Ausgrid Demand Management
*Cool*Saver Interim Report

September 2015

www.ausgrid.com.au/coolsaver

Contents

1 Executive Summary

Air conditioners used to cool homes and businesses are a significant contributor to peak demand on hot summer days. They are the largest residential appliance with no load control option currently available to customers and offer significant potential for residential peak demand reductions. It is estimated that residential air conditioners contribute about 20-25% of the Ausgrid system summer peak demand. The Ausgrid *Cool*Saver trial aims to explore ways to reduce the impact of peak demand from residential air conditioners by partnering with customers and offering direct incentives for controlling their air conditioners on peak summer days.

The *Cool*Saver trial is funded through the Demand Management Innovation Allowance (DMIA) approved by the Australian Energy Regulator. This allowance provides funding to explore new innovative demand management solutions. It enables network companies to develop cost-effective demand management options that could potentially offer a lower cost option for addressing a network investment than supply side solutions. Delivering safe and reliable electricity at the lowest cost helps to keep power bills lower for all customers in the long term.

One of the main objectives of the *Cool*Saver program was to trial low cost technology and communications solutions that did not require a costly smart meter roll-out. The voluntary adoption of the Australian standard AS/NZS 4755 by a number of air conditioner manufacturers and the development of commercially available demand response enabling devices has also substantially lowered the potential cost to introduce direct load control to air conditioners.

The *Cool*Saver trial so far has progressed through three phases targeted at testing different objectives including technology options, customer response, incentives and sales approaches.

Phase 1: During 2012/13 the trial was commenced by developing and testing demand response enabling device technologies and solutions applicable for Ausgrid's network. This included testing a commercially available ripple frequency signal receiver with Ausgrid control systems and the development of a new signal receiver based on mobile phone communications technologies and SMS commands. This phase of the trial also included the preliminary testing of this signal receiver on a small number of AS4755 air conditioners at the homes of Ausgrid staff.

Phase 2: In December 2013, a customer offer was made in parts of the Central Coast and Lake Macquarie areas with 109 households participating over the past two summers. The primary aims of this phase of the trial were to test the technology but more importantly to understand customer response and acceptance to an initial customer offer with a direct incentive for participation.

We have received consistently positive survey feedback from these households with 91 of participating households (83%) extending their participation in the trial to a third summer period in 2015/16. In addition, monitoring equipment has shown that the average demand reductions achievable on hot summer days was 1.5 kVA average per customer for systems >10kW cooling capacity and 0.7kVA per customer for systems with a cooling capacity between 4 and 10kW.

Phase 3: The trial has been extended to a third phase in order to test alternative sales and customer acquisition approaches with a preliminary launch in February 2015. For this phase, we have partnered with retailers and air conditioner installers in Maitland to trial a sales model designed to reflect a likely future customer approach that would achieve the lower customer acquisition costs considered sufficient to successfully defer network investments. This phase of the trial is targeted at acquiring customers at the point of sale of new AS4755 compliant air conditioners and is in its preliminary stages with a full launch by retailers scheduled for Spring 2015.

As trial activities progress, further reports outlining results and learnings will be made available.

2 Project Background

2.1 Impact of residential air conditioners on peak demand

Peak electricity demand events occur when demand for electricity is significantly higher than the historical average. These events are relatively rare, occurring on average only about 20-40 hours in a year or less than 0.5% of the time. Peak demand is the primary driver of network augmentation investment, which can add to electricity prices paid by consumers through the network component of electricity bills.

To assess the impact of air conditioner use on peak summer days, Ausgrid analysed the half hour meter data for 250,000 Ausgrid residential customers on key peak demand days. The results, described in Figure 1 below, show that on the historical peak day of 3 Feb 2011, electrical demand increased by an average of one and a half times (147%) in comparison with a moderate summer day a week later. This increase is equal to about 400 MW of electricity demand, or 1600 watts per household.

It is estimated that in 2011, residential air conditioners comprised about 1300-1700 MW of the overall Ausgrid system peak of 6300 MW, or about 20-25% of total peak demand.

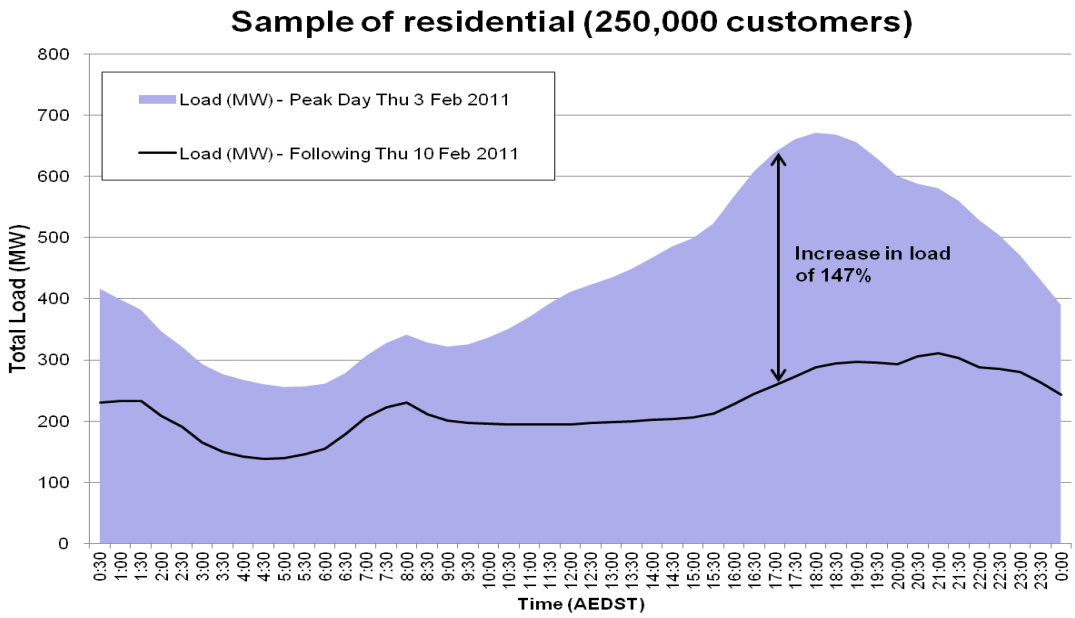

Figure 1: Electrical demand for peak day 3 Feb 2011

2.2 Penetration of residential air conditioners

In the past Ausgrid's distribution network was predominantly a winter peaking network; that is, most network assets reached their annual peak in the winter season. But since about 2000, the trend has been for an increasing number of network assets to reach their maximum demand in summer. This is due primarily to the increased use of air conditioners in homes and businesses and the replacement of electric resistance heaters with gas heaters and reverse cycle air conditioners for winter heating.

Survey data compiled by the Australian Bureau of Statistics (ABS) provides an estimate of the percentage of households with an air conditioner used for cooling in summer. According to the ABS

survey data, in 1999, 28% of households in NSW had air conditioners. By 2014, 64% or about two thirds of households in NSW had an air conditioner. NSW air conditioner penetration is shown in Figure 2.

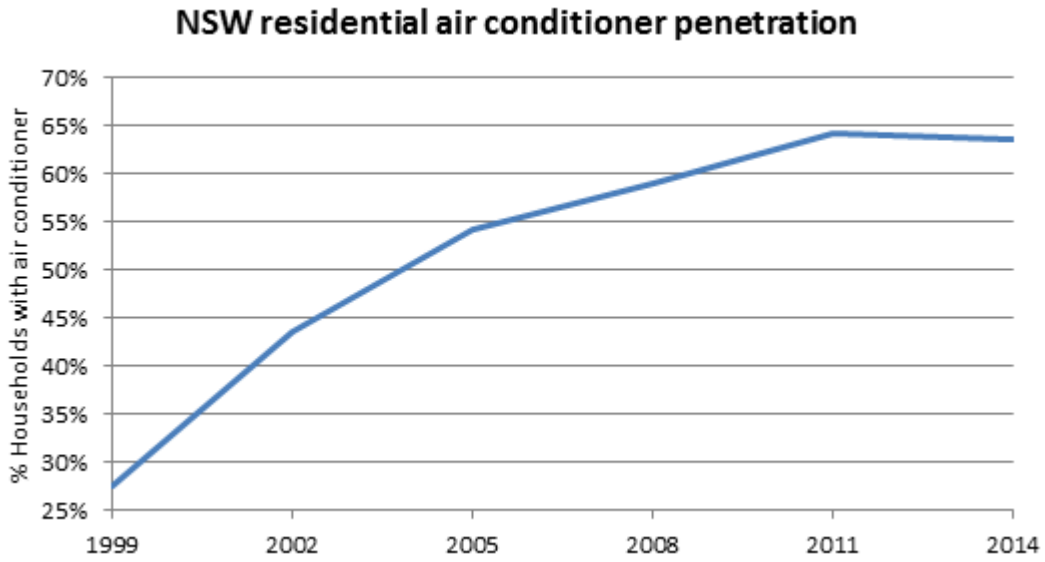

Figure 2: NSW residential air conditioner penetration 1999-2014. Source: ABS survey data

The most recent ABS reports indicate that this penetration rate has stabilised at about 64%. While this indicates that the share of households with air conditioners is not increasing, air conditioner sales data and anecdotal evidence from the air conditioning industry indicates that the total living area being cooled continues to increase. This shows that the current measure of penetration rate may be insufficient to forecast future electricity demand and that a new measure is required to adequately track the influence of air conditioners on peak electricity demand.

2.3 Australian Standard AS/NZS4755

Australian Standard AS/NZS 4755 is the standard defining the framework for demand response capabilities and supporting technologies for electrical products. This standard has not been mandated as yet, but an increasing number of air conditioner manufacturers have voluntarily adopted the relevant demand response standard (AS/NZS 4755.3.1) and are offering compliant appliances in the Australian market.

A demand response enabling device, or signal receiver (figure 3), is an electronic device that is connected to an AS/NZS 4755 compliant air conditioner. It offers the ability to remotely switch the air conditioner into a demand response mode DRM1, DRM2 or DRM3 at times of peak demand to cap the rated input power consumption on hot days.

Figure 3: Demand response enabling device/ Signal receiver (3G model used for Phase 3 of the trial)

Figure 4 below shows a typical energy rating label that you would find labelled on air conditioners. The air conditioner is AS/NZS 4755 compliant when the label indicates the availability of a demand response mode and has full capability under the standard when all three demand response modes 1, 2 and 3 are ticked.

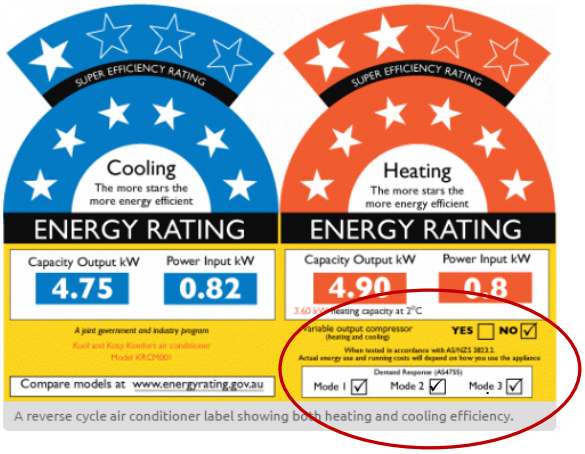

Figure 4: Energy rating showing demand response modes 1, 2 and 3

Demand response mode 1 turns the air conditioner compressor off, mode 2 reduces the air conditioner capacity to 50% of rated capacity and mode 3 reduces the air conditioner capacity to 75% of capacity. The Ausgrid *Cool*Saver trial uses only modes 2 and 3.

In total, there are currently over 500 models of air conditioners that are AS4755 compliant either out of the box or with an additional part supplied by the manufacturer that needs to be installed. Using demand response ready air conditioners also means that the manufacturer's warranty remains valid and the air conditioner is designed to operate in these modes.

2.4 Similar trials by network service providers

Earlier trials of air conditioning load control by SA Power Networks in South Australia, Energex in Queensland and Endeavour Energy in NSW explored customer acceptance and technical solutions prior to the development of the AS4755 standard.

These trials indicated that consumers would be willing to accept some level of external control of their air conditioner. However, a key barrier was that control modifications to existing residential air conditioners were costly and carried some risk as modifications were not supported by the air conditioner manufacturer potentially voiding warranties. The high costs and risk demonstrated by these earlier trials indicated that air conditioning load control did not offer a cost effective demand management solution under such a program model.

More recently, trials by Energex in Queensland and Endeavour Energy in NSW using AS4755 compliant air conditioners have shown more promising results. The use of existing network ripple control systems to signal the AS4755 demand response devices has offered a potentially cost effective solution for air conditioner load control to address peak demand. Ripple frequency control systems send a signal down the power lines and have traditionally been used to activate switches mounted on household meter boards to control off peak electric hot water storage systems.

There are over 2.3 million customers across NSW and QLD and over 500,000 in Ausgrid's network area on these controlled load tariffs that predominantly use a ripple frequency injection system to

control electricity supply to domestic electric storage hot water systems. In return, customers receive lower electricity charges for their hot water system through off peak tariffs OP1 and OP2 in NSW and Tariffs 31 and 33 in Queensland.

Energex has been the most successful with air conditioner demand response programs reporting over 27,000 customers in air-conditioner load control programs in their submission to the Australian Energy Regulator in October 2014. This includes over 13,000 on Energex's most recent PeakSmart program which is marketed through appliance retail stores in South-East Queensland.

3 Trial Objectives

The overall objectives of *Cool*Saver are to:

1. Explore and trial an innovative way to partner with residential customers to reduce peak demand by activating the demand response modes of AS4755 compliant air conditioners;
2. Build upon the learnings from similar trials by Energex, Ergon and Endeavour Energy; and
3. Verify the costs and benefits of air conditioner load control so as to determine whether the solution offers a viable cost effective alternative to expanding the network.

The operational trial program objectives were staged with specific trial activities introduced as performance milestones. When these were achieved, this warranted continuation of the trial. The phases of the trial program are as follows:

1. Develop and trial different technology options not reliant on a smart meter interface to verify the reliability and performance of the equipment used to enable the demand response mode of air conditioners;
2. Identify levels of customer response and acceptance to an offer designed to reflect a likely future network offer or electricity retailer tariff; and
3. Trial a program sales model designed to reflect a likely future customer approach that would achieve both lower customer acquisition costs and lower complexity for customers.

4 Trial overview and results

The trial program so far has consisted of three phases as outlined below:

- Phase 1: Develop and test demand response devices (including staff trial)

  This phase started in summer 12/13 and included lab testing and a small Ausgrid staff trial. The staff trial was continued until summer 14/15 and has now been completed.

- Phase 2: Customer trial in Central Coast and Lake Macquarie (109 customers)

  This phase started in summer 13/14 and continued during summer 14/15 and has now been extended to summer 15/16.

- Phase 3: Customer trial in the Maitland area

  This phase started in summer 14/15 and was preliminary launched in stores in the Maitland area late in summer 14/15. The full launch is planned for Spring 2015 and the trial program is planned to continue until summer 16/17.

4.1 Phase 1 - Develop and test demand response device

4.1.1 Overview

As outlined in Section 3, the objective of the trial was to develop and trial technology options for managing peak demand from residential air conditioner that were not reliant on the installation of a smart meter and associated communications system.

While previous trials by other network service providers had tested the use of a ripple signal demand response device to enable the power savings modes on AS4755 compliant air conditioners, there had been no trial of a direct telecommunications link to operate the demand response device.

There are some aspects of air conditioner load control that would benefit from the two way communications offered by a telecommunications link with the signal receiver. In particular, the ability for a customer to override an individual peak event was recognised as a possible key barrier to higher customer take-up.

A further important consideration relates to future deactivation of signal receivers and the need for an electrician to visit the site to remove ripple signal receivers in order to deactivate. In comparison, devices operated via a telecommunications signal can be deselected from a peak event or permanently deactivated remotely.

The trial also tested a ripple signal receiver device to verify reliability and functionality with Ausgrid's ripple control system.

4.1.2 Results

Signal receiver development (utilising SMS and mobile phone communications)

The first phase of the trial involved the development by Ausgrid of a GSM (2G) enabled signal receiver using off-the-shelf components. These first prototypes were successfully commissioned and tested in the laboratory as well as on test air conditioners in the field.

Devices were tested in our test facilities and field tested at the homes of Ausgrid staff who volunteered to assist with the trial. Air conditioners that were AS4755 compliant 'out of the box' and those which required the installation of a retrofit control card formed part of this phase of the trial.

Monitoring equipment was also installed at the switchboard of the trial homes to measure the air conditioner electrical load during demand response events to understand how different air conditioners performed when in a demand response mode. Figure 5 shows the measured electrical power in average 1-minute intervals for a single air conditioner during a test day when the demand response mode 2 (reduces air conditioner capacity to 50% of rated capacity) was activated during the summer afternoon peak time between 3 to 7pm.

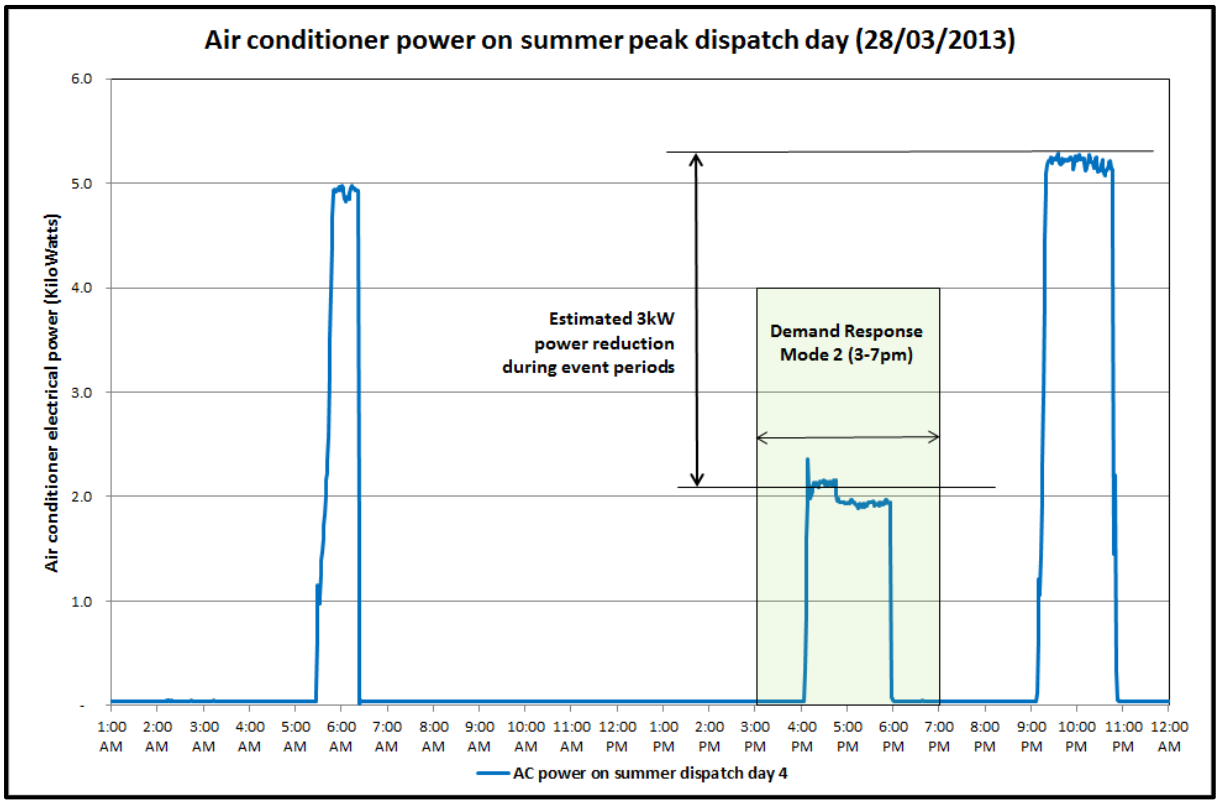

Figure 5: Electrical load of a Daikin inverter air conditioner during a DRM2 event (summer)

The experience gained in fitting signal receivers and installing retrofit control cards was an important learning in the development of the best installation procedures to be used when deploying external contractors to install such devices at customers' premises.

Figure 6 shows some of installation configurations tested as part of phase 1 with the signal receiver mounted on the outside and inside of the air conditioner outdoor unit. For the inside installation an external aerial was required to receive a reliable mobile phone signal.

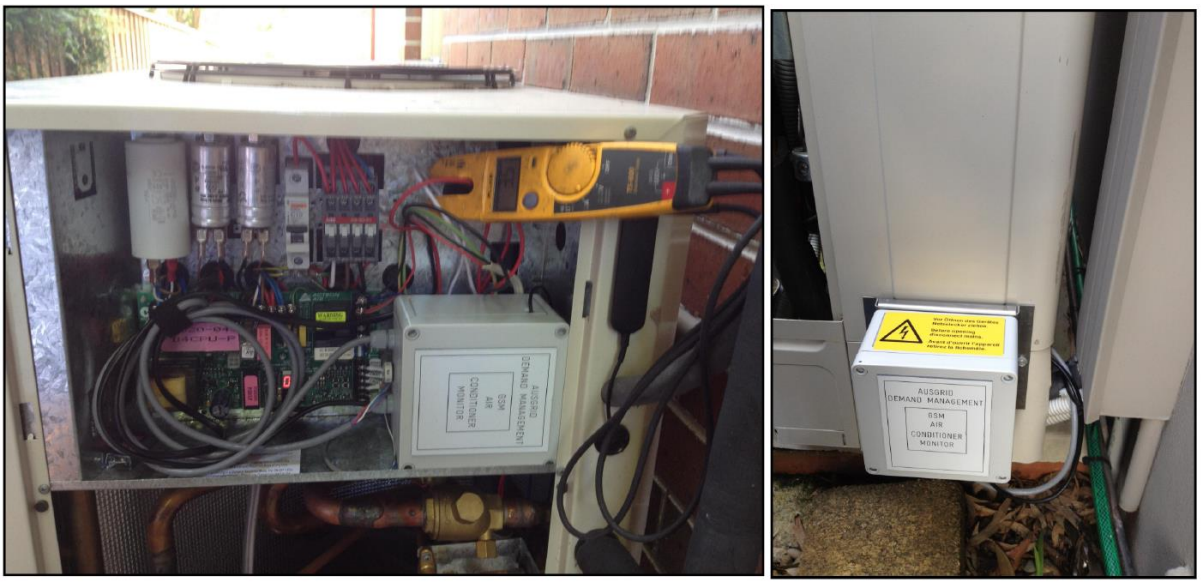

Figure 6: Demand response signal receiver device inside and outside the outdoor unit

Once functionality and reliability of the 2G SMS signal receiver was verified and installation procedures were refined, the trial was advanced to the customer response component of the trial.

Ripple frequency signal receivers

A ripple frequency enabled signal receiver was also field tested in the Ausgrid network by programming a commercially available ripple receiver with the ripple frequency signals used on the Ausgrid network. This product has been used extensively by Energex for their PeakSmart program.

As part of phase 1, the ripple frequency enabled signal receivers were successfully commissioned and tested in the laboratory as well as in the field.

4.2 Phase 2 - Test customer response to an offer

4.2.1 Overview

In this second phase, the trial sought to identify the level of customer response and acceptance to an offer designed to reflect a likely future network offer or electricity retailer tariff. Other objectives were to understand the number of AS4755 compliant air conditioners already installed at existing homes and test the two preferred technology options; (1) ripple signal receivers and (2) signal receivers that utilized the existing mobile phone network using SMS protocols for activating demand response modes. Both signal receiver options allowed us to remotely activate the air conditioners in-built power saving modes.

For this phase, two separate areas were selected to trial each of the technology options. For the ripple signal receiver component of the trial, 7 adjacent suburbs around the Cardiff and Mount Hutton zone substations in the Lake Macquarie area were selected. For the telecoms signal receiver component of the trial, 8 adjacent suburbs around the Charmhaven zone substation in the Central Coast area were selected. Selection of the trial areas were not based on any forecast network needs but on a number of factors related primarily to trial operations, including choosing zone substations that had a residential summer peaking load profile. All customers made an offer were able to participate in the trial program provided they were the owner of the property and they had an eligible AS4755 air conditioner.

The offer to customers was developed from Choice modelling completed to test various demand management program offers and was composed of two separate elements; an initial payment and

annual reward payments over two summers. The initial payment was designed to offer an immediate reward to customers for signing onto the program while the annual reward payments reflected an estimate of a cost effective annual deferral value to the network for the average air conditioning system.

Offer terms and conditions set out that there would be a maximum of 8 peak events per season of between 4 and 6 hours per event. Peak events were selected when the electricity network experiences high demand on hot summer days on working weekdays.

The customer payment details of the offer made to customers is listed in the table below. Payment was via Coles Group & Myer or Woolworths WISH gift cards.

Offer element	Customer payment maximum
Installation reward	$160
Summer 2013/14 rewards	$120
Summer 2014/15 rewards	$120
Total *Cool*Saver rewards (2 years)	$400

The signal receivers and any additional parts required to enable the demand response modes were installed by a qualified air conditioner technician at Ausgrid's cost. Aided by learnings from phase 1 of the trial, installation of the signal receivers progressed smoothly with few issues, which was recognised in our survey of participants.

From the survey results (Section 5) recipient said: "*everything was simple and easy. Installation was done when they said it would be done and it just works, nothing to be done by me*"

Central Coast

For the Central Coast component of the trial, an upgraded 3G compatible signal receiver was developed by Ausgrid to enable the demand response modes.

The upgraded 3G signal receivers included a current sensor that was installed on the air conditioner to verify the peak event operations and determine the actual demand reductions from individual participants. Due to the small scale of the program, measurement of demand reductions at the network level was not viable.

On the morning of a *Cool*Saver peak event, participants were notified by SMS to their nominated mobile number, detailing the *Cool*Saver peak event start time and duration. Participants confirmed in the survey that notification was a positive aspect to the trial operation.

From the survey results (Section 5) recipient said: "*while not necessary it was nice to be notified when the CoolSaver trial was on*"

A feature of the trial for Central Coast participants was the option to opt out of a *Cool*Saver peak event using the capability of the 3G signal receiver installed. This capability was featured in the original customer offer to the Central Coast participants and required customers to send an SMS response back to Ausgrid at the time of the peak event to enable the override feature. As a condition of the offer, where participants opted out of a peak event, the total summer rewards were reduced by $20 each time they opted out.

Lake Macquarie

Lake Macquarie participants did not have the option to opt out of individual peak events because the ripple signal receiver does not allow this functionality. Customers did have the option to opt out of the *Cool*Saver trial in its entirety at any time (as did Central Coast participants). These participants did not receive any notifications of the peak demand events, but could call Ausgrid if they noticed any significant difference in air conditioner performance.

Extension of Central Coast and Lake Macquarie trials to 2015/16

As peak event days in 2013/14 and 2014/15 included few high temperature days, the trial was extended to 2015/16 to potentially better understand the response by customers under these conditions and test the willingness of customers to participate over an extended number of seasons.

The program extension also included a reduction in the annual summer reward payments to reflect a better understanding of the likely future payment levels and a further refinement to the annual rewards based on the size of air conditioner. The revised 2015/16 offer is detailed in the table below.

Offer element	Customer payment maximum (Air conditioner <10kW*)	Customer payment maximum (Air conditioner >10kW*)
Summer 2015/16 rewards	$50	$100

* kW is the rated cooling capacity output of the air conditioner.

For more information on the trial program overview for Central Coast and Lake Macquarie, refer to our website **here.**

4.2.2 Participation results

Initial customer participation (summer 2013/14)

To identify levels of customer response and acceptance to the original offer, the *Cool*Saver trial was direct marketed to 16,141 households in selected areas of the Central Coast and Lake Macquarie using personalised letters and telemarketing. This direct marketing invited householders to register their interest to participate in the *Cool*Saver trial via an online form. Registration of interest letters were sent out during December 2013 and January 2014 with a closing date in February 2014 to submit a registration of interest. The letters sent out were targeted at separate houses in the selected suburbs with a medium to large annual energy consumption on the primary tariff (>4MWh per year) thereby targeting domestic customers that were more likely to have an air conditioner.

Of the 16,141 households approached, 1205 (or 7.5%) registered their interest in participating in the trial. This acceptance rate indicated that the financial rewards and offer terms were sufficiently attractive to customers.

From the survey results (Section 5) recipient said: *"it was a great offer, and I was very happy to participate", "I liked the gift cards, they were good for me to use then pay the amount off my electricity bill"*

Customers registering their interest were required to provide information about their air conditioner including brand and model number. Information was provided in the offer letter on how to obtain the

model number from the unit. From the list of those registering their interest, Ausgrid identified the customers with air conditioners compliant with the AS4755 standard.

Of the 1205 customers who registered their interest online, only 134 (11%) were found to have an eligible air conditioner installed in their home with most of these models requiring an additional part to be installed to activate the demand response interface. The relatively low volume of eligible air conditioners was not unexpected, as the voluntary adoption of the standard by manufacturers has only been introduced in recent years and this phase of the trial was specifically targeted at existing homes with an air conditioner already installed.

From the 134 eligible customers, offers were made to the 129 customers who resided inside the trial areas. A total of 112 (87%) households accepted the offer and 109 installations were completed successfully; three installations not being completed due to safety and technical issues. This included an air conditioner outdoor unit that was mounted beyond a safe work height, no spare demand response terminals on one unit and an incorrect model number supplied by the customer. Of the 109 trial participants, there were 69 households in the Central Coast trial area and 40 households in the Lake Macquarie trial area.

Of the 109 customers that had a signal receiver installed, 93 (85%) required the purchase and installation of an additional part from the manufacturer to enable the demand response functions. This was primarily because most customers had existing ducted air conditioner units from Actron Air, Daikin and Fujistu that were several years old or greater. These air conditioners required an additional part to be purchased to enable the demand response functions. Only 16 customers had newer models of air conditioner from Panasonic, Samsung and Hitachi that were demand response ready ‘out of the box’.

Because of the bias of customers towards larger ducted air conditioners the majority of the participants had systems with a high cooling capacity. In total, 82 customers had a system with greater than 10kW cooling capacity, 25 customers had a system with a cooling capacity between 4kW and 10kW and 2 customers had a system with a cooling capacity less than 4kW.

Opt-outs due to house moves and technical issues (2013/14, 2014/15)

Over the 2013/14 and 2014/15 trial periods there were a total of four participants who opted out of the trial. In three instances, this was due to the customer moving out of the home. The signal receivers were removed and no attempt was made to re-contract with the new residents of the home. There was one customer who removed and returned the signal receiver due to a technical issue with the air conditioner potentially caused by the signal receiver. After further investigation and discussion with the customer it was concluded that the technical issue was due to the original installation of the air conditioner system and not related to the installation of the signal receiver. The signal receiver was not re-installed.

Summer 2015/16 trial extension

In April 2015, an offer was made to the remaining 105 participants to extend the trial for another summer (2015/16). Of these, one customer was planning to move house in September 2015 and another 13 customers decided not to continue in the trial for summer 2015/16. This leaves a total of 91 customers (88%) continuing in the trial for another summer. Of the 91, 34 participants are in the Lake Macquarie trial area and 57 participants are in the Central Coast trial area, with both areas having similar participation rates for continuation of 87-88% when taking into account move outs.

4.2.3 Peak event results

In 2013-14 there were seven peak events on the days and times detailed in the table below. These peak events activated Demand Response Modes 2 and 3. DRM2 reduces the input power to 50% of rated cooling capacity power of the air conditioner. DRM3 reduces the input power to 75% of rated cooling capacity. Peak events were initiated when maximum temperatures at a local weather station were forecast to exceed about 30-32°C on working weekdays. In some instances, actual maximum temperatures were lower than forecast.

Date	Day of week	Start Time	Finish Time	Mode	Maximum daily temp C
15/01/14	Wednesday	3:30pm	7:30pm	DRM2 & DRM3	32.7
16/01/14	Thursday	3:30pm	7:30pm	DRM3	33.4
31/01/14	Friday	3:30pm	7:30pm	DRM2 & DRM3	31.0
19/02/14	Wednesday	3:00pm	7:30pm	DRM2 & DRM3	30.8
20/02/14	Thursday	3:00pm	7:00pm	DRM3	26.5
25/02/14	Wednesday	3:00pm	7:00pm	DRM2 & DRM3	27.7
18/03/14	Tuesday	3:00pm	7:00pm	DRM2 & DRM3	28.7

In 2014-15 there were only three peak events due to fewer days where the maximum temperature was forecast to exceed 30-32°C on working weekdays.

Date	Day of week	Start Time	Finish Time	Mode	Maximum daily temp C
3/12/14	Wednesday	3:00pm	7:00pm	DRM2	35.7
17/02/15	Tuesday	3:00pm	7:00pm	DRM2	28.1
20/03/15	Friday	2:00pm	7:00pm	DRM2 & DRM3	37.3

Air conditioner load information is currently being collected from all participants in our *Cool*Saver Central Coast trial with load information being measured by a current sensor that had been installed on the electrical input power supply to the air conditioner. Preliminary results of the diversified air conditioner load from participants in the trial during summer 2014/15 is shown in Figures 7 and 8 below. These show the average hourly electrical load on the dispatch day of 3 December 2014 versus another high temperature non-dispatch day in mid-November.

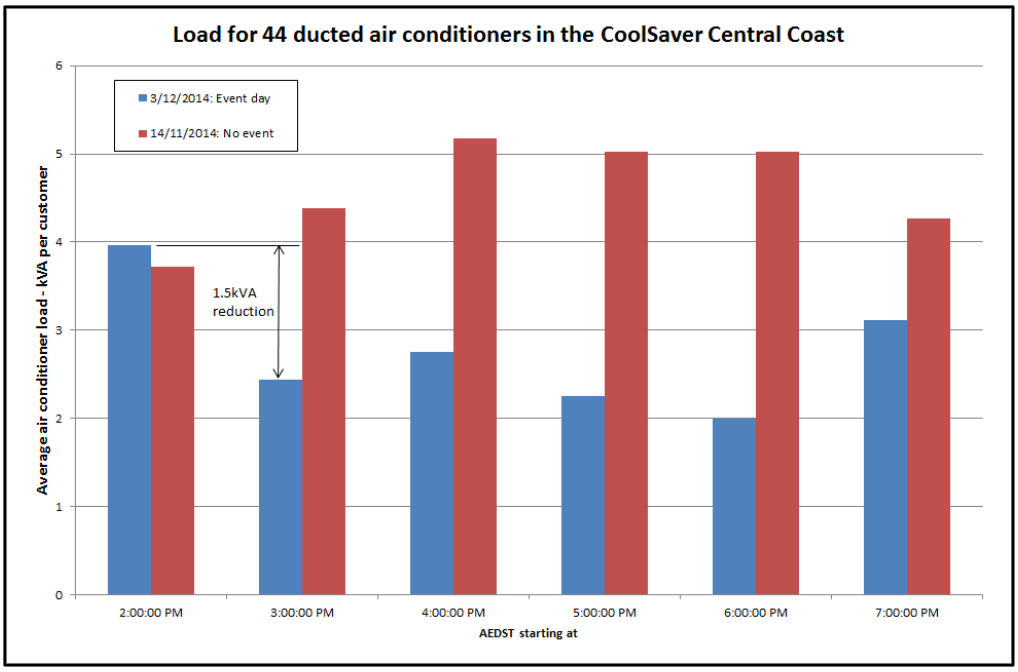

Figure 7: Measured average demand reductions for ducted air conditioners in the Central Coast trial

As can be seen in Figure 7, the demand response event run on the 3 December 2014 between 3pm and 7pm resulted in an estimated average reduction of 1.5 kVA per customer (for 44 participants with ducted air conditioners, >10kW cooling capacity). These results include diversity for air conditioners not operating during the peak event, with an equivalent overall 38% reduction in diversified load.

Although the sample set for non-ducted air conditioners is small in the Central Coast *Cool*Saver trial, preliminary results indicate a demand reduction of approximately 0.70 kVA per air conditioner for 2 customers with non-ducted air conditioners between 4-10 kW cooling capacity (see Figure 8). More detailed analysis of 1-minute load data over the summer 2014/15 period is in progress and these results are only considered preliminary.

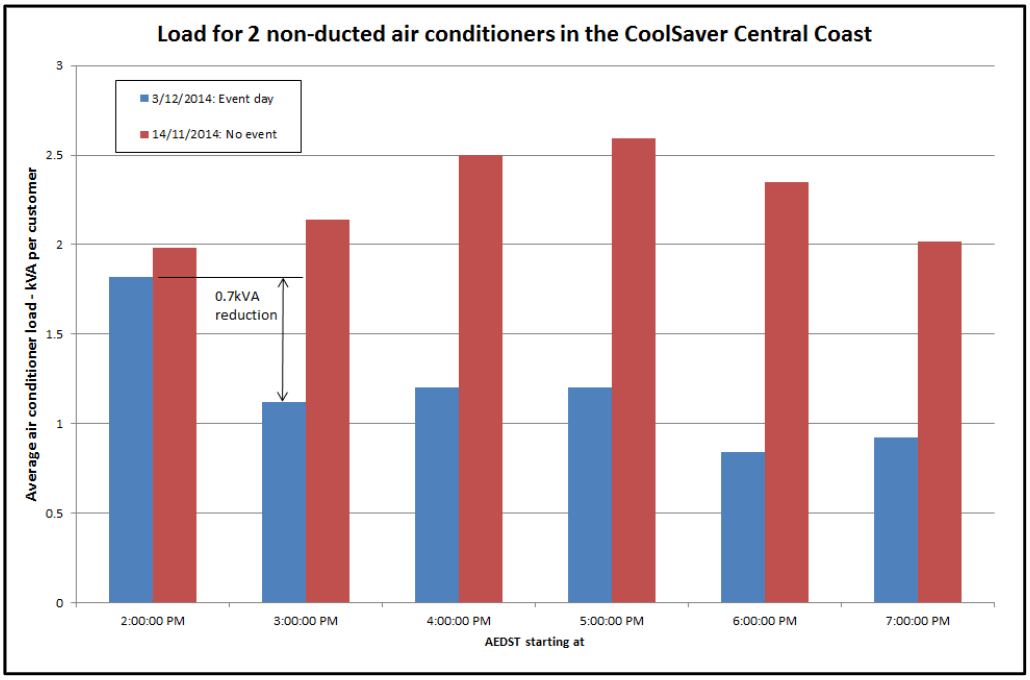

Figure 8: Measured average demand reductions for split-system air conditioners in the Central Coast trial

As peak event days in 2013/14 and 2014/15 included few high demand summer peak days, the trial was extended to 2015/16 to potentially better understand the response by customers to higher temperature conditions and test the willingness of customers to participate over an extended number of seasons.

4.2.4 Participant survey results

An important element of this phase of the trial was to identify the level of customer satisfaction with the program and identify ways to improve the customer experience. *Cool*Saver is dependent on the willingness of participants to provide demand reductions and a poor customer experience can limit the cost effectiveness of demand management programs.

As a new concept for Ausgrid customers (and a type of offer that is rare in Australia), it is important to measure the level of interest and satisfaction with the program and build positive advocates for similar innovative offers in future.

Surveys were sent out to all participating customers in April 2015, with a total of 35 questions. The first 7 questions covered customer demographics and the remainder covered aspects of the trial.

A total of 56 customers responded to the survey, with responses indicating a very high level of satisfaction with the program. Due to the operational differences between the Central Coast and Lake Macquarie parts of the trial, key survey results are detailed separately for each area as follows:

Central Coast

- 53% of participants (35 of 66) responded to the survey.
- 95% of respondents only used the air conditioner that had the signal receiver installed. 5% did use another air conditioner as well.
- How often they used the air conditioner in the summer (Nov-March)

Almost every day >61 days	17%
Most days (31 to 60 days)	40%
On very hot days (16 to 30 days)	40%
Sometimes (6 to 15 days)	3%
Hardly ever	0%

70% of respondents did not notice a difference in their air conditioning cooling experience on the very hot days where the power saving mode was activated.
A further 25% only noticed a slight difference.

- 98% of respondents rated their experience with the installation process as 8 or above (with 10 being the highest).
- 86% of survey respondents rated their experience with the sign up process and communications received as 7 or above (with 10 being the highest).
- The main reasons they participated in the trial were the financial incentive (50%), interested in technology (30%) and overall reduction in network charges (20%).

A feature of the trial for Central Coast participants was the option to opt out of a *Cool*Saver peak event using the capability of the 3G signal receiver installed, so we surveyed the response to this option for Central Coast only.

- 54% said they found the opt out option useful.
- When we asked would they participate in a future *Cool*Saver trial that had no opt out option, 91% said they would.
- 70% said they would participate in a future *Cool*Saver trial that has no notifications at all

Lake Macquarie

- 52% of participants (21 of 40) responded to the survey.
- How often they used the air conditioner in the summer (Nov-March)

Almost every day >61 days	10%
Most days (31 to 60 days)	14%
On very hot days (16 to 30 days)	62%
Sometimes (6 to 15 days)	9%
Hardly ever	5%

90% of respondents did not notice a difference in their air conditioning cooling experience on the very hot days we activated their power saving mode.

- 99% of respondents rated their experience with the installation process they received as 8 or above (with 10 being the highest).
- 99% of survey respondents rated their experience with the sign up process and communications they received as 8 or above (with 10 being the highest).
- The main reasons they participated in the trial were their interested in the technology (52%), financial incentive (33%) and overall reduction in network charges (14%).

Participants who completed the survey were also offered the opportunity to comment on their experiences with the trial. These responses reflected the strong levels of satisfaction in the responses to specific survey questions. A snapshot of their comments is given below:

Survey comments:

- "It was a great offer, and I was very happy to participate"
- "I liked the gift cards, they were good for me to use then pay the amount off my electricity bill"
- "Always notified, whenever someone phoned always polite and let me know what was happening, nothing ever a bother"
- "Professional installers, polite, no mess"
- "While not necessary it was nice to be notified when the *Cool*Saver trial was on"
- "Great communication, letters were clear and easy to understand, installation was quick, and SMS on the morning great so you don't forget"
- "Everything was simple and easy. Installation was done when they said it would be done and it just works, nothing to be done by me"
- "Everything that was promised was done on time and how it was promised"

4.3 Phase 3 - Trial alternate sales model

4.3.1 Overview

In phase two of the trial, the Lake Macquarie and Central Coast trial areas set out to test the customer response to an offer to customers with an already installed air conditioner. However, the marketing approach and acquisition model had a high cost due to the need to retrofit to existing air conditioners.

The objective of phase three of the trial is to test an alternative approach that would leverage the initial purchase and installation of new compliant air conditioners and so lower the cost of customer acquisition and participation. Furthermore, this approach would simplify the process for customers.

The marginal cost of each unit of demand reduction ($ per kilowatt) is a key metric in determining the viability of this approach to deferring network investment. Therefore, the lower each kW of demand reduction can be, the more effective a tool it can be in deferring the need for network augmentation.

While this approach has been used by Energex in Queensland as part of their PeakSmart program, their program has been introduced to the entire Southeast Queensland area. As future network investment needs are commonly isolated to much smaller geographic areas, we identified a single area to test the viability of using this approach in a localised area. For this element of the *Cool*Saver trial, Ausgrid selected the Maitland area with participation restricted to the Maitland local government area.

Similar to the Lake Macquarie and Central Coast elements of the trial, this was not based on any near term forecast network needs but on a number of factors related primarily to trial operations. All customers residing in the Maitland local government area are eligible to participate in the *Cool*Saver trial program. The *Cool*Saver Maitland trial utilises a pre-commercial 3G signal receiver technology similar to that which was field-tested in the Central Coast trial so as to offer customers the override functionality. This new version of the 3G signal receiver also works using SMS commands and was supplied by an external provider rather than developed by Ausgrid internally (as per phase 1 & 2 of the trial program).

To simplify the offer, two levels of customer incentive were introduced comprising air conditioner cooling capacities of 4 to 10 kW and greater than 10 kW. Air conditioners with cooling capacities less than 4 KW are not eligible to participate. Payments in the Maitland component of the trial are made using a reloadable Visa gift card. The offer structure is detailed in the table below.

Offer element	Customer payment Maximum (Air conditioner 4kW to 10kW*)	Customer payment Maximum (Air conditioner >10kW*)
Installation reward 2015	$150	$300
Summer 2015/16 rewards	$50	$100
Summer 2016/17 rewards	$50	$100
Total *Cool*Saver rewards	$250	$500

* kW is the rated cooling capacity output of the air conditioner.

To leverage the initial purchase and installation of eligible air conditioners, we have partnered with air conditioner retailers and installers in the Maitland area. Industry Partners are rewarded for their efforts in promoting the program to customers through a modest incentive made for each customer registered with the program.

Signal receivers are provided free of charge to customers via Industry Partners who are also provided with sales and marketing materials and training for sales staff. Signal receivers are installed at time of installation of the new air conditioner at the customers cost. Local air conditioner technicians have also been trained to ensure the proper installation of the signal receivers.

The offer is also available to customers with an already installed eligible model of air conditioner. For these customers, the installation of the signal receiver and any additional parts, if required, is organized by the customer through an Industry Partner.

The marketing and point of sale material to support this offer are shown in figure 9.

Figure 9: Marketing and point of sale support material

For more information on the trial program overview for Maitland, refer to our website **here**.

4.3.2 Results

This phase of the trial is in its preliminary stages with the full launch by air conditioner retailers and installers scheduled for Spring 2015. In September 2015, we were notified by an Industry Partner in regards to the first installation of a signal receiver for the Maitland trial.

Figure 10 shows the installation of one of the new 3G signal receivers used for the Maitland trial that is being tested on one of the air conditioners in the Central Coast trial.

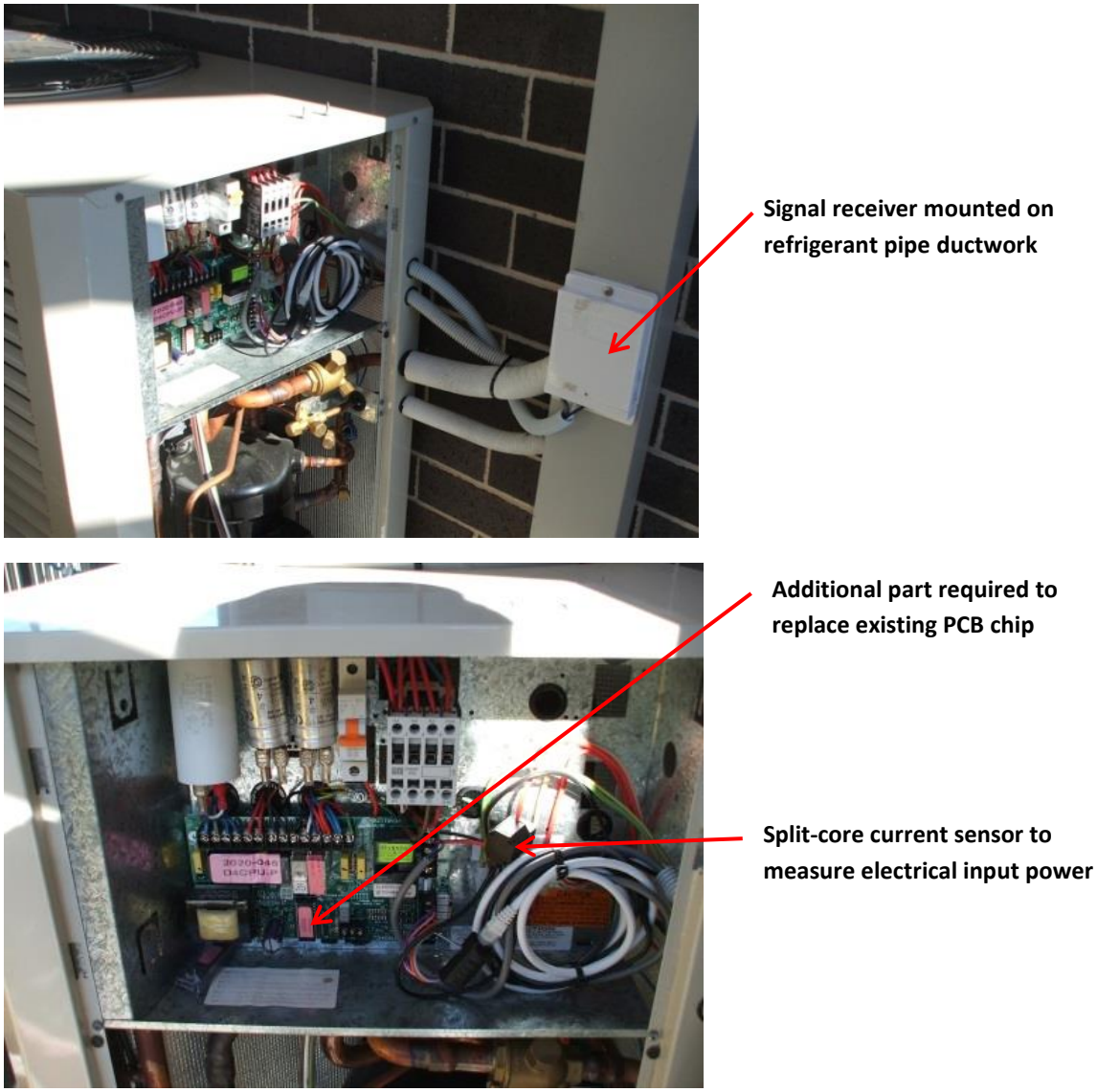

Figure 10: Installation of the signal receiver on an Actron Air ducted system

5 Next Steps

The *Cool*Saver trial in the Central Coast and Lake Macquarie areas will continue into the summer of 2015/16 but is closed to new participants. We will continue to verify the reliability and functionality of the two different demand response technologies deployed and aim to get a better understanding of the average demand reductions achievable on hotter summer days. We will also continue to monitor customer participation and satisfaction in the program during and after the summer period.

*Cool*Saver Maitland is currently open to new participants and will continue over the summer 2015/16 and 2016/17 periods. We will continue to trial alternative sales models designed to reflect a likely future customer approach that would achieve lower customer acquisition costs. A key objective will be to monitor the success of offering the program through industry partners, targeted at customers who are purchasing new air conditioners for summer 2015/16.

Although the *Cool*Saver trial programs are not addressing a specific network investment, the research and development of new innovative demand management options under the Demand Management Innovation Allowance is important. These types of projects allow networks to test new solutions and where found viable and cost effective, develop into non-network alternatives to traditional supply-side solutions to network needs.

As trial activities progress, further reports outlining results and learnings will be made available.

Contact us

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For further information on Ausgrid's Demand Management process, recently completed screening tests, and reports, refer to: www.ausgrid.com.au/dm.

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