Ergon Energy Demand Management Innovation Allowance Report 2015-16

31 October 2016

Figures and tables

Figure 1: DMIA focus areas 5
Figure 2: Ergon Energy innovation environment 6

Table 1: Schedule 1, paragraph 6 – DMIA compliance 3
Table 2: Ergon Energy DMIA program – 2015-16 4
Table 3: Ergon Energy DMIA project selection criteria 7
Table 4: Ergon Energy DMIA program expenditure 2015-16 8
Table 5: Ergon Energy DMIA co-contributions 9

1. Introduction

Purpose and compliance

Ergon Energy is pleased to present the Demand Management Innovation Allowance (DMIA) Report for the 2015-16 regulatory year. The purpose of this report is to allow the Australian Energy Regulator (AER) to:

- assess Ergon Energy's 2015-16 DMIA initiatives and Ergon Energy's entitlement to recover the expenditure under the AER's Demand Management Incentive Scheme (DMIS)[1]
- confirm Ergon Energy's compliance with the annual reporting requirements of the AER's Regulatory Information Notice (RIN) issued to Ergon Energy on 3 February 2016.

This report has been completed in accordance with:

- Clause 6.6.3 of the National Electricity Rules, which allows the AER to develop and publish a DMIS that provides incentives for Distribution Network Service Providers (DNSPs) to implement efficient non-network alternatives, or to manage the expected demand for standard control services in some other way, or to efficiently connect Embedded Generators; and
- Schedule 1, paragraph 6 of the AER's RIN (refer to Table 1), which requires a DNSP to which the DMIS applies to submit an annual report to the AER on its expenditure under the DMIA.

Further, as noted in the RIN, information provided to demonstrate compliance with paragraph 6 of Schedule 1 of the RIN is considered to constitute the provision of an annual report for the 2015-16 regulatory year, in accordance with paragraph 3.1.4.1 of the DMIS.

This report, and the information contained in the report, is suitable for publication by the AER.

[1] AER (2008), *Demand Management Incentive Scheme, Energex, Ergon Energy and ETSA Utilities 2010-15*, October 2008.

Table 1: Schedule 1, paragraph 6 – DMIA compliance

6	Requirement	Section
6.1	Identify each demand management project or program for which Ergon Energy seeks approval.	Section 4
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 DMIA criteria detailed at section 3.1.3 of the DMIS	Sections 3 and 4
	(ii) its nature and scope	Section 4
	(iii) its aims and expected outcomes	Section 4
	(iv) the process by which it was selected, including its business case and consideration of any alternatives	Section 2
	(v) how it was/is to be implemented	Section 4
	(vi) its implementation costs	Section 3
	(vii) any identifiable benefits that have arisen from it, including any off peak or peak demand reductions	Section 4
(b)	confirm that its associated costs are not:	
	(i) recoverable under any other jurisdictional incentive scheme	Section 3
	(ii) recoverable under any other Commonwealth or State Government scheme	Section 3
	(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	Section 3
(c)	state the total amount of the DMIA spent in the relevant regulatory year and how this amount has been calculated.	Section 3
6.3	Provide an overview of developments in relation to projects or programs completed in previous years, and of any results to date.	Section 4

Submission summary

In its Distribution Determination[2], the AER decided to apply Part A of the DMIS (i.e. the DMIA component) to Ergon Energy, approving an innovation allowance amount of $5 million over the 2015-20 regulatory control period.

The DMIA is provided to investigate opportunities that are not yet commercial, in addition to any business-as-usual capital and operating expenditure allowances for demand management and embedded generation projects approved in Ergon Energy's Distribution Determination. This provides a direct incentive for DNSPs to assess emerging opportunities for potentially efficient non-network alternatives, to manage the expected demand for standard control services in some other way or to enable more efficient connection of embedded generation other than through network augmentation.

Ergon Energy's 2015-16 DMIA program comprised ten projects. The total cost incurred for the DMIA initiatives during 2015-16 was $337,729. Table 2 summarises Ergon Energy's DMIA program expenditure recovery for the 2015-16 regulatory year.

Table 2: Ergon Energy DMIA program – 2015-16

Projects	Number	Expenditure
Closed	5	$2,948
Continuing	2	$234,496
New	3	$100,285
Total	**10**	**$337,729**

Ergon Energy seeks the AER's approval to recover the costs for the full amount of DMIA spent in the 2015-16 regulatory year.

In line with all Ergon Energy investments, the DMIA program follows Ergon Energy's standard gated governance framework, with built-in review for prudency and efficiency at each gate, as the project moves through the investment lifecycle.

For the 2015-16 DMIA program, all nominated DMIA projects were subject to a screening and feasibility processes, consistent with the AER's DMIS, and a subsequent cost-benefit analysis to identify the highest value projects, based on factors including their ability to shape energy load profiles, enable demand management and support our customers.

Budgets were also prepared in accordance with Ergon Energy's standard project methodology, detailing information including the projects' goals, deliverables, project milestones and resources required. Cost estimations were developed for the resources identified, as required for each phase of each project. These cost estimations drew upon various sources including the costs of similar projects undertaken by Ergon Energy, current preferred contractor panel contracts and market research. For projects with co-contributions from industry partners and research institutions, the total project budgets were inclusive of such amounts and assessed on this basis.

Ergon Energy's DMIA program is delivering strongly against its DMIA objectives, with several of the projects moving to a business-as-usual operation.

[2] AER (2015), *Final Decision, Ergon Energy determination 2015-16 to 2019-20, Attachment 12 – Demand management incentive scheme,* October 2015.

2. DMIA program of work

Program development

Ergon Energy considers DMIA investments an important component of its commitment to delivering customer value over the longer term. The DMIA program complements our non-network alternative program, which is geared towards providing a more efficient solution to network augmentation. The DMIA initiatives have enabled Ergon Energy to investigate and test innovative approaches to a range of network issues, such as improvement of load factors, customer behaviours, renewable integration, capacity limitation solutions, tariff enablement, customer and community engagement and power quality solutions. Our DMIA program has five focus areas, as detailed in Figure 1, to support the criteria of shifting reducing demand through non-network alternatives rather than increasing supply through network augmentation.

Figure 1: DMIA focus areas

Ergon Energy considers that over the longer term, innovation in the core DMIA focus areas highlighted above will aid in the reduction of network augmentation by addressing network constraint challenges through collaborative partnerships between networks, markets and customers. This offers the entire supply chain the opportunity to reduce costs through finding solutions that better fit all stakeholder needs. As such the diversity of initiatives across the DMIA program reflects this commitment to lowering capital investments through finding alternatives for limitations driving network investments.

Program cycle

Identifying innovation opportunities

The DMIA program has enabled Ergon Energy to place greater emphasis on the importance of innovation for demand management opportunities. By drawing on its own experience and examples of industry practice, Ergon Energy has developed an environment that characterises solutions beyond the traditional network solution.

To identify and increase the innovation opportunities, Ergon Energy's innovation environment comprises three key groups to funnel innovation ideas into the DMIA program, as illustrated in Figure 2:

- the DMIA program team, providing opportunity for anybody in Ergon Energy to contribute
- the Smart Network Reference Group, providing senior management representation and oversight from across the business
- co-contributions from external parties such as universities, research partners and industry partners.

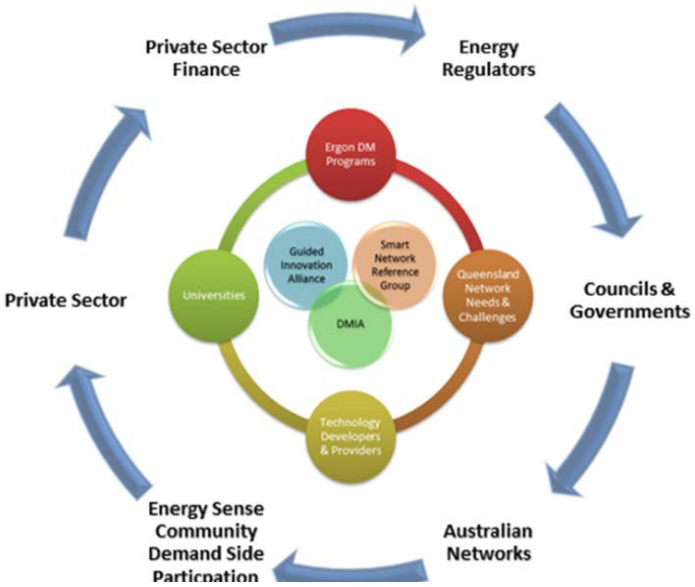


Figure 2: Ergon Energy innovation environment

Selection process

To ensure prudent investment choice and project delivery efficiency, all Ergon Energy investments adhere to our standard gated governance framework. The DMIA projects follow the same methodology, with particular emphasis placed on meeting the DMIA criteria and objectives. Accordingly, once projects are identified and nominated through the above-mentioned innovation environment, the eligibility-screening process is performed on nominated projects as a high level assessment, to determine whether the projects meet the objectives of the DMIA. Specifically, this tests whether each potential project is in accordance with paragraph 3.1.3 of the DMIS. Table 3 outlines the criteria in detail.

Provided all the specified conditions are met, then the project proceeds to the feasibility assessment and approval stages, as per the gated governance framework. All Ergon Energy DMIA projects are selected and scoped to respond to current and emerging network limitation drivers. Information from the development activities undertaken enables implementation scheduling, milestone planning and confirmation of resources.

Table 3: Ergon Energy DMIA project selection criteria

Selection criteria
• Reduces, shifts or manages electricity demand through non-network alternatives or projects or programs designed to build demand management capability and capacity and explore potentially efficient demand-management mechanisms, including but not limited to new or original concepts, that support a reduction in network risk through means other than network augmentation.
• Has costs which are not recoverable under any other jurisdictional incentive scheme
• Has costs which are not recoverable under any other state or Commonwealth Government scheme
• Has costs which are not included in Ergon Energy's forecast capital or operating expenditure approved in the AER's distribution determination for the regulatory control period under which the scheme applies, or under any other incentive scheme in that determination
• Is technically feasible (based on whether, in Ergon Energy's assessment, the project is suitable for its intended application and whether it can be theoretically and physically integrated with Ergon Energy's infrastructure).

3. Budget management

DMIA program expenditure

Ergon Energy's DMIA total expenditure for 2015-16 was $337,729. The costs incurred on the DMIA program for the year were all operating expenditure with no capital expenditure. Ergon Energy seeks the AER's approval to recover the costs for the full amount detailed in the 2015-16 expenditure column of Table 4. These costs are all Ergon Energy's contribution to the projects and are over and above any external funding received from industry or government grants.

For the year, the DMIA program comprised of ten projects, with five closed projects (carry over costs from 2014-15), two continuing projects from 2014-15 and three new projects. All projects were developed and managed in accordance with Ergon Energy's established program management framework as outlined in the previous section.

Table 4 summarises the actual expenditure for the 2015-16 Ergon Energy DMIA program, along with the total approved budget costs, actual annual costs, program-to-date incurred costs, and any applicable comments.

Table 4: Ergon Energy DMIA program expenditure 2015-16

Project	Budget ($)		2015-16 expenditure ($)		Project to date expenditure ($)		Comment
	Total Project Budget	Ergon Energy Project Budget	Capital	Operating	Capital	Operating	
Large LV Statcom	348,640	348,640	-	81	-	321,045	Closed
Urban LV Statcom	318,570	318,570	-	29	-	311,560	Closed
Solar Energy Management Systems	593,830	146,255[3]	-	1,843	-	127,499	Closed
Demand Response Integration	50,000	50,000[4]	-	840	-	42,775	Closed
LED Streetlight System (DMIA funded)	450,000	134,000	-	155	-	108,940	Closed
LED Streetlight removing barriers	182,000	182,000	-	4,421	-	173,524	Continuing
Centralised Energy Storage	450,000	450,000	-	230,075	-	230,075	Continuing
Iot Load Control	263,833	263,833	-	34,285	-	34,285	New
Feeder of the Future Research	20,000	20,000	-	22,030	-	22,030	New
ARC Customer response and risk management	1,202,644	281,911[5]	-	43,970	-	43,970	New
Total	3,879,517	2,195,209	-	337,729	-	1,415,703	

Of note, Ergon Energy costs associated with each of the DMIA projects, as identified in Table 4, are not:

- recoverable under any other jurisdictional incentive scheme
- recoverable under any other Commonwealth or State Government scheme
- included in the forecast capital or operating expenditure approved in the AER's 2015-20 Distribution Determination or recoverable under any other incentive scheme in that determination.

Longer term trends

Ergon Energy's DMIA program progressed well over the previous regulatory control period, providing valuable knowledge and creating opportunities. We expect this to continue throughout

[3] Ergon Energy's financial budget is $146,255. However Ergon Energy's contribution includes other non-financial contributions such as data and expert advice bringing Ergon Energy's total contribution value to $200,000.

[4] In the 2014-15 DMIA Outcomes Report the Ergon Energy Project Budget was incorrectly reported as the project expenditure for the year at $41,095, the correct project budget is $50,000 as reported above.

[5] The project is part funded by an Australian Research Council grant, Queensland University of Technology and Ergon Energy via the Demand Management Innovation Allowance as such Ergon Energy's contribution is a fraction of the overall project budget.

the current regulatory control period. The DMIA program continues to collaborate with innovation partners who are willing to contribute to DMIA projects and trials. Ergon Energy has found co-contributions are a useful way to lower Ergon Energy's innovation costs, share risks and identify collaboration opportunities, share knowledge and capabilities, and gain valuable insights into emerging markets.

Table 5 presents a summary of co-contributions into Ergon Energy DMIA funded projects. It demonstrates how Ergon Energy is leveraging industry, research organisations and other development funds to lower our DMIA costs. Importantly, the parties value these projects or programs as they are willing to make contributions towards these costs. The costs Ergon Energy is seeking to recover do not include the co-contributions received for the project.

Table 5: Ergon Energy DMIA co-contributions

DMIA Project	Funding Source	Project total budget ($)	Co-contributions Cash Total ($)	Ergon Energy Project Cash Budget ($)	Project Total Cash Amount ($)
Solar Energy Management Systems	CSIRO	163,830	393,830	146,255	540,085[6]
	GWA	230,000			
	Ergon Energy	200,000[7]			
LED Streetlight system trial	CTIP	316,000	316,000	134,000	450,000
	Ergon Energy	134,000			
ARC Customer response and risk management	QUT ARC	525,000	525,000	281,911	806,911[8]
	Ergon Energy	527,644[9]			
Total		**2,096,474**	**1,234,830**	**562,166**	**1,796,996**

[6] The DMIA 2014-15 Outcomes report included the total project budget, the reporting this year is for the total project cash contributions

[7] Includes financial contribution and non-financial in kind contributions, such as access to data and expert advice.

[8] The DMIA 2014-15 Outcomes report included the total project budget, the reporting this year is for the total project cash contributions

[9] Includes financial contribution and non-financial in kind contributions, such as access to data and expert advice.

4. Program delivery progress

Program delivery

This section of the report details the status of Ergon Energy's DMIA projects in 2015-16 by describing each project, its objectives, progress and findings to date.

Urban Statcom

Nature and scope

The increasing prevalence of residential photovoltaic (PV) systems and non-linear loads is starting to have a significant impact on our network and customer supply.

These impacts include over-voltage and voltage swings on the low voltage network, affecting customer loads, causing PV systems to trip off (reducing output) and necessitating (partially effective and expensive) network augmentation and potential restriction of PV system connection.

Ergon Energy has placed a high priority on identifying solutions and products to mitigate these problems including lower cost, more effective alternatives to network augmentation.

Aims and expectations

This project, laboratory tests and field trials two different products from different manufacturers.

Product 1 is a single phase 10kVAR capacitive only type of unit. For this product, the distribution transformer would be tapped down then the unit would supply capacitive VARs to boost the voltage when needed. This system can address out-of-balance voltages.

Product 2 is a three phase 20kVAR Statcom that can act as both a capacitor and inductor. Although the product is a three-phase unit, it does not address out-of-balance issues on the network.

Field trials will be undertaken in Townsville on a low voltage network that suffers from voltage fluctuations, as a result of both high load and high PV. This will allow practical assessment of the capability of LV Statcoms to mitigate PV related voltage issues in a real situation.

Project phase

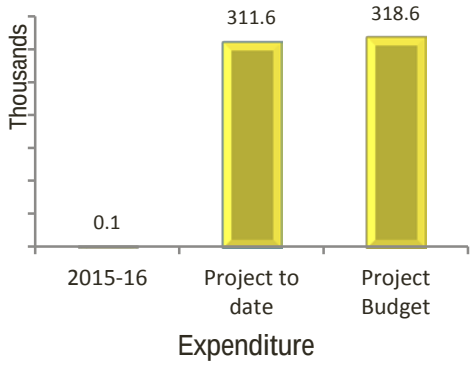
Indicates current phase

Benefits and outcomes

- Improved low voltage supply quality
- Allows for increasing amount of PV without the need for network augmentation
- Can be installed in brownfield sites that do not have customer VAR inverters but are experiencing low voltage network issues

Issues

- One of the products on order does not address out-of-balance issues. While not impacting the project, having this feature (as they are further developed) would provide better network outcomes



DMIA alignment

Urban Statcom, if successful, will manage local network voltage to enable the connection of higher levels of embedded generators and help maintain statutory voltages.

Update summary

The project was finalised in 2014-15 and closed out in 2015-16.

Products have been field tested and outcomes have provided the foundation for a tender for LV statcoms.

The LV Statcom project has been instrumental in the development of a tender for LV statcoms which is currently in market.

Large Statcom

Nature and scope

Ergon Energy has extensive networks of long rural and remote feeders that are being stressed by the increasing demands placed on them by modern customer electricity needs, and by the increasing prevalence of distributed generation, particularly residential PV.

The Large LV Statcom project will trial a three-phase 300kVAR unit on the Ergon Energy network. The main application is to support the voltage on a long medium voltage rural feeder with voltage regulation issues, partially due to higher penetration of PV, and avoid the conventional network upgrade, which may otherwise be required.

Aims and expectations

Distributed LV Statcoms are low voltage power electronic products that have the ability to inject both capacitive and inductive reactive power into the electricity network. Project expectations are:

- confirmation (or not) of the learning hypothesis
- identification of the control methodology for large LV Statcom to optimise voltage profile while avoiding deleterious impacts such as inter-unit hunting
- broad brush investigation of optimal placement of these devices
- evaluation of product capability to provide the desired performance
- comparison of the value of large LV Statcoms coupled to the MV, versus small distributed LV Statcoms in LV networks.

DMIA alignment

Large statcom if successful will manage feeder level network voltage to enable the connection of higher levels of embedded generators and help maintain statutory voltages.

Project phase

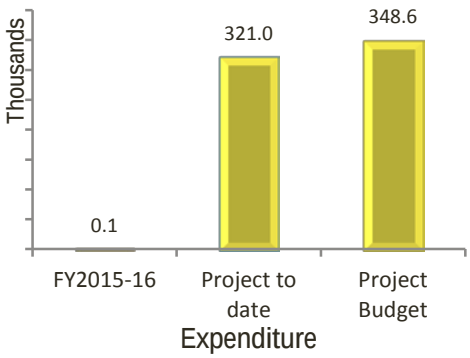
☆ Indicates current phase

Benefits and outcomes

- Project closed. Final report and technical paper completed.
- Successful management of residential solar where approximately twice as much solar has connected since the trial began.
- Very effective provided adequate upstream reactance at:
  - Voltage regulation
  - Voltage unbalance correction
  - Dynamic voltage support
- Nominated for Premier's sustainability award

Issues

There are no current issues in the project



Update summary

The Large Statcom project is finalised, incurring some minor expenses in the 2015-16 regulatory year.

The final report and a technical paper have been completed. The STATCOM successfully resolved PV driven voltage constraints as well as improving voltage unbalance and providing dynamic voltage support. Since the trial began, approximately twice as much solar has connected to the network and the STATCOM is continuing to manage network voltages in relation to this. Without the STATCOM, network augmentation would now be required.

Large LV statcoms are now part of our standard tools for managing voltage, especially in conjunction with high penetrations of PV.

Solar Energy Management system

Nature and scope

This project represents development of a world-first firm solar system with a Solar Energy Management (SEM) controller that is capable of continuous operation, overcoming solar intermittency, displacement of electrical consumption, increasing the penetration of cost-effective renewable energy technology, and providing reliable renewable energy.

As a utility energy management tool the system is capable of simultaneously satisfying both renewable energy supply and electricity network demand management objectives.

This project will develop, prototype and evaluate this firm solar system through the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in collaboration with Ergon Energy and heating and cooling manufacturer GWA Group.

Aims and expectations

The expectation is that an operating model is produced that shows the demand reduction and energy-related benefits to both the customer and Ergon Energy of the SEM system. In effect it will assist in determining the opportunity to develop a solution for residential air conditioning that removes the electrical demand from the distribution network when needed.

Ergon Energy being involved in such an activity will allow a significant opportunity for improving its community standing both in the electricity industry and the residential market.

DMIA alignment

The project, if successful, will enable residential cooling, heating and hot water systems that utilise solar energy and integrate demand response for supporting network peak demand reduction.

Project phase

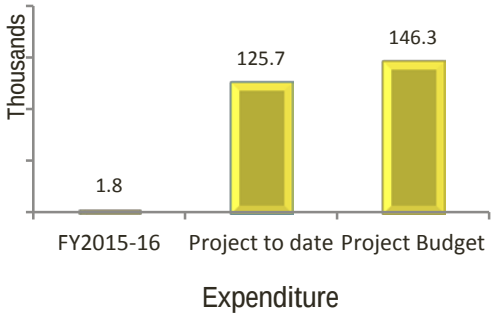
Indicates current phase

Benefits and outcomes

- Completion of field testing and data analysis.
- Installation testing and evaluation completed
- DRED system control testing completed

Issues

- Prototype solution had some teething issues with the technology that impacted system reliability
- Longevity of testing is required to deliver conclusive results, but there is clear evidence the product does have potential
- GWA are yet to commit to full-scale production of a first generation system



Update summary

Some minor expenses were incurred in the 2015-16 regulatory year. From the few results stated by CSIRO the Coefficient of performance (COP) should be around 21, which is seven times higher than a normal Split system. This result shows the potential of the technology and, despite the setbacks in the project, this could be a future technology which would benefit our network and also reduce the energy bill of our customers. The systems did not work reliably and further work needs to be undertaken to develop a functioning reliable consumer device. However, the product has great potential and could offer a significant alternative for a future in air-conditioning.

LED Streetlight System (DMIA funded)

Nature and scope

The Adaptive Light Emitting Diode (LED) Streetlight Systems project will validate 'smart' lighting system performance in both laboratory and field conditions.

The project has received Australian Government funding under the Clean Technology Innovation Program (CTIP). It is collaboration between the Guided Innovation Alliance (Ergon Energy as project lead, with the Queensland University of Technology (QUT) and Smart Grid as partners), LED Roadway Lighting, and three site hosts – Townsville City Council, Ipswich City Council, and Brisbane Airport Corporation.

This Adaptive LED Streetlight Systems project validated the performance off LED streetlights in a laboratory trial with QUT and GIA. The project delivered field trials to determine the consumer acceptance and real world system performance.

Project phase

Indicates current phase

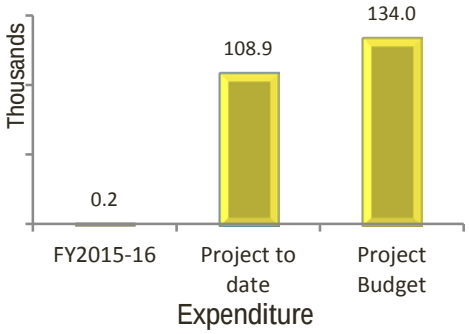
Benefits and outcomes

- Demonstrate the performance ability of adaptive LED technology in relation to demand savings
- Demonstrate the performance of an adaptive streetlight technology
- Confirmation on the ability to reduce demand by 60% with LED technology and over 80% with adaptive control

Aims and expectations

The project delivered:

- laboratory and field test the Adaptive LED Streetlight technology
- measure the energy performance of P and V Class LED luminaires compared with existing high energy discharge light (Mercury Vapour and High Pressure Sodium)
- demonstrated the enhanced LED light control systems ability to further increase energy and demand savings, from 60% with its current LED luminaire to 80% with the adaptive light control system.



DMIA alignment

Streetlights operate across the key residential peak demand period and by utilising more efficient lighting options there is an opportunity to reduce peak loading across residential areas, this project examined the benefits of LED streetlights for this purpose.

Update summary

The project is closed, incurring some minor expenses in the 2015-16 regulatory year. As a result of the project, LED streetlights are now becoming a standard installation option.

Centralised Energy Storage System (CESS)

Nature and scope

Distributed storage has an increasingly significant role on our electricity networks as energy storage technology improves and price falls. Ergon Energy and Energex have a range of applications for larger-scale distributed energy storage, particularly for micro-grid applications, network support and also off-grid applications (mainly for Ergon Energy). This project is a joint Ergon Energy-Energex project to develop these applications.

This project will initially develop and evaluate a 100kW/200kWh CESS. The CESS will be installed at the Cairns, Hartley St depot as a test platform to enable further development. The system will be tested, trialled and integrated in a controlled, generation test environment in the workshops to develop functionality and verify its effectiveness and reliability. It is anticipated that the CESS project will seed other projects to develop advanced control systems to enable higher penetrations of customer-owned renewable generation and also develop micro-gridding functionality.

Project phase

Indicates current phase

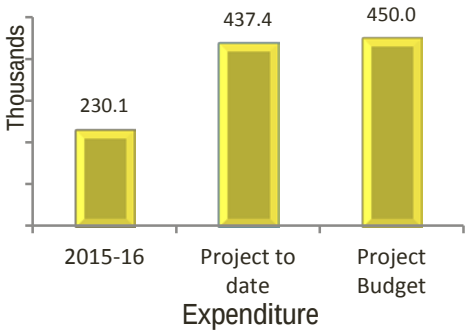
Benefits and outcomes

- Enable higher penetrations of PV on the network using centralised energy storage
- Investigate micro-gridding functions to seamlessly transition between on and off grid.
- Provide a test platform for further development of advanced control systems

Aims and expectations

The project aims to:

- develop integration strategies for traditional generation, energy storage and renewable energy
- enable higher penetrations of renewable energy using centralised energy storage systems
- understand the how to achieve seamless transitions between on-grid and off-grid, and the ability of centralised storage to support islanding (micro-grids)



DMIA alignment

Energy storage and combined generation and storage is a promising demand management technology for reducing peak demand. As this technology develops a key barrier for broader implementation will be the integration of the many control systems in seamless manner.

Update summary

A key area of interest lies in enabling effective integration of diesel generation and renewable energy, alongside inverter/battery technologies. Stage 1 of the CESS project involved the procurement of a 83kVA/200kWh energy storage system as a flexible test and development platform. This was successfully completed in May 2016, with the CESS platform commissioned in the Cairns, 308 Hartley Street depot. This paves the way for Stage 2 of the project which involves utilising the CESS platform for the development of advanced control algorithms for network and isolated applications.

Demand Response Integration

Nature and scope

This was a capability enablement project to take the findings from previous Automated Demand Response project and develop the business as usual (BAU) approach for applying the learnings.

The project sought to establish, at a minimum, the tendering and purchasing of a demand response system and was funded via DIMA under the category of capability enablement. Once the procurement process was complete the project would continue to be funded via BAU activities.

Project phase

Indicates current phase

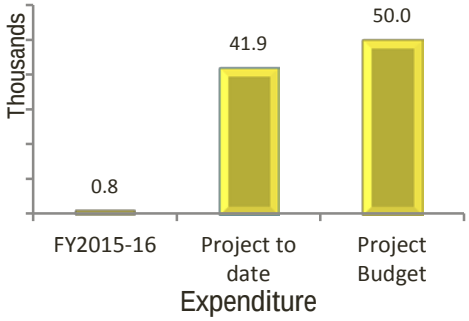
Benefits and outcomes

- Establish a demand response platform and commence BAU application of the system

Aims and expectations

The project aims to:

- establish the purchasing of a demand response platform
- commence integration into BAU activities.



DMIA alignment

A demand response system integrated into a business as usual platform will enable more efficient control of demand side resources and reduce the costs to implement customer side load control.

Update summary

The project had some small carryover of expenses into the 2015-16 regulatory year.

The project was successful in establishing a BAU project for the purchasing and integration of a demand response system. The integration and implementation was funded from a BAU project.

LED Streetlight Removing Barriers

Nature and scope

This project seeks to take an innovative approach by identifying actions focused on mitigating the financial, regulatory and technical barriers to large scale deployment. The project will enable effective markets and efficient services by developing solutions to enable Ergon Energy to significantly reduce cost, peak demand, network constraints, increased infrastructure requirements, energy use and carbon emissions from the provision of street lighting, which can in turn provide value to Ergon Energy's street lighting customers; the Department of Transport and Main Roads (TMR) and 77 Local Government Authorities (LGAs).

Aims and expectations

The project developed:

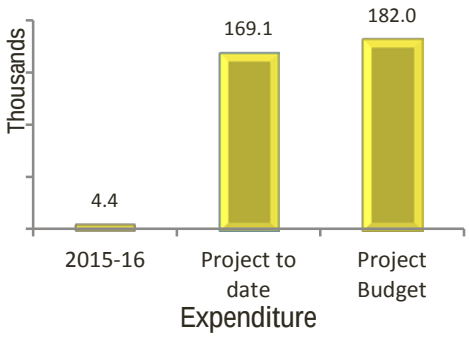
- technical guidelines to support a specification for the procurement of LED streetlights under contract.
- a guide to deployment for LED streetlights.
- an engagement plan and communications package to support a program for the pilot deployment of LED streetlights
- a high level Market Analysis report.
- of a high level outline of a commercial and financial structure for LED streetlights.

Project phase

Indicates current phase

Benefits and outcomes

- Establish opportunity for demand reduction through enabling the use of LED streetlights
- Identification of capability for LGAs and TMR to increase energy efficiency in lighting
- Technical specification used for a tender for LED streetlights to be used for pilot program and as an option for gifted streetlight for LGAs
- Identification of potential business opportunities for future ownership and operational capabilities presented by advancing technical solutions in the streetlight space



DMIA alignment

Streetlights operate across the key residential peak demand period and by utilising more efficient lighting options there is an opportunity to reduce peak loading across residential areas. While previous projects examined the technical benefits of LED streetlights, this project focused on the legal, commercial and regulatory barriers for a full scale adoption of LED streetlights.

Update summary

The project successfully delivered Ergon Energy's LED Streetlight Strategy. While there are many barriers to LED streetlight deployment, the current price of the technology is the biggest barrier. As the price of the technology reduces, transition to the technology will become a very attractive choice for LGAs and TMR when looking to reduce costs and energy consumption. Ergon Energy's preparation works under this project to identify, reduce and remove barriers to large scale deployment will contribute to a structured and smooth transition to the advanced technology, and create business opportunities for future asset management models.

IoT

Nature and scope

This is a capability enablement project to utilise the potential offered by Internet of Things (IoT) technologies for demand response applications.

The project aims to establish, at a minimum a Proof of Concept (PoC) deployment of an IoT enabled demand response system and is funded via DIMA under the category of capability enablement. Once the PoC stage is complete the project would continue to be funded via BAU activities.

Project phase

Indicates current phase

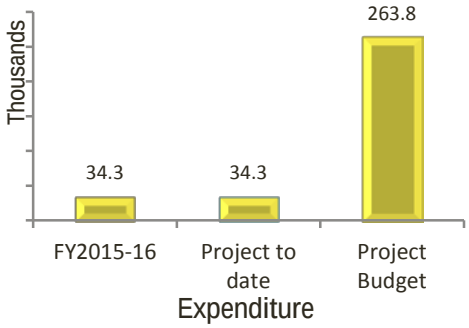
Benefits and outcomes

- Utilise IoT technologies to enhance demand response abilities
- Explore alternative demand response communications options
- Enable more complex load control interactions

Aims and expectations

The project aims to:

- evaluate the suitability and applicability of a Low Power Wide Area Wireless Network, belonging to the family of IoT, to provide transport services for signalling and reporting of demand response enabling devices (DRED)
- develop an end-to-end solution and evaluate it in a PoC deployment.



DMIA alignment

IoT is a promising low cost interconnection of appliances and devices in the home, this project will explore the emerging IoT technologies and validate the cost, operational and technical benefits for managing consumer side devices for reducing peak demand.

Update summary

The project is well underway in the development phase and has completed the first milestones.

The project is developing the firmware to enable cloud and fog computing over the wireless network.

Feeder of the Future Initial Research

Nature and scope

This project aims to gain a better understanding of customer loads and modelling based on individual customer metering data that was recently obtained.

To achieve this, the project will perform data analytics and machine learning techniques so that a model of customer load, based on variables such house size, temperature, solar irradiance etc., can be developed. This model will then be used to estimate the effect customer battery systems would have on overall feeder loads.

Project phase

Indicates current phase

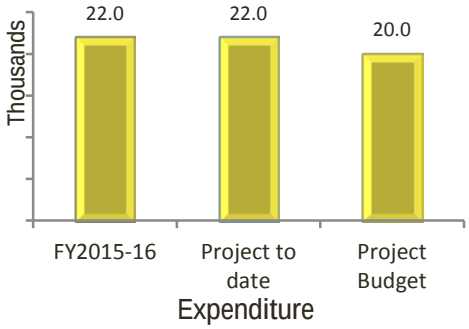
Benefits and outcomes

- Initial model established to enable customer loads to be simulated with batteries and other emerging technology on a diversified feeder basis.

Aims and expectations

The project aims to:

- develop a model of individual customer loads based on a number of relevant parameters
- use this model to gain a better understanding of aggregate customer load when battery systems and other modern devices are installed.



DMIA alignment

Enabling more accurate models of the consumer side technologies that may be leveraged for managing peak demand enables our demand management program to better quantify the benefits of a program and to develop products which consumers may adopt that support a reduction in peak demand.

Update summary

The project was successful in developing a preliminary customer load model that can be used to simulate the effects of battery systems and other loads on aggregate feeder load profiles.

ARC Customer response and risk management

Nature and scope

The project is an Australian Research Council (ARC) project and, in collaboration with QUT, will research the customer response and risks associated with demand management, direct control of appliances and tariff signals.

The project will perform detailed research in Townsville with existing customers to gain an understanding of:

- the customers' tolerance to changes in utility service levels
- enablement of the utility to directly control appliances in the home
- the application of essential services circuits
- the utilisation of efficient technologies in rental properties.

This research will provide a platform for our future development of demand management products and the integration of tariffs with technology.

Project phase

Indicates current phase

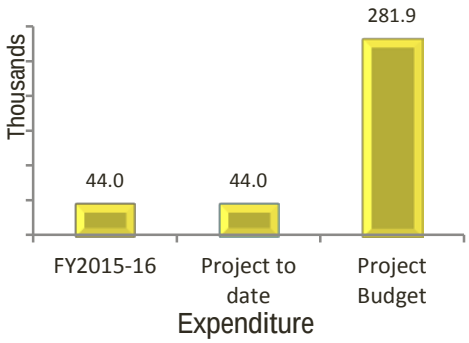
Benefits and outcomes

- Understanding the customer tolerance to changes in utility service levels
- Understanding how to enable the control of appliances in the home
- Developing an understanding of the benefits of essential services circuits that can be backed up by energy storage
- Understanding how to engage with the rental market and enable this market to participate in energy markets

Aims and expectations

The project aims to identify:

- the customers' willingness or not to use energy at specific times based on tariff signals.
- the customers' acceptance for purchasing demand response enable appliances.
- what tariffs and incentives are most likely to gain customer favour.
- what demographic segments are least likely to be able to respond to market signals.



DMIA alignment

This project aims to develop a quantitative understanding of a consumer's value of the services that energy provides and how that changes with direct control of appliances, price signals, comfort and behavioural changes. The project will inform our future demand management products and services and help to create efficiencies in our program.

Update summary

- Scope and survey requirements in order to meet the project aims established.
- Initial surveys completed, initial data acquisition commenced, survey design commenced.
- High level survey summaries received, survey results being coded into analysis model

Abbreviations, definitions and units of measure

A, kA, MA	Amps, unit of measure of electrical current, kA 1000s of amps, MA 1,000,000 of amps
AER	Australian Energy Regulator
ARC	Australian Research Council
BAU	Business as usual
CESS	Centralised Energy Storage System
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Constraint	A condition whereby a limit, that has been pre-set to a declared criteria, is exceeded.
CTIP	Clean Technology Innovation Program
Demand (Maximum Demand MD)	The maximum electrical load over a set period of time. The figure may be for use with tariff calculations or load surveys and the units may be in either kVA, kW or amps.
Demand reduction	The amount of electrical load that can be removed for a period of time.
Demand Management	Demand Management is the design and implementation of programs designed to influence customer use of electricity in ways that will produce desired changed in system load shape.
DMIA	Demand Management Innovation Allowance
DMIS	Demand Management Incentive Scheme
DNSP	Distribution Network Service Provider
DRED	Demand Response Enabling Device
GUSS	Grid Utility Support System
IoT	Internet of Things
LED	Light Emitting Diode
LGA	Local Government Authority
LV	Low voltage – 240V or the voltage used in residential houses
PoC	Proof of Concept
PV	Photovoltaic – a technical term for solar power generation.
QUT	Queensland University of Technology
RIN	Regulatory Information Notice
SEM	Solar Energy Management System
Statcom	Static VAR compensator
SWER	Single Wire Earth Return. Distribution to customers using a single wire conductor with the greater mass of Earth as the return path.
TMR	Department of Transport and Main Roads
V, kV, MV	Volts, kV kilo volts 1000s volts, MV mega volts 1,000,000s volts
VA, kVA, MVA	Volt amps, kVA kilo volt amps 1,000s volt amps, MVA mega volt amps 1,000,000 volt amps

VAR, kVAR, MVAR	Volt amps reactive, kVAR kilo volt amps reactive 1,000s VAR, MVAR mega volt amps reactive 1,000,000 VAR
W, kW, MW	Watts, kW kilo watts 1,000s watts, MW mega watt 1,000,000s watts
Wh, kWh, MWh	Watt hours, kWh kilo watt hours 1,000 watt hours, MWh mega watt 1,000,000s watt hours

Customer Service
13 10 46
7.00am – 6.30pm, Monday to Friday

Faults Only
13 22 96
24 hours a day, 7 days a week

Life-Threatening Emergencies Only
Triple zero (000) or 13 16 70
24 hours a day, 7 days a week

Ergon Energy Corporation Limited ABN 50 087 646 062
Ergon Energy Queensland Pty Ltd ABN 11 121 177 802

ergon.com.au