Electric Ireland
Customer Innovations

Power Off & Save Pilot

Project Progress Report One

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DOCUMENT REVIEW

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Abbreviations & Acronyms

DSM – Demand Side Management

EED – Energy Efficiency Directive

PID – Project Initiation Document

POS – Power Off & Save

PPR – Project Progress Report

SEC – Smart Energy Controller

SPAYG – Smart Pay As You Go

Executive Summary

The purpose of this document is to report on the progress of the Power Off & Save project from May 2016 to January 2017.

'Power Off & Save' Overview

Power Off & Save is a pilot project which aims to investigate if a group of residential consumers can significantly reduce demand on request for a specific time period to allow EirGrid to manage the grid at peak times. The project was designed by EirGrid and Electric Ireland are the delivery partner. Electric Ireland will recruit up to approximately 1,400 customers who will take part in 10 Power Off & Save events. During each event, a text will be sent to participants asking them to reduce their usage for the following 30 minutes. The change in usage will be recorded and analysed. The programme target is a minimum of 2MW and a maximum of 5KW demand response. Some participants will receive smart control technology enabling them to control certain appliances remotely. Others will only be able to reduce usage manually. Consumer research will also be carried out to gain an understanding of participants' behaviour and their experience of the project.

Progress to Date

The project has made good progress to date. All key deliverables and milestones for the timeframe have been reached as outlined in the Project Initiation Document. The key achievements are:

- **Project launch** - the project was successfully launched in June 2016 and received positive press coverage.
- **Recruitment of participants** - over 900 participants have been recruited to the programme from the Electric Ireland customer base.
- **Technology installation** - all smart control technology necessary for event delivery is in place and operational for current participants.
- **Communication channels established** - an Electric Ireland communication service was established to enable communication with participants and project partners.
- **Two events delivered** - Two 'Power Off & Save' events have been successfully delivered. The first was on 3rd November 7.30-8pm and the second was December 5th 6-30-7pm.
- **Data Analysis -** two methods for calculating the demand response have been developed. The first is a comparison of participant usage with their previous five week usage (historical data). The second is a comparison against the usage of a control group (who do not get any text message) during the event period. Results for the first two Events have shown an average reduction of 15% when comparing against historical data and 16% against a control group. The results are very similar and this provides us with confidence that there are no irregularities in the analysis.

Key Learning's to Date

There have been a number of key learnings on the project to date. These are interim learning's which will be added to as the project progresses.

- For the Smart Energy Controller participant group the most popular reaction time was the first five minute period with 40% reacting within this period.

- For the Smart Energy Controller participant group the peak reduction times for the first two events were 20 minutes and 25 minutes respectively.

- Looking at all participants together, over 50% reduced their electricity usage for the 30 minutes of the event when compared to the half hour before each event.

- The data analysis indicates that available load for reduction in each home is significantly lower than what was originally estimated.

Communications & Stakeholder Engagement

Project communications have been effective to date. The communications strategy and consumer engagement plan ensure that communications are consistent and timely. There has also been some engagement with external stakeholders through the project launch and presentations made by the Project Manager to key industry stakeholders.

Risks to Project Delivery

There are no major issues to report. The project is currently ahead of schedule and risks are being managed.

Next Steps

As the report will show, all areas of 'Power Off & Save' are on track against the project plan. The next steps in the project are:

- **Continuation of Participant recruitment** - participant recruitment will continue for SEC, SPAYG and smart hot water control participant groups.

- **Implementation of further 'Power Off & Save' events** - additional events will be implemented by Electric Ireland when notified by EirGrid.

- **Data analysis** - the data from the subsequent events will be analysed and evaluated.

- **Market Research** - consumer research will be carried out after event five to gain insights into participants' experience of 'Power Off & Save'.

- **Communications** - participant and stakeholder communications will continue to be carefully managed and information on the project will be disseminated as appropriate.

1. Introduction

This is the first progress report from the Electric Ireland 'Power Off & Save' project team. Launched in June 2016, 'Power Off & Save' is a pilot Demand Side Management (DSM) project focusing on residential consumers. The project will investigate the ability of a group of households to effectively reduce electricity use for specific time periods on request. The report will summarise project activity from May - January, 2017. It will detail key deliverables during this period and the associated learning outcomes. It will also outline plans for the coming months.

1.1 BACKGROUND TO 'POWER OFF & SAVE'

The growth in smart control technology for electricity users has opened up many new possibilities for DSM and it is now an important component of the European Union's transition towards a low carbon economy. The Irish government has also recognised the potential of DSM and is committed to exploring opportunities in the sector. However to date the focus has been on commercial and industrial based initiatives only. In order to stimulate growth and innovation in residential DSM. EirGrid ran an industry wide competition to carry out a demand response project targeted at residential consumers. Electric Ireland were chosen as the preferred supplier to deliver the programme.

1.2 PARTNERSHIP APPROACH

The ethos of the project is very much a partnership approach. EirGrid is responsible for ensuring the day-to-day operational security of the power system and 'Power Off & Save' will act as a pilot for a residential DSM programme and help encourage technological innovation in this sector. Electric Ireland has previous experience of engaging with customers to provide smarter usage solutions sand the project team includes professionals skilled in some of today's most advanced Smart Home technologies. The project is also supported by a number of strategic partners, including technology providers Accenture, Climote and Glen Dimplex. Electric Ireland has also engaged data sciences experts Baringa and IPSOS/MRBI as their market research agency.

1.3 OBJECTIVES OF 'POWER OFF & SAVE'

The overarching goal of the project is to test the hypothesis that a group of residential customers can reduce demand by a significant enough level for a specific time period to allow EirGrid to manage the grid when requested, without any prior notice. The high level objectives are:

- **Establish and operate the 'Power Off & Save' project -** recruit and engage the appropriate number of participants to provide meaningful results. Up to 1,430 customers will be recruited.
- **Extend participation to the Smart Pay As You Go customer base -** these customers can be included in the programme as their usage data can be captured at 30 minute intervals.
- **Incentivise customers to take part in the 'Power Off & Save' events -** customer participation in events is vital and therefore customers will receive an incentive for taking part.
- **Deliver 10 'Power Off & Save' events** - Electric Ireland will manage the delivery of the events when notified by EirGrid and record the usage data.
- **Gain insights into participant behaviour** - independent market research will be carried out to gain an understanding of customer behaviour and attitudes to the programme and the associated technology.

2. Project Schedule and Progress against Plan

This section outlines progress against the project plan. The project is being rolled out in a phased approach with each phase building on the next. The first section summarises key deliverables to date for each phase. The next section details key activities for this period.

2.1 KEY DELIVERABLES AND MILESTONES FOR THE REPORTING PERIOD

There are eight phases with key deliverables and milestones as agreed in the Project Initiation Document. The following table outlines progress to date for each phase.

Table 1: Key Deliverables by Project Phase

Key Deliverables	Update
Phase 1 - Project Set Up • Project Initiation Document agreed • Customer Communications Plan agreed • End to end process agreed	**All delivered**
Phase 2 - Establishment of Smart Energy Controller (SEC) Group • 437 participants recruited from existing Smarter Living customer panel • Smart Energy Controller technology successfully modified for programme • Communication service established • Customer messaging approach upgraded to take demand response action	**All delivered**
Phase 3 - Establishment of Smart Pay As You Go (SPAYG) Group • 448 participants recruited from SPAYG customer base • Text messaging system put in place to allow for event communications	**Progress in line with plan**
Phase 4 - Extension of SEC Group to include remote immersion control • Smart Energy Controller capability extended to include immersion control switch capability • Additional homes installed with Smart Energy Controller and immersion switch	**Progress in line with plan**
Phase 5 - Glen Dimplex Quantum Hot Water Cylinder Group • Cylinders installed in 25 homes • Smart Energy Controller and immersion switch installed in additional homes	**Progress in line with plan**
Phase 6 - Climote Hot Water Control & DSM control Group • Controls installed in 4 homes	**Progress in line with plan**
Phase 7 - Electric Vehicle/Micro Generation homes Group • Smart Energy Controller installed in one Electric Vehicle home • Homes with these technologies will be recruited as required	**Progress in line with plan**
Phase 8 - Project Close Down Report	**March 2018**

2.2 KEY ACTIVITIES AND ACHEIVEMENTS

The main activities to date have focussed on recruiting participants and putting the necessary technical framework in place to deliver the events. Here is a summary of the key activities and their results.

2.2.1 Public Launch

'Power Off & Save' was launched publicly in June 2016. It received positive press coverage and there was a good level of interest from the general public.

2.2.2 Participant Recruitment

Participant recruitment was an important activity for this period. The recruitment process has been effective and numbers are on track against target. Participants are divided into three main groups:

- **Smart Energy Controller (SEC) Group -** this group has been recruited mainly from the existing Electric Ireland Smarter Homes Panel. Many panel members are already in possession of a Smart Energy Controller. All members of the panel were sent an email inviting them to take part in 'Power Off & Save'. Member who didn't want to participate were free to opt out. Less than 1% wrote back to say they didn't want to take part. As of 12th January 2017, 437 participants are up and running in this group.

- **Smarter Pay As You Go (SPAYG) Group -** this group was recruited from the existing Electric Ireland Smarter Pay as You Go customer base. Phased emails were sent to groups of customers inviting them to take part in the programme. Customers had to reply to opt in. Participants in this group received an incentive at sign up. As at 12 January 2017, 448 participants have been recruited to this group. These participants won't receive any additional smart control technology.

- **Smart Hot Water Group** - recruitment for this group has been more challenging because of the considerations within the hot-presses, for example either replacing cylinders or retrofitting to existing cylinders. Participants are being recruited from a number of different Electric Ireland customer groups.

As a result of the programme launch, a considerable number of people contacted Electric Ireland and EirGrid directly asking to take part in the programme. If these householders are deemed suitable to participate they will be allocated to the appropriate group.

2.2.3 Technology Delivery

A proportion of participants will receive smart control technology to help them control electricity use more easily. Therefore another key activity for this period was the installation of smart control technology to selected participants homes. The technologies employed are:

- **Smart Energy Controllers** - participants in the SEC group will use Smart Energy Controllers to help them reduce usage. The package includes three Smart Plugs to install on energy intensive appliances such as tumble dryers, dishwashers and washing machines. The Controller allows participants to see exactly how much electricity they're using at any time and also to remotely control the appliances which have Smart Plugs from their phones. Later in the programme the Smart Energy Controller will be extended to enable participants to control their immersion water heaters remotely.

- **Smart Hot Water Cylinders -**a group of participants will test smart hot water cylinders. These cylinders are highly insulated and retain heat for a significantly longer period of time than standard cylinders. Replacement cylinders have been installed in a small number of homes to date.

2.2.4 Establishment of Communication Channels

An Electric Ireland communication service was established for the project to facilitate communications with EirGrid and participants. All participants are sent texts for each event. Many of the SEC participants also receive push messages on their controller screens.

2.2.5 Delivery of two Events

Two events were successfully delivered by Electric Ireland following notification from EirGrid. The first took place on November 3rd 19.30-20.00 and the second on December 5th 18.30-19.00. All participants were texted on time and the usage data was captured. The results of the analysis for the first two events are in the key learning's section.

2.2.6 Data Analysis

For SEC participants usage data is available in 5 minute intervals. For SPAYG customers data is captured in 30 minute intervals. Currently two comparison methods are being used to measure the change in usage during an event.

Method 1 - Control Group	Method 2 - Participant Historical Data
The first method compares participant usage during the event to usage of a group of customers who aren't taking part in the programme for the same period - a control group.	The second method compares participant usage during the event to their five week historical usage data of each participant.

Both methods will be used for the duration of the pilot and an evaluation of their effectiveness will be carried out at the end of the programme.

2.3 COMMUNICATIONS AND STAKEHOLDER ENGAGEMENT

2.3.1 Communications Strategy

A communications strategy for the project was developed in Phase One to ensure clear and co-ordinated communication between all stakeholders in the project. To date the strategy has proven to be a useful framework to ensure effective communications.

2.3.2 Consumer Engagement Plan

A Consumer Engagement Plan was developed in Phase One. It is based on the existing Electric Ireland framework for the Smarter Living Programme. This includes a comprehensive customer support facility which ensures any issues are addressed promptly. To date customer engagement has gone smoothly and there have been no negative issues.

2.3.3 Stakeholder Engagement

A stakeholder management plan was developed to ensure all key internal and external stakeholders were identified and communicated with appropriately. Information on the project has been disseminated to the following external stakeholder groups:

General public - the launch of 'Power Off & Save' generated press coverage including an article in the Irish Independent, social media coverage and dedicated webpages on both EirGrid and Electric Ireland websites.

Industry Stakeholders - presentations have been made by the Project Manager to several key industry stakeholders such as CER, SEAI, DS3 Advisory Council and the EurElectric Conference.

2.3.4 Market Research

Understanding the underlying drivers of participant behaviour in relation to reducing electricity usage will be an important part of the project. Focus groups were carried out by IPSOS MRBI before the project started to gain insights into what people thought of the programme concept and how interested they would be in taking part. In general people were positively disposed towards the concept. The research highlighted that simple communications would be important to participants. Further research will be carried out after event five to gain a deeper understanding of participants' experience of the programme so far and how easy or difficult they found it to reduce usage.

2.4 RISKS AND CONSTRAINTS

A number of potential risks and restraints to programme delivery were identified at the start of the programme. These risks were in relation to resources, timeline, technology, customer engagement and ongoing business as usual for the programme partners. To date all risks and constraints are being managed and the programme is on schedule.

3. Learning Outcomes to date

To date two 'Power Off & Save' events have taken place, the first in November and the second in December. Both events were successfully delivered. Messages were sent to all participants on time and usage data was captured and analysed for the appropriate time periods. The next two sections will look at each event in more detail.

3.1 EVENT 1 - NOVEMBER 3RD 2016 7:30-8:00PM

620 households took part in the first event - 370 SECs and 250 SPAYGs. All participants received a message at 7:30pm announcing the start of the 'Power Off & Save' event and asking them to reduce electricity usage. At 8pm participants received another message stating the event was now over, thanking them for taking part and to resume normal usage.

The event went smoothly and the usage data was recorded for the 30 minute period with only minor communication issues. One minor issue was that a small number of participants turned off their broadband which prevented the usage data from being recorded. To address this issue an email was sent to all participants explaining that their broadband must be kept on during future events to allow the data to be captured.

Usage data for the SPAYG group is available in 30 minute intervals whereas usage data for the SEC group is recorded in 5 minute intervals. The following table gives a breakdown of the reaction times for the SEC participants for each 5 minute period. The results are very interesting. The most popular reaction time was the first 5 minute period with 37% responding within this time. Participation peaked at 20 minutes and 30% of participants did not react at all.

Table 2: Breakdown of SEC customer reaction time in 5 minute periods for Event 1

Number of Participants	Percentage	Reaction Time
137	37%	5 minutes
63	17%	10 minutes
38	10%	15 minutes
17	5%	20 minutes
0	0%	25 minutes
5	1%	30 minutes
110	30%	No reaction
370	**100%**	

3.2 EVENT 2 - DECEMBER 5TH 2016 6.30-7PM

A second event took place on December 5th, 6:30-7pm. This event was also successfully delivered. 785 households took part this time - 366 SECs and 419 SPAYGs. Similar messages were sent to participants notifying them of the start and end of the event.

The reaction behaviour followed a similar pattern to the first event. The most popular reaction time again was the first 5 minute period with a slightly larger percentage of 42% reducing their electricity usage within

this timeframe. The peak participation rate was at the 25 minute mark with 70% participation and a slightly lower percentage of 28% of participants did not react at all.

Table 3: Breakdown of SEC customer reaction time in 5 minute periods for Event 2

Number of Participants	Percentage	Reaction Time
154	42%	5 minutes
56	15%	10 minutes
25	7%	15 minutes
20	5%	20 minutes
0	0%	25 minutes
7	2%	30 minutes
104	28%	No reaction
366	**100%**	

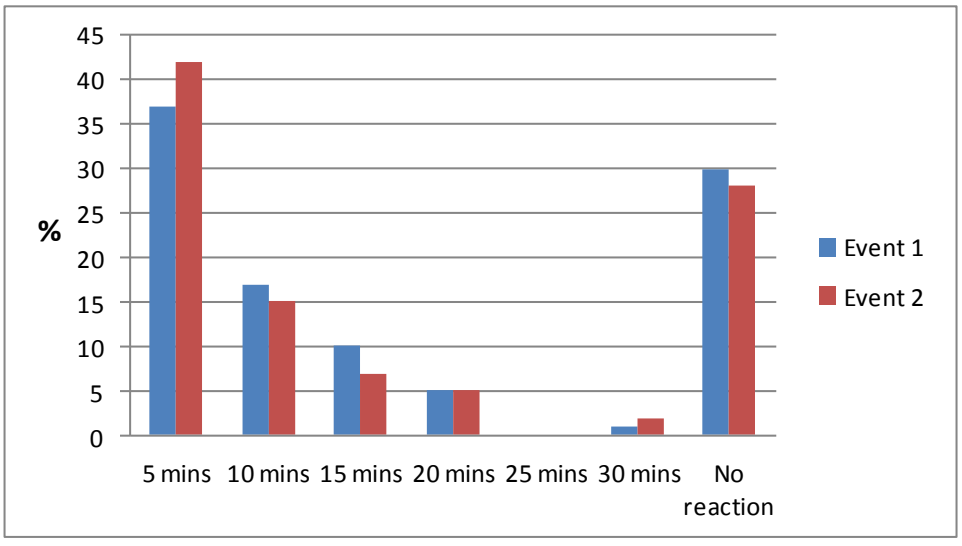
3.3 EVENT LEARNING OUTCOMES

3.3.1 Reaction Times

An analysis of the results for both events shows that 50% of all participants reduced their consumption when compared to the 30 minute period before the event.

Looking at the reaction times of SEC participants for both events together in a bar chart graph we can see a similar pattern emerging in reaction times. However not enough data has been collected as yet to draw any firm conclusions. The programme will build on this data as future events take place.

Figure 1: SEC Reaction times of both events together



3.3.2 Usage Reduction Levels

Looking at the level of usage reduction, the data analysis shows that the available load is considerably lower than the original estimate. Usage reduction levels will be captured for future events and the cumulative data will be analysed at the end of the project.

4. Next Steps

As detailed earlier in the report, all areas of 'Power Off & Save' are on track against the project plan. The next steps in the project are:

Continuation of recruitment - participant recruitment will continue and additional SEC and PAYG customers will be signed up to the programme. Recruitment for the hot water control participant groups will also continue to take place.

Implementation of further 'Power Off & Save' events - additional events will be implemented by Electric Ireland when notified by EirGrid. EirGrid will continue to determine the time and date of each event with Electric Ireland receiving minimum advance notice of the events. This is necessary to test the ability of the programme to mobilise and deliver an event in a short space of time. For a DSM initiative to be of benefit to grid stability in real-time a fast turnaround time is key.

Data analysis - the data from the subsequent events will be analysed and added to usage data already captured from the first two events.

Market Research - consumer research will be carried out after the fifth event to gain insights into participants' experience of the programme and the technology they've been using.

Communications - participant and stakeholder communications will continue to be carefully managed and information on the project will be disseminated as appropriate.