DEMAND MANAGEMENT INNOVATION ALLOWANCE REPORT 2014/15

Submission to AER

Prepared by Asset Standards and Design

Endeavour Energy

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1.0 EXECUTIVE SUMMARY

Endeavour Energy has completed two Demand Management Innovation Allowance (DMIA) projects, the Pool Pump Trial which was approved in the previous regulatory year (FY 2013/14) and the Power Factor Correction (PFC) Trial which commenced in FY 2014/15. The total DMIA claim for 2014/15 is $378,787.

Project	Operating expenditure ($ nominal)	Capital expenditure ($ nominal)	Total expenditure ($ nominal)	New or Continuing
Pool Pump Trial	$94,990	$102,694	$197,684	Continuing
PFC Trial	$181,103	$0	$181,103	New
Total	**$276,093**	**$102,694**	**$378,787**	

2.0 BACKGROUND

This report has been prepared in accordance with the AER's Regulatory Information Notice in response to paragraph 6 of Schedule 1. The information provided will constitute the provision of an annual report for the purposes of paragraph 3.1.4.1 of the Demand Management Incentive Scheme (DMIS) applying to Endeavour Energy (as set out in the 2014-2019 Distribution Determination).

As per paragraph 6 of AER's Regulatory Information Notice Schedule 1, Endeavour Energy is requested to provide responses describing its expenditure and the nature of its demand management activities for review by the AER. The annual reporting requirements are outlined below.

Endeavour Energy's response on the Demand Management Incentive Allowance must include:

1. *Identify each demand management project or program for which Endeavour Energy seeks approval.*
2. *For each demand management project or program identified in the response to paragraph 1:*
    a) *explain:*
        i. *how it complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme;*
        ii. *its nature and scope;*
        iii. *its aims and expected outcomes;*
        iv. *the process by which it was selected, including its business case and consideration of any alternatives;*
        v. *how it was/is to be implemented;*
        vi. *its implementation costs; and*
        vii. *any identifiable benefits that have arisen from it, including any off peak or peak demand reductions;*
    b) *confirm that its associated costs are not:*
        i. *recoverable under any other jurisdictional incentive scheme;*
        ii. *recoverable under any other Commonwealth or State Government scheme; and*
        iii. *included in the forecast capital or operating expenditure approved in the 2014-19 Distribution Determination or recoverable under any other incentive scheme in that determination; and:*
    c) *state the total amount of the Demand Management Innovation Allowance spent in the Relevant Regulatory Year and how this amount has been calculated.*
3. *Provide an overview of developments in relation to projects or programs completed in previous years of the regulatory control period, and of any results to date.*

3.0 PREVIOUSLY APPROVED PROJECTS

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

3.1 POOL PUMP TRIAL

The pool pump trial allowed customers to switch their pool pump energy supply from Domestic supply to Controlled Load 2 supply, saving them over 40% on their pool energy costs if they are currently on the Domestic regulated retail tariff. This could be savings of several hundred dollars per year but is dependent on the energy efficiency of their pool pump and the number of hours it is used per day. Customers also received $150 after completing the switch to Controlled Load 2, to assist with electrician costs and any other costs.

The recruitment target number for the pool pump trial was 250 residential customers located in selected suburbs.

3.1.1 NATURE AND SCOPE

The purpose of the trial was to assess customer pool pump usage behaviour and control pool pumps through the Controlled Load 2 circuit in order to shift peak load to off-peak times. The trial's main objective was to quantify the peak demand reduction by investigating when customers use their pool pumps and the costs associated with controlled load conversion. The likelihood of customers disconnecting their pool pump from the Controlled Load 2 socket and plugging it into a non-Controlled Load 2 socket during peak times, and/or plugging other appliances into the Controlled Load 2 socket, was also investigated, as this would undermine the expected peak demand reduction.

3.1.2 AIMS AND EXPECTATIONS

The deliverables of this project were to report on:

1. Customer pool pump usage behaviour and validate usage information provided by customers against available measured usage data;
2. Acceptability of the payback timeframe to customers;
3. Likelihood of pool pumps being disconnected from Controlled Load 2 sockets and plugged into non Controlled Load 2 sockets during peak times, and/or non-authorised appliances being plugged into the Controlled Load 2 socket; and
4. The level of demand reduction as a result of pool pump control through the Controlled Load 2 circuit.

3.1.3 PROJECT JUSTIFICATION

The high penetration of air conditioners and swimming pools across our distribution network, particularly in the western Sydney region, cause periods of peak demand that 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 and pool pump demands are likely to be at a maximum. Pool pump load is more readily interruptible than air conditioners. This trial was aimed to deliver control of customers' pool pump units via the Controlled Load 2 circuit.

3.1.4 IMPLEMENTATION PLAN

The Pool Pump Trial commenced with recruitment occurring in June 2014 and concluding in early April 2015 (instead of 31 March 2015) due to delays with installation of some participants' electrical equipment and meter(s).

3.1.5 IMPLEMENTATION COSTS

Expenditure claim in 2014/15 financial year is a total of $197,684; $94,990 OPEX and $102,694 CAPEX covering the following costs:

- procuring and installing equipment;
- updating the AFIC Controlled Load 2 off-peak switching times;

- adding new webpages and online registration form to the corporate website;
- marketing;
- customer recruitment and payments;
- surveys; and
- postage costs for return of the usage monitor devices.

3.1.6 RESULTS

The recruitment channel for the *Pool*Saver program was via a flyer that was distributed in residents' letterboxes. This resulted in a total of 63 net participants in the program.

Overall the trial achieved its purpose of controlling customers' pool pumps through the Controlled Load 2 supply. The pool pump usage information provided during registration indicated that pool owners operate their pool pumps twice per day, once during the morning between 7am to 11am and in the afternoon between 4pm to 8pm. This closely matched the pool pump usage measured by the usage monitor device.

The daily average energy usage pre-Controlled Load 2 conversion was 7.678kWh compared to the daily average energy usage post-Controlled Load 2 conversion of 8.386kWh. This equates to a 9.2% increase in consumption after the Controlled Load 2 conversion.

Data analysis found 15 participants to have at least one half hour interval where the usage monitor device detected the pool pump running during peak times when power was unavailable under the Controlled Load 2 supply. This suggests that the pool pump was plugged into a socket other than the dedicated Controlled Load 2 socket. But only one participant did this on each of the three peak demand days of the 2014 summer.

Ten (21%) participants' Controlled Load 2 meters were found to register energy consumption whilst the pool pump was not operating. This implied that these participants plugged appliances other than their pool pump into the Controlled Load 2 socket.

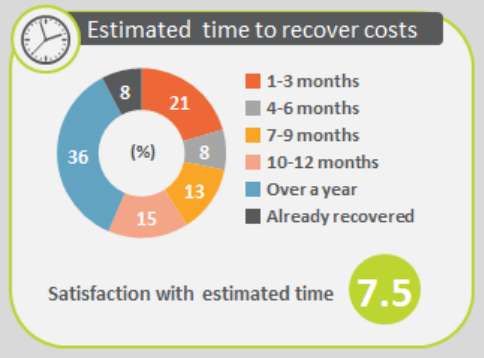
An analysis was performed to determine the number of participants gaming the system, whether they were powering their pool pump from an alternative power source such as their Domestic supply or using the Controlled Load 2 socket for another appliance. It was identified that 20 participants were involved in both forms of gaming. Although the total number of participants that gamed the system was high (42%), the impact on the network was very low as only one (2%) participant contributed to the maximum demand on each of the three peak demand days.

From the registration data, the calculated average peak demand reduction that could be achieved by shifting all pool pump usage outside the 1pm to 8pm period was approximately 300W per pool pump. The measured average peak demand reduction obtained from the usage monitor devices and Controlled Load 2 meters was 366W. Thus, this validates that customer survey responses can be relied upon in determining the demand reduction achievable from pool pumps.

Endeavour Energy engaged an independent research agency, to conduct a quantitative study with 81 customers, out of whom 39 had completed the *Pool*Saver program and 42 had registered for the program but did not fulfil all the requirements to participate in the program. Twenty two of these customers had cancelled from the program and 20 were rejected by Endeavour Energy as they did not complete the required electrical works by the due date.

Overall satisfaction amongst participants was fairly strong with a rating of 7.9 (mean score out of 10) and 92% stating their expectations had been met or exceeded. Saving money on energy bills was the biggest reason for signing up to the program for *Pool*Saver participants. Seventy four percent of customers had already recovered their costs to switch to Controlled Load 2 or estimated that it would take less than a year to do so. Their satisfaction score for the cost recovery timeframe was 7.5. Two in five (41%) of those who had already received an energy bill noticed savings and 67% recommended the program to a friend or colleague.

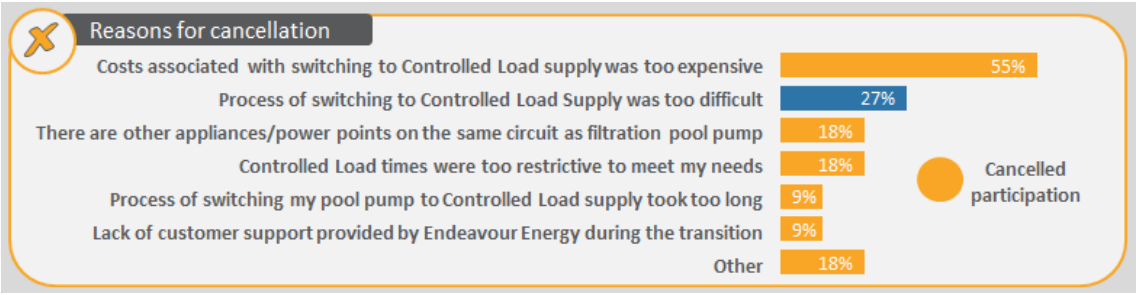
GRAPH 1 - ESTIMATED COST RECOVERY TIMES



There was interest amongst participants (seven out of ten) in an alternative program where a financial incentive would be provided for allowing Endeavour Energy to remotely control and lower the energy consumption of the pool pump. The pool pump would normally remain connected to the domestic supply and only be controlled on peak event days and during peak periods.

Fifty five percent of customers that cancelled their participation in the *Pool*Saver program cited associated costs as the reason, and 27% said it was too difficult to complete the switch to Controlled Load 2. Eighteen percent said that it was due to having other appliances on the same circuit as their filtration pool pump such as solar heating, pool lights, jets and garden lights or a socket for electrical tools use. Similar to those that cancelled, customers who were rejected from the program did not complete the electrical works due to lack of time, the switching costs involved or inability to source an electrician to complete the works by the due date.

GRAPH 2 - CANCELLATION REASONS



Half of these cancelled and rejected customers said that a higher incentive would have encouraged them to proceed with the *Pool*Saver program, comprising 59% of those that cancelled and 40% of those that were rejected.

Interest amongst cancelled and rejected customers in the alternative pool pump program was strong and higher than participants, with only two in ten saying they would have little interest.

4.0 NEW PROJECTS FOR APPROVAL

This section outlines the projects for approval by the AER.

4.1 PFC TRIAL

The PFC trial was implemented to determine the benefits of a broad based PFC program and to assess the level of financial incentive required to motivate the customer to install PFC.

The financial incentive in this trial was structured in a way as to offer a one year payback for customers on a Demand Time of Use (ToU) tariff and to cover the cost of PFC installation for General Supply ToU customers. A maximum financial incentive limit of $150/kVA applied for both tariff classes.

4.1.1 NATURE AND SCOPE

The trial targeted large industrial and commercial users of electricity on the General Supply ToU tariff and Demand ToU tariffs.

For the trial, seven customers were targeted in each tariff class and sub-class. The trial offered a financial incentive level per kVA of verified demand reduction depending on customer's tariff.

TABLE 1 - BROAD BASED PFC TRIAL OBJECTIVES AND INCENTIVES

Criteria	General Supply ToU	Demand ToU
Customer number	14	7
Maximum incentive payment $ / kVA	$150	$150
Expected incentive payment $ / kVA	$82	$66
Target average demand reduction	140 kVA	80 kVA
Total demand reduction	1,960 kVA	560 kVA
Budget Estimate per group	$159,740	$36,960
Total Demand reduction	**2,520 kVA**	
Total Budget Estimate	**$196,700**	
Average Cost per KVA	**$78.06**	

4.1.2 AIMS AND EXPECTATIONS

The original purpose of the trial was to test the feasibility and assist in developing a broad based PFC program proposed for the 2014-19 regulatory period. This trial was to deliver the following:

- Confirm the benefits of a broad based PFC program;
- Test the take-up rate of customers from different tariff classes;
- Determine appropriate incentive levels for different tariff classes;
- Develop a proposal for a broad based PFC program for the 2015-19 period with an appropriate budget; and
- Assist in the development of a Networks New South Wales (NNSW) financial incentive structure for a broad based program.

4.1.3 PROJECT JUSTIFICATION

Poor power factor is an issue for Network Service Providers (NSP) as it increases network demand and network losses bringing forward network augmentation. The overall peak demand in Endeavour Energy's network area has declined in the past five years due to several factors however, the demand in new development areas is increasing, reflecting the transformation of rural and semi-rural land into new urban developments. Nevertheless, there are pockets in the network that are constrained as a result of

localised load increases. If demand growth across the network returns, PFC along with other demand management options could be deployed in areas of constrained network to assist in deferring the need to augment.

Endeavour Energy is required to present a power factor of 0.95 or better at the TransGrid Bulk Supply Point as opposed to customers' minimum requirement of 0.9. This mismatch has driven significant investment in PFC equipment at zone and transmission substations. While this has improved the situation at the higher level of the network, the issue of poor power factor at lower levels remains a concern.

The improvement of power factor at the customer's premises provides the maximum benefit in terms of demand reduction at all levels of the network. Benefits include:

- Peak demand reduction on low, medium and high voltage components of the network;
- Network loss reduction;
- Voltage level improvement;
- Reduced equipment stress and maintenance resulting in longer life; and
- Reduced need to install PFC at Endeavour substations.

Two methods for analysing the benefits of PFC were considered: Long Run Marginal Cost (LRMC) and Avoided Distribution Cost (ADC) of deferring Capital expenditure. Targeted programs can be analysed using an ADC methodology which is more reflective of true short-term savings.

Using the ADC methodology, a sample of overloaded feeders and distribution substations were analysed where power factor could be implemented to defer network expenditure. This identified a potential saving of $76,375 if PFC was implemented on the overloaded assets and sufficient demand reduction obtained.

4.1.4 IMPLEMENTATION PLAN

Endeavour Energy utilised its current process of enlisting customers for this trial. This entailed an initial site visit followed by a letter sent detailing their contractual requirements under the New South Wales (NSW) Service and Installation Rules (SIR) to maintain a power factor above 0.9 at all times. Customers on Demand ToU tariff were also notified of the potential annual savings achievable by installing PFC. This approach has achieved an average take up rate of 22% for customers on a Demand ToU tariff and negligible uptake in General Supply ToU customers without financial incentives.

Customers wishing to participate in the trial were required to request three quotes and obtain a minimum of two. Endeavour Energy then reviewed the quotations to ensure they were competitive and cost effective. Once the PFC unit was installed and the demand reduction verified, the financial incentive payments were made directly to the customer as per the existing demand management customer payment procedure.

4.1.5 IMPLEMENTATION COSTS

As the existing process of enlisting customers for this trial was utilised, the expenditure claim in 2014/15 financial year is $181,103 OPEX covering the cost of customer incentive payments.

4.1.6 RESULTS

A total of 43 customers with poor power factor were approached of which 15 were General Supply ToU and 28 were on a Demand ToU tariff customers.

The General Supply ToU group resulted in 12 out of 15 customers participating in the trial with a take-up rate of around 80%. The total demand reduction achieved was 1,360 kVA (target being 1,960 kVA), resulting in an average demand reduction of 113 kVA per customer.

The Demand ToU group resulted in 18[1] out of 28 customers participating in the trial with a take-up rate of 64%. The total demand reduction achieved was 1,065 kVA (target being 560 kVA), resulting in an average demand reduction of around 59 kVA per customer.

A breakdown of the trial results versus the targets is shown below in Table 2.

TABLE 2 - RESULTS

Category	General Supply ToU		Demand ToU		Total	
	Target	Achieved	Target	Achieved	Target	Achieved
Customers approached	15		28		-	-
No of Customers Installed PFC	14	12	7	18	21	30
% of Customer Installed PFC	>0%	80%	>22%	64%	-	70%
Total kVA Reduction	1,960 kVA	1,360 kVA	560 kVA	1,065 kVA	2,520 kVA	2,425 kVA
Average kVA reduction / Customer	140 kVA	113 kVA	80 kVA	59 kVA	-	-
Total Incentive payment	$159,740	$140,633	$36,960	$40,470	$196,700	$181,103
Average incentive payment / customer	$11,410	$11,719	$5,280	$2,248	-	-
Average per kVA incentive payment	$120	$103.4	$66	$38	-	-
kVAr Installed	-	2150 kVAr	-	2,500 kVAr	-	4,650 kVAr

The total demand reduction achieved was 2.43 MVA. This equates to 96% of the 2.52 MVA target set for the trial.

The funding offered through the trial removed barriers faced in PFC installation, particularly for General Supply ToU customers who receive no benefit from installing PFC. The trial also found that certain customers on General Supply ToU consume enough energy to be moved to a Demand ToU tariff based on their consumption level.

The PFC trial was a success as it increased the take-up rate of customers on General Supply ToU and Demand ToU tariffs. The average payment for each tariff was $103/kVA for General Supply ToU and $38/kVA for Demand ToU tariff customers. This indicates that if demand reduction is required in a relatively short time period incentives would provide the best opportunity to achieve the desired demand reduction.

[1] Increased from 7 as a result of a lower average cost/kVA incentive level than expected.

5.0 STATEMENT

Endeavour Energy confirms the funding of the projects contained in this report are not:

a. recoverable under any other jurisdictional incentive scheme;
b. recoverable under any other state or Commonwealth government scheme; and
c. included in the forecast capital or operating expenditure approved in the 2014-19 Distribution Determination or recoverable under any other incentive scheme in that determination.