result in higher consumption of materials, such as concrete, which will result in higher CO2 emissions. There will also be less strain on supply chains as less material is required.

6.3 **Housing association A**

1. Main priorities in LCT development
Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTJV project or its partners.

The most important form of LCT implementation is solar PV. Housing association A is building hundreds of new homes per year and most of these will be fitted with solar PV. Even where homes are being built as blocks of flats, there will be solar PV installed on the roof.

Solar PV projects are popular with housing associations as there is relatively little involvement with the residents, particularly when the equipment is installed in the common parts of a block of flats. These installations can benefit tenants in different ways, according to the type of residence. For example, in a block of flats, the PV panels will normally be installed in the common roof of the property. Electricity generated is used to supply the common parts and any excess is sold back to the network, earning FiTs and export fees. These funds are then used to reduce management fees. Under these circumstances, the electricity would not normally be fed directly into any of the properties. However in other properties, for example stand-alone houses, the electricity may be supplied directly to the tenant. Housing association A looked into battery storage about 6-12 months prior to the interview (June 2015) but came to the conclusion that it would not be cost effective.

Housing association A has installed heat pumps as part of refurbishments, but not as new-build properties, and has implemented some CHP schemes. It also operates one geothermal scheme; however this is unusual. Most of the homes owned by housing association A are on the gas main and heat pumps and CHP are less viable under such circumstances. Where the property is on the gas network, some gas condensing boilers have been installed.

Measures are also required to control temperature in properties. In many places this may take the form of more effective insulation. However older properties can be hard to treat. Housing association A has a number of such difficult properties, many of which were built in the 1950s.

In some newer flats, overheating of the property can be a problem. This is particularly the case where the property has single aspect windows which, for safety and security reasons, cannot be opened very wide. The heaters on such properties do not always have summer bypass fitted. The problem may be exacerbated by communal heating which cannot be controlled from the individual properties.

2. Influence of subsidies

The interviewee felt that there is restricted access to subsidies. For example, funds available under ECO have been cut and there remains little opportunity to take advantage of these. There is frustration within
housing association A that that there is little consistency in policies related to support of LCT. It is very difficult to plan financial investments if access to funding can be cut off at short notice.

3. Strategies for encouraging low carbon technologies

For housing association A, its primary objective is to ensure low running costs for its tenants; this includes energy related costs. The priority of housing association A’s customers is high levels of comfort and low cost.

Housing association A tries to plan any installations of LCT together with other forms of regular maintenance. For example, if it needs to install scaffolding to do maintenance on the roofs of properties, it tries to schedule installation of PV panels concurrently with this. This can be a considerable saving as scaffolding represents a significant portion of the costs associated with roof-top PV.

With regards to subsidies for PV, housing association A often has to forgo certain potential income streams. For example where housing association A receives funding from the Homes and Communities Agency for the installation of PV, this makes it ineligible for FiT payments unless the grant is repaid for that particular investment. For this reason, it typically allows excess electricity from PV to be supplied for free and unmetered into the network. It does not claim the value of the export electricity as the value it would receive for doing this is often outweighed by the cost of metering equipment. According to the interviewee, this is a very common occurrence, not only at housing association A but also at other housing associations.

The interviewee also pointed out that with the UK government reduction in FiTs housing associations will have even less incentive to monitor solar PV electricity generation, especially if these have been recipients of other subsidies. Housing association A will continue to install solar PV systems in order to meet building regulations standards. However with no monitoring they will not know if the system stops working.

Housing association A has made no biomass related energy investments and as such has little experience with RHI.

4. Barriers

The interviewee felt that the main barrier was related to cost. As was mentioned earlier, it feels that subsidies are becoming less easily available and provided in a way which does not promote financial
planning. The organisation is subject to quite stringent financing costs of 6.5%, which makes it hard to raise finance on its own.

There is particular frustration related to the retrofit of existing housing stock. As this is often older and built to a lower building code, it is often in need to new insulation. This is often difficult to provide. Housing association A often conducts such projects at a negative NPV so as to fulfil its social obligations to its tenants and to meet regulatory standards.

Some residents have had some difficulty understanding how to most effectively use the equipment which has been installed in their home, which tends to work against the objective of the project. Housing association A has found it useful to employ ‘Green Living Advisers’. It has found that residents understand instructions better if they are explained than from reading the manual.

There are problems with the standard SAP classification methodology. This measure is based on standard patterns of occupation for the property, which is not necessarily the case in the properties operated by housing association A.

Developments in IT will have a great influence on LCT in the future. However to date there has been relatively little convergence between these worlds.

Housing association A has had difficulty finding smart meters which will work together with its solar PV.

5. Vested interests

Housing association A has reservations about innovative technologies. It does not want to become a guinea pig for new technologies and to accept the risk associated with an untested system.

6. Community benefits

Some of the efficiency improvement measures go hand-in-hand with activities intended to improve the aesthetics of the housing stock. This helps to put pride into the community.

6.4 Housing association B

Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners.

1. Main priorities in LCT development

The current main priority for LCT in housing association B is solar PV. This is mainly being installed in new-build homes. Although the subsidies for solar PV have been repeatedly reduced over the past years,
the price of solar PV has also reduced drastically, which means that the technology is still financially viable. There is hardly any work going on to retrofit PV in existing homes. Housing association B is currently doing a significant amount of building for rental and sale. For sales properties, the value of the solar PV is included within the value of the property. For rental properties which incur management fees (normally flats), 70% of revenue derived from these panels is used to defray the cost of the service charge. The other 30% is paid into a fund intended to fund the low carbon projects described in this interview.

Housing association B has been approached by a number of hedge fund backed solar PV providers which wish to install solar PV and to provide a portion of the value to the housing associations. Housing association B has not tended to take advantage of such schemes, but has mostly funded its own projects.

Housing association B is working to remedy LCT policies which have not been conducted in the most optimal manner. Often solar PV was not registered for FiTs and was losing potential subsidies. This has meant that electricity was being generated and any unused excess was supplied directly into the network.

As regards passive measures such as insulation, investments have frequently been deferred due to uncertainty with government schemes such as ECO and Green Deal. Insulation measures have now largely reach saturation point, as most of the properties which could realistically be treated have been completed.

There has been a lot of work to install CHP at the larger estates (500+ properties). This is being driven largely by regulations which require the housing association to consider CHP in locations where it could be feasible.

Heat pumps are not a preferred form of LCT at housing association B. This is due to their high maintenance requirements. Solar thermal is also not much favoured due to its high maintenance costs. When it comes to competition for roof space between solar PV and solar thermal, solar PV will always win. This is mainly due to its much greater ease of maintenance.

When retrofitting new properties, housing association B will look at all options available within a property. This may include active measures such as PV, passive measures such as insulation and an optimal combination of all possible measures.

Most of the technologies being installed do not make use of active smart metering technology. Tenants do not want to have to operate complicated operating systems. The interviewee felt that any technology intended to react to requirements in demand response should be the responsibility of the OEM. For example freezers should have devices installed which allow them to be shut off if required to meet network needs.
2. **Influence of subsidies**

The lack of consistency in government LCT support schemes has been a barrier to implementation of such schemes. This has made it very difficult to fund energy improvement schemes. Also the way in which ECO was implemented has resulted in some poor quality installations, which has tended to bring the scheme into disrepute. This was due to the time-limited nature of the grants available, which caused some of the installations to be rushed and therefore of lower quality.

The Green Deal was not suited to housing association tenants. However the assessments conducted under Green Deal have had some positive knock-on effects. Namely some leasehold tenants have made use of the assessments to seek private funding, often at better rates than Green Deal, which they have used to conduct these programmes.

3. **Strategies for encouraging low carbon technologies**

Housing association B does have a general aspiration to promote low carbon energy, although its main priority is to act in the direct interests of its tenants. This has often meant working to implement climate change mitigation measures. Such measures may include flooding defences where required and passive measures against overheating (such as shutters).

4. **Barriers**

Lack of understanding can be a barrier to optimal use of LCT. Some tenants do not necessarily want to engage with any technology which takes them out of their ‘comfort zone’. For example some of their properties have been built to code 6 in accordance with the standards code for sustainable homes. However the LCT integrated into these properties have been so complicated to use, that some tenants have not been able to take advantage of them. Housing association B has employed ‘green doctors’ to advise tenants on the best way to get the full value from LCT installed.

Regarding solar PV, the need to build properties for sale within social housing has been a source of some problems. Some blocks are built with a penthouse flat.

This flat requires access space which takes up a part of the roof which could have been used to install solar PV, this reducing the size of the potential solar PV installed.

In some cases previous, badly executed projects can be a major cause of tenants losing confidence in LCT. If an initial installation goes badly, it is difficult to shake the perception that the technology itself is at fault.
The supply chain is also a potential problem. Some low-carbon technologies, such as heat pumps, are dependent on equipment which is manufactured in other countries. This means that it may be difficult to obtain spare parts in the event of failures.

5. **Funding and vested interests**

Many of the installations have been driven more by improvements in building codes than in government grants. Housing association B has a target of bringing all buildings to code level 4 in London and code level 3 outside London.

Funding tends not to be too much of a challenge to this housing association as they are cash rich and are able to fund LCT projects from their own cash reserves. This is the reason that it has not been particularly interested in schemes where they effectively rent out their roof space to PV installers.

6. **Community benefits**

As a social organisation, the housing association is run principally for the benefit of its tenants. Social tenants do not always have control over the property which they inhabit. As properties may be of very different standards, this means that some tenants will be luckier than others and will have more energy efficient properties allocated to them. The application of energy efficiency measures and other forms of LCT should help to alleviate the inherent unfairness of this situation.

The general benefit to the community is that, with lower energy consumption levels, tenants will have lower energy bills. This in turn means that they have more cash available to pay their rent. This has a clear positive benefit to the housing association as well as to the tenants themselves.

There is however a number of other community benefits which can accrue from such LCT schemes. Such installation projects can act as a vehicle to train tenants to conduct installations of LCT. This helps promote skills, employment opportunities and community engagement in such schemes.

6.5 **Housing association C**

*Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners.*

1. **Main priorities in LCT development**

Housing association C mostly provides housing to elderly people. Their estates are made up mainly of single room flats with on average 35 flats per block. These blocks tend to have high communal energy.
use. Communal energy consumption is normally covered under a service charge. Most individual flats have their own meter and, as such, pay their own energy bills.

The highest priority of housing association C is to make full use of its currently untapped resources, namely roof tops which could be used for installing solar PV. It estimates that it may have the capacity to install up to 3-5 MW of solar PV across its estates. Its intention is to take advantage to FiTs where they can do this. Electricity produced in this way will be used to supply communal areas and any excess sold onto the network. The value gained from this will be deducted from the service charge.

It is also considering air source heat pumps so as to improve the main social priorities of comfort and controllability. For the same reasons, housing association C is also considering switching to gas where it is able to do so.

As regards insulation, housing association C feels that it has done all of those actions which can easily be performed. Much of its stock was built in the 1960s. As such it was built with cavity walls, which have now largely been filled. This was done in response to building regulations and to a large extent making use of government funds.

Finally housing association C is looking to put LEDs in all estates by 2021. It has worked out the current cost of a bulb to be around £70 given their costs of changing a bulb. The longevity of LEDs could therefore promote large savings, not to mention better energy efficiency.

2. Influence of subsidies

Having already taken advantage of ‘low hanging fruit’, housing association C does not really have much access to other government funds. It put in for up to £300k for implementation external cladding under ECO but did not receive any of this.

With regards to PVs, subsidies are what make or break projects from a financial viability perspective. The constant changing of FiTs regulations has tended to break down trust in the system.

The Warm Front scheme tended to encourage leaseholder tenants at the domestic level, but was of less interest to renters.

3. Strategies for encouraging low carbon technologies

Housing association C has conducted 13,000 EPC evaluations, which has provided it with a benchmark against which to measure future improvements in energy efficiency. These EPC measurements are seen as being useful at a macro level. It has taken actions to improve the worst reporting performers. It has a
policy of improving their stock from the bottom up. Having already improved G rated homes under CERT, housing association C is now targeting D and E rated homes for improvements.

Housing association C has made increased use of information sharing across other housing associations. Other housing associations also have teams of 1-5 people doing the same function as the interviewee and communication has improved across these teams.

Housing association C has made use of estate managers to disseminate information on energy efficiency to tenants. These estate managers are the customer face in housing association C, will have a close working relationship with residents and are considered a part of the community.

4. **Barriers**

A major barrier to LCT is the prevalent business culture. It is difficult to bring about change in an organisation with inbuilt inertia.

The residents at housing association C’s properties tend to have an unusual consumption profile. Namely they spend more time at home than would be the case with working people. For this reason, their consumption does not necessarily match normal energy consumption peaks. Older tenants tend to be less aware of environmental issues and thus less careful about saving energy. One challenge is therefore in educating residents about energy efficiency. The interviewee felt that a smart tool which people did not have to think about would be the best approach to managing energy usage.

Overheating is a growing problem in their homes. This is particularly not easily controlled where there is a central boiler. During winter, this is often controlled by tenants by opening their windows. Summer overheating can be a significant contributor to excess summer deaths.

5. **Funding and vested interests**

Funding tends not to be a significant problem for housing association C. Like many housing associations, it is cash rich and is able to fund LCT projects from its own funds.

The potential returns for projects have been estimated at between 7% and 14%, depending on what assumptions are made regarding subsidies. This rate of return is considerably better than putting this money in the bank. The payback on projects varies between 7 and 14 years, depending on what proportion of returns are retained by the housing association and what proportion is passed onto the tenants.

The more elderly tenants who live in housing association C’s properties often tend to prefer to keep their properties at a high temperature.
6. Community benefits

Housing association C’s reason for existing is its social mission. It provides affordable housing to elderly people and all of its actions derive from that objective. The health and wellbeing of its tenants is paramount. Its main priorities with regards to energy are to provide comfort, controllability and affordability. One of the advantages of LCT is that they have the capacity to reduce costs to tenants which in turn increases the affordability of the properties.

6.6 Housing association D

Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners.

1. Main priorities in LCT development

Housing association D is implementing LCT through a programme of insulation measures, such as roof and wall cavity insulation. It has also installed high-efficiency condensing boilers and new windows and doors in a number of properties.

The interviewee discussed an example of a block of flats which is currently undergoing treatment. The block is now a grade 2 listed building, which means that its façade cannot be altered. This building has had highly efficient double glazing fitted and attempts are underway to insulate the frame of the building. This is however complicated by the design of the building, which features a free-standing metal frame.

The current generation of efficient electric storage heaters is being fitted. This is however being complicated by the difficulty of connecting the building to the electricity network. Housing association D has considered the use of biomass for the building as well as connecting to the gas mains. However both of these ideas have been rejected due to the complications associated with running piping through the structure. Biomass in particular is seen as being difficult to maintain, with a scarcity of trained operators.

In addition to the block of flats described above, housing association D has obtained £0.5m of Green Deal funding to install external insulation to 350 Wimpey no-fines² concrete homes.

These energy efficiency measures are seen as having a much higher priority than low carbon energy production measures such as solar PV. Solar PV is seen as a relatively untested solution and housing

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² A construction method developed in the latter part of the 20th Century and commonly used in social housing, ‘No-fines’ refers to the grade of concrete used.
association D would prefer to see a more technically advanced solution before this is rolled out across its stock.

Housing association D is however in discussion with an installer of solar panels. This panel installer has looked at its stock and will consider what offers it can make in terms of solar panel installations. These installations, if they take place, should be implemented before the end of 2015.

Housing association D has a gas-fired CHP unit at its extra-care scheme. It has considered biomass as a technology, but feels that it is impractical.

2. **Influence of subsidies**
The improvements being made to the Wimpey no-fines homes were only made possible by Green Deal funding. This made it possible to obtain the remaining funding needed to do this work.

The unpredictability of the various subsidy schemes have been a major barrier to approving energy efficiency investments. It is very difficult to obtain board approval for such schemes when the funding terms change frequently.

3. **Strategies for encouraging low carbon technologies**
Housing association D has been carrying out significant investments to implement its affordable warmth strategy. This strategy aims to achieve an average SAP rating of 72, compared to a local average of 65. These investments have been spent mainly on energy efficiency. The purpose of this initiative is to move tenants out of fuel poverty. An additional objective of this programme is to reduce maintenance problems arising from condensation. Condensation is an issue which has a negative impact on the health of tenants as well as the property in which they live. The build-up of damp can lead to mould growth and damage to property.

Housing association D feels that this has positive benefits for themselves as well as for their tenants. If tenants have more disposable income, they are less likely to fall into arrears with their rent.

4. **Barriers**
Some tenants will take advantage of improved efficiency to increase the temperature of their homes rather than reducing energy costs. The condensation problem, which was mentioned earlier, is also to a certain extent the result of lifestyle choices. Condensation tends to occur in insufficiently ventilated homes. This is often a lifestyle choice of tenants who do not wish to sacrifice warmth for a reduction in condensation.
There is a need for education to make tenants understand the optimum method for them to save energy. There is a concern however that such education should not be seen as proscriptive. Education tends to be done in a sporadic way by the housing management staff. There is not a dedicated education team.

5. **Funding and vested interests**
As was discussed before, it is the uncertainty of subsidies rather than the availability of funding which tends to be the main problem related to LCT investments.

6. **Community benefits**
In addition to the cost savings to tenants mentioned at point 1, housing association D also feels that the energy efficient measures have other direct and indirect benefits to tenants and the wider community. Improving energy efficiency will help to protect the environment and to reduce housing association D’s own carbon footprint. In addition the improved energy efficiency of the stock will have positive benefits for the health and wellbeing of the tenants.

6.7 **Housing association E**

Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners.

1. **Main priorities in LCT development**

Housing association E has introduced a home energy standard. The objective of this is to bring all of their housing stock to a minimum SAP level of 75. This is being achieved in a number of ways.

The highest priority is ‘fabric first’. This means that housing association E has mostly been concentrating on improving insulation standards. It has now completed most of the loft and cavity wall insulations which could be implemented in their stock. It is now mostly left with solid wall properties. It has been looking at other forms of insulation, but these tend to be more difficult and expensive to install.

The next priority is improved boilers. This does not necessarily mean moving over to gas heating. Housing association E wants to shield its tenants from future increases in gas prices.

It is aware that lack of connection to the gas network is often correlated to fuel poverty. However it is not convinced that a move to gas heating is the best long-term strategy for their tenants.

Housing association E conducted a trial of ceramic glass radiators, but this was not successful and this has been discontinued. It was found that this type of heater did not match the lifestyle of many housing association tenants. The current preferred heating solution is the use of Dimplex Quantum heaters.
There has recently been a programme in housing association E to roll out solar PV, although this is still relatively uncommon in the 60,000 homes which it owns. There are currently approximately 800 homes with solar PV installed, of which about half were built new with PV installed and the other half are retro-fits. Housing association E regards solar PV as a tried and tested technology which can be used to make the housing association E housing stock more environmentally friendly in a fairly straightforward manner.

Solar PV is seen as a cost effective method of increasing EPC levels in properties which are hard to treat for insulation or have sold walls. Housing association E estimates that it costs £300 to increase SAP by one point compared to £600 per SAP point for solid wall insulation.

Solar PV has largely been installed in blocks of flats. The electricity is used to supply common parts with any excess sold onto the network. Money earned in this way is used to defray management fees. Where electricity supplied to the gird is not metered, the housing association is entitled to a payment against a deemed amount.

Housing association E has also had a programme of trialling air and ground source heat pumps. It has trialled approximately 40 of these so far. These trials have mostly been quite successful and they would like to extend these further. These heat pumps are mostly installed in stand-alone houses as it is complicated to install these in blocks of flats.

There are a large number of 8000 storage heaters within the stock, of which 4,000 are soon due for replacement.

It is interested in battery storage, but it feels that this still too expensive. It will continue to monitor this market.

2. Influence of subsidies

The FiT is a strong incentive for the installation of roof-top solar PV. However it is not necessarily essential for future investments.

Housing association E will consider the most efficient method available to achieve minimum home energy standards in its stock. This may be most effectively achieved by means of solar PV, even when subsidies are reduced.

3. Strategies for encouraging low carbon technologies

Housing association E has found that a key technique for selling the concept of LCT to tenants is to ensure that the right person has direct contact with the tenants. Some employees are technically strong, but do not necessarily have the right interpersonal skills to convince tenants of the advantages of the new
technology. For this reason, the housing association E sustainability team also employs down-to-earth, friendly employees who are able to develop a good rapport with the tenants.

4. Barriers

Previous energy efficiency measures at housing association E have tended to be less effective due to a lack of focus as to which department within the organisation is responsible for such measures.

Another barrier is the lack of data available in order to analyse energy demand and energy performance in their properties. It is aware that using benefit information is an imprecise proxy for understanding fuel poverty. It is trying to obtain GIS information which will help it to more precisely understand energy usage in its stock.

Another potential barrier is the attitude to and confidence with the technology. This can refer to the tenants who have to use the technology, but it can also mean the installers who need to fit it. The contractors which housing association E uses for maintenance are not necessarily familiar with the kind of low-carbon equipment under consideration.

Attitudes amongst tenants vary, but are in general good. Some older tenants may not necessarily react as positively to new technology. However people are generally happy to accept technology which increases their ease of use.

There are sometimes complaints from neighbouring properties (which are not necessarily tenants of housing association E) about the noise from air source heat pumps.

5. Funding and vested interests

Lenders are generally nervous of 3rd party (e.g. rent-a-roof) arrangements for LCT. This is because of the risk associated with encumbered properties in the event of the residences being sold off.

Housing association E is not going to go down the rent-a-roof route and will pay for any solar PV projects out of its own cash reserves.

There are also issues related to state aid. For all forms of grant funding which might be available from government agencies, housing association E has to be cautious that it complies with state aid regulations.

One of the major issues with implementing energy efficiency projects is the access to capital funding. The procedures for getting funding are so complicated, that there is always a danger that the proposed project will be shelved even before it has started. This can happen after considerable effort has already been expended trying to get funding.
When putting forward a case for funding, housing association E has to put forward a business case which considers, amongst other things, the value-for-money of the investment. This needs to consider the environmental benefits, but also customer satisfaction and comfort. These value-for-money considerations differ depending on whether the property is a new-build or a refurbishment.

There is a strong indirect incentive to implement energy efficiency schemes. Homes which have good energy efficiency are less likely to suffer from condensation and damp. This means that they require less maintenance, which results in lower maintenance fees. Housing association E feels that there is a strong argument to be made that this should be included in any value for money calculations; however there is little data available to prove this point.

6. Community benefits

There are colleagues within the housing association E who will look at such issues as employability. This is however not the same at the sustainability team of which the interviewee is leader. For this reason, the sustainability team needs to maintain close contacts with the employability-responsible team so as to consider any potential employment opportunities for tenants which might arise out of any new low-carbon installations. For example, housing association E will try if it can to ensure that tenants are employed on LCT installation projects.

Housing association E has looked at potential trials of smart technology which would make use of a mobile internet platform. They are however not certain as to how many of their tenants actually have hand-held smart devices.

6.8 Housing association F

Unless otherwise stated, the opinions expressed within these notes are those of the interviewees and not necessarily of the NTVV project or its partners.

1. Main priorities in LCT development

The general approach of housing association F is of 'fabric first'. This applies both in new build and retrofit properties. Only after having considered any material improvements to the fabric of properties, will it consider any other form of LCT. Depending on the appropriateness of the property, housing association F has implemented external solid wall insulation and certain internal insulating products. Housing association F feels it has a particularly challenging stock, as the age of its properties varies widely. Some properties are new-builds, whereas others are as much as 150 years old.

It has a preference for passive solutions (which under their definition includes solar PV) as these tend to reduce maintenance costs. However in some circumstances it has installed LCT measures which actually
increased maintenance costs. This includes air-source heat pumps, which it sees as a viable solution in certain properties which are not connected to the gas network. It has also trialled ground source heat pumps and solar thermal in certain properties. Another technology which it has trialled includes biomass as part of a district heating scheme. However housing association F has a general policy of moving to gas wherever this is available.

Housing association F has implemented approximately 500-600 solar PV schemes. These were mainly installed in properties which are not attached to the gas network. Use of 3rd party solar PV suppliers tends to be problematic, as this causes problems related to lenders consent. Some solar PV has been installed so as to help meet low carbon targets in buildings.

2. **Influence of subsidies**

Housing association F sees access to funding as a major barrier when implementing LCT, both in terms of its own cash reserves and also of relevant subsidy schemes. Housing association F believes that the subsidy regime has become worse. The interviewee felt that Green Deal and ECO had been ineffective at achieving their aims and compared poorly to previous subsidy schemes. The solar PV 'gold rush' of 2010 is now in the past and the perception is that there will be a much less favourable subsidy regime for solar PV in the future. Some grants may still be available from local government, which may allow limited numbers of PV installations.

3. **Strategies for encouraging low carbon technologies**

Housing association F sees its strategic priorities as follows:

- Controlling capital costs
- Reducing costs to tenants
- Reducing its own operational costs

Its main goal is to ensure an appropriate balance between cost and the comfort of its residents. However in many cases, investments in improving infrastructure can have positive benefits in reducing maintenance costs. This is because improved energy management can result in reduced condensation and thus prevent damage to properties.

Specifically housing association F intends to bring all of its properties to an EPC level of ‘C’ by 2025. In all cases however it is trying to fulfil this aim in the most cost efficient manner, measured in terms of £/ EPC point. Previously installation of solar PV had been seen as a significant part of this strategy. However, with the reductions in FiTs, PV is likely to become a small part.
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Housing association F has no specific reporting requirements with respect to environmental standards. However it is influenced by certain local government regulations which require housing associations to achieve certain standards if they wish to remain a partner of local government.

4. Barriers
As well as the external barriers associated with obtaining appropriate funding, implementation of LCT can be subject to internal barriers. Housing associations such as housing association F can be very risk averse organisations and do not necessarily welcome unfamiliar innovations.

Some barriers are also raised by the residents themselves. These may become cynical of the efficacy of such projects if they see that they have previously not been implemented completely to plan. However experience has shown that when such projects are successfully implemented, and their benefits become apparent, residents may become more enthusiastic.

5. Funding and vested interests
There is a perception that housing association F has in the past been guilty of chasing funding rather than planning expenditure on LCT in a more structured manner. The tendency to get access to large grants can tend to blind decision makers as to the ultimate cost benefits of the improvements associated with such grants.

The interviewee felt that there was a need to shift the mind-set of its own finance department from only considering CAPEX, to consider the balance between CAPEX and OPEX.

Residents tend to have certain expectations about the affordability of their accommodation and of all other living costs. Their expectations with respect to what they regard as discretionary and non-discretionary expenses are not necessarily intuitive.

Residents will often regard rent as a lower priority expense than paying their utilities as the ramifications of non-payment tend to be more immediate (eviction typically takes six months). Namely being moved onto a pre-payment scheme is likely to happen much more quickly than being evicted from their property as a result of non-payments.

Housing association F recognises two different kinds of new-build project, including those which involve LCT. These are (1) those projects which housing association F implements itself, and (2) those which are largely entrusted to subcontractors. Where projects are implemented by subcontractors, these may be subject to certain concessions i.e. the subcontractors may be bound to certain equipment suppliers. This can allow relatively little freedom of scope to housing association F and to its residents. This can lead to tensions between the subcontractor, housing association F and the residents.
The interviewee referred to a specific instance in which housing association F worked together with SSEPD to ensure the seamless incorporation of LCT onto the network whilst ensuring minimal disruption on the network. Namely 70 houses in one of its regions had 35 kW of solar PV installed. This was done in conjunction with SSEPD to ensure that localised upgrades were made to the distribution network to accommodate this additional load.

Housing association F sees the government’s right-to-buy scheme as an unwelcome complication, as it reduces incentives for LCT upgrades.

6. Community benefits

Housing association F sees the main community benefit of LCT as increased affordability to its tenants. There is conventional wisdom in housing associations that reduced energy costs mean that residents will have more cash available to pay their rent and thus that these improvements also financially benefit the housing association. The interviewee felt that this belief is largely anecdotal, but that the general availability of extra cash to residents could be seen as a positive benefit. He noted there were ongoing studies into this relationship between energy expenditure and rent payment.

The interviewee believed that there were other non-financial benefits to the implementation of LCT. There were opportunities to implement apprenticeships. This links into existing schemes to implement apprenticeship training amongst residents.

There do seem to be other non-tangible benefits to the schemes, namely that they encourage social interaction between residents.

Housing association F does not have a solid insight into the impacts of behaviour on energy efficiency and carbon reduction. It has however engaged a team of ‘neighbourhood champions’.

These are ordinary unpaid residents who have received training on LCT and energy efficiency and are able to advise their neighbours on their usefulness and most effective implementation.
7 Annex C: Your Energy Explained Data

In total out of the 250 invitations sent out to project participants to attend the Your Energy Explained event, 62 (24.8%) were returned with a completed questionnaire outlining the demographic structure of their household, and their perceived attitude towards the environment (see Section 5.2.1). The results indicate a positive consensus towards acting in an environmentally sensitive manner. This is demonstrated in Figure 15 where a value of 1 signifies strongly disagree and a value of 5, strongly agree.

Figure 15: Results of YEE questionnaire

Interestingly younger generations (<40 years) have a higher expectation of “scientists finding a solution to climate change” than other age groups. This group is also more likely to see the environment as a lower priority than other groups.

Families appear to see the environment as important but they admit to being less environmentally friendly, presumably as the environment is a lower priority for them due to commitments of family life.

Learning: Families see the importance of the environment but see it as a low priority. It is therefore important that this group receive quick and easy initiatives to being environmentally friendly.
Of the 62 returned questionnaires a total of 36 people attended Your Energy Explained events. There is no log of how many of these people turned up as couples/families and how many on their own. However given the amount of secondary questionnaire responses filled out at the event (20) it is assumed this is the number of households which attended (8% of total project participants). Of these customers 15 also filled out the visual representation of their daily load-profile. For comparative purposes only the 15 customers that filled both questionnaires will be looked at here.

7.1 Method

With guidance from the University of Reading a method for quantifying how accurately each customer's estimated consumption profile matched their actual load-profile was devised. First each customer's hand-drawn graph was divided into a 48 X 80 grid. This was to collect data points every half hour (24*2=48) to an accuracy of 1.25% (100/80 = 1.25%). Each drawn data point was given a percentage level between 0 and 1 every half hour, where 0 was the minimum consumption and 1 the maximum. The customer's actual, average load-profile was then normalised so that it too was valued between 0 and 1 (with 0 as the min point and 1 as max). The method for this was to find the minimum value in the data set then subtract this value from each data point. The maximum value from this new data set (X-min) was then found, and each data set divided by that new maximum value (X-Min/(Max(X-Min))).

The half-hourly intervals of data were then graphed against each other (Section 7.3), as one example shows below, and a Pearson product-moment correlation coefficient (PMCC)⁴ was calculated between the two data sets to show the relationship between the estimated and actual consumption.

Figure 16: Example of actual / estimated usage comparison

⁴ PMCC is a measure of the strength of a linear association between two variables. A Pearson product-moment correlation attempt to draw a line of best fit through the data of two variables, and the Pearson correlation coefficient, r, indicates how far away all these data points are to this line of best fit.
7.2 Findings

The process described above was performed for each customer participating in the activity. Graphs were then examined and a table of common customer mistakes in estimating the consumption profile was constructed. From this table two key learnings are drawn:

1. Morning peak as a proportion of maximum peak is often overestimated by people when they predict their load-profile.
2. Evening peak is often estimated later than it occurs by 44% of people.

This tells us that people are aware that the evening is when they use the majority of their electricity and our question “before today’s event did you realise that the time you consume electricity impacts its cost and carbon intensity?” which was answered “yes” by 68% of respondents suggests people link this to electricity in the evening being more costly. This awareness suggests that people know that consuming energy at this time is not efficient; however do so anyway.

Secondly the fact that people did not realise how early their evening peak is suggests that for a DNO to ask domestic customers to shift their consumption profile, they would first need to inform those customers when precisely this peak is. Within the sample there were three families with children in education. Of these, 2/3 estimated the evening peak as too late. It would be valuable to further explore whether this is caused by children coming home from school earlier than parents and using appliances without their knowledge. There are not currently enough samples or enough information to draw this conclusion.
7.3 Consumption Profiles

PMCC: 0.647

PMCC: 0.560
PMCC: 0.736

PMCC: 0.758
PMCC: 0.690

PMCC: 0.667
PMCC: 0.72

PMCC: 0.862
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New Thames Valley Vision

PMCC: 0.206

PMCC: 0.659
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