

# Energex 2015-16 DMIA RIN Report - Demand Management

AER Submission  
2015/16

**Energex Limited**  
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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 Allowance

- 6.1 Identify each demand management project or program for which Energex seeks approval.
- 6.2 For each demand management project or program identified in the response to paragraph 6.1:
  - 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 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 2015-20 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.
- 6.3 Provide an overview of developments in relation to projects or programs completed in previous years of the regulatory control period, and any results to date.

# 1 DMIA Program 2015-16

The DMIA Program for 2015-16 is comprised of four projects endorsed by the Energex Investment Review Committee (IRC) for DMIA funding:

- Small Business Customer Load Profile Market Segmentation Project
- Battery Energy Storage Systems (BESS) Pilot
- Real Time Tariff Study
- Low Voltage Network Power System Static-State Estimation

Energex seeks approval for expenditure on the Small Business Customer Load Profile Market Segmentation Project which has now completed. The remaining three projects commenced in 2015 and will be continuing in 2016/17. More detail about each project is outlined below.

## 2 Completed DMIA Projects 2015-16

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

### 2.1 Small Business Customer Load Profile Market Segmentation Project (For AER Approval)

#### 2.1.1 DMIA Criteria

The Small Business Customer Load Profile Market Segmentation Project complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme because the project contributes to a larger tariff reform project that ultimately seeks to reduce network peak demand through customer response to demand based tariffs. Information about load profiles that vary by customer segments assists in targeting those customers who have the greatest potential for demand reduction. This in turn improves the ability of the network to deliver demand reduction programs.

#### 2.1.2 Nature and Scope

Energex was 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. The data was only available at a network element level and knowledge of the impacts of a demand tariff on different small business customer segments and load profiles was limited. Energex engaged an external service provider to formulate small business customer load profiles, collated into identified low voltage (LV) customer market segments.

### 2.1.3 Aims and Expectations

The project engaged an external service provider to conduct research and analysis utilising existing Energex customer data and research to build a business case which identifies the best solution/s for addressing the following:

- Provide customer load profiling energy consumption at a low, medium and high scenario collated into identified small business low voltage customer segments based on industry type.
- Identify the customer segments which are currently having the most impact on peak demand
- The proposed solution was designed to enable analysis to be undertaken to determine the impact a demand tariff will have on the network and on network peak demand by individual load profile, network area and market segmentation level.
- Provide sufficient customer profiling at an individual level and market segmentation level which provides a statistically valid sample that is representative of the Energex network area in South East Queensland.

### 2.1.4 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 3rd August 2015.

### 2.1.5 Project Implementation

The proposed DMIA initiative was a two stage project:

1. The first stage was a study to scope and build a business case and recommended data acquisition and analysis approach before proceeding to stage two.
2. The second stage was the implementation of a data gathering exercise and formulation of detailed customer load profiles and modelling of demand impacts.

### 2.1.6 Project Costs

The cost of the completed project for AER approval was \$250,833 including external contractor costs, meter probe data 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.

### 2.1.7 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. The project identifies which industries are best placed to contribute to demand reductions and enables targeted implementation of demand tariffs.

## 3.0 Initiated DMIA Projects 2015-16

### 3.1 Battery Energy Storage System (BESS) Pilot

#### 3.1.1 DMIA Criteria

The BESS Pilot complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme as the BESS project focuses on an emerging technology that is anticipated to be taken up by customers at an increasing rate over the coming years. It is imperative that Energex gain early insights into how customers will take up BESS, how Energex can provide a direct demand load control value proposition, how the systems will be integrated into the network and what changes need to be made to the network to accommodate the technology.

#### 3.1.2 Nature and Scope

Both awareness and intention to purchase Battery Energy Storage Systems (BESS) has increased significantly across Queensland with uptake likely to grow over the next five years. To better understand the impact of BESS on the network and how BESS can enable a higher penetration of solar PV, Energex is conducting BESS trials over four years. The data obtained from these trials will assist in developing systems to manage new technologies, including battery systems, and provide cost-effective outcomes for Queenslanders.

The trials are being conducted in two parts:

1. A targeted Market Based Battery Trial in cooperation with BESS manufacturers who are selling BESS to customers in South East Queensland. The Market Based Battery Trial will be run in two stages: firstly with staff (up to 15 sites) and secondly with customers in selected areas of the network.
2. The Demonstrations Project will investigate options for integrating BESS into the network including opportunities to deliver advanced control. The key work packages (WP) are:
  - WP1 – Residential BESS Pilot – Three residential single phase BESS at EsiTrain, Rocklea
  - WP2 - Integration of BESS control with the Demand Management System (DMS) PowerOn
  - WP3 - Small Commercial Customer Pilot – One three phase BESS at an Energex site
  - WP4 - Large Commercial Customer Pilot – One large BESS at Eagle Farm Distribution Centre (DC)

Initially the scope of this project included an educational display and Energex submitted a request for a ring fencing waiver on 19<sup>th</sup> May 2016. A temporary and conditional waiver was approved on 18<sup>th</sup> August 2016 and this educational display project will not be funded by DMIA and has subsequently been removed as a DMIA project.



### 3.1.3 Aims and Expectations

The aim of the project is to gain a better understanding on the customer value proposition and expectations from the electricity network in taking up BESS; how Energex can leverage off the existing load control system with direct load control and tariffs to benefit both Energex and the customer and investigate how the BESS technology will integrate with the electricity network.

### 3.1.4 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 7 September 2015.

### 3.1.5 Project Implementation

Overview of developments for the project are:

- WP1 has commenced with the first demonstration site residing at Energex's EsiTrain Rocklea training facility. Three BESS have been installed; Tesla with Reposit and SolarEdge, Sunverge and Redback Technologies.
- WP2 is underway with the Business Requirements Document approved and the Design currently under review.
- WP3 has not yet commenced.
- WP4 will be located at the Energex Eagle Farm DC site and a temporary and conditional waiver was approved on 18<sup>th</sup> August 2016 including the PV component of the trial.
- The Market Based Trial Project will incorporate learnings from the Demonstrations Project, particularly from WP1 and WP2. In stage one, there are 15 employees who have solar PV and will be installing BESS (3 year trial). In the second stage, Energex customers will be invited to participate. All the BESS in the trial are lithium-ion batteries and have been claimed as AS/NZS 4755.3.5:2016 compliant by the suppliers/manufacturers. Energex have selected five different suppliers/manufacturers to participate in the trial; three systems are DC coupled and two systems are AC coupled.

For the first stage of the Market Based Trial Energex has entered into an agreement with a third party to own and operate the BESS to ensure this project is compliant with section 1(b) of the Final Determination Electricity Distribution Ring-Fencing Guidelines. Energex intends to follow this approach for WP4.

### 3.1.6 Project Costs

The cost of the project to date (2015/16) is \$207,052. The labour costs associated with all existing Energex staff who have provided input into the project have been absorbed into business-as-usual.

### 3.1.7 Project Benefits

It is anticipated that the findings of the pilots will assist Energex in developing systems to manage new technologies, including battery systems, and provide cost-effective outcomes for Queenslanders. The trial supports Energex to work towards a connected network of the future, to help facilitate customer choice whilst leveraging technology and data, so that Energex can continue to provide a reliable, safe and secure electricity supply.

## 3.2 Real Time Tariff Study

### 3.2.1 DMIA Criteria

The Real Time Tariff Study complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme as the project ultimately seeks to reduce network peak demand through customer response to demand based tariffs. The long term benefits through implementation of a demand and complimentary load control tariffs will provide savings for Energex through deferment of peak growth driven augmentation and improvement of network utilisation.

### 3.2.2 Nature and Scope

In response to the broader change in the electricity market, Energex has prepared a comprehensive tariff reform program. The new electricity tariffs were introduced on 1 July 2016 and are a demand based, time of use structure which will enable emerging technologies such as battery storage to connect to the electricity network. These new electricity tariffs are:

- a primary tariff: NTC7000 – Residential Demand, and
- a secondary tariff: NTC7300 – Smart Control.

The complimentary secondary Smart Control tariff is designed to suit appliances on traditional Economy tariffs (e.g. electric storage hot water and pools pumps) and AS/NZS 4755 compliant appliances (e.g. PeakSmart air-conditioning units).

The Real Time Tariff Study's scope is to research the impact of the new demand tariff and complimentary Smart Control tariff on small, low voltage customers. This research will be conducted through partnerships with retailers, customer representatives, market participants and the Queensland government.

### 3.2.3 Aims and Expectations

The study aims to:

- examine customers comfort around and awareness of the new tariffs,
- understand which educational and promotional materials are successful in attracting and retaining customers on the new tariffs,
- understand which educational and promotional materials are successful in eliciting customer response to the new tariffs,
- monitor the cost, availability and delivery channels of the technologies and services that enable customer response,
- quantify the magnitude of customer response,
- observe and influence the market response and offerings that arise from the tariff offerings, and
- identify barriers to tariff adoption and assess and implement mitigation strategies.
- inform future communication strategies

### 3.2.4 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 2 November 2015.

### 3.2.5 Project Implementation

The project is initially targeting 225 customers for tariff adoption and survey completion. These customers will be from a broad cross section of Energex's customer base, and include no more than 25 Energex employees.

Customers who agree to participate in the study will be provided with a digital meter through a competitive metering provider, as negotiated with their retailer. Their retailer will then arrange for the adoption of a demand based primary tariff, and optionally, the Smart Control tariff. Customers are then billed on a monthly basis and paid incentives to complete surveys after their first, third and sixth bills.

Energex has entered into a consortium partnership with CitySmart. This partnership will assist Energex in progressing tariff reform implementation activities by identifying the communication channels most suitable for different cohorts of customers. Modern communication channels, along with specifically tailored messages about demand and other tariff concepts and best practices for exchange of information with customers for demand tariff adoption. Energex will contribute the cost of customer segmentation, and will access the research findings of the entire consortium.

### 3.2.6 Project Costs

The cost of the project to date (2015/16) is \$9,090. The labour costs associated with all existing Energex staff who have provided input into the project have been absorbed into business-as-usual.

### 3.2.7 Project Benefits

The project is helping networks, retailers and customer representatives in understanding how to communicate with customers about demand, in order to enable demand tariff adoption. In particular, the project is identifying the communication channels best suited for this kind of education, which varies depending on the customer cohort. The study also contributes valuable insight about customer respond to demand signals that are delivered through electricity tariffs.

## 3.3 Low Voltage Network Power System Static-State Estimation

### 3.3.1 DMIA Criteria

The Low Voltage Network Power System Static-State Estimation complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme as the improved data and information that can be achieved by application of an estimator can be used to improve the benefits of demand management and coordination of Distributed Generation across the low voltage network.

### 3.3.2 Nature and Scope

The proposed project is to develop, implement and test an innovative state estimation algorithm for monitoring low voltage electricity distribution networks. This algorithm will form the basis for coordinating demand and Distributed Generation with respect to operational limits of local network segments. A 'static state estimator' can provide a basis for an autonomous low-voltage network management and monitoring system. This project is a joint project between Energex, Ergon and The University of Queensland (UQ) for a period of three years.

### 3.3.3 Aims and Expectations

The objectives of the project are to support the University of Queensland to:

- Develop a Static State Estimation algorithm that can be applied to low voltage networks
- Provide timely control inputs to a number of low voltage connected devices to improve the efficiency of the network
- Provide trial networks for field trials of a prototype application
- Improve the dispatch of Distributed Energy Resource
- Improve the demand management response
- Minimise future network investment.

### 3.3.4 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 6 December 2013 however was later deferred to the 2015-2020 regulatory period due to UQ not receiving project funding through the Australian Research Council.(subsequent application approved July 2015)

### 3.3.5 Project Implementation

The approach for UQ delivering this initiative is to:

- Nominate one LV network in each project partners' networks to serve as a trial and demonstration platform
- Generate model of nominated LV networks and establish network simulation capabilities
- Identify network parts most likely at risk of operational issues and identify suitable measurement scheme for monitoring these sections
- Choose communication technology and channel, source or build suitable measurement devices and install them in one network first
- Run State Estimation to identify best location and required size of state influencing equipment and install it.
- Start closed loop control and record performance.
- With lessons learnt, install metering and state influencing equipment into second network and repeat trial.

### 3.3.6 Project Costs

The cost of the project to date (2015/16) is \$5,432 which is for internal labour costs and the Energex general overhead.

### 3.3.7 Project Benefits

The project outcomes will help Energex to better manage the distribution network, including the optimisation of Distributed Energy Resources (including solar PV, demand side management, energy storage, and electric vehicles) and network loading during critical events.

## 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 2015-2016

The total expenditure for the financial year 2015- 2016 regulatory period is \$472,407 as indicated in the table below:

| Name of project  | Total amount of the DMIA spent in 2015-16 |                     |                |
|--|---|---------------------|----------------|
|  | Operating expenditure                     | Capital expenditure | Total          |
|  | \$0's, nominal                            |                     |                |
| <b>Completed Project for AER Approval</b>  |   |                     |                |
| Small Business Customer Load Profile Project<br>(completed and requiring AER Approval) | 250,833                                   |                     | 250,833        |
| <b>Projects Initiated in 2015/16 (Not yet completed)</b>                               |   |                     |                |
| Battery Energy Storage System Pilot  | 52,680                                    | 154,372             | 207,052        |
| Real Time Tariff Study Project   | 9,090                                     |                     | 9,090          |
| LV System Static-State Estimation Project  | 5,432                                     |                     | 5,432          |
| <b>Total</b>   | <b>318,035</b>                            | <b>154,372</b>      | <b>472,407</b> |