Customer-Led Network Revolution

Project Lessons Learned from Trial Recruitment

Customer-Led Network Revolution Trials

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LCN Fund Low Carbon Networks

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1. Aim of the review

This short review by Sustainability First requested by Northern Powergrid and British Gas provides a brief account of the notable successes and key challenges encountered by British Gas in recruitment of customers to the CLNR trial[1].

This review is not intended to replace – or replicate – later, more comprehensive evaluation by Durham of interim and final findings from the customer trials[2].

Instead it aims to capture project lessons from trial recruitment for the current trial, for future trials and the development of new customer propositions.

2. Methodology

This review is predominantly based on interviews with nine members of the Customer-Led Network Revolution (CLNR) project team carried out in late autumn 2012 and largely reflects the project experiences of the British Gas team. Interviewees included:

- **British Gas:** Stavros Sachinis; Cara Belady; Allan Row; Lee Barlow; Keiran Allan and Simon Wallwork.
- **Northern Powergrid:** James Fletcher and Chris Thompson.
- **Durham Energy Institute:** Gareth Powells and Robin Wardle.

It is also based on access to data and materials provided by British Gas. These included:

- Communications materials used with each customer group;
- Project tracker of customers on each trial;
- Summaries of components of each test cell.

[1] This paper focuses on residential and SME customers, it does not look at Industrial and Commercial customers.
[2] Including customer motivation for trial participation and customer experience of the trial more widely.

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3. Executive Summary

- The Customer-Led Network Revolution (CLNR) is a major collaborative project undertaken by Northern Powergrid, British Gas, Durham Energy Institute (Durham University) and EA Technology. Over a three-year period, the project is trialling smart-grid solutions on the electricity distribution network.
- The trials are being conducted through 22 'test cells', detailed below, each testing different variables based on the low carbon technology installed, type of tariff, degree of monitoring, external 'control' over electricity usage, and customer demographics.
- Customers were recruited onto the trials using a variety of methods, including direct marketing campaigns, both opt-in and opt-out, as well as through developing partnerships with local communities and social landlords
- This paper by Sustainability First provides a brief account of the notable successes and key challenges encountered by British Gas in recruitment of domestic and SME customers to the CLNR trial[3].

CLNR trial test cells: test cell number, short-name & key features.		
Household Test Cells		
Number	**Name**	**Composition**
1a	Smart meter data	Basic monitoring of domestic electricity use of regular smart meter customers
2a	In-home monitoring	Enhanced monitoring of regular smart meter customer, including cooking, space & water heating, cold & wet appliances, consumer electronics, lighting.
3	Heat pump monitoring	Monitoring of air-source heat pump electricity use and whole house consumption, via a flat-rate tariff
4	Micro Combined heat and power boiler monitoring	Monitoring of micro-CHP appliance electricity use and whole house consumption, via a flat-rate tariff
5	Solar Panel monitoring	Monitoring of photovoltaic electricity performance and whole house consumption, via a flat- rate tariff
6	Electric Vehicle Off-Peak Saver 2 Rate Tariff Trial/Electric Vehicle Monitoring	Monitoring of electric vehicle charging patterns using a two-rate (time of use) tariff.
9a	Off-Peak Saver 3 Rate Tariff	Half-hourly monitoring of domestic electricity use with a three-rate (time of use) tariff
10a HW	Hot Water Monitoring	Monitoring of electricity consumption and tank temperature of immersion heater through an Economy 7 tariff
10a WWG	Washing Machine and Peak Electricity Saver	Monitoring of electricity consumption with a three-rate (time of use) restricted hours tariff plus direct external control of a smart washing machine

[3] This paper focuses on residential and SME customers, it does not look at Industrial and Commercial customers.

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11a SH	Hot Water Monitoring and Electric Heating	Monitoring of electricity consumption of a storage heating unit as well as tank temperature of an immersion heater through an Economy 7 tariff
11a WWG	Washing Machine and Energy Supply Manager	Monitoring of electricity consumption with a general tariff plus direct external control of a smart washing machine
12	Heat Pump and Off-Peak Saver 3 Rate Tariff	Monitoring of air-source heat pump electricity use and whole house consumption, via a three-rate (time of use) tariff
13	Heat Pump and Peak Electricity Saver	Monitoring of air-source heat pump electricity use and whole house consumption, via a three-rate (time of use) tariff plus restricted use of heat pump during peak hours
14	Heat Pump and Energy Supply Manager	Monitoring of air-source heat pump electricity use and whole house consumption, via a general tariff plus direct external control of heat pump
16	Electric Vehicle Peak Electricity Saver	Monitoring of customer electric vehicle charging patterns using a two-rate (time of use) tariff plus restricted use between 4 and 8pm
20 IHD	Solar Panel Electricity Generation and Usage	Monitoring of customer photovoltaic electricity production and provision of information to customer when excess is being produced through use of an IHD and whole house consumption
20 Auto	Solar Panel Monitoring and Hot Water Generation	Monitoring of customer photovoltaic electricity production and when excess is being produced it is automatically diverted to heating a hot water tank (EMMA unit) and whole house consumption

SME test cells.		
Number	**Name**	**Composition**
1b	Electricity Supply Monitoring	Basic profiling of regular smart meter customers in SME sector
2b	Enhanced Monitoring Trial with Disturbance Allowance	Enhanced profiling of regular smart meter customers in SME sector
9b	Time of Use Tariff with Disturbance Allowance & Loss Protection Subsidy	Pure Time of Use tariff, general load in SME sector
10b	Time of Use Tariff with Disturbance Allowance, Loss Protection Subsidy and Peak Usage Assistance	Restricted hours tariff, general load in SME sector
11b	Full year discount for agreeing interruption facility	Direct control, general load in SME sector

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Recruitment progress

- The project bid included an ambitious timetable for recruitment of customers to the trial. Following challenges to recruitment to some test cells, revisions to recruitment timescales were made in October 2011, followed by amended recruitment targets in October 2012.
- Of the 14,920 customers to be recruited into test cells, the vast majority (~11,250 fell within two smart-meter related groups. In terms of customer volumes and the project timescales, recruitment into these two core test cells has been successful: recruitment to Test Cell 1a[4] met the original target for recruitment (~8,900 customers).Recruitment was carried out via an 'opt-out' direct mail campaign to British Gas' existing smart meter customer base which meant that, although the demographic was representative of British Gas' smart-meter population at the time – it was not representative of the population as a whole. Test Cell 9a[5] also over-recruited against target. This has been a particular success for trial-recruitment, as unlike the far larger 'basic monitoring' test-cell, this group of 643 Time of Use household customers were also required to 'opt-in'.
- Recruitment to the twenty remaining project test-cells encountered some significant challenges from early-on. Challenges required considerable flexibility and ingenuity from the team in order to achieve its trial recruitment goals. This has required looking beyond British Gas's own customer base, sourcing new financing for uptake of low carbon technologies, and designing new technology from existing components on the market today.
- Despite these challenges, the CLNR trial is now on track, with eight test cells achieving over three-quarters of their recruitment target and a further four achieving over half. In total 12,734 customers have been recruited so far (accurate as of 7 March 2013, taking into account drop outs and removals to date), 88% of the revised target, with equipment installed in 97% of those homes.
- Equipment installation is in its final stages and there has been sufficient recruitment to carry out statistical analysis for almost all the test cells (bar six, which will instead give qualitative insights).

Availability and design of low carbon technology

- The project has shown that those customers with low carbon technologies are keen to know more about their potential. The project has pushed forward innovation in design with the heat pump NANO unit which won a Micropower Council Innovation Award.
- In the electric vehicle, heat pump and hot water test cells, recruitment was severely hampered by the lack of penetration of the various technologies. For the

[4] Test Cell 1a - Basic monitoring of domestic electricity-use of regular smart meter customers
[5] Test Cell 9a - Half-hourly monitoring on a TOU tariff

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PV test cells it was difficult to find sufficient properties that were not 'rent a roof' schemes. This was solved by working with housing associations. The team sourced additional money from DECC for heat pump installations and worked with Charge your Car (North) to recruit scarce EV customers. Interaction with housing associations and local authorities also identified suitable areas of clustered low carbon technologies in Maltby and Hexham.

- Further challenges were as a result of the development challenges of the technical solutions needed and the availability of these solutions in the market.

Identifying and communicating with customers

- Systems for managing customer communications worked well, as did written material, although the sheer number of these (72 different documents) was an administrative challenge, with each requiring Ofgem sign-off. Direct marketing was particularly successful (8-11% success rate for TOU and PV test cells compared to an industry average for direct-marketing, understood to be nearer 1-1.5%). Only email communications, trialled for the smart washing machine test cell, failed to recruit sufficient test cell participants. .
- It was more successful to contact customers about a specific test cell rather than giving them an option of which to sign up to. Although if they refused a more 'demanding or complex' option, a less complex proposition (test cell) was offered.
- Association with Durham University was particularly important, giving the project credibility and both residential and SME customers have been motivated to respond to their web survey (600 and 160 respondents so far respectively) whilst 222 face-to-face interviews have been carried out.
- Challenges have been experienced in filling some of the demographic requirements of the test cells such as, tenure, age and type of property, rurality etc. particularly when the majority of customers have come from British Gas's existing smart meter customers, who have already gone through an eligibility sieve, due to the early stages of the smart meter roll out. Broadening to non-British Gas and non-smart meter customers has enabled most test cell demographic groups to be filled but brought their own challenges in terms of communications and technical solutions.

Installations

- The project team had to 'create' future technologies within project time-scales from products and materials available in the current market. 'Ideal' technical solutions were not necessarily available, and some products and equipment were larger / more cumbersome than a fully-developed market-ready product. Nevertheless, and despite initial low expectations from the trial team, trial recruits seemed relatively open to accepting trial equipment in their homes, despite some inconvenience. Installing monitoring equipment caused particular problems as it required an isolation switch in the customer's home, located

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between the meter and the consumer unit, to allow equipment to be safely installed[6] but many houses did not have such a switch. Without an isolation switch, only the supplier's appointed meter operator is authorised under industry guidelines to temporarily disconnect the power supply at the mains fuse instead (i.e. on the DNO side of the meter). Without an isolation switch, liaison was therefore required with the relevant meter operator and/or energy supplier and hence delayed installation of the monitoring equipment.

- The majority of residential trials required the installation of home area network hubs to communicate with the installed monitoring technology. This required broadband and a phone line, which many homes did not have and therefore needed installing first. This also required homeowners not to move the hub once in place, which sometimes happened for household convenience or aesthetics.

Incentives and tariff design

- The CLNR project offered a £100 incentive to all test cells apart from test cell 1a (basic monitoring) paid in Marks & Spencer vouchers, to all households in two installments. Given the positive reception to the trials, it is unclear to what degree the incentive ultimately contributed to participation in the trial, and Durham may wish to explore this further.
- Heat pumps and micro-CHP technologies were subsidised by the project to match the cost of a conventional boiler to encourage uptake, as a result of funding received from DECC. However the customer still needed to pay for the remainder of the cost. The trial was unable to convince sufficient customers to do so, and so those test cells still remain under-filled.
- The Time of Use tariff (TOU) was well received by residential customers in terms of trial recruitment, although it is unclear to what degree the customers contacted were more likely to benefit from the trial, as they were at home during the day when contacted.
- The direct control and restricted hours tariffs are new customer concepts and have proved less attractive so far, in terms of trial recruitment. It is hard to gauge whether this is as a result of the technologies combined with the particular tariffs, the characteristics of the tariffs themselves, or, the way in which the tariffs were presented / communicated to prospective participants. Durham may wish to explore this further.
- The prospect of a smart meter proved to be a strong incentive for TOU test-cell recruitment. Recruitment rates from 'smart eligible' customers were 11% higher than amongst those that already had a smart meter.

[6] i.e. there is a 60 amp fuse at the point of electrical in-feed from the distribution network to the meter. An isolation switch, where fitted, sits between the meter and the consumer unit, readily allowing the power supply within the home to be temporarily switched off for electrical works to be carried out safely.

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- From the early face to face interviews, customers generally thought that the two things (IHD and TOU) came as a pair and they couldn't really see that they could have one without the other.

Partnerships, project management and bid design

- The Low Carbon Networks Fund timescales did not make detailed 'post-bid' scoping and planning easy with regard to trial recruitment. From the outset there was a basic tension between the formal project time-line and the practical reality of time needed for project set-up, contract negotiations, detailed test-cell design and development, designing and sourcing equipment and customer recruitment.
- Despite internal and external demands, relations between partners are strong, especially now that more informal communication channels are well-established.
- The project will produce an extremely rich source of data. There would be a significant benefit in extending some parts of the project time-table to enable full monitoring of those test cells subject to a delayed start.
- Valuable lessons have been learned for development of future commercial propositions from recruiting to this trial within 'real-world' constraints: in particular the insight gained into devising demand-side offers which are both commercially realistic and also attractive to a variety of customer and demographic groups.
- The process of recruitment to the CLNR trial has generated significant amounts of learning so far: both from those aspects which have gone well and those that have been more problematic. Arguably, some of the challenges faced and overcome will produce some of the most valuable learning – both commercially and from a wider research viewpoint.
- The team, having not previously worked together, nor on a trial of this kind, have successfully set-up and managed a huge customer-facing trial. They have worked with considerable commitment and energy to deliver the project – on occasion needing to compete with the normal business planning cycle and obtain colleague buy-in.
- The process of recruitment to the trial has tested and developed ways in which electricity distribution companies and electricity suppliers can successfully collaborate in developing commercial 'smart grid' approaches.

SME test cells

- SMEs are less open to up-take of TOU and also to restricted hours and direct control. Importantly, trial recruitment to the SME test-cells found that the SMEs contacted expressed initial keen interest in the prospect of lower bills. However, in the end the firms contacted were not amenable to remaining involved with the trial for restricted-use or direct control tariffs. The TOU tariff test-cell has been half-filled against the original target. Other SME trials have encountered similar challenges, whilst some trials (e.g. Ireland) have had more success in

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recruiting SMEs. For the future, in development of tariff offers to SME customers, more insight is needed on how best to approach this customer group. A better understanding is needed of SME electricity-use and demand side potential and how much 'benefit' is available to share via TOU tariffs with SMEs as a customer group.

Overall lessons from trial recruitment

All trials, particularly large multi-partner trials, will face challenges in terms of technology, IT, customer recruitment, development of partner relationships, and sourcing products from suppliers. In addition, large-scale trials will take time to integrate alongside the main business, to secure resources, and to negotiate contracts. It would therefore be unrealistic to expect that all such challenges could be avoided in future major trials no matter how detailed the pre-planning.

Trials funded through public or regulated sector sources must of course ensure proper accountability for their expenditure. Nevertheless, after a successful bid, large-scale trials may also benefit from a degree of 'development-stage' flexibility – while detailed plans are worked-up and finalised. Perhaps a clearer recognition / expectation from the outset on the part of project partners and Ofgem, that revisions may be necessary to certain elements of the project time-table and / or indeed to particular project goals, might be beneficial. Such revisions seem to be an important part of the learning process overall – and should not simply be badged as 'failure'. Openness to this kind of early-stage iteration between project partners and Ofgem – be this via an informal or a more formal process - should also support more robust trial design and cost-efficient trial delivery.

Section 7 of this paper pulls together some specific suggestions for further consideration on lessons identified from CLNR trial recruitment.

These break down by:

- **Lessons for the current trial:** (including some areas which Durham may wish to explore further).
- **Lessons for the future:** including lessons for other trials and / or development of commercial propositions; some general lessons arising from trial set-up and recruitment; and, some possible considerations for Ofgem on future network innovation competitions.

It is a significant achievement that recruitment to the CLNR test cells has been completed in a way which should deliver robust trial findings, suitable for detailed quantitative and qualitative analysis, despite many of the early-stage challenges and problems encountered. The project can now look forward with confidence to the trial results. These will bring forward some very substantial lessons about how customers might help to support cost-efficient management of the low-voltage networks in the future, by the way in which customers use their low-carbon technologies.

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4. Introduction to the CLNR project

4.1 Aims and objectives

The Customer-Led Network Revolution is a collaborative project undertaken by Northern Powergrid, British Gas, Durham Energy Institute (Durham University) and EA Technology. Over a three-year period, the project team are trialling smart-grid solutions on the electricity distribution network through installing and monitoring a range of customer facing low carbon technologies such as electric vehicle charge-points, air source heat pumps and Solar PV arrays as well as trialling innovative tariffs and direct control solutions.

The project is based in the Northern Powergrid distribution services area covering the Northeast, Yorkshire and northern Lincolnshire and involves residential customers, small and medium enterprises (SMEs) and some larger industrial and commercial (I&C) customers. The area represents a diverse range of geographical features and demographic groups.

As well as exploring the impact on electricity demand of customers using new technologies themselves, the project will explore the use of network-operated new technology on the electricity network and commercial arrangements between suppliers, distributors and customers.

The Learning Outcomes of the project are as follows, with LO1 and LO2 being relevant to customer engagement:

- Learning Outcome 1 (LO1): What are current, emerging and possible future customer (load and generation) characteristics?
- Learning Outcome 2 (LO2): To what extent are customers flexible in their load and generation, and what is the cost of this flexibility?
- Learning Outcome 3 (LO3): focuses on network technology and evaluates the extent to which the network can be more flexible, and the cost of this flexibility.
- Learning Outcome 4 (LO4): seeks to answer the question ‘what is the optimum solution to resolve network constraints driven by the transition to a low carbon economy?’
- Learning Outcome 5 (LO5): seeks to answer the question ‘what are the most effective means to deliver optimal solutions between customer, supplier and distribution network operator?’

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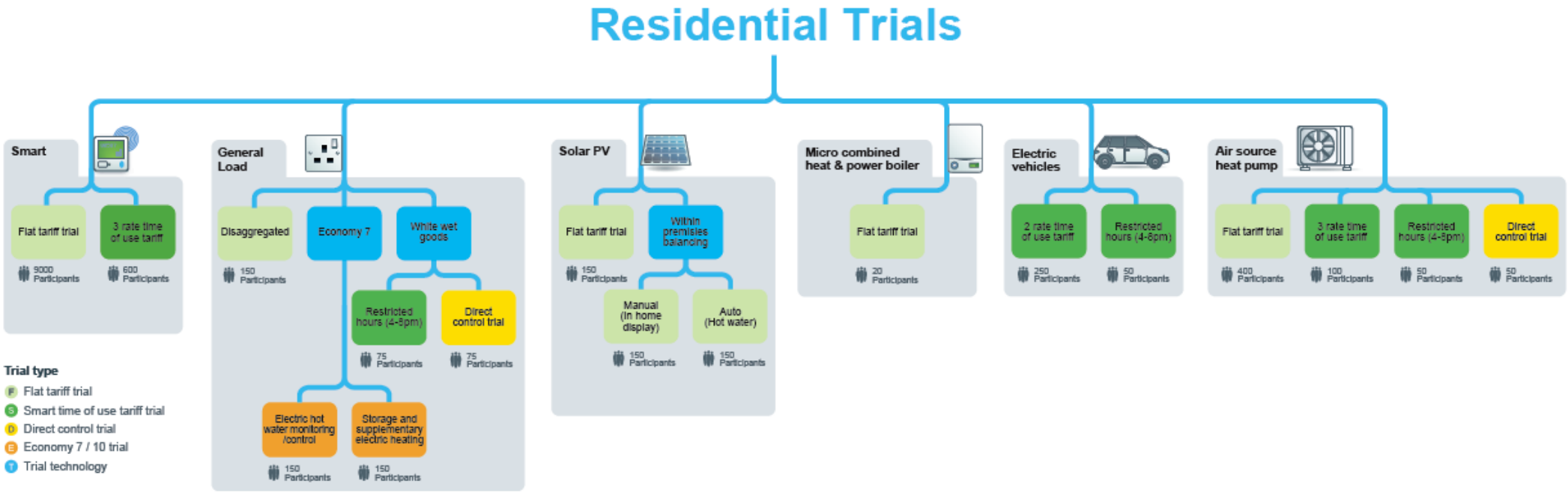
4.2 Partner roles and responsibilities

Northern Powergrid	Overall project leader. Responsible for delivery of Learning Outcomes 3,4 and 5.
British Gas	Project delivery. Responsible for customer recruitment and managing the test cells for Learning Outcomes 1 and 2.
Durham University	Test cell design, data analysis and detailed evaluation for Learning Outcomes 1, 2, 3 and 4.
EA Technology	Consultant for Learning Outcomes 3, 4 and 5.

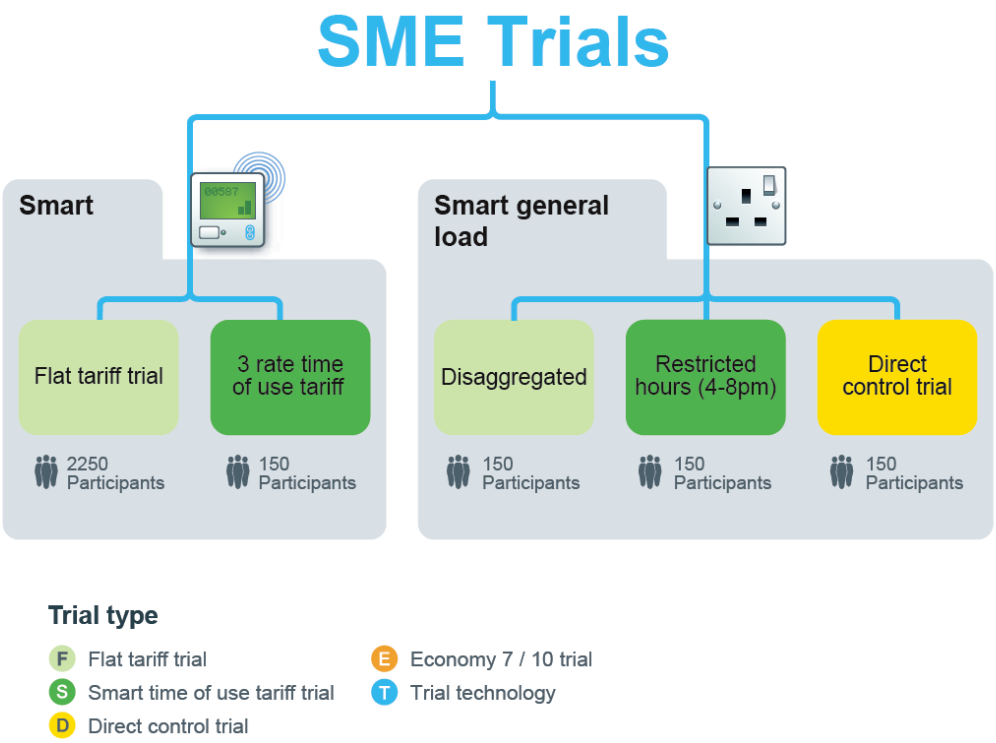
4.3 Test cells - overview

The project aims to achieve its outcomes through the recruitment of customers into 22 separate 'test cells'. Each test cell has a number of different variables based on low carbon technology installed, type of tariff, degree of monitoring, external 'control' over electricity usage and demographics.

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Each test cell has its own recruitment target. Details of the test cells that were carried through to recruitment[7] are below:

CLNR trial test cells: test cell number, short-name & key features.		
Household test cells		
Number	**Name**	**Composition**
1a	Smart meter data	Basic monitoring of domestic electricity use of regular smart meter customers
2a	In-home monitoring	Enhanced monitoring of regular smart meter customer, including cooking, space & water heating, cold & wet appliances, consumer electronics, lighting.
3	Heat pump monitoring	Monitoring of air-source heat pump electricity use and whole house consumption, via a flat- rate tariff
4	Micro Combined heat and power boiler monitoring	Monitoring of micro-CHP unit's electricity use and whole house consumption, via a flat- rate tariff
5	Solar Panel monitoring	Monitoring of photovoltaic electricity performance and whole house consumption, via a flat- rate tariff
6	Electric Vehicle Off-Peak Saver 2 Rate Tariff Trial/Electric Vehicle Monitoring	Monitoring of customer's electric vehicle charging patterns using a two-rate (time of use) tariff.
9a	Off-Peak Saver 3 Rate Tariff	Half-hourly monitoring of domestic electricity use with a three-rate (time of use) tariff

[7] Some test cells were altered before the recruitment period commenced.

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10a HW	Hot Water Monitoring	Monitoring of electricity consumption and tank temperature of immersion heater through an Economy 7 tariff
10a WWG	Washing Machine and Peak Electricity Saver	Monitoring of electricity consumption with a three-rate (time of use) restricted hours tariff plus direct external control of a smart washing machine
11a SH	Hot Water Monitoring and Electric Heating	Monitoring of electricity consumption of a storage heating unit as well as tank temperature of an immersion heater through an Economy 7 tariff
11a WWG	Washing Machine and Energy Supply Manager	Monitoring of electricity consumption with a general tariff plus direct external control of a smart washing machine
12	Heat Pump and Off-Peak Saver 3 Rate Tariff	Monitoring of air-source heat pump electricity use and whole house consumption, via a three-rate (time of use) tariff
13	Heat Pump and Peak Electricity Saver	Monitoring of air-source heat pump electricity use and whole house consumption, via a three-rate (time of use) tariff plus restricted use of heat pump during peak hours
14	Heat Pump and Energy Supply Manager	Monitoring of air-source heat pump electricity use and whole house consumption, via a general tariff plus direct external control of heat pump
16	Electric Vehicle Peak Electricity Saver	Monitoring of customer electric vehicle charging patterns using a two-rate (time of use) tariff plus restricted use between 4 and 8pm
20 IHD	Solar Panel Electricity Generation and Usage	Monitoring of customer photovoltaic electricity production and provision of information to customer when excess is being produced through use of an IHD and whole house consumption
20 Auto	Solar Panel Monitoring and Hot Water Generation	Monitoring of customer photovoltaic electricity production and when excess is being produced it is automatically diverted to heating a hot water tank (EMMA unit) and whole house consumption

SME test cells		
Number	**Name**	**Composition**
1b	Electricity Supply Monitoring	Basic profiling of regular smart meter customers in SME sector
2b	Enhanced Monitoring Trial with Disturbance Allowance	Enhanced profiling of regular smart meter customers in SME sector
9b	Time of Use Tariff with Disturbance Allowance & Loss Protection Subsidy	Pure Time of Use tariff, general load in SME sector
10b	Time of Use Tariff with Disturbance Allowance, Loss Protection Subsidy and Peak Usage Assistance	Restricted hours tariff, general load in SME sector
11b	Full year discount for agreeing interruption facility	Direct control, general load in SME sector

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5. The Recruitment Process

5.1 Recruitment process and terminology

The recruitment process is summarized in the diagram below. For the purposes of this paper the following terms are used:

- '**Recruited'** customers - refers to those who accepted to take part in the trial over the phone, either in response to (or followed by) some initial high-level information.
- **'Net recruited'**- refers to the customers who are still part of the anticipated 'monitoring' group net of customers being lost from the trial.
- **'Monitored'** customers - refers to those who have had the required technology installations - and from whom data is now being collected.

There are a number of points when recruited customers might drop-out or become no longer eligible for the trial. These are indicated in the diagram below by a red diamond.

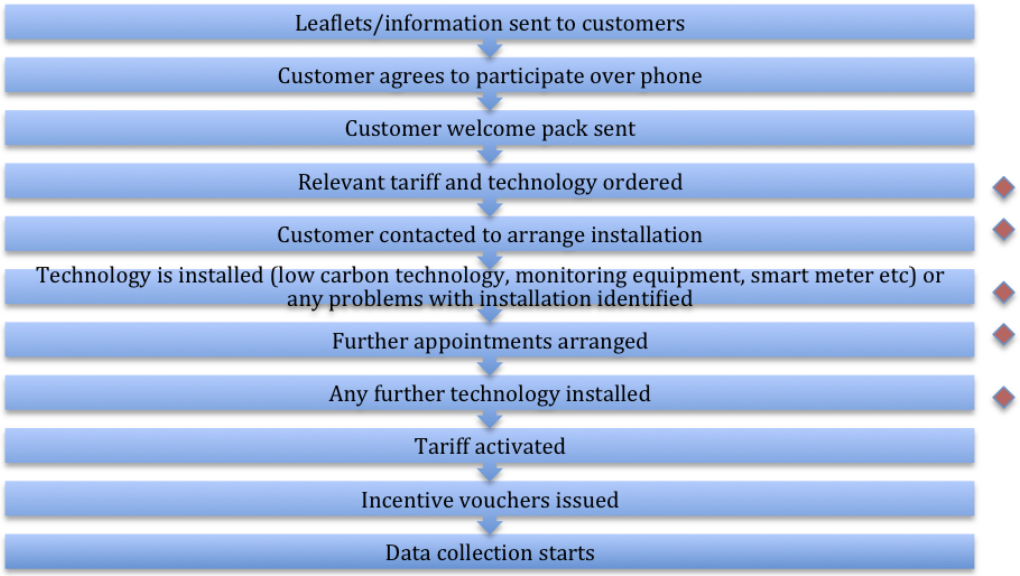
Removal from the trial might be for a number of reasons explored in more detail in section 6.

In summary:

- Their property may not be eligible for a smart meter;
- Their demographic sub-group may not be required;
- The technology might not work in their property;
- Their low carbon technology might owned by a third-party;
- British Gas might not be able to contact them to arrange installation; or
- They have requested removal from the trial.

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Customer Recruitment and Installation Journey



◆ = Customer may drop out or become ineligible at this point

5.2 Recruitment overview

The project team:

- Designed the test cells
- Set up internal customer service and data capture systems
- Designed communications materials and systems
- Negotiated technology installations
- Negotiated recruitment of customers; and
- Negotiated installation of the required materials.

All of these trial set-up and recruitment stages are now substantially complete. Challenges (both foreseen and unforeseen) were found with the recruitment and installation into very many of the test cells, as described further in section 7. As a result the recruitment timescale was revised in October 2011 and recruitment targets in October 2012 to be more achievable, given the constraints encountered

Household Test Cells: For most residential test cells, as of 7 March 2013, recruitment is underway or completed. In total the team initially recruited 11,654 customers, of which 10,794 are 'net recruited' customers[8], those that have not dropped out or

[8] Figures supplied by British Gas, accurate as of 7 March 2013

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become ineligible for some reason. Relevant monitoring and equipment has been installed in 10,391 households (96% of net recruited households) with final installations still on-going**.** On aggregate numbers BG has net recruited 92% of customers against their revised targets, and has monitored 88%. However on a test cell by test cell basis this picture breaks down less evenly.

Initial recruitment to residential test cells (getting customers to initially agree over the phone to be on the trial) was broadly successful. The high-level picture on net recruitment to the household test-cells is as follows:

- **For five test cells - the team have achieved net recruitment against their revised targets** (1a, 2a, 5a, 9a and 20 IHD).
- **Two test cells reached 75% of their target or above**(3 and 4)
- **Three test cells have over 50% of customers recruited** (10a (HW), 11a (SH) and 20 (Auto)).
- **Seven test cells have net recruitment between 0-25% of the revised target for recruitment**: the Wet White Goods trials (10a(WWG) and 11a(WWG)) the electric vehicle test cells (6 and 16) the heat pump test cells (12 and 13) and the direct control heat pump test cell (14).

Not surprisingly, this breakdown shows that recruitment proved most straight-forward into the 'simplest' household test-cells (i.e. monitoring, enhanced monitoring, TOU tariff). The household test cells where recruitment fell short most against targets at the initial stage, were those where it proved most challenging to: find suitable customers with the right technologies; install new technologies; and / or to find customers willing to take the new technologies (see section 6 for more detail).

British Gas aims to complete recruitment, monitoring and installation by the end of June 2013. However, due to the challenges discussed in this paper, whilst sufficient numbers of customers will be taking part in most test cells for statistical analysis, initial test cell recruitment targets will not be met in them all.

SME Test Cells: Whilst recruitment to the SME trials was initially successful (with over 78% initially recruited to each of the five test cells[9]), once site technical surveys for installation were carried out there was almost 100% drop out from test cells 10b and 11b (i.e. restricted hours or direct control). Test Cell 1b (Basic Monitoring) has worked the best in terms of net recruitment (80% net recruited against the revised target). 2b (Enhanced Monitoring) and 9b (TOU) currently 59% and 33% net recruited respectively. Whilst installation of monitoring equipment and further recruitment should take place for these three SME test cells during March 2013, British Gas is now not aiming to recruit any further customers to 10b and 11b.

[9] See paragraph 5.1 above – '**Recruited'** customers refers to those who accepted to be part of the trial over the phone, either in response to (or followed by) some initial high-level information.

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5.3 Recruitment results per test cell

Household test cells - recruitment results per test cell						
Test Cell	**Monitoring**	**Number net recruited (March 2013)**	**% net recruited against revised target**	**Number monitored (as of March 2013)**	**% filled against target**	**Key issues with recruitment**
1a	Smart meter data	8,909	100%	8,909	100%	Interoperability of some of the smart meters already installed and meter agent assigned to them.
2a	Enhanced monitoring of smart meter customer	162	108%	91	61%	British Gas decided to recruit Partner company employees to this test cell as they were concerned about the intrusiveness of the large circuit monitoring 'box' required.
3	Whole house of heat pump customer	381	195%	222	56%	Low number of heat pumps installed. Required finding customers willing to accept (and pay part of) installation of pump.
4	Whole house of micro-CHP customer[10]	15	75%	10	50%	Finding customers willing to accept (and pay part of) installation of micro-CHP unit and who could fit unit into their home.
5	Whole house of PV customer	150	100%	150	100%	Finding PV customers who owned their unit and weren't on a 'rent-a-roof scheme'.
6	Whole house EV customer (with two-rate tariff)	26	10%	11	4%	Finding customers with electric vehicles.
9a	Half-hourly monitoring on TOU tariff	643	107%	643	107%	No real issue. People liked the tariff.
10a HW	Whole house + and tank temperature on Economy 7 tariff	104	69%	67	48%	Finding customers with electric-only Economy 7 hot water from supplier based records. Social Housing stock was a better target group.
10a WWG	Half-hourly monitoring of TOU tariff + direct external control of smart washing machine	4	5%	3	4%	This was delayed as British Gas could not find a partner willing to partner to develop the required technology. In the end a new 'product' has been developed straight from the laboratory.

[10] This test cell was always going to be a qualitative study; the target was only to recruit 20 participants.

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11a SH	Storage heater and tank temperature on Economy 7 tariff	84	56%	24	16%	Finding customers with electric-only Economy 7 hot water and storage heaters from supplier based records. Social Housing stock was a better target group.
11a WWG	Whole house + direct external control of smart washing machine	7	9%	4	5%	This was delayed due to a decision by the original appliance partner part way through the project on their priorities in this sector. Indesit Company were engaged by British Gas as a suitable replacement
12	Heat pump, whole house consumption + TOU tariff.	49	12%	2	1%	The length and complexity of the customer journey: heat pump, mains isolator, broadband, phone line, smart meter, time of use tariff and monitoring kit all required for this Test Cell.
13	Heat pump, whole house consumption +TOU tariff and restricted use during peak hours	2	4%	0	0%	Required finding customers willing to accept (and pay part of) installation of pump. Plus finding homes technically suitable to accommodate the smart heat pump with a thermal store, particularly in social housing.
14	Heat pump, whole house consumption + direct external control of heat pump	11	22%	11	22%	Required finding customers willing to accept (and pay part of) installation of pump. Plus finding homes technically suitable to accommodate the smart heat pump with a thermal store, particularly in social housing. In addition the concept of an interruptible heating supply is completely new and required a big leap of faith on behalf of customers.
16	EV charging patterns + restricted use 4-8pm	0	0%	0	0%	Finding customers with electric vehicles who are not on a dual tariff.
20 Auto	PV production +extra energy stored in EMA unit	150	100%	150	100%	Finding PV customers who owned their unit and not on a ‘rent-a-roof scheme’ and had sufficient space for the EMMA unit.
20 IHD	PV production +extra IHD info	97	65%	94	63%	Finding PV customers who owned their unit and weren’t on a ‘rent-a-roof scheme’.

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SME test cells – recruitment results per test cell						
Test Cell	**Monitoring**	**Number net recruited (March 2013)**	**% net recruited against revised target**	**Number monitored (as of March 2013)**	**% filled against target**	**Key issues with recruitment**
1b	Basic SME	1,800	80%	1,800	80%	Problems only around identifying SME customers and getting a sufficient mix of businesses.
2b	Enhanced monitoring SME	88	59%	86	57%	
9b	TOU tariff SME	49	33%	42	28%	
10b	Restricted hours tariff SME	3	2%	3	2%[11]	No customers willing to have power restricted or reduced once fully understood requirement of test cell.
11b	Direct control tariff SME	0	88%	0	0%	No customers willing to have power restricted or reduced once fully understood requirement of test cell.

6. Generic factors affecting trial recruitment and project delivery timescales

This section discusses some generic factors which arose in trial recruitment. It looks both at what has gone well and where main challenges lay for:

- Availability and design of low carbon technology
- Identifying, and communicating with customers on trial recruitment
- Installations
- SME trial recruitment

6.1 Availability and design of low carbon technology

6.1.1 What has gone well

- **Sufficient installations in almost all test cells despite challenges.** The original bid assumed that recruitment would take place from customers who already used low carbon technologies. However it was not possible to find sufficient existing customers and as a result many installations had to

[11] It has been decided to stop recruiting for these test cells as SME customers are unwilling to have their power interrupted or reduced.

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take place to fill the test cells. Sufficient numbers of customers have been recruited to the solar panel test cells and it is expected that sufficient will be recruited for electric vehicles. Only for heat pumps (specifically time of use, restricted hours and direct control) will there be a challenge on numbers. Recruitment has been particularly impressive considering much of the technology being installed was 'unfamiliar' to customers and not known in the marketplace and was not accompanied by a big marketing push to increase understanding. Trial recruitment rates of some customers contacted for some test cells (c.10%) was comparatively very high.

- **Achieved clustering with PV and heat pumps.** The project aimed to focus recruitment on two areas, Rise Carr and Wooler, so that the impact of a number of low carbon technologies in one place could be explored. Network monitoring equipment has been installed, but recruitment of customers with the right technologies in these areas was not successful. The team have managed to create alternative clusters for in-home monitoring such as in South Shields. Data from the clusters will be combined, allowing computer simulation of live-network operation impacted by PV and heat-pump operation.
- **Customers with low carbon technologies are keen to know more about their potential.** Those customers who already had low carbon technologies installed were keen to know about how they could use them further/make more use of them. This was a commonly cited reason by British Gas call centre staff or entry into the trial for customers with photovoltaics (PV) especially. Customers were keen to see how the EMMA units (units that stored excess electricity generated as hot water) could enhance the efficiency of the PV panels they had. Those on the trials with the in-home displays were interested in knowing in real time how much their solar panels were generating compared to how much electricity they are using. With feed-in-tariff levels now reduced new customers will become keener to get extra value from their equipment.
- **Project pushing forward innovation i.e. with heat pump Neura NDA NANO unit.** For the main heat pump test cells the technology was standard. However the restricted hours test cells (test cells 13 and 14) required installation of a large tank for hot water and a smart heat pump variant (the Neura NDA NANO unit). This technology had to be developed from existing components and has therefore pushed forward innovation. This technology won 'innovation of the year' from the Micropower Council.
- **Found routes to reach heat pump and electric vehicle owners.** When the initial attempts to reach heat pump and electric vehicle owners failed, the team went via alternative routes that were more successful. Partnerships with social housing providers, using additional funding from DECC, delivered heat pump customers to some test cells and working with Charge Your Car (North) should deliver electric vehicle customers.

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6.1.2 Challenges

- **Data protection hampered identification / access to customers with specific low-carbon technologies.** Although Northern Powergrid is aware of certain heat pump installations in their region and broadly where they are planned, this information could not be shared at a detailed MPAN level, due to data protection issues. Information on heat pump ownership was therefore gleaned from market intelligence and from discussion with housing authorities and councils, rather than via recorded data.
- **Penetration of heat pumps lower than expected.** The market penetration of heat pumps was far lower than anticipated in the project bid. The delay to the domestic Renewable Heat Incentive (originally due for launch in summer 2011) meant that there is not yet a compelling economic case for the technology and far fewer household heat pumps have been installed nationwide than expected (current estimations are that there were around 20,000 heat pumps installed by the end of 2011[12]). The project secured extra funding from DECC (under its Building Innovation programme) to subsidise the installation of air-source heat pumps and thermal stores to enable those test cells to proceed. Social landlords were keen to take advantage of this funding but understandably took time to make decisions. This has affected the socio-demographic make-up of these test cells, but also reflects the current market which is dominated by social landlords. Housing associations recognise heat pumps as a significant measure and may seek to install them en masse as part of wider property fabric and energy efficiency upgrades.
- **Size of heat pump affects installation options.** The 'Neura NDA NANO' smartair source heat pump combined with the 300l Gledhill thermal store (used in test cell 14) weighed 36 stone (263kg) and was 1560x560x1040mm in dimension which made it difficult to manoeuvre. The thermal store is 470kg when filled. This meant not only that the installation was non-standard (it required rear access to the property and bespoke lifting equipment) but that only those houses with sufficient space could accept them. This has resulted in the low number of households recruited to these test cells as social housing properties were generally not able to accommodate units of this size. Private home owners were a challenging market to sell to (85 technical surveys were completed for eight installations), being very price conscious and averse to upheaval.
- **Low take-up of micro-CHP offers.** The project provided subsidy for over 50% of the cost of the micro-CHP unit. However this still left £4-5000 for householders to fund. As a result of this and the physical size (950x450x426mm)and weight (118kg) of the BaxiEcogen unit chosen, which

[12] From http://www.amaresearch.co.uk/Ground_Source_Pumps_12s.html in 2011, the market has experienced further growth to around 19-20,000 units

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meant that siting of the appliance was difficult, take up was lower than hoped, despite the low recruitment target (20). It should also be noted that there were other technical issues such as operating noise levels which drove the decision to pause recruitment and not fill the test cell.

- **Penetration of electric vehicles lower than expected.** Whilst official predictions were that by 2012, 1% of all vehicles sold would be electric (around 20,000 per annum) there are currently only 2,610 registered electric vehicles in the UK[13]. In discussion with Ofgem, the project had a high ambition-level in the number of customers it attempted to recruit. The original goal was to recruit 350 electric vehicle owners (so, a significant percentage of the current fleet). Without access to data on EV owner location, project partners had to work with existing networks such as charging point managers and existing British Gas customers. However data protection rules also hampered contacting these customers. The methods used to identify suitable EV owners for trial recruitment have yielded only 26 customers to date with potential of a further 150 expected through a new partnership with Charge Your Car (North). Many of the EV customers recruited were already on a form of time-of-use tariff.
- **A high proportion of the solar panels that have been installed in the proposed trial areas are owned by 'rent-a-roof' schemes**. Many of the customers recruited who had PV panels (173) were found to be part of 'rent-a-roof' schemes, where companies lease roof space from home-owners on which they place panels. Most of these households belonged to a single rent-a-roof company who in the end opted against co-operation with the trial. This meant that alternative customers had to be found and that the team had to recruit 753 customers overall to get to a *net recruitment* total of 399.The most successful route was via Gentoo, a social housing provider, but this route has had an impact on the socio-economic mix of those recruited.
- **Very few customers use electricity to heat hot water during peak hours.** Initial recruitment attempts to the hot-water test cells proved that there were very few customers who used electricity to heat hot water during peak hours (in contrast to overnight hours). Although customers responded to the direct mailshot and expressed their interest, only ten out of the 1,195 customers contacted proved to be eligible and only one of those had broadband internet - which was required for the monitoring equipment. Following a re-design of the test cell, focus was changed to Economy 7 electric heating customers which has also proved hard to fill, although some success is being had through social housing channels. Installations will continue until June 2013 in this test cell, currently 91 are being monitored, 30% of the original recruitment target.

[13] Figures from http://www.cenex.co.uk/programmes/plugged-in-midlands/electric-car-registration-statistics

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- **Slow development of technological solutions**. There have been a few test cells where recruitment was delayed as a result of a delay in the availability of technological solutions. The micro-CHP unit was to have been a fuel cell unit, but that was not ready for deployment, so the BaxiEcogenStirling Engine unit was used. The original appliance supplier for the smart-enabled washing machines withdrew their services at a very late stage, just before installations were due to commence, which meant a new supplier had to be sought. In addition, a suitable platform for the external interface with the in-home communications also had to be developed from scratch.

6.2 Identifying, and communicating with, customers on trial recruitment[14]

6.2.1 What has gone well

- **Systems for managing customer communications for trial recruitment worked well.** To manage and monitor customer communications with both British Gas and non-British Gas customers a new database was developed. This enabled the team to track the customer journey and enabled the appropriate parts of British Gas to see the same information and be updated on the current status of the recruitment process. It also ensured that it was clear when a customer on the trial rang a standard help-line that they were taking part in CLNR trial and could be communicated with appropriately.
- **Recruitment into test cell 1a (basic monitoring of smart customers) was extremely successful with low opt-out, despite the number of demographic sub-groups involved.** Recruitment into test cell 1a was done through a letter with an opt-out option. Only a very low percentage of customers chose to opt-out (less than 1%) which enabled the project team to over-recruit into this test-cell to allow for any withdrawals. Although the overall numbers are positive, populating the 80-90 different demographic sub-groups within this test cell was a challenge (partly as a result of the eligibility criteria applied when the smart meters were installed) and British Gas needed to make assumptions on certain parameters (i.e. rurality) to populate certain sub-groups. Some of these sub-groups were not populated at all, although having completed the exercise it became apparent that some of these sparse sub-groups describe customers possessing very unlikely combinations of attributes. In any event, the purpose of the sub-grouping exercise was to ensure adequate sample stratification and this has been mostly achieved.
- **Contacting customers about *specific* trial options rather than giving all options worked best.** It was initially anticipated that British Gas would give customers the option of which trial they would like to take part in. However

[14] These are initial findings, predominantly based on feedback from British Gas staff. A full analysis of customer communication and interactions will be carried out by Durham University.

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it soon became apparent that giving customers the choice added confusion and risked customers who were eligible for a hard-to-fill test cell choosing to join an 'easier' test cell. It was therefore decided to contact customers only about one particular test cell, although if they refused a more 'demanding' option, another 'easier' test cell was then offered. Any available data about these initial refusals would offer some greater insight as to which propositions were popular / unpopular with customers, and Durham may wish to explore this.

- **Association with Durham University gave the project credibility.** The involvement of a well-known research institute, Durham University, gave the project credibility and trust in the eyes of many customers and encouraged them to be part of the trial.
- **Customers have been motivated to respond to survey and interview requests**. A web survey sent out to both SME and residential participants has received 152 SME and 741 domestic respondents, which is a very satisfactory participation rate. Face to face research with a representative sample of trial participants also had a successful response with 134 interviews completed so far and repeat visits booked with many participants.
- **Communications materials worked well**. These materials varied depending on the test cell **with over 72 separate customer facing documents produced**. With some test cells the materials focused far more on the incentive, for example for the PV test cells the incentive offer was printed on the outside of the envelope to encourage customers to open it. With others it focused on the research objectives. Examples of the communications materials can be found in Annex 1.
- **Direct marketing success**. The response rate from direct-marketing, in terms of initial expressions of interest, has been high: for time of use tariffs - 8%; and for PV test cells 11%. This was contrary to expectation, as a normal response rate for direct marketing is understood to be ~1-1.5%. In contrast, e-mails used to communicate with customers, about the free smart-enabled washing machines on offer to trial customers, were not successful. It would seem that this was because customers did not trust the medium and possibly perceived the email as a 'scam'. Letters are now being sent instead.

6.2.2 Challenges

- **Period from recruitment to installation longer than ideal.** Recruitment began for some test cells in 2011 and in some cases installation is still to take place (as a result of technical delays, issues with isolation switches etc, explored more under 7.3). This delay has led to a number of customers withdrawing from the trial, while in others the customer has forgotten about agreeing to take part and needs to be re-recruited.

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- **Smart meter penetration lower than expected - and design not always fully compatible with test cell requirements.** Whilst it was originally anticipated that customers would be recruited from within British Gas's existing smart meter customer base, British Gas's penetration of the market in the trial geographic area is about 10% - despite the supplier 'going early' on the smart meter rollout and installing a million smart meters in the UK already. So, recruitment of non-British Gas customers took place for some test cells (using enhanced monitoring equipment instead of a smart meter), to achieve the numbers, and demographics required for statistical analysis. Even within the British Gas smart meter customer base many had older meter models that did not provide all the functionality required for the trial. In the SME test cells, many British Gas customers were ineligible for the trial as a result of their meter agent[15]. Due to the complexities of meter agent migration, the decision was made to use just one meter agent for the purposes of the trial.
- **Communication via third parties meant customers' questions on the trials could not always be readily answered.** The main point of contact for customers was often call centre staff and on-site engineers/electricians who undertook project related tasks as part of their business-as-usual operations. This meant they did not necessarily have enough information about the wider project to answer some customer questions. Second, engagement with social housing tenants was primarily through the housing association, which meant that it was a challenge to engage directly with these tenants with regard to installation visits for example. This led to new creative methods being developed, i.e. the social landlord carrying out installations of certain technology for British Gas for the purposes of the trial.
- **Communication with non-British Gas customers added complexity**. Non British Gas customers do not already have a relationship with the company and British Gas was not able to answer any supply related questions they might have had. In addition, under the terms of the LCNF funding, British Gas could be vulnerable to accusations of mis-using a competitive advantage if a customer chose to switch while on the trial or post trial - so had to be very careful in its dealings with these customers.
- **Number of demographic groups and test cells made the project extremely complex to manage and administer.** The number of test cells, and the demographic requirements within each, meant that as well as the population of each test cell being laborious, administration was also complex. For example, over twenty different sets of terms and conditions needed to be drafted and 72 different items of communication materials. Each of these needed to be signed off internally by several teams in British Gas and Northern Powergrid and also by Ofgem.

[15] G4S is British Gas Business's appointed smart meter agent. Using other agents would have added further expenditure.

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- **Present smart meter customers not representative of the general population.** Because British Gas has 'gone early' on the roll-out of smart meters, it is currently not able to install new meters at all properties or to all customers. During this trial, it was only able to install smart meters for certain customers; those that have no debt, are on the gas-grid, do not live in a flat and are on a dual fuel tariff. Although the trial did allow installations for single fuel customers and the British Gas customer insight team worked hard to find as representative a picture of the UK as possible the resultant trial base does exclude certain segments of the population at large.
- **Difficult to know how to brand CLNR as a non-legal entity**. CLNR is a partnership set up for the duration of this project. This caused questions relating to branding and in developing Terms and Conditions for customers, as CLNR does not have a legal identity.
- **Significant community engagement was not feasible with the detailed plan timeline**. The original plan included community engagement plans, particularly focused on the three main areas of Denwick, Rise Carr and Maltby where clusters of participants were to be recruited. However the expediency of recruitment of large scale trial participants across the North East region and subsequent national recruitment was such that the small scale community engagement has been less than envisaged in the outline plan. Community engagement has been conducted at a local representative level with organisations such as the councils. However there is relevant learning for direct local community engagement with end customers in other LCNF projects such as: SoLa Bristol and Smart Hook Norton projects being conducted by other DNOs.

6.3 Installations

6.3.1 What has gone well

- **Working with available low-carbon technologies to 'create the future'.** At no point, for all those technologies which required in-home installation, did the project team have the ideal equipment or market-ready technology to deliver the specified test cells. This meant they had to 'create future technologies' out of materials that exist currently. Partners decided that installing completely new technology would have been a far riskier proposition in terms of both the available project timing and customer service.
- **Ambitious technical demands driven by the network aspects of the trial were addressed and accommodated by British Gas –** Northern Powergrid indicate that they had perhaps not fully taken on board initially the very considerable demands (commercial, marketing) which the technical network aspects of the CLNR trial would create for an electricity retailer. For example, in terms of requesting customers to have their power-supply restricted; or, the inconvenience to customers of installing novel or large-sized equipment in their homes (e.g. circuit monitoring unit or large-sized

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storage units for HPs & PV). However, success in trial recruitment, albeit including some 'friendly' customers[16], seems to point towards the value of having combined a high technical 'ambition-level' by the network in the trial, with a commercially-led approach.

6.3.2 Challenges

- **Installing monitoring equipment required power isolation switches that were often not in place, resulting in a protracted customer experience.** Power isolation switches are needed between the meter and the consumer unit, to permit safe installation of equipment designed for detailed in-home monitoring of electricity-use[17]. Where an isolation switch is already installed, this is a relatively minor technical adjustment. However, where there is no isolation switch, work to install monitoring equipment entails either (1) temporary disconnection of the mains fuse (on the DNO side of the meter), and / or, (2) installation of an isolation switch. A supplier's appointed meter operator is the authorised party to undertake these tasks under existing industry working arrangements. Some suppliers allow isolation switches to be installed (or a mains fuse to be disconnected), only by their own meter-operator or engineer. Others may allow suitably qualified meter operators or engineers of another supplier to undertake such work. There is no central register of whether homes have these switches, so engineers could not know whether they could fit the monitoring equipment until visiting each home. Fitting isolation switches into homes of non-British Gas customers involved either securing permission for installation from other energy suppliers - or waiting for the other supplier to undertake the installation themselves. Installing the isolation switch therefore became a costly and time- consuming process and also disengaged customers who were then required to take further time off work for the isolation switch and monitoring equipment installation.
- **Arrangements for separate meter ownership and meter agent complicated energy data sharing.** Differing ownership of the meter and management of the meter-data meant there were several partners to coordinate in order to access information from the property. For the SME test cells, British Gas was only working with one meter agent so had to disregard any customers successfully recruited but who had other meter agents.

[16] Project partner employees

[17] i.e. there is a 60 amp fuse at the point of electrical in-feed from the distribution network to the meter. An isolation switch, where fitted, sits between the meter and the consumer unit, readily allowing the power supply within the home to be temporarily switched off for electrical works to be carried out safely.

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- **The need to secure planning permission from the local authority delayed heat pump installation in some cases.** This was particularly an issue in areas where there were clusters of heat pumps[18].
- **Installation of communication hubs met with complications.** The majority of the residential trials required the installation of home area network hubs/gateways in order to communicate with installed monitoring/intervention technology. These have proven a challenge for installers for two reasons: first the time taken to download 'new' software updates, and second, the network hub needs to be in the range of signal of the router. Whilst the hubs might have been placed in near enough proximity, sometimes they were moved by householders for aesthetic or practicality reasons.
- **Lack of broadband required further installations.** Ofcom estimates that 67% of GB homes have broadband[19]; however British Gas found it was installed in only 47% of households in the social housing sector in the trial area. Where this was encountered the CLNR project team decided to pay for one year's broadband and assist in installation to avoid further project delays. This however lead to further complications in that in some cases customers also required a phone line before they could have broadband and in others, communications issues were encountered with customer's existing broadband. In the end, the project had to work together with the monitoring equipment supplier to specify, test and deploy GSM routers as an ultimate back-up plan.

6.4 Incentives and tariff design

6.4.1 What has gone well

- **Incentives offered seemed generally well-received for almost all residential test cells**. Earlier British Gas research into tariff design had suggested that £50 was a likely 'tipping-point' for incentivising customer action. It was estimated that customers may have to take up to two days off work for equipment installation and therefore that £100 was a reasonable compensation. £50 of this was to be delivered at the end of the trial to encourage customers to stay on it. To date there have been few drop-outs: less than 8% residential and 9% overall (includes all drop outs and removals).

[18] From 1st December 2011 domestic air source heat pumps are treated as permitted developments, however this is only if: there is no wind turbine at the property; the external unit is less than 0.6 m^3 in size; the unit is more than one metre from the edge of the householder's property; it is not on a pitched roof, or near the edge of a flat roof and it meets additional criteria if in a conservation area, World Heritage Site or similar. For more information see: http://www.energysavingtrust.org.uk/Generating-energy/Choosing-a-renewable-technology/Air-source-heat-pumps#planning

[19] Ofcom 2011, Communications Report

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- **Extra funding from DECC secured household heat pump uptake.** Extra funding received from DECC supported heat pump installations to the cost of a conventional boiler (heat pumps may cost £5-8,000 depending on size). Social housing providers were able to use this funding to leverage further match-funding to pay for the systems.
- **Time-of-use tariff (TOU) well-received on residential side.** The TOU tariff saw high household customer uptake. Of those mailed there was a response rate of around 8%. Call centre staff reported that once the tariff was explained to customers some were keen to be part of the trial even before any mention of the incentive voucher on the call (although they might have received printed material mentioning the incentive prior to being contacted by phone). The overwhelming reason for TOU test cell sign up- reported by call centre staff- was that customers thought they could reduce their bills through the tariff. However this might partly be explained by the fact that customers were contacted during the day - before 6pm. If customers are anyway at home during the day, they are more likely to benefit from the TOU tariff on offer during the CLNR trial.
- **The prospect of obtaining a smart meter appears to have been a strong incentive for TOU test-cell recruitment.** Recruitment rates from 'smart eligible' customers for the TOU test cells was 11% higher than amongst those customers that already had a smart meter installed. This suggests that the prospect of obtaining a smart meter was an incentive to sign-up to the TOU trial

6.4.2 Challenges

- **Timing of funding from DECC for heat pumps resulted in skewed demographic representation and delayed installations.** The funding received from DECC had a limited timescale attached to it which meant once it was available the team focused almost exclusively on installing heat pumps using this funding rather than continuing to source existing heat pump customers. This, combined with the extra incentive for social housing providers of levering EU match-funding, meant that the heat pump test cells ended up being dominated by social housing. This gives a somewhat biased test cell population and use patterns, as many of the people in the test cell may be home during the day. However currently heat pump installation is dominated by the social housing sector so may, in practice, represent current demographic characteristics of those taking up the technology. The timing of the DECC process also led to a delayed installation of the heat pumps which means that only six months of data from these customers will be available at the originally scheduled end of the project (December 2013)
- **Technical limitations to time-of-use tariff design.** Very considerable time and effort was spent on 'real-world' commercial tariff design by the project

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team[20]. However, in this paper we do not cover the process of tariff design itself, nor importantly, how tariff-design may / may not have influenced recruitment to the trial and subsequent customer reaction to the tariffs during the trial. Simply to note here, that the initial plan was to introduce an evening 'shoulder' as part of the time-of-use tariff. This did not prove to be possible as the meter and billing system could only cope with three different tariff rates, so the shoulder was abandoned.

6.5 Partnerships, project management and bid design

6.5.1 What has gone well

- **Successful multi-partner project inception, development and management.** The team, which have not worked together previously have successfully set-up and are delivering a huge customer-facing trial. The trial has tested and developed ways in which electricity distribution companies and electricity suppliers can collaborate in developing the "smart grid" approach.
- **Current good working relationship between partners.** The delivery team across all the partners now has a shared sense of the project, clarity of purpose and a good rapport. This has partly come about due to personnel consistency over the last year, relaxation of most issues being escalated to a more senior level on the basis of initial project procedures, and, the development of more informal channels of communication, so that trust and good personal relationships have developed.
- **Results will be delivered within specified timetable.** Results will be available for all test cells within the timetable agreed with Ofgem. The team had hoped to have 17 months of data for more test cells, but for most will achieve the 12 months of data specified. For certain test cells there will only be six months of data by the close of the project in quarter three 2013 (for example for the wet white goods and some heat pump test cells). Although Durham could produce further results for these test cells via computer simulation, once the monitoring system is in place it would seem short-sighted to remove it early. There is currently the intention to provide an addendum report in summer 2014, which would cover 12 months+ for almost all customers, although the formal change request has not yet been agreed with Ofgem, nor the time extension agreed with trial customers.
- **Project team had the flexibility to alter plans when test cell design was not working.** The team has remained flexible, on occasion with considerable ingenuity, and has had to formulate and adapt to alternative solutions to respond to the technological and market constraints that became apparent once recruitment began.

[20] See Frontier Economics, June 2012, Domestic and SME tariff development for the Customer-Led Network Revolution, for a full account of this aspect of the trial development.

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6.5.2 Challenges

- **Timescales from bid underestimated complexity of the initiation phase.** The time assigned for project initiation post bid-award did not allow for detailed pre-trial planning activity. These activities were eventually accommodated in the overall project timeline but it would be recommended to avoid acting in this way on future projects, since it adds too much risk to the project delivery**.** We believe that a period of six to 12 months would have been ideal for the activities to arrange contracts, etc. Having said this, a longer detailed planning and mobilisation phase would not have prevented all the unforeseen challenges encountered by CLNR and other innovation projects.
- **Review and sign-off procedures slowed processes down.** Both the project Partners and Ofgem needed to review the 70-80 pieces of test cell participant literature and approve any changes in the mandatory documents: Customer Engagement Plan and Data Protection Strategy. Although parties were largely able to provide fast turnaround for the bulk of the customer materials, Both Ofgem's and Partners' internal processes seemed to create some bottlenecks. Approval of the mandatory documents did take up to three months to get signed off. Additional sign-off procedures even within the internal organisations of individual project partners were also often lengthy and these timescales need recognising in future project plans.
- **Embedding project delivery into business-as-usual departments was challenging,** especially where these were areas of scarce technical or commercial expertise. This would always be the case with an ambitious project of this type; however project delivery ultimately prevailed due to a senior-level commitment in each partner company. This demonstrated the importance of executive-level sponsorship, and confirmed that the more that can be explicitly planned in advance; the smoother would be the delivery of the rest of the project.
- **Lengthy third-party contract negotiations.** Following the awarding of the bid it took almost three months of negotiation among partners to draw up the collaboration agreement. Until these negotiations were concluded and contracts signed none of the partners could put any resource into recruiting teams to deliver the project. This was not explicitly recognised in the mobilisation plan. This timescale is probably typical for projects of this type and needs to be accounted for in future projects.
- **The project required complex IT solutions.** Dealing with the volume and sensitivity of data that Durham has to process involved the development of a bespoke system and strict data security procedures, the scope of both being beyond that envisaged at project inception. Negotiations over setting up this system were complex and challenging for partners, particularly

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where these kinds of arrangement were new and where dedicated staff were not available.

- **Mismatch in time-scales for project-managing an ambitious project– and 'real world' challenges.** The project is extremely ambitious, involving thousands of participants, and numerous contractors, stakeholders and delivery partners. No partner had prior experience of delivering a trial project of this magnitude. In particular, there was relatively little overlap between those who designed the bid and those now responsible for taking forward practical delivery. This meant that, despite the significant will to make the project work, some continuity of vision and purpose was obscured. Initial project management plans faced persistent challenge from a variety of obstacles (as described in this paper) together with a mix of organisational cultures. Initial systems of sharing information were not adequate. Due to the formality of the process for changing project timescales from the original project contract agreed with Ofgem, it took more time than perhaps desirable to go back to Ofgem to request revisions to milestones and targets. As a result delivery teams felt pressured and even somewhat demoralised, in the sense that from the outset they saw themselves being constantly behind the agreed schedule. This kind of pressure notwithstanding, the project team demonstrated very significant dedication and commitment to project delivery.
- **Project team relationships within their own organisations.** The delivery of this project required action from across each organisation and particularly from almost every aspect of British Gas's business. This lead to challenges typical of this type of cross-functional project such as having to compete for time and resource from day to day business operations. Some personnel changes further complicated matters. The project has received high-level executive support and visibility, which has proved essential to assist with these natural organisational challenges.
- **Formal channels of communication hampered progress.** Understandable processes to co-ordinate partner relationships via one or two contacts also meant that direct conversations between those with the required expertise / knowledge were not always easy. For example requests from Durham for work to be performed by British Gas's customer insight team (e.g. concerning test cell recruitment and make-up) had to be formally proposed through the British Gas project manager, as internal British Gas teams are not set up to deal directly with ad-hoc requests from external organisations. This sort of tension between project and business operations is always likely to cause challenges in projects of this type.

6.6 SMEs Test Cells

6.6.1 What has gone well

- **Sufficient SMEs gave initial expression of interest for all test cells.** Initial identification of SMEs and SME recruitment was extremely challenging with

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many delays and problems that needed working around - but 560 customers expressed initial interest in being part of the trial against a target of 600.

- **Good working relationship developed between partners.** Once weekly phone calls for the SME side were established in May 2012, (in addition to the weekly residential call), a good working relationship was established between partners where joint solutions to problems were devised.
- **Equipment worked well for all test cells.** The British Gas team could not find the necessary technical support in-house so took-on a dedicated design engineer. They were therefore able to design a solution to fit the exact specifications needed for all the SME test cells. This was a non-intrusive solution built around the smart-meter so isolation switches were not an issue.
- **Customers bought into trial aims.** Many of the customers contacted already appeared quite savvy about energy savings and had already taken various steps to be energy conscious. Many therefore were receptive to the aims of the trial even if they could not be part of it themselves. Again having Durham as part of the team was extremely important in giving the project credibility.
- **Working with customer recruitment contractor.** British Gas did not have sufficient internal resources to undertake SME customer recruitment so brought in an external contractor. Whilst this was successful in terms of numbers recruited[21], the contractor did not have a sufficiently wide understanding of British Gas's business to answer customers' queries about energy supply.

6.6.2 Challenges

- **SME customers were not attracted by TOU incentive / tariff.** The team used a time-of-use tariff that was representative of likely 'real-world' costs in 2020, as the aim of the project was not to test elasticity but, rather, the appetite for customer flexibility against a realistic value for deferred industry expenditure / investment in 2020. However this did not prove a sufficiently attractive offer for many of the SME participants approached, and over 50% of those who had initially expressed interest in this tariff dropped out once they understood more about the terms. Recruitment to this test cell stands at around one-third against the original target.
- **All 'recruited customers' to SME test cells 10b and 11b dropped out (test cells involving power restriction or direct external control).** There are now just three 'friendlies'[22] in test cell 10b, and none in 11b. There were four main reasons why participants either withdrew or were no longer eligible

[21] i.e. 'recruited customers' – as per definitions in paragraph 6.1.

[22] i.e. some link to British Gas

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for the trial: first they did not have sufficient functionality on their smart meter; second they were not signed up with G4S (the main meter agent supplier); third they did not have the right physical set-up on site; and lastly, that they had not previously fully understood the terms of the trial – and which they only fully understood once engineers came to install equipment. This last reason was the most dominant. Business customers seem to have dropped out after trial recruitment (i.e. they did not become 'monitored' customers) because they did not feel they had the flexibility to have their electricity supply restricted or remotely controlled under the terms of the proposition offered to them. An alternative approach for any future study could be the use of a broader, more open flexibility and compensation offering. This could produce a higher take-up rate.

- **Customer selection was extremely challenging.** There is currently relatively little general knowledge about the electricity use of the small business sector in the UK. The team started off contacting only businesses for whom they had sufficient data, but soon needed to contact customers for whom data was incomplete to fill the test-cells. Recruitment took three months instead of the four weeks timetabled due to the volume of customers that needed to be approached and the very low response rate (17,000 approached, to achieve the 560 initial acceptances to participate).
- **Domination in test cells by small-scale manufacturing.** Despite attempting to get a spread of businesses involved in the trial, test-cell recruitment has ended in being dominated by small, single site businesses. It was extremely hard to fill some of the proposed demographic groups at all, for example large, single site businesses who were less keen to entertain any interference whatsoever with their energy usage.
- **Finding the decision-makers in companies.** Accessing the decision-makers in companies was extremely hard. Whilst an initial 'yes' might be given by the bill-payer, once on site it often became apparent that they perhaps lacked insight into the impact that the trial may have on the company's processes- and those responsible for business operations declined to be involved.
- **Time it took to get equipment designed, delayed adequate evaluation of a customer's suitability.** The delay between recruiting customers and getting the equipment specifications designed, meant that time was lost engaging with some customers for whom the end design would never work.
- **Communicating final proposition via engineer on site.** It was difficult for British Gas call centre to communicate the full extent of the trial via the phone. In addition partners soon realised that until a site survey was done it was very hard to tell if a customer was technically eligible for the trial. This meant that it was not until the site survey stage that customers realised how the trial might impact on their business. This was an important feature of the SME recruitment experience. Customers were recruited with long periods of time elapsing between verbal sign-up and any subsequent contact. This period of uncertainty led to doubt and disengagement which

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did not help recruitment. The on-site communication happened through an on-site engineer who was key in assuring the SME of the importance and validity of the trial.

7. Lessons from trial recruitment

The CLNR trial recruitment process has generated very significant learning so far, both from those aspects which have gone well and from those which have been more problematic.

This review has shown that in setting about trial recruitment to a large and complex multi-partner innovation and technology trial, neither companies nor Ofgem should underestimate the significant demands which may arise from working in a competition environment to project-led time-scales.

Arguably, going forward, some of the challenges faced and overcome will produce some of the most valuable learning for taking forward realistic customer propositions for demand-side development. It is important for this learning to be taken forwards both within the trial, and also applied to development of commercial propositions and / or for future trials.

7.1 Lessons for the current trial

Trial recruitment is largely complete, so we simply make the following points:

- **Pioneering role.** Whilst CLNR trial recruitment has faced many challenges, satisfactory solutions have been found to almost all recruitment issues as they arose. The project team should be particularly positive about their role as pioneers for such a large-scale trial involving multiple partners and successfully bringing together the working arrangements necessary for eventual delivery of an effective electricity demand side. Due to the significant efforts of the entire project team, not least collective commitment and hard work over a sustained period, the project is on track to deliver data suitable for systematic analysis.
- **Working with 'real world' constraints.** The project has had to work with real world constraints, which is the reality for successful commercial development of innovative demand-side measures in the electricity system. As a result, recruitment goals have been altered and new expectations now need to be incorporated into the project team's thinking.
- **Extending data collection period for delayed test cells.** There has been substantial outlay on recruitment and installation of equipment in the heat pump test cells. It would therefore seem sensible to leverage the value of this by extending the data collection period.

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Durham University will comprehensively evaluate the full trial results and `findings. Specifically on trial recruitment, based on this paper, we would suggest that Durham may wish to explore further:

- **Reasons for strong household interest in participating in time-of-use tariff trial.** Which factors had the greatest influence in customer- interest and uptake of the residential time-of-use tariff test cells? Was it the communication material; the association with Durham University; the M&S voucher; and / or the message about saving money; or a combination of these factors? Furthermore, to what extent did those customers targeted, have lifestyles which allowed them to accommodate these tariffs, i.e. they were home during the day.
- **Reasons for less household interest in the direct control and restricted hours tariffs test-cells**. The direct control and restricted hours tariffs offered new customer concepts but have proved less attractive in terms of trial recruitment. It is hard to gauge whether this is a result of: the technologies in association with the particular tariffs; the characteristics of the tariffs themselves; or, the way in which the tariff was presented / communicated to prospective participants.
- **Understanding of 'smart meter'**. Customer understanding of the term 'smart meter', and whether it was the smart meters themselves, or the IHD that was supplied with the smart meters, which was the key reason for customers' interest in joining the test cells which included smart meters.
- **Effect on trial uptake of communication about the trial**. How far did the extent and manner of communication with customers (household and SME) influence their trial uptake. For example, to what extent did either call centre staff or the engineers installing the technology have a good understanding of the trial aims and were able to answer questions posed by customers.

7.2 Lessons for the future

7.2.1 For other trials/and/or development of commercial propositions

Trial recruitment has thrown up a number of lessons. Some relate to further trials and some to new commercial propositions.

- **Value of aiming high.** The CLNR trial is a very significant and ambitious project. As well as introducing many challenges, this high ambition-level has equally driven innovative approaches towards successful test-cell recruitment and brought forward creative and workable solutions (technology and other). This high bar for the project from its inception, should also deliver a strong dividend from the project in terms of new insights, lessons and outcomes.
- **Can afford to be braver with customers.** Despite the technology-related challenges in filling some test-cells, there were also a number of instances in which the trial team anticipated customer problems which in the end did

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not materialise. For example the decision to concentrate on 'friendlies'[23] for the enhanced monitoring household test cell, (because the large box (circuit monitoring unit) was felt likely to be unattractive to customers). In the end, recruitment of 60% against target to that test cell suggests this was not necessarily so and that in practice there was some openness to new demand-side technology and propositions. Rather than second-guessing customers' possible negative responses, focus groups and / or similar small-scale customer exploration might help to avoid unduly 'low expectation' in design of possible 'customer offers'. This is also based on a narrow understanding of what motivates customers and how they relate to energy; we hope the broader findings from the analysis will enable a 'braver' approach.

- **Understanding different partner objectives in trial recruitment.** Greater awareness from the outset of the somewhat distinctive goals that project partners had in trial recruitment may have smoothed the process of detailed test cell design and recruitment (e.g. Northern Powergrid wished to install and trial network-related technology in customers' homes; Durham sought robust and rigorous trial design; British Gas wished to trial customer approaches which had strong commercial realism).
- **Real world constraints.** Designing a trial such as CLNR with such a large number of test cells, and demographic and technical sub-groups within those test cells, adds significant complexity. A balance needs to be found between testing a sufficiently varied range of options and real-world constraints.
- **Research credibility.** Working with a recognised and respected university gives the trials credibility and encourages customer participation.
- **Offer of smart meter as incentive.** Inclusion of smart meters (and IHDs) in the trial-offer does seem to make the offer more attractive in recruiting participants.
- **Domestic customers are interested in time-of-use and other tariffs.** Reasonable numbers of residential customers are interested in time-of-use (TOU) tariffs and also in exploring tariffs involving restricted use and direct control. However, for very understandable reasons trial recruitment targeted those people who could benefit from a TOU tariff. It needs to be clarified how far this interest extends further to other customers who might have to change usage patterns significantly to benefit.
- **SMEs are less open to up-take of TOU – and also to restricted hours and direct control.** Importantly, trial recruitment to the SME test-cells found that the SMEs contacted expressed initial keen interest in the prospect of lower bills. However, in the end the firms contacted were not amenable to remaining involved with the trial for restricted-use or for direct control tariffs. The TOU tariff test-cell has been half-filled against the original target.

[23] Project partner employees

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Other SME trials have encountered similar challenges (e.g. Ontario) whilst some trials (e.g. Ireland) have had more success in recruiting SMEs. For the future, in development of tariff offers to SME customers, more insight is needed on how best to approach this customer group, a better understanding is needed of SME electricity-use and demand side potential, and, how much 'benefit' is available to share via TOU tariffs with SMEs as a customer group.

- **There is appetite to enhance use of PV units.** There is appetite among PV owners to enhance the use of their PV units – especially as the current FIT tariff means that a PV-owner obtains a better return by using their PV-electricity on-site. Further exploration around thermal storage equipment like the EMMA unit would be beneficial.
- **Customers are interested in low carbon heating technologies.** Trial recruitment suggests that customers are interested in installing low carbon heating technologies, where prices are comparable with existing boiler technologies, and that they are also interested in methods to enhance the effectiveness of these systems. However until these systems are of a more conventional size (i.e. closer to the size of a gas boiler), and entail little more disruption than a straight replacement, many customers may be reluctant to install them. Because of the nature of the proposition, (offering low carbon heating units at a comparable cost to conventional boilers), trial recruitment has not revealed anything about the price that people are willing to pay for this technology.
- **Arranging installations can be hard.** Whilst customer agreement over the phone to trial recruitment may have been easier to achieve than anticipated, actually arranging installations was much harder. Sufficient allowance needs to be made for how hard it is for people to take time off work to let installers into their properties.

7.2.3 Some general lessons from set-up and trial recruitment.

All trials, particularly large multi-partner trials such as this, will face challenges in terms of available technology, IT, customer recruitment, development of partner relationships and sourcing products from suppliers. In addition, large-scale technology and innovation trials will take time to integrate into normal business-planning cycles and to secure resource allocation within organisations (including appropriately experienced and / or skilled personnel). Contract negotiation can also take considerable time, particularly where partners have not worked together before and where intellectual property issues need to be clarified. It would therefore be unrealistic to expect that all such challenges could be avoided in future major trials no matter how detailed the pre-planning.

Trials being funded through public or regulated sector sources will also have to meet the compliance frameworks required to ensure proper accountability for that expenditure.

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We do not have a detailed knowledge of the formal rules for LCNF competitions - nor for the subsequent contractual arrangements relating to project delivery and oversight, but coming out of this short review, we would suggest that:

- **In bidding:** Such large trials need to be able to build-in reasonable allowance for development of detailed plans (finalising technical choices, detailed test cell design, demographics etc), and for project set-up (partnership & governance arrangements, resourcing etc). Time spent in development of well-considered bids, should lead to cost-efficient and worthwhile outcomes.
- **Post bid:** Greater contingency / flexibility may be desirable for managing unavoidable delays (e.g. supply-chain) and for resolving technical problems which will inevitably arise. Time should be allowed for the anticipation of potential problems. This could improve the trial recruitment process, reduce the risk of early customer drop-out, and increase overall trial efficiency.
- **Review points for test cell recruitment:** Some clear 'stop-go' review points built into test-cell development and trial recruitment may enable earlier and more decisive action on test-cell viability and on whether change is needed in support of a more cost-efficient or realistic trial.
- **Generic problems:** There needs to be a way of surfacing and resolving problems of a generic nature. There are often solutions/formal work-arounds to such problems, but teams can spend considerable time identifying these. For example, data protection rules mean it is hard to readily identify and share the details of customers in possession of low carbon technologies, even though registers or data-sets with relevant data may exist. Additionally, some difficulties arise because of procedural, methodological or regulatory structures that are built by the project as part of its management, engagement or organisational activities. Over the course of a long project, these structures may need to be changed and it is important to recognise this and implement such changes quickly.
- **Value of experience:** The team involved in the CLNR trial across all the partners now has very considerable experience of 'set-up' and management of a very major project. Learning-by-doing, including from 'failure' delivers major value and expertise – both for business-as-usual and for future projects – and such experience needs properly leveraging within the business and with other organisations undertaking similar projects.

7.2.4 Considerations for Ofgem on trial set-up in future innovation competitions

Many of the lessons from CLNR trial recruitment are most beneficial for the organisations involved. Again, we do not have a detailed knowledge of the formal competition rules and contractual arrangements for oversight of LCNF projects. However from this short review, and with future innovation competitions in mind, we note some general issues which Ofgem may wish to consider regarding trial design.

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Not least, there are significant issues for Ofgem, beyond compliance with the rules of the network competitions, concerning the trade-off between ensuring value for customers through sufficiently detailed and rigorous project oversight against the successful promotion of innovation. The latter may entail an element of 'failure' or of recasting or even abandoning some elements of a project; but from which nevertheless very valuable lessons can also flow.

- **Bid process:** needs to be able to accommodate / embrace the demanding nature of developing and working-up ambitious multi-partner technology and innovation projects within a competition environment. This may create some tension within the constraints of a competition process.
- **Detailed post-bid planning and set-up:** Ofgem may wish to consider how to balance their need to drive demanding project timescales against the time necessary for detailed post-bid planning. This includes ways to incorporate some flexibility before key project milestones and time-lines are fully locked down in a project contract. Time spent getting the detail 'right' early on, may in the end make for more cost-efficient projects and for valuable project lessons and outcomes. (Any such iteration with successful bidders is likely to need factoring into bid documentation and be transparent, given compliance with a competitive bidding process and procurement rules).
- **Flexibility:** Ofgem has a clear duty to ensure consumer value from these innovation projects, but nevertheless may wish to examine whether sign-off procedures between projects and Ofgem, may on occasion, inhibit small adaptations to project designs, and whether there might be scope for more autonomy / flexibility on relatively minor matters.
- **Generic challenges:** Ofgem and DECC may wish to give some thought to some of the generic challenges arising from recruitment to smart trials and their wider implications for demand-side development. This may help avoid each project working through the same problem-set afresh, and could help to speed-up future projects and / or roll-outs. For example: (1) common ways to identify potential trial participants with low-carbon technologies whilst working within data protection rules; (2) whether current 'change processes' among market actors are suited to readily surface, discuss and resolve minor technical adjustments to meters or other customer equipment (e.g. isolation switches).
- **Best practice lessons:** LCNF is organised as a competition but from an overall value perspective, Ofgem may wish to consider how any clear best practice lessons emerging on trial set-up and recruitment might perhaps be readily distilled for those looking to participate in future innovation competitions be it for distribution or for transmission and gas distribution.

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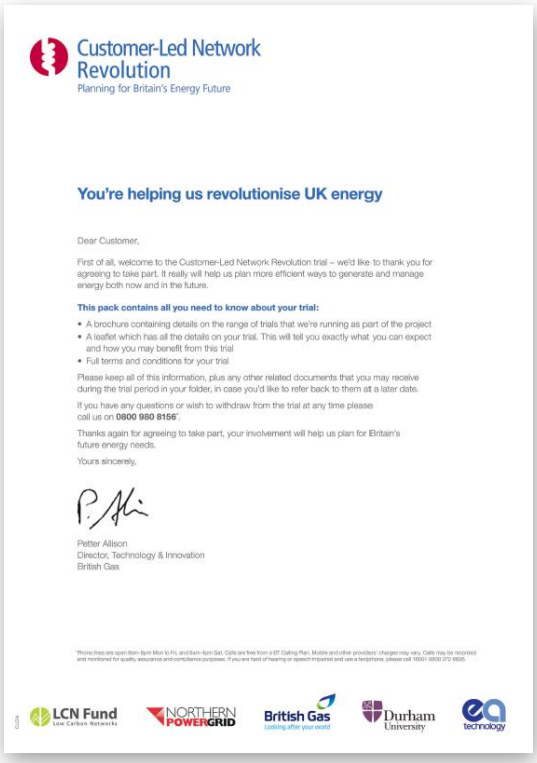
8. Conclusion

It is a significant achievement that recruitment to the CLNR test cells has been completed in a way which should deliver robust trial findings, suitable for detailed quantitative and qualitative analysis, despite many of the early-stage challenges and problems encountered.

The project can now look forward with confidence to the trial results. These will bring forward some very substantial lessons about how customers might help to support cost-efficient management of the low-voltage networks in the future, by the way in which customers use their low-carbon technologies.

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Annex 1. Examples of communications materials



Customer-Led Network Revolution
Planning for Britain's Energy Future

You're helping us revolutionise UK energy

Dear Customer,

First of all, welcome to the Customer-Led Network Revolution trial – we'd like to thank you for agreeing to take part. It really will help us plan more efficient ways to generate and manage energy both now and in the future.

This pack contains all you need to know about your trial:

- A brochure containing details on the range of trials that we're running as part of the project
- A leaflet which has all the details on your trial. This will tell you exactly what you can expect and how you may benefit from this trial
- Full terms and conditions for your trial

Please keep all of this information, plus any other related documents that you may receive during the trial period in your folder, in case you'd like to refer back to them at a later date.

If you have any questions or wish to withdraw from the trial at any time please call us on **0800 980 8156***.

Thanks again for agreeing to take part, your involvement will help us plan for Britain's future energy needs.

Yours sincerely,

Petter Allison
Director, Technology & Innovation
British Gas

LCN Fund · Northern Powergrid · British Gas · Durham University · EA Technology



Customer-Led Network Revolution
Planning for Britain's Energy Future

Your guide to our trials

Welcome and thanks for agreeing to take part

Welcome to the Customer-Led Network Revolution trial. Many thanks for agreeing to take part. You're now at the forefront of shaping the UK's future energy service needs.

Over the next year, you'll be helping us understand more about your needs as a customer and how you are using energy today and how to plan for your needs in the future. But you're not alone. Together with 14,000 other homes and businesses, this insight into energy use will help in our search for more sustainable and economic energy solutions. From which we can plan for an altogether lower carbon future and find ways for customers to use their energy more efficiently.

You'll find full details of your trial in the enclosed leaflet which can be kept in your folder for future reference.

Smart meters

Electric vehicle charging

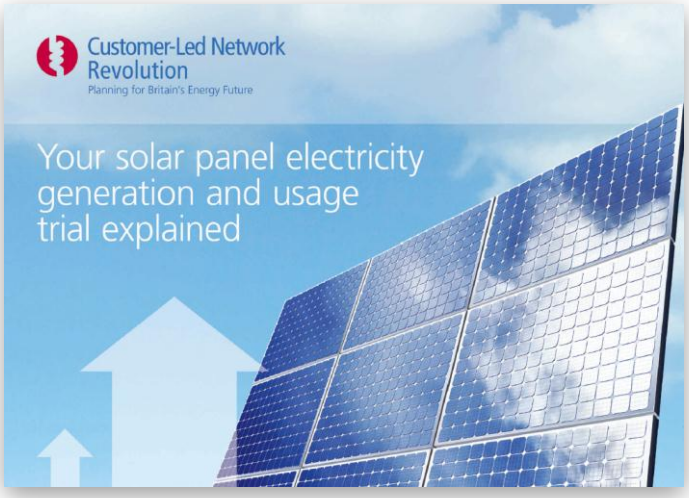
These are the technologies we are trialling

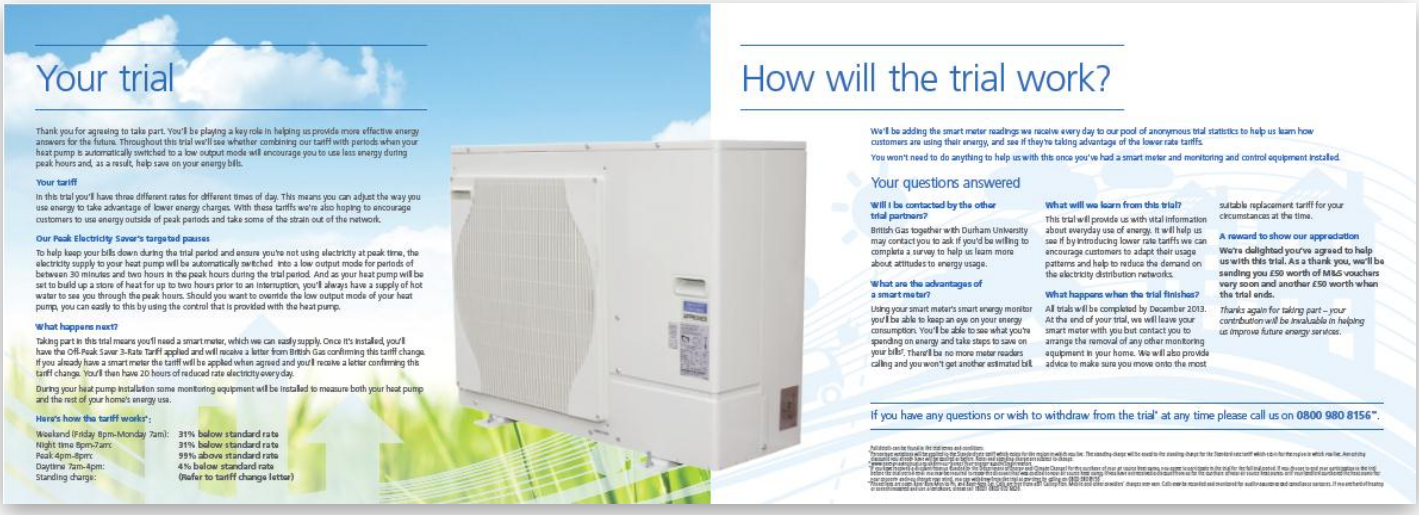
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Your trial

Thank you for agreeing to take part. You'll be playing a key role in helping us provide more effective energy answers for the future. Throughout this trial we'll see whether combining our tariff with periods when your heat pump is automatically switched to a low output mode will encourage you to use less energy during peak hours and, as a result, help save on your energy bills.

Your tariff

In this trial you'll have three different rates for different times of day. This means you can adjust the way you use energy to take advantage of lower energy charges. With these tariffs we're also hoping to encourage customers to use energy outside of peak periods and take some of the strain out of the network.

Our Peak Electricity Saver's targeted pauses

To help keep your bills down during the trial period and ensure you're not using electricity at peak time, the electricity supply to your heat pump will be automatically switched into a low output mode for periods of between 30 minutes and two hours in the peak hours during the trial period. And as your heat pump will be set to build up a store of heat for up to two hours prior to an interruption, you'll always have a supply of hot water to see you through the peak hours. Should you want to override the low output mode of your heat pump, you can easily to this by using the control that is provided with the heat pump.

What happens next?

Taking part in this trial means you'll need a smart meter, which we can easily supply. Once it's installed, you'll have the Off-Peak Saver 3-Rate Tariff applied and will receive a letter from British Gas confirming this tariff change. If you already have a smart meter the tariff will be applied when agreed and you'll receive a letter confirming this tariff change. You'll then have 20 hours of reduced rate electricity every day.

During your heat pump installation some monitoring equipment will be installed to measure both your heat pump and the rest of your home's energy use.

Here's how the tariff works*:

Weekend (Friday 8pm-Monday 7am):	31% below standard rate
Night time 8pm-7am:	31% below standard rate
Peak 4pm-8pm:	99% above standard rate
Daytime 7am-4pm:	4% below standard rate
Standing charge:	(Refer to tariff change letter)

How will the trial work?

We'll be adding the smart meter readings we receive every day to our pool of anonymous trial statistics to help us learn how customers are using their energy, and see if they're taking advantage of the lower rate tariffs.

You won't need to do anything to help us with this once you've had a smart meter and monitoring and control equipment installed.

Your questions answered

Will I be contacted by the other trial partners?

British Gas together with Durham University may contact you to ask if you'd be willing to complete a survey to help us learn more about attitudes to energy usage.

What are the advantages of a smart meter?

Using your smart meter's smart energy monitor you'll be able to keep an eye on your energy consumption. You'll be able to see what you're spending on energy and take steps to save on your bills*. There'll be no more meter readers calling and you won't get another estimated bill.

What will we learn from this trial?

This trial will provide us with vital information about everyday use of energy. It will help us see if by introducing lower rate tariffs we can encourage customers to adapt their usage patterns and help to reduce the demand on the electricity distribution networks.

What happens when the trial finishes?

All trials will be completed by December 2013. At the end of your trial, we will leave your smart meter with you but contact you to arrange the removal of any other monitoring equipment in your home. We will also provide advice to make sure you move onto the most suitable replacement tariff for your circumstances at the time.

A reward to show our appreciation

We're delighted you've agreed to help us with this trial. As a thank you, we'll be sending you £50 worth of M&S vouchers very soon and another £50 worth when the trial ends.

Thanks again for taking part – your contribution will be invaluable in helping us improve future energy services.

If you have any questions or wish to withdraw from the trial* at any time please call us on **0800 980 8156****.

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