Energex Demand Management Innovation Allowance Annual Report

AER Submission 2014/15

Energex Limited
31 July 2015

energex
positive energy

Version Control

Version	Date	Description
1.0	31/07/2015	Initial

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DMIA Annual Report Requirements

This report has been prepared to address the Australian Energy Regulator's (AER) requirements as described below:

Schedule 1: Item 6 – Demand Management Incentive Scheme

6.1 In respect of the Demand Management Innovation Allowance:

6.1(a) Provide an explanation of each demand management project or program for which approval is sought;

6.1(b) Explain, for each demand management project or program identified in the response to paragraph 6.1(a), how it complies with the Demand Management Innovation. Allowance criteria detailed at section3.1.3 of the demand management incentive scheme, with particular reference to:

(i) the nature and scope of each demand management project or program;

(ii) the aims and expectations of each demand management project or program;

(iii) the process by which each demand management project or program was selected, including the business case for the demand management project and consideration of any alternatives;

(iv) how each demand management project or program was/is to be implemented;

(v) the implementation costs of the demand management project or program; and

(vi) any identifiable benefits that have arisen from the demand management project or program, including any off-peak or peak demand reductions;

6.1(c) Provide an overview of developments in relation to the demand management projects or programs completed in previous years, and any results to date;

6.1(d) State whether the costs associated with each demand management project or program identified in the response to paragraph 6.1(a) are:

(i) not recoverable under any jurisdictional incentive scheme;

(ii) not recoverable under any other Commonwealth or State Government scheme;

(iii) not included as part of:

(1) the forecast Capital Expenditure or the forecast Operating Expenditure; or

(2) any other incentive scheme applied by the 2010-15 Distribution Determination; and

6.1(e) Provide the total amount of the Demand Management Innovation Allowance spent in the Current Regulatory Control Period and how this amount has been calculated.

1 DMIA Program 2014-15

The DMIA Program for 2014-15 is comprised of five projects endorsed by the Energex Investment Review Committee (IRC) for DMIA funding:

- AFLC/ZigBee Project
- Customer Load Profile Market Segmentation Project
- Energy Efficiency Research Project
- Residential Distributed Energy Resources Research Project
- SME Demand Response Investigation Project

Energex seeks approval for each of these projects. More detail about each project is outlined below.

2 DMIA Projects 2014-15

An explanation of each demand management project or program for which approval is sought, demonstrating compliance with the Schedule 1: Item 6 – Demand Management Incentive Allowance, is detailed below:

2.1 AFLC/ZigBee Project

2.1.1 Nature and Scope

Smart Appliances are beginning to emerge in the market (through Demand Response Ready – DRR AS4755 – compliant appliances). It is important for Energex to investigate how the existing AFLC (Load Control) platform can be utilised in Demand Management to manage these new capabilities as they emerge.

This project was a small scale trial to demonstrate the effectiveness of AFLC to ZigBee capabilities and to explore the capability of meters communicating with Demand Response Enabling Devices (DRED's). Energex purchased load control equipment from two manufacturers, capable of translating AFLC to a ZigBee wireless communication network. These distribution load control devices were then subjected to a suite of tests to validate the operational model of this trial.

2.1.2 Aims and Expectations

The project objectives were to test a proof of concept which demonstrated the effectiveness of AFLC to ZigBee Device capabilities, as well as exploring the capability of Smart Meters to pair ZigBee DREDs. Objectives included:

1) Demonstrate the viability of AFLC to ZigBee capability of available devices
2) Demonstrate the capability of meters to signal ZigBee capable DREDs
3) Identify issues and opportunities related to these metering capabilities

4) Feed results of the trial into the PeakSmart air-conditioning program and Energex load control strategy to:

   a. future proof load control capabilities; and

   b. reduce cost to serve and customer-side of the meter issues related to the PeakSmart program.

5) Feed results of the trial into Australian Standards to develop a new National Standard for DREDs.

2.1.3 Selection Process

The project underwent a formal DMIA assessment process in Energex.

- The business case for the project was reviewed against the DMIA criteria by both Demand Management and Regulatory Departments.
- The project was deemed to meet the DMIA criteria and costs confirmed to be not in any way recoverable from another source.
- The business case was presented to the Energex Investment Review Committee which endorsed the project for DMIA funding on 4 February 2014.

2.1.4 Project Implementation

The tested DREDs were from two different manufacturers, which were developed to comply with the technical/functional specification for an AFLC to ZigBee Coordination Device to DRED. The trial compromised of two stages of testing:

- Initial desktop testing at Energex with both manufacturers
- Testing with United Energy (Victorian Based DNSP).

This resulted in successful pairing and ability to initiate multiple Demand Response Events on the DREDs tested.

2.1.5 Project Costs

The cost of the completed project is $36,361 which includes the cost of the DREDs, associated manufacturer consultant costs, internal labour for testing, and Energex general overheads. The labour costs associated with all the existing Energex staff who from time to time, provided input into the project have been absorbed into business as usual.

2.1.6 Project Benefits

The project revealed a number of opportunities including:

- One model of DRED could be paired to many different device types
- Auditing could be conducted at the meter box, instead of requiring internal access to the home/DRED)
- Allows a transition pathway from AFLC to ‘smart networks’ without the need for expensive, short-term upgrades

- Customers could operate these DREDs via Home Area Networks (e.g. facilitating time of use tariffs)
- Distributors could call on this load during network constraints
- Customers could procure their own DREDs
- Creates transition path for this AS4755 functionality to be readily installed into the appliances at time of installation/manufacture
- Completion of the AFLC to ZigBee Coordination Device to DRED will result in a broader market, which reduces the cost to procure DREDs, accelerating the transition to a model where customers source DREDs

2.2 Customer Load Profile Market Segmentation Project

2.2.1 Nature and Scope

Energex is currently developing a demand tariff to be implemented by 2016/2017 and the project aimed to inform the development of the demand tariff and Network Pricing Strategy. Currently data is only available at a network element level and knowledge of the impacts of a demand tariff on different customer segments and load profiles is limited. Energex engaged an external service provider to formulate residential customer load profiles, collated into identified low voltage (LV) customer market segments.

2.2.2 Aims and Expectations

The external service provider collated information utilising existing Energex customer data and research to address the following project objectives:

- Provide customer load profiling energy consumption at a low, medium and high scenario collated into identified LV customer segments based on demographics.
- Identify the customer market segments which are currently having the most impact on peak demand
- Provide a solution which would enable analysis to be undertaken to determine by individual load profile, network area and market segmentation level what impact a demand tariff would have on the network and on network peak demand.
- Provide sufficient customer profiling at an individual level and market segmentation level which would provide a statistically valid sample that is representative of the Energex network area in South East Queensland.

2.2.3 Selection Process

The project underwent a formal DMIA assessment process in Energex.

- The project was proposed by the Regulatory and Pricing Group to the Demand Management Department
- The business case for the project was reviewed against the DMIA criteria by Demand Management, Regulatory and Pricing
- The project was deemed to meet the DMIA criteria and costs confirmed not to be in any way recoverable from another source
- The business case was presented to the Energex Investment Review Committee which endorsed the project for DMIA funding on 7 July 2014.

2.2.4 Project Implementation

The project was conducted in two stages; the first stage was a study to scope and build a business case and recommended data acquisition and analysis approach; the second stage was the implementation of a data gathering exercise and formulation of detailed customer load profiles and modelling of demand impacts.

2.2.5 Project Costs

The cost of the completed project was $445,673 including external contractor costs and the Energex general overhead. The labour costs associated with all existing Energex staff who from time to time have provided input into the project have been absorbed into business-as-usual.

2.2.6 Project Benefits

The long term benefit of the project is to inform the Network Pricing Strategy and the future demand tariff. Implementation of a demand tariff will provide savings for Energex through deferment of peak demand growth driven augmentation and improvement of network utilisation.

2.3 Energy Efficiency Research Project

2.3.1 Nature and Scope

Ongoing improvements in the energy efficiency of residential appliances continue to have a considerable impact on both consumption and demand across the Energex network. Energex engaged an external service provider to research the impact that energy efficiency gains have had on historical demand and the projected future impact on demand.

2.3.2 Aims and Expectations

The project objective was to produce a research report and model which would assist with forecasting network peak demand in the future, and inform future residential demand management programs on energy efficient technologies.

2.3.3 Selection Process

The project underwent a formal DMIA assessment process in Energex.

- The business case for the project was reviewed against the DMIA criteria by both Demand Management and Regulatory Departments.
- The project was deemed to meet the DMIA criteria and costs were confirmed not to be in any way recoverable from another source.
- The business case was presented to the Energex Investment Review Committee which endorsed the project for DMIA funding on 4 February 2014.

2.3.4 Project Implementation

Energex engaged an external service provider to complete the following:

- Provide a baseline of current state of energy efficiency in residential homes in South East Queensland
- Gain an understanding of how energy efficiency products and thermal efficiency for residential homes have improved and are likely to improve, and what they have achieved historically and can achieve in terms of energy (and peak demand) reductions in the future
- Collate and assess relevant information on key external impacts/influences, i.e. changes to Australian Standards, laws, energy star ratings and impacts of other programs and incentive schemes.
- Collate and analyse the trend of appliances over recent years and into the future (including replacement of old technology to new) and researching the impact on network peak demand.
- Development of a model which utilised the above knowledge, and existing energy consumption data of appliances and households to assist with projecting the future state of energy efficiency of residential homes.

2.3.5 Project Costs

The cost of the completed project was $133,697 including external contractor costs and the Energex general overhead. The labour costs associated with all existing Energex staff who from time to time have provided input into the project have been absorbed into business-as-usual.

2.3.6 Project Benefits

Overall, it is concluded that energy efficiency improvements have contributed significantly to declining residential demand over the past few years. A few key findings include:

- Appliance uptake (particularly growth in air-conditioners) contributed to accelerated demand growth from 2000 to 2008.
- Improving energy efficiency and MEPS[1] changes have subsequently significantly reduced (per household) demand and consumption from 2010 onwards. This has been driven by significant efficiency gains in hot water, air-conditioning and lighting in particular.
- Demand and consumption will continue to decline on a per-household basis, however, population growth will drive appliance growth which will likely drive residential demand growth beyond 2022.

[1] Minimum Energy Performance Standards (i.e. Star Ratings on Appliances)

2.4 Residential Distributed Energy Resources Research Project

2.4.1 Nature and Scope

The rapid growth of residential Solar PV take up in recent years is driving significant change across the industry. The approaching emergence of Distributed Energy Resources (DER), particularly storage technologies like battery storage and electric vehicles (EVs), have the capacity to drive further significant changes in customer usage in terms of consumption and demand. Energex engaged an external service provider to produce a detailed forecast, report and model considering how widespread adoption of EVs and storage will impact residential demand and consumption across the Energex network to 2030.

2.4.2 Aims and Expectations

The project objective was to produce a research report and model which would assist forecasting network demand, and inform demand management programs on residential battery storage and electric vehicles in the future. This was achieved by:

- Gaining an understanding of how battery storage (including EVs) in residential homes are likely to emerge and how will they impact demand in the future
- Collating and assessing information on other external impacts/influences i.e. Changes to Australian Standards, laws, retailer programs and incentives schemes
- Development of a model which tests different scenarios based on research, battery storage and electric vehicle data, to assist with projecting the likely impact on the network of future storage technologies in residential homes, at a spatial network level.

2.4.3 Selection Process

The project underwent a formal DMIA assessment process in Energex.

- The business case for the project was reviewed against the DMIA criteria by both Demand Management and Regulatory Departments
- The project was deemed to meet the DMIA criteria and costs were confirmed to be not in any way recoverable from another source
- The business case was presented to the Energex Investment Review Committee which endorsed the project for DMIA funding on 7 July 2014.

2.4.4 Project Implementation

Energex engaged an external service provider to complete the following:

- Analyse the battery storage technologies and configurations that are likely to emerge, and the potential capabilities these will provide to customers and the grid
- Model the variables that will drive storage adoption and outline likely conditions under which batteries and storage will emerge, with take up categorised by demographic and geographic elements, and at what penetration rates

- Model how likely scenarios could impact the grid in terms of peak demand and consumption (also providing a forecast model which can be applied in Energex forecasting and planning models)
- Outline how Energex can address identified scenarios to potentially manage customer-side-of-the-grid storage technologies for peak demand management outcomes, or how Energex can influence market factors in a way that helps, rather than harms the network. (E.g. tariff / pricing strategies that can mitigate storage load impacts on peak demand).
- Improve Energex's understanding of likely storage impacts and provide analysis and options to address the likely scenarios that will drive storage adoption across the Energex network.

2.4.5 Project Costs

The cost of the completed project was $378,687 including external contractor costs and the Energex general overhead. The labour costs associated with all existing Energex staff who from time to time have provided input into the project have been absorbed into business-as-usual.

2.4.6 Project Benefits

The model that has been delivered with the final report provides significant scenario modelling capabilities and provides Energex with a flexible tool that can be manipulated to consider how EVs and residential battery storage are likely to emerge under different scenarios, evolving policy settings, or changing environmental conditions. This will assist with forecasting network peak demand in the future and inform future residential demand management programs.

2.5 Small to Medium Enterprises (SME) Demand Response Investigation Project

2.5.1 Nature and Scope

While Energex has an understanding of the demand response (DR) potential from large Commercial & Industrial (C & I) customers the DR potential from Small to medium (SME) customers cannot be assessed accurately as this group of customers are less well understood. The overall aim of the project was to identify the DR potential from small to medium businesses (SMEs) in South East Queensland (SEQ) with the results informing the development of methodologies to support non-network assessments undertaken as part of applying the RIT-D.

2.5.2 Aims and Expectations

The objectives of this initiative were to:

- identify and prioritise demand response potential from SMEs in SEQ; and
- assist with the development of methodologies to support undertaking non-network assessments as part of RIT-D.

2.5.3 Selection Process

The project underwent a formal DMIA assessment process in Energex.

- The business case for the project was reviewed against the DMIA criteria by both Demand Management and Regulatory Departments.
- The project was deemed to meet the DMIA criteria and costs confirmed were not in any way recoverable from another source.
- The business case was presented to the Energex Investment Review Committee which endorsed the project for DMIA funding on 4 February 2014.

2.5.4 Project Implementation

Energex engaged an external service provider to undertake customer research in the SME market to assess demand opportunities. Over 150 SME customers participated in the research across three target areas: Inner Brisbane, Northern end of the Gold Coast and Ipswich.

2.5.5 Project Costs

The cost of the completed project was $246,443 including external contractor costs and Energex general overhead. Labour costs associated with Energex staff were absorbed into the business as usual.

2.5.6 Project Benefits

The research uncovered over 20MVA of demand response potential from SME customers with over half having some form of demand response available. In addition, it was found that energy efficiency measures could provide approximately 10% network peak demand reduction, or 9MW. While these results are promising, the remuneration customers would need to participate in a

program was not tested. The results of this research will feed into the development of tools to assist in undertaking future non-network assessments when applying the RIT-D.

3 DMIA Projects Prior to 2014-15

An overview of developments in relation to projects or programs completed in previous years of the regulatory control period is below:

4.1 Network Pricing Initiatives Project

An external consulting firm was contracted in 2011 to undertake three key initiatives to enable Energex to better understand network pricing drivers, and how to utilise them in managing demand. The three key initiatives were:

- Literature review of electricity demand responsiveness to price signals
- Decision-making criteria to choose between tariff and non-tariff alternative demand management mechanisms
- Long Run Marginal Cost (LRMC) methodology to estimate the cost of meeting incremental customer demand to enable more cost reflective and efficient price signals to be incorporated into network tariffs.

The result of the project was a recommendation from the external consulting firm to utilise a long run marginal cost (LRMC) pricing methodology based on the average incremental cost (AIC) approach. This approach can be used to calculate LRMC estimates at the voltage and/or customer tariff class levels based on a forecast 10 year planning horizon. The total cost of the project was $54,656 which included external contractor costs and Energex general overheads.

4 Costs

Energex confirms that the costs of the projects specified in this report are:

- not recoverable under any jurisdictional incentive scheme;
- not recoverable under any other Commonwealth or State Government scheme;
- not included as part of:
    - the forecast Capital Expenditure or the forecast Operating Expenditure; or
    - any other incentive scheme applied by the 2010-15 Distribution Determination.

5 Total Expenditure 2010-2015

The total expenditure for the 2010- 2015 regulatory period is $1,295,517 as indicated in the table below:

Project Name	Project Cost	Overheads	Total Cost
Network Pricing Initiative Project (2011)	$ 39,240	$ 15,416	$ 54,656
AFLC/ZigBee Project	$ 25,090	$ 11,271	$ 36,361
Customer Load Profile Market Segmentation Project	$307,199	$138,474	$ 445,673
Energy Efficiency Research Project	$ 92,863	$ 40,834	$ 133,697
Residential DER Research Project	$262,676	$116,011	$ 378,687
SME Demand Response Investigation Project	$171,688	$ 74,755	$ 246,443
Total	$898,756	$396,761	$1,295,517

Further information of costs is detailed in the cost section for each project in this report.