DEMAND MANAGEMENT INNOVATION ALLOWANCE 2011-2012 REPORT

Submission to AER

Prepared by Network Technology Strategy

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Endeavour Energy

CONTENTS

1.0 EXECUTIVE SUMMARY

Endeavour Energy currently has two Demand Management Incentive Allowance (DMIA) projects, the Rooty Hill Residential Demand Management Program and the Powerview Standby Power Reporting that were both approved in the previous regulatory year (FY 2010/11). An addition two new projects, the Glenmore Park Demand Response Trial and Data Analysis and Reporting were subsequently developed and commenced in FY 2011/12. The total DMIA claim for 2011/12 is $268,642.

Project	Operating expenditure ($ nominal)	Capital expenditure ($ nominal)	Total expenditure ($ nominal)	New or Continuing
Rooty Hill Residential Demand Management Program		96,388	96,388	Continuing
Powerview Standby Power Reporting	48,000		48,000	Continuing
Glenmore Park Demand Response Trial	20,244	31,505	51,749	New
Data Analysis and Reporting	72,505		72,505	New
Total	**140,749**	**127,893**	**268,642**	

2.0 BACKGROUND

This report has been prepared in accordance with the AER's Demand Management Incentive Scheme (DMIS) for the ACT and NSW 2009 Distribution Determination's Demand Management Innovation Allowance (DMIA) scheme, November 2008.

As per Section 3.1.4 of the scheme, Approval of Expenditure under the DMIA, Endeavour Energy is required to submit an annual report describing its expenditure and the nature of its demand management activities for review by the AER. The annual reporting requirements are outlined below.

A DNSP's annual report must include:

1. The total amount of the DMIA spent in the previous regulatory year, and how this amount has been calculated.
2. An explanation of each demand management project or program for which approval is sought, demonstrating compliance with the DMIA criteria detailed at section 3.1.3 with reference to:
    a. the nature and scope of each demand management project or program,
    b. the aims and expectations of each demand management project or program,
    c. the process by which each project or program was selected, including the business case for the project and consideration of any alternatives,
    d. how each project or program was/is to be implemented,
    e. the implementation costs of the project or program, and
    f. any identifiable benefits that have arisen from the project or program, including any off peak or peak demand reductions.
3. A statement signed by a director of the DNSP certifying that the costs of the demand management program:
    a. are not recoverable under any other jurisdictional incentive scheme,
    b. are not recoverable under any other state or Commonwealth government scheme, and
    c. are not included in the forecast capex or opex approved in the AER's distribution determination for the next regulatory control period, or under any other incentive scheme in that determination (such as the D–factor scheme for NSW).
4. An overview of developments in relation to projects or programs completed in previous years of the next regulatory control period, and any results to date.

3.0 PREVIOUSLY APPROVED PROJECTS

This section reports on the progress of projects previously approved by the AER.

3.1 ROOTY HILL RESIDENTIAL DEMAND MANAGEMENT PROGRAM

In August 2010, approval was given to implement phase 1 of the Rooty Hill Residential Demand Management Program and commence the acquisition of residential customers to the air conditioning cycling (*Cool*Saver) program and the peak time rebate (*Peak*Saver) program.

A Peak Time Rebate (PTR) was selected over Dynamic Peak Pricing as this product rewarded the customer by paying them $1.50 per kWh for energy reduction below their forecast afternoon consumption rather than penalising them for using energy during the peak period. The reward approach has been tested successfully overseas and Endeavour Energy saw this as an opportunity for higher customer participation as the program will deliver a monetary incentive rather than increasing costs to their energy bills. This program was marketed as *Peak*Saver and was the first innovative peak time rebate demand management program offered in Australia.

The costs sought for this project consist only of the purchase and installation of metering and communications equipment. All other costs for this program are claimed through D-factor and tabled in the Report on Demand Management Projects for FY 2011/12.

3.1.1 NATURE AND SCOPE

Peak demand in Endeavour Energy's network area has grown significantly over the past decade, reflecting the transformation of rural and semi-rural land into new urban developments, and a sharp increase in the popularity and use of air conditioners.

Penetration of air conditioners across NSW was 59% in 2009 and significantly higher in Western Sydney. This is of particular concern because the peak demand from air conditioning loads can be both very large and of short duration, resulting in poor utilisation of fixed assets. In addition, the generation and distribution systems tend to be at their lowest capacity during very hot weather when air conditioner demands are likely to be at a maximum.

The Rooty Hill zone substation area was chosen due to network constraint and part of the overall Rooty Hill Demand Management Program outlined in the Report on Demand Management Projects for FY 2010/11.

3.1.2 AIMS AND EXPECTATIONS

The overall program is to be delivered over three years and two phases with phase 1 heavily focused on developing the systems and investigating the correct approach to adopt for implementing the broader campaign during phase 2.

The objectives of the residential DM program are to:

- Reduce peak demand from the residential initiatives by 1,000kVA by year 3
- Educate participants and the public on the benefits of these initiatives
- Gain an understanding of customer behaviour and acceptance of these initiatives for future expanded programs
- Develop systems and processes to make future programs cheaper to implement
- Put Endeavour Energy's network business in a solid position to offer cost-effective DM initiatives to accompany any potential smart meter roll-out if mandated by the Government

3.1.3 PROJECT JUSTICATION

The Rooty Hill Residential Demand Management program is part of the wider Rooty Hill Demand Management Program. The business case for the Rooty Hill Demand Management Program is based on network constraint.

3.1.4 IMPLEMENTATION PLAN

The *Peak*Saver program is based on providing a financial reward to customers that reduce electricity consumption rather than penalising them for consuming electricity during peak times. They are paid for the quantity of electricity not consumed. To calculate this quantity, a baseline forecast of what the customer would have consumed on a hot day needed to be developed.

For this program to operate, a number of systems needed to be developed to manage the following functions:

- Customer recruitment
- Event notification
- Customer record management
- Metering data acquisition and storage
- Payment calculation, monitoring and storage
- Baseline algorithm development

3.1.5 IMPLEMENTATION COSTS

Costs claimed under DMIA for the Rooty Hill Residential Demand Management Program in 2011/12 includes $96,388 capex covering the purchase and installation of metering and communications equipment. All other costs incurred through this program are claimed under D-factor.

3.1.6 RESULTS

There were 103 customers telemarketed for *Cool*Saver, which resulted in recruiting 32 participants, a conversion rate of 31%. One participant subsequently cancelled. The *Cool*Saver program currently has 40 participants.

There were 5,900 letters sent out for *Peak*Saver in two batches followed by the telemarketing campaign, which resulted in recruiting 240 participants. Eighteen participants subsequently cancelled leaving a total of 216 newly registered participants for the 2011/12 campaign. The *Peak*Saver program currently has 251 participants.

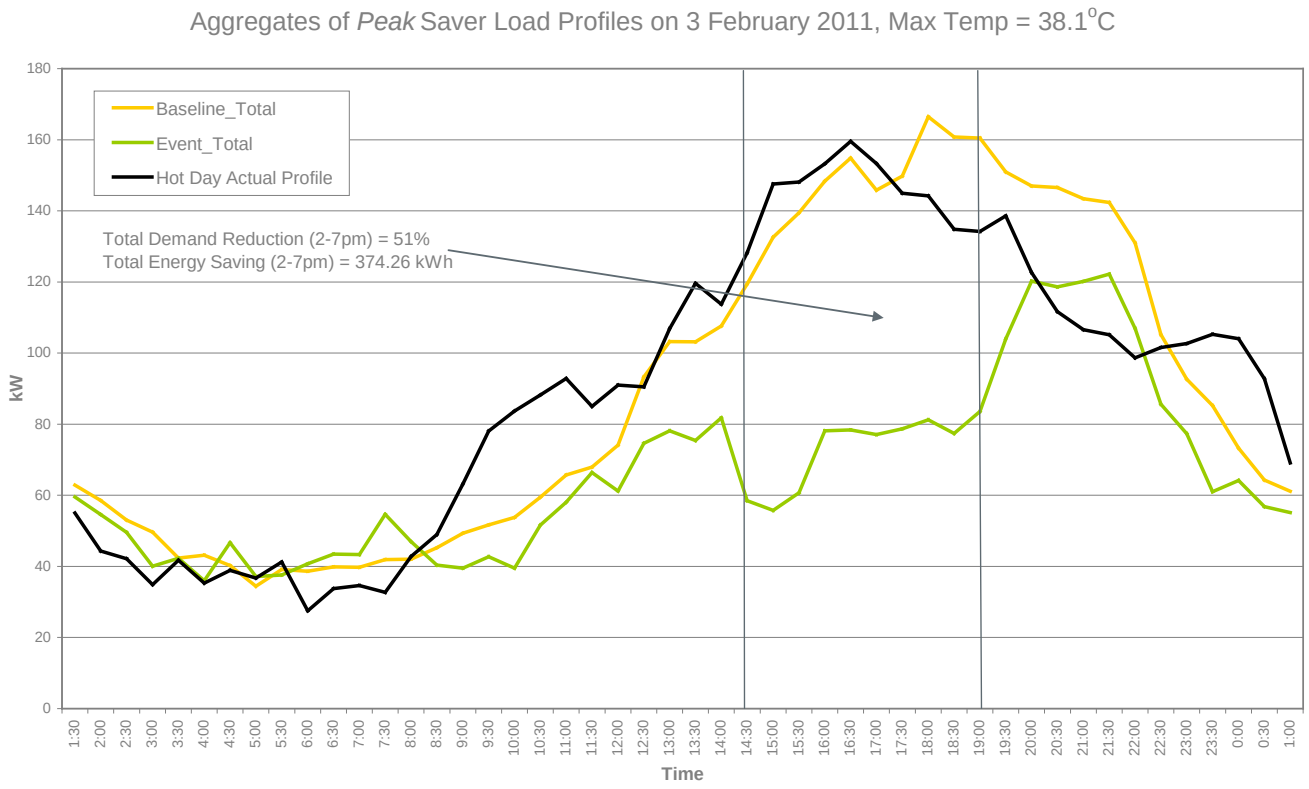
Four events were conducted out of a possible six during the 2010/11 summer, being:

- Tuesday 25 January 2011
- Tuesday 1 February 2011
- Thursday 3 February 2011
- Tuesday 1 March 2011

The main driver for calling an event was a sequence of hot days and a resultant rise in the peak demand on the affected zone substation. Event days were working days only, excluding public holidays. The results showed positive participation from *Peak*Saver customers and a higher than expected kVA demand reduction per participant (1.7 as compared to 1.0). An explanation for the *Peak*Saver result is a high level of participant buy-in, as identified by the survey conducted.

*Peak*Saver RESULTS SUMMARY

	25 Jan 2011	1 Feb 2011	3 Feb 2011	1 Mar 2011
Participants	34	38	38	38
Max. Temperature	36.2°C	40.0°C	38.1°C	31.5°C
Total Energy Reduction	111kWh	296kWh	374kWh	128kWh
Average Demand Reduction compared to baseline	29%	41%	51%	36%
Average kVA Reduction / Customer compared to baseline	0.7kVA	1.6kVA	2.0kVA	0.7kVA
Peak kVA Reduction / Customer	1.2kVA	1.7kVA	2.2kVA	1.0kVA



There were no load curtailment events during the 2011/12 summer. The *Peak*Saver and *Cool*Saver programs were developed and budgeted with up to a maximum of six events. Unfortunately, the 2011/12 summer was one of the coldest and wettest on record. There were only three days above 35 degrees, , none of which created network loading issues.

The maximum load on the Rooty Hill Zone substation over the summer period was 33.7MVA which occurred on the 14th November. This is well below the rated capacity of 45MVA and 17.2 MVA or 34% below the forecast maximum demand of 50.9MVA.

3.2 STANDBY POWER REPORTING

Standby power is the power that electrical appliances consume when they are not completely switched off. A common example is when the television is turned off using the remote control, but the power point switch is on and the equipment is still consuming power. Another attribute of standby power is that it is always on and this provides opportunity for possible energy savings during peak times that will lead to reductions in peak demand.

Although individual appliances may only consume a small amount of standby power, the combined standby power consumption of all appliances in a home can contribute a significant part of a household's total energy consumption. The Standby Power Reporting project was developed to inform customers of their standby power usage and allows them to view their energy consumption via a web portal and take actions towards reducing their standby power consumption.

This project formed part of the Blacktown Solar City program that is scheduled for completion in 2012/13.

3.2.1 NATURE AND SCOPE

The installation of residential interval meters through the Blacktown Solar City project has allowed Endeavour Energy to offer a web-based monitoring tool, showing the daily load profile. This provides users with the opportunity to identify their standby power consumption.

Endeavour Energy offered this product to 3,000 customers who have remotely read interval meters.

Customers were provided with tips on how to reduce standby power consumption

This product is branded PowerView.

3.2.2 AIMS AND EXPECTATIONS

Standby power consumed by a household is the result of appliances being left on standby rather than switched off. This trial focuses on advising customers on the impact of their standby power and encourages change in behavioural and consumption patterns. Aims include:

- Inform customers of their consumption patterns
- Reduce overall energy consumption
- Reduce standby power consumption leading to reduced peak demand

3.2.3 PROJECT JUSTIFICATION

This was an energy efficiency/demand management program designed to educate customers on their energy consumption patterns and encourage customers to take actions to reduce their standby power consumption that leads to a reduction in peak demand. This program was designed to provide customers with some benefits associated with smart metering such as the viewing of household consumption data on a 30 minute interval basis. This project formed part of the Blacktown Solar City program.

The cost of the program was also greatly reduced due to the smart meters already deployed and data retrieval communications infrastructure already being in place.

3.2.4 IMPLEMENTATION PLAN

Endeavour Energy offered this product to over 3,000 customers who had a remotely read interval meter. Every night data from the interval meter was uploaded to a secure website, which could then be accessed through a range of graphs. The data was usually available within 48 hours. Customers were encouraged to use the data and tips on energy efficiency to manage their energy use and reduce their standby power consumption.

3.2.5 IMPLEMENTATION COSTS

Implementation costs for the PowerView program is mainly attributed to the web portal and the costs associated with hosting the website. The PowerView web portal was designed and implement by an external vendor who also provides the hosting services.

The total costs claimed in 2011/12 was $48,000 opex.

3.2.6 RESULTS

Summary of key results from survey:

- Overall Satisfaction the Website and Program Overall can be considered good/moderate:
    - Overall Satisfaction with PowerView Program rated at a 6.9 (mean score out of 10)
    - Overall Satisfaction with PowerView Website rated at a 6.9 (mean score out of 10)
    - While the majority said that the program “Met Their Expectations” (77%), less than one in ten said the program had “Exceeded Expectations” (6%)
- Close to one in two (49%) respondents identified themselves as infrequent users of the website with less than one in five identifying themselves as using the website on a regular basis, be it quarterly (when receiving a bill) or on a more regular basis
- The level of communications to participants could be increased. Around one in two (49%) said the communications they received from Endeavour Energy about the program was “too little”
- Respondents mentioned the concept of the web tool was strong, however execution could be

improved. When looking at aspects of the website, their performance, and their relative correlation with overall satisfaction of the website experience, the survey identified the following aspects as potential areas of improvement:

    - Ease of creating graphs that display household electricity usage: 6.7 (mean score) - highly correlated (with overall web satisfaction)
    - Ease of reading graphs that display household electricity usage: 6.7 (mean score) - highly correlated
    - Design and layout of the website: 6.9 (mean score) - highly correlated
- Suggestions provided by customers on ways to improve the website were varied, but many focused on improving the general layout/design, using some form of "push email" function to communicate power usage in a more proactive way to users and providing more information on how to use it effectively (be it a step by step case study or information video to educate users).
- The large majority of those who signed up for the program took measures to reduce power consumption (87%). The most popular measures being:
    - Turning off light switches when rooms not in use: 86%
    - Using air conditioners less often: 79%
    - Turning appliances off at the power point: 79% (most likely to be Kettles, TV's and Computers)
- The concept of an "Appliance Monitor" was most popular, followed by the "Regular Reminder Notification" (tying in with the need for more proactive communications from Endeavour Energy to drive energy saving behaviour). The Cool Saver program (air-conditioner control) tested the least positively among the concepts proposed
- Suggestions for additional tools included receiving relevant energy usage tracking charts through email or smart phone apps. There seems to be a general theme towards more proactive and customised contact from Endeavour Energy regarding participants' energy usage. Respondents were also generally receptive to receiving energy saving tips or recommended energy saving tools

4.0 NEW PROGRAMS FOR APPROVAL

This section outlines the projects for approval by the AER.

4.1 GLENMORE PARK DEMAND RESPONSE TRIAL

The Glenmore Park Demand Response trial will provide an insight into how smart meters can be used to reduce peak demand through time-based financial incentives, information from in-home displays, and direct control of air-conditioners. The technology for the trial, including in-home displays and AS4755 DRED controllers for air-conditioners, was acquired and tested in a laboratory environment prior to a small field test for evaluation, followed by a mini trial in the Glenmore Park area prior to a larger implementation.

4.1.1 NATURE AND SCOPE

The scope of the work is to deploy the Glenmore Park Demand Response Trial to Glenmore Park residents who have existing smart meters installed at their premises (which were installed as part of a previous smart meter trial) or are within range of smart metering communications infrastructure. Under this project the following tasks are to be completed:

- Laboratory tests of vendor equipment
- Implement a small field trial of equipment for evaluation
- Perform an initial analysis of energy consumption within Glenmore Park
- Conduct targeted marketing campaign in order to sign up participants located within the Glenmore Park smart metering area
- Create a robust control group
- Develop a productionised demand response management system
- Test In-Home Display (IHD) and air conditioning control technology
- Validate the demand response outcomes from the trial

4.1.2 AIMS AND EXPECTATIONS

The purpose of the project is to assess:

1. The technical/usability performance of IHDs with the general public
   The advancements in IHD technology are rapidly developing, with new and continued improvement in both functionality and performance. The main focus of this trial is to test the usability and technical performance of IHDs in the homes of customers in Endeavour Energy's network area.

2. The perceived benefit of IHDs to the general public
   IHDs allow customers to view their household consumption in real time and also view historical usage. The IHD provides customers with a tool in which they can use to learn more about their energy usage. The IHD provides customers with a tangible interface with which they may relate to better use information communicated to it from the smart meter. The trial will qualitatively assess, via customer surveys, the perceived benefit of IHDs and the amount of electricity the customers believe they may have saved as a result of its use.

3. The quantity of energy/demand reduction from IHDs (to the extent possible given small sample size)
   The trial aims to quantify the energy/demand reduction from the use of IHDs by comparing the electricity use/demand reduction of IHD users with a control group (non-trial participants). Whether this is possible and to what level of statistical robustness given the relatively small sample size will depend on the size of behavioural change and other factors such as variance across customer groups.

4. The demand reduction from time-based financial incentives
   The Peak Time Rebate program (marketed as *Peak*Saver) has been successfully deployed in Rooty Hill as part of a live demand management program. This program provides customers a financial incentive to reduce peak demand on selected peak days by paying $1.50 per kWh the customer saves over the peak period compared to a forecast of their consumption over that period.

No control group was set up as part of the Rooty Hill program given that program's aim of deferral of a substation augmentation, so although it is clear that customers responded compared to a forecast of their usage, the calculation of demand reduction from a holistic network point of view requires that comparisons be made against a control group. This Glenmore Park trial aims to address this issue by determining a robust control group for Glenmore Park program participants.

5. The ability to productionise demand management initiatives for a broader rollout
   The systems Endeavour Energy currently use for the *Peak*Saver program depend heavily on manual processes on systems such as Microsoft Access databases and Excel spread sheets. One of the deliverables in this project is a Demand Response Management System which aims to address this issue by providing better integration with existing systems to reduce the chance of errors and streamline the approach to managing customers on the *Peak*Saver program.

6. The level of demand reduction achievable from one marketing campaign
   Marketing campaigns involving *Peak*Saver thus far has been to achieve a set target number of participants. Although minimum targets have been set for the Glenmore Park program, the objective is to allow continued recruitment above the set minimum target number (removal of target capping), until marketing channels are fully exhausted of customer take-ups. The required investment associated with this customer recruitment will be modest, due to the relatively small volume of smart meters available in the area.

7. Technical capability to use smart metering for control of air-conditioners using AS4755 interfaces
   Wireless communications from the smart meter to AS4755 interfaces are new technology. The reliability through different installations are variable due to several factors that are potentially site specific such as the distance of the air conditioner to the meter, the construction material of the home, line of sight and positioning of the interface. This trial will assess these issues in real-life scenarios.

4.1.3 PROJECT JUSTIFICATION

This project aims to deliver a study into *Peak*Saver as a viable option in the demand management arsenal within a network business. *Peak*Saver is currently run as part of the Rooty Hill Residential Demand Management program.

The deliverables of this project are as follows:

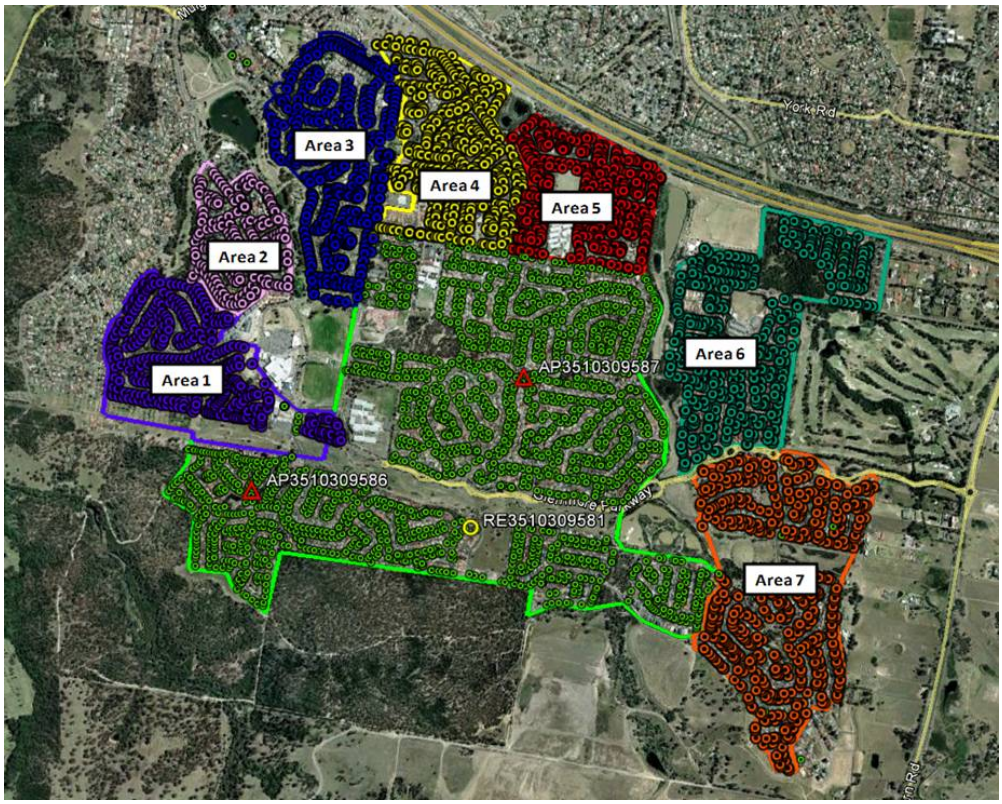
- Demand Response Management System
- Report on the peak demand reductions achieved with the various programs
- Report on the technology of IHDs and air conditioner control through smart metering communication

4.1.4 IMPLEMENTATION PLAN

The first step in this trial (Phase 0) was to select and test the technology prior to deploying the project to the public of Glenmore Park. A pilot mini-trial was established for selected staff members residing in the program area, to test the devices and their overall suitability for extended trials.

The second step (Phase 1) of this trial will only involve the Glenmore Park residents with existing smart meters installed at their residence. The total number of existing households with smart meters in Glenmore Park is 2,222. In order to achieve the target numbers specified of 150 *Peak*Saver and 200 IHD customers, each with their own control groups, the target are may need to expand beyond the current smart metering pilot area to target up to 5,328 customers (Phase 2). The Expanded areas marked Areas 1-7 will not require every home to have a smart meter but to install smart meters on households that have signed up to a program such as *Peak*Saver, *Cool*Saver, IHD or have been selected as part of the control group. This measure will significantly reduce metering and installation costs.

Figure 1: Trial area and proposed phase 2 (areas 1-7) expansion areas if required



4.1.5 IMPLEMENTATION COSTS

Expenditure claimed in 2011/12 financial year for phase 0 is $20,244 opex and $31,505 capex covering the costs for initial trials of IHDs, appliance monitoring equipment, AS4755 compliant controllers, requirements gathering and project management costs.

The costs of the Glenmore Park Demand Response Trial is estimated at $393,800 for phase 1 in 2012/13 and $217,800 for phase 2 in 2013/14.

4.1.6 RESULTS

The results from the deployment in the first year 2012/13 will be analysed after the 2012/13 summer.

4.2 DATA ANALYSIS AND REPORTING

4.2.1 NATURE AND SCOPE

Provide statistical and data analytical services to continue analysis and reporting of Blacktown Solar City project, *Peak*Saver & *Cool*Saver Residential Demand Management Programs, pilots and trials of current energy efficiency and demand management programs including the Smart Grid Pilot

4.2.2 AIMS AND EXPECTATIONS

Comprehensive analysis to include the following:

- Analysis and reporting of Blacktown Solar City project with detailed statistical studies into changes in customers behaviours to respond to peak demand
- Analysis and reporting of our demand side alternatives to network augmentation in Rooty Hill - *Peak*Saver & *Cool*Saver Residential Demand Management Programs
- Analysis and evaluation of recruitment test groups and control groups of energy efficiency and demand management programs proposed for the Smart Grid Pilot
- Ad-hoc energy efficiency, demand management statistical and data analysis

4.2.3 PROJECT JUSTIFICATION

There was an urgent requirement for data analytical services for a number of demand management programs. The engagement of an external service provider, with broad experience utilising a team of statisticians, provides certainty and independence of the trial results. The requirement to develop statistically robust trials by providing target numbers for specific demand management trials requires additional skills that were provided externally.

4.2.4 IMPLEMENTATION PLAN

Western Sydney Pricing Trial and Blacktown Solar City Load Control Trial de-identified data was provided for approximately 5,000 households down to a granularity of 30 minute load profile intervals. Data for the analysis was supplied in a secured format using encryption software.

Deep level analysis was required in the areas of demand response:

- Change in behaviour on an extreme hot summer day
- Change in behaviour on an extreme cold winter day
- Response according to temperature
- Relative demand in relation to maximum daily temperature
- Response over time
- Response in relation to notice period of a pricing event
- Response over consecutive price event days
- Response in relation to having an in-home display monitor

Energy savings analysis was to include customer energy savings from pricing trial participation.

This project also covers pre-trial design work involving sample size analysis and demographic breakdown of trial participants for our current demand management projects, and in planning for future projects.

4.2.5 IMPLEMENTATION COSTS

In 2011/12, costs totalled $72,505, all of which was opex.

4.2.6 RESULTS

The analysis for the Blacktown Solar City project and the Western Sydney Pricing Trial is in the final stages of validation.

5.0 STATEMENT

Endeavour Energy confirms the funding of the projects contained in this report:

a. are not recoverable under any other jurisdictional incentive scheme,
b. are not recoverable under any other state or Commonwealth government scheme, and
c. are not included in the forecast capex or opex approved in the AER's distribution determination for the next regulatory control period, or under any other incentive scheme in that determination (such as the D–factor scheme for NSW).

It should be noted that:

a. the Standby Power Reporting: PowerView program did form part of Blacktown Solar City but was funded by Endeavour Energy
b. the data analysis and reporting claimed in this report did form part of Blacktown Solar City data analysis was funded by Endeavour Energy