

# The Energy Queensland Group

## Ergon Energy Corporation Limited Demand Management Outcomes Report 2017-18

August 2018



Part of the Energy Queensland Group

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# Executive Summary

Ergon Energy's Demand Management (DM) program seeks to manage peak demand for our network, facilitate customer choice and lifestyle and build an understanding of new technology and market new and existing DM products and Services. In 2017-18 Ergon Energy continued with the targeted area programs based on the methodology introduced in 2016-17. The PeakSmart air-conditioner program, previously only available in targeted areas, was expanded to the majority of Ergon Energy's network supply area.

Ergon Energy transitioned program metrics from capacity to efficiency in order to ensure the program continued to deliver an efficient program. Ergon Energy's demand management program had an overall program efficiency of \$154/kVA.

The Demand Management program was underspent for the financial year with a total expenditure of \$4.4 million compared to a budget of \$8.1 million, including the Demand Management Innovation Allowance (DMIA). The underspend was due several key factors, including:

- Reduced labour costs
- Asset utilisation expenditure put on hold as Energy Queensland reassessed the joint Demand Management program direction
- Lower than expected DMIA costs

The Australian Energy Regulator (AER) approved a \$5.0 million Demand Management Innovation Allowance (DMIA) to spend over the 2015-2020 regulatory period. The purpose is for Ergon Energy to invest in understanding future demand management issues. The budget for 2017-18 was \$1.0 million. In 2017-18 Ergon Energy spent \$0.26 on a range of DMIA projects including:

- Technology as an enabler to cost reflective tariffs;
- Alternative demand response enabling devices;
- Energy storage systems; and
- Alternative communications systems to enable demand management.

## Introduction

### About Energy Queensland

Energy Queensland came together as a Group in June 2016 to build on our proud history of powering Queensland and create a community-focused energy business ready for the future.

The group includes two electricity distribution network Energex in the south east and Ergon Energy regional Queensland. Both Energex and Ergon build, operate and maintain the 'poles and wires' that bring power to the end use customers' homes and business across Queensland.

#### Network

The group includes two electricity distribution network Energex in the south east and Ergon Energy regional Queensland. Both Energex and Ergon build, operate and maintain the 'poles and wires' that bring power to the end use customers' homes and business across Queensland.

- Our network has:
- 2.2 million connected customers
- 220,000 km of powerlines
- 1.7 million power poles
- 498,500 solar energy systems connected delivering 1,338MW of generation capacity
- 34,482 GWh electricity delivered a year
- Peak demand: 4,920 MW south east Queensland and 2,601 MW regional Queensland

#### Retail

Our retailer (Ergon Energy Queensland Pty Ltd) buys electricity from the generators, through the market and direct negotiations, and on-sells it to our customers throughout regional Queensland.

- Over 700,000 retail customers in regional Queensland.

#### Energy Services

To ensure we are able to meet the unique and diverse needs of our communities and customers we are evolving our unregulated or contestable products and services in the market.

- Metering Dynamics delivering multi-utility metering, information and energy measurement solutions.
- Nexium Telecommunication supports the Groups' communication needs.
- Energy Impact enables us to expand in a variety of ways beyond traditional electricity distribution and retail services through the use of distributed energy resources.

As a state wide service provider, our diverse network services the state's south east, with highly interconnected systems, and regional Queensland, with infrastructure that is largely radial in design. Three quarters of our regional network is considered rural – traversing large distances between communities with only small numbers of customers for each kilometre of powerline.

## About Ergon Energy

Ergon Energy is a subsidiary of Energy Queensland. Ergon Energy supplies electricity to over 733,000 residential and business customers across a vast operating area of over one million square kilometres – around 97% of the state of Queensland – from the expanding coastal and rural population centre's to remote communities of outback Queensland and the Torres Strait. Our electricity network consists of approximately 160,000 kilometres of powerlines and one million power poles, along with a range of associated infrastructure such as major substations and power transformers. We also own and operate 33 stand-alone power stations that provide supply to isolated communities across Queensland, which are not connected to the main electricity grid.



# Demand Management Outcomes Report 2017-18



Table 1 Overview of Ergon Energy of network

Key network statistics	Current	Forecast
No. Connections Supplied	759,185	Low growth
Annual Energy Delivered	13,243GWh	Steady
Summer Peak Demand	2.6GW	Low growth
Demand Under Controlled Load Tariffs	203MW	Slow decrease due to changing customer values and needs
Demand Under Contractual Control	27MW	Maintain where appropriate
Solar Energy Systems – Residential	>133,000 systems	Medium growth
Large Scale Solar Farms	132.9MW connected	Rapid growth
Energy Storage	~1,266	Emerging market
Electric Vehicles	164	Emerging market

## About Ergon Energy's Demand Management

Demand management has long been seen as a key tool to managing our costs and network risks, through non-network solutions.

Each year Ergon Energy publishes a Demand and Energy Management Plan to engage and inform our stakeholders of our activities and strategies for demand management. The Demand Management Plan for 2017-18 outlined the following programs which would be delivered:

- Target Area incentive program;
- Utilisation initiatives to support efficient use of the network;
- Maintenance of existing non network alternative contracts
- Capability initiatives to support the future program of work; and
- Innovation using the Demand Management Innovation Allowance (DMIA).

## Compliance and Regulation

This is Ergon Energy's report on its performance against Ergon Energy's Demand Management Plan 2017-18 (the Report).

Ergon Energy's 2017-18 Demand Management Plan was submitted to the Department of Energy and Water Supply (the Regulator, DEWS) , now known as the Department of Natural Resources, Mines and Energy (DNRME) to comply with section 127C(4) of the Electricity Regulation 2006 (the Regulation). In accordance with section 127D of the Regulation, DEWS approved Ergon Energy's 2017-18 Demand Management Plan on 31 May 2017.

The report has been drafted to ensure compliance with the Electricity Regulation 2006. Under section 127H of the Regulation, Ergon Energy, as the holder of a Distribution Authority is required to submit to the Queensland Energy Regulator an annual report comparing details of the following:

- The proposed initiatives stated in the entity's approved Demand Management Plan for the prior year.
- The actual initiatives the entity carried out in the year.

The report satisfies all the requirements specified in the Regulation. Table 2 sets out where each requirement has been met in the Report.

Table 2: Regulation requirements

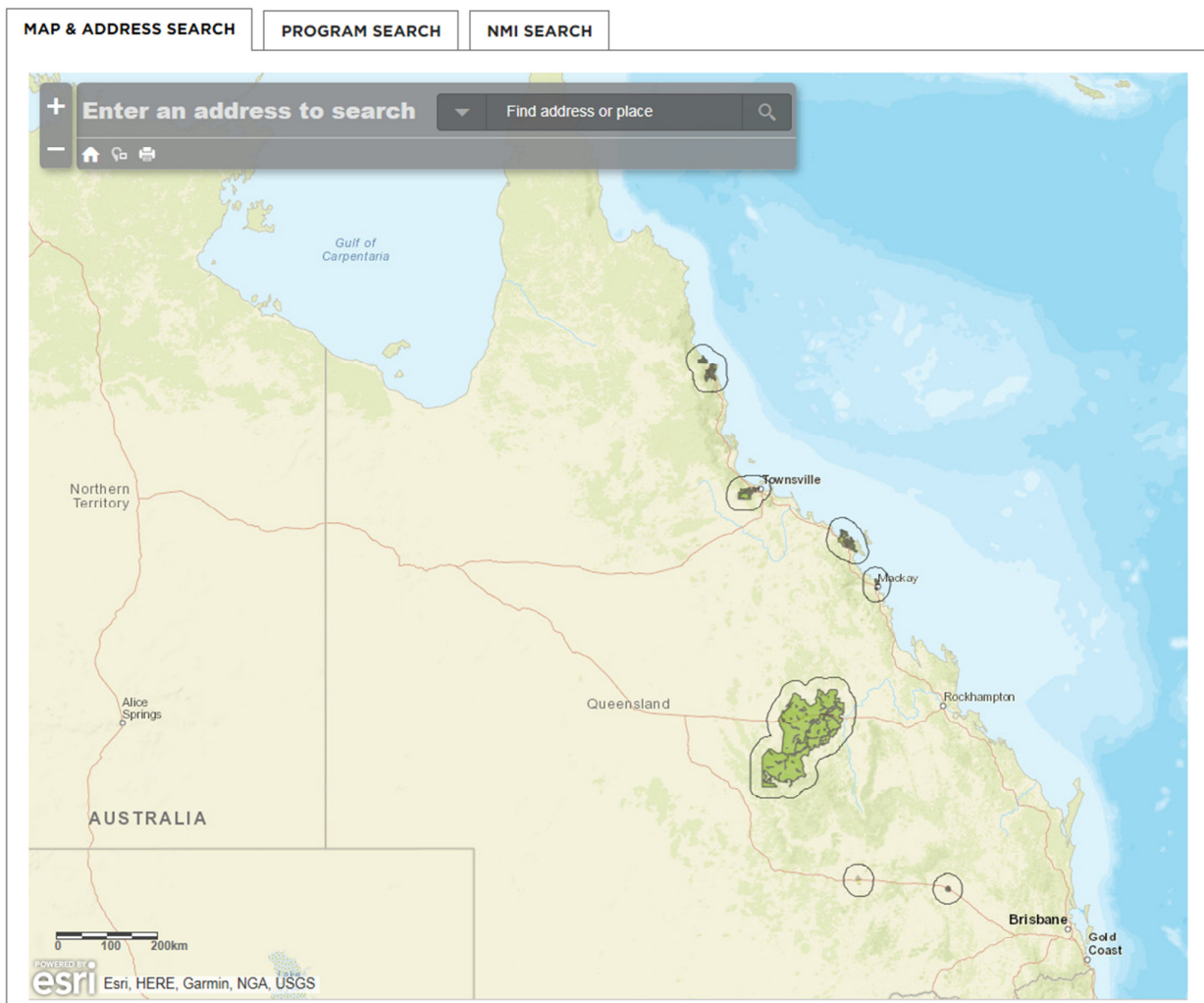
Section	Compliance obligation	Compliance
127G	The distribution entity must use its best endeavours to comply with its approved Demand Management Plan.	Requirement met. This is set out throughout the Report.
127H(1)	Ergon Energy must, for each financial year, prepare a report comparing: The proposed initiatives stated in the entity's Demand Management Plan. The actual initiatives carried out in each year.	Requirement met. The submission of this Report satisfies section 127H(1).
127H(2)	Ergon Energy must provide a copy of the report on or before 31 August in the following financial year.	Requirement met through lodgement with DEWS by 31 August 2017.

## 2017-18 Performance

Ergon Energy is delivering the yearly DM targets at a lower cost than originally budgeted with a 2017-18 expenditure of \$4.4 million against a budget of \$8.1 million. The program for 2017-18 was delivered at an overall program efficiency of \$154/kVA.

### Target Area Incentive Program

Incentives are available to eligible customers in selected areas (Target Areas) to reduce electricity usage at peak demand times. This program is based on the Optimal Incremental Pricing (OIP) methodology. Demand management incentives help to reduce peak demand, deferring costly network infrastructure upgrades to help minimise electricity price increases for everyone. Information on the incentives and areas is available on the Ergon website:



<https://www.ergon.com.au/network/manage-your-energy/incentives/search-incentives> to

The OIP methodology for demand management acquisition has achieved lowest cost outcomes but the Target areas continue to work below the levels of demand anticipated. There are learnings to be

employed with regards to improved communication of the programs, creating a more robust feedback loop of any successes into the OIP methodology. Opportunities to review the incentive values available for demand management acquisition are also part of the mix to impact the success rate of these programs

Program	Description	Sub-programs	Status
Target Areas	All programs are published on our Ergon Energy Incentives map.	<b>Townsville North and West area</b>	Active
		Program actively contracting demand throughout 2017-18.	
		Two operational programs currently active.	
		<b>Mackay South area</b>	Active
		Program actively contracting demand throughout 2017-18	
		<b>Cannonvale area</b>	Active
		Program actively contracting demand throughout 2017-18	
		<b>Cairns Northern Beaches</b>	Active
		Program actively contracting demand throughout 2017-18	
		<b>Cairns South</b>	Active
Safety Net Program	Develop the practices, contracts and products to support Safety Net risk mitigation in conjunction with network operations.	Program introduced after risk reviews	
		<b>Mackay Northern Beaches</b>	Active
		Program actively contracting demand throughout 2017-18	
		<b>Emerald</b>	Active
		Program actively contracting demand throughout 2017-18	
		<b>Harvey Bay</b>	Pending
		Program remained pending subject to other proposed research initiatives.	
		<b>Chinchilla</b>	Active
		Program actively contracting demand throughout 2017-18	
		<b>Roma</b>	Pending
		Program pending with network risk reviews and customer demographic modelling.	
		Embedded generation contracts delivered to support quick restoration of supply within regulatory requirements.	Active

Program	Description	Sub-programs	Status
<b>Voltage Program</b>	<p>Develop and implement a product that enables business-as-usual demand side responses to voltage risks as an alternative to network augmentation.</p> <p>These programs will include: Local programs, specific to individual customers and Large scale programs, leveraging solar farm inverters to provide network voltage support.</p>	Network embedded generation delivered to support voltage and power quality issues at different locations on the network.	Active

## Utilisation initiatives to support efficient use of the network

Utilisation initiatives aim to influence energy volumes and customer load profiles to improve network utilisation. In 2017-18 dedicated expenditure on utilisation initiatives was put on hold whilst the Ergon Energy and Energex Demand Management programs aligned. Any future initiatives will be considered as part of the Energy Queensland Future Grid Roadmap. Whilst there is no specific utilisation program at present, Ergon Energy has continued to promote activities which have the potential to improve network utilisation. Recent activity has seen the creation of the Developers Energy Guide (Building a Smart Energy Home) promoting the all-electric house. The potential for Electric Vehicle utilisation of the network is also an opportunity under review.

Program	Description	Objective	Outcomes
<b>Utilisation Program Establishment</b>	Increase the utilisation of the network by encouraging shaped customer load profiles.	<p>Develop products including pricing, systems and practices for enabling increased utilisation through using the network in off-peak times.</p> <p>Develop products suitable to encourage commercial and industrial usage with shaped load profiles to optimise the network.</p>	<p>Program closed. Utilisation being considered as part of the Energy Queensland Future Grid Roadmap.</p>
<b>Electric Vehicles</b>	Electric vehicles provide a unique opportunity for increasing the utilisation of the network while providing our customers choice of transport.	Support initiatives that increase the adoption rate of EVs and off peak charging, such as the Energy Queensland electric vehicle charger roll out.	Program closed. EV strategy being developed for Energy Queensland.
<b>Focused Utilisation Program</b>	Increasing the use of network assets in areas where new connections can improve utilisation.	Develop incentive pricing methodology, product offerings to enable new load where there is available network capacity.	Program complete. Business as usual use of developer handbook.
<b>Utilisation wholesale product</b>	Enable a systemised utilisation program across the network.	Develop a product to increase utilisation and the wholesale channels to market.	Program closed. Learnings from Energex battery trials are being incorporated to inform industry consultation

## Maintain the operation of existing contracts

These initiatives support existing contracts where there is an on-going network support contract with a customer or aggregator in operation. These programs have demand under management that is available for dispatch at any time for network risk mitigation. Much of this demand is large embedded customer generation and is supporting large capacity constraints.

Program	Description	Outcome	MVA contracted
<b>Gordonvale</b>	Contracted demand at the sugar mill in the Gordonvale-Mt Peter area to support peak demand and load growth in the southern Cairns growth corridor.	Objective maintained	2.47MVA
<b>Dingo</b>	Support of voltage constraints on the Dingo network derived from customer contracted embedded generation.	Objective maintained	0.07MVA
<b>Mt Isa</b>	Network support for the Mt Isa network derived from customer and network embedded generators.	Objective maintained	1.743MVA
<b>Alpha</b>	The Alpha network from Barcaldine has voltage constraints and is supported by an integrated network embedded generator.	Objective maintained	1MVA
<b>Malanda</b>	Customer embedded generator contracted to support the reduction of load in the Malanda area for network contingency requirements.	Objective maintained	1.4MVA
<b>Moranbah</b>	Customer embedded generators to support reduction from the Moranbah substation.	Objective maintained Contract expired in Feb 2017	N/A
<b>Barcaldine</b>	Network embedded generator enabled to support the Barcaldine area during network outages.	Objective maintained	20MVA
<b>Dajarra</b>	Network embedded generator in the Dajarra area for supporting voltage and outages.	Objective maintained	0.25MVA
<b>Kajabbi</b>	Network embedded generator in the Kajabbi area for supporting voltage and outages.	Objective maintained	0.10MVA

## Capability initiatives to support the future program of work

Capability building initiatives are designed to enable the future activities of the demand and energy management program by testing new concepts, building the necessary systems and processes and evaluating options that support future network risk reductions. These initiatives are designed to enable our Demand and Energy Management program to continue to evolve with the changing operation environment.

Program	Description	Objective	Outcomes
<b>Cost Reflective Tariffs</b>	Enable and encourage consumer uptake of cost reflective tariffs.	500 customers on new cost reflective tariffs.	Project closed. 546 residential and business customers switched to a seasonal time of use demand tariff. Cost reflective tariffs are now being progressed via the 2020-2025 Tariff Structure Statement.

# Demand Management Outcomes Report 2017-18



Program	Description	Objective	Outcomes
<b>Wholesale Products</b>	Enable retailers and market participants to leverage wholesale demand value to participate in demand outcomes.	Deploy one wholesale product.	Project continuing. New product opportunities continually under review No new wholesale (network) products launched in 2017-18. Learnings from Energex battery trials are being incorporated to inform industry consultation and way forward.
<b>Tariff controlled load</b>	Maintain or grow the volume of controllable load.	Deliver one wholesale product to market.	Project continuing. Research undertaken to determine how often control load tariffs are removed when solar PV is connected. Survey of solar installers undertaken to understand drivers for removal of loads from off peak tariffs. Trial of off peak tariffs for small agricultural customers commenced.
<b>230Volt rollout</b>	Evaluate use of international standard 230V (+10/-6%).	Acceptance by stakeholders and 230V supply implementation as standard.	Project completed. 230V trial completed, with the Queensland Government confirming a change in voltage from 240 volts to 230 volts across the State.
<b>Alternative Supply Arrangements</b>	Investigate using alternative supply arrangements for some network elements.	Engagement of key internal and external stakeholders in the potential use of alternate supply and development of business model.	Project continuing. Alternative supply arrangements are being implemented for a number of locations on the network.
<b>ADMD Phase 2 Calculator</b>	Development and validation of a tool to model expected After Diversity Maximum Demand (ADMD) in greenfield developments.	Recommendations and options for business integration of the calculator, including other uses.	Project completed with recommendations made for future development of suitable model.
<b>Greenfield Developers Program</b>	Embed demand capabilities within housing stock and other urban developments.	Implementation plan. Promotion through key industry channels.	Program complete. Business as usual use of developer handbook.
<b>IPDRED</b>	Develop the next generation DRED to enable customer and retailer value.	Scope and define DRED specifications.	Project continuing on functional specification in light of AS/NZS4755.2
<b>SWER energy storage</b>	Evaluate the use of behind the meter energy storage and renewables for network support on SWER.	Target two customer sites on SWER for trial participation.	Project on hold and, waiting outcome of Western Zone analysis.
<b>Energex/Ergon Alignment</b>	Align Ergon Energy and Energex programs and develop joint capabilities to deliver future programs	Bi-monthly meetings of working group, program redevelopment	Project commenced. Joint Demand Management Plan .for Energex and Ergon approved by the Regulator for 2018-19.

## Expenditure against target for 2017-18

Demand and Energy Management Plan	Forecast Expenditure (\$'000)	Actual Expenditure (\$'000)	Plan Measure	Outcomes
Target Areas	\$2,547	\$1,662	\$500/kVA <sup>1</sup>	- <sup>2</sup>
Utilisation initiatives	\$1,200	\$0	\$0.50/kWh <sup>3</sup>	- <sup>4</sup>
Maintenance initiatives	\$2,531	\$2,379	Maintain demand under control	Maintained in accordance with contracts
Capability	\$874	\$120		
DMIA initiatives <sup>5</sup>	\$1,000	\$262		
<b>TOTAL</b>	<b>\$8,152</b>	<b>\$4,423</b>		

The PeakSmart air-conditioner program, previously only available in target areas, was expanded to the majority of Ergon Energy's network supply area, effectively becoming a broad based program. This program required once-off start-up expenditure on equipment, marketing and communications. This expenditure is currently reported against the target areas, however it will be reported against broad based activity in future reports. The incentive efficiency target of \$500/kVA was based on a targeted program and the introduction of a broad based PeakSmart program, part way through 2017-18, represents a material program change. For this reason, it is not appropriate to report on the measure for 2017-18.

Our program in 2017-18 had significant underspends as compared to the forecast budget due to several reasons as indicated below.

### Target areas program:

1. The program is still developing appropriate marketing and promotion activities to raise awareness with our market providers and customers in these areas, as this marketing program matures we expect the awareness in market to increase the uptake of incentives.
2. The low uptake of demand management and therefore expenditure on incentives is an expected outcome of the underlying Optimised Incentive Program design. The incentive rates are expected to increase in subsequent years which should drive more uptake based on the price-sensitivity of the market
3. The PeakSmart air conditioning program was launched half-way through the financial year in December 2017 and is still in development, resulting in a lower than expected uptake of incentives.

<sup>1</sup> Incentive efficiency

<sup>2</sup> Incentive efficiency performance impacted by introduction of broad based PeakSmart and therefore not reported this year

<sup>3</sup> Based on forecast annual additional volume enabled without augmentation, excluding program establishment costs.

<sup>4</sup> Utilisation expenditure put on hold as Energy Queensland reassessed the joint Demand Management program direction

<sup>5</sup> Demand Management Innovation Allowance programs do not have targets as the programs are research programs.

## Utilisation initiatives:

In 2017-18 dedicated expenditure on utilisation initiatives was put on hold whilst the Ergon Energy and Energex Demand Management programs aligned. Any future initiatives will be considered as part of the Energy Queensland Future Grid Roadmap.

## Maintenance initiatives:

These initiatives generally involve the direct contract of generation whereby the cost of the program is impacted directly by per-use agreements. Over the past 12 months the individual contracts were not operated as much as was allowed for, resulting in an overall lower program cost.

# Innovation

Our demand management innovation program is funded under our Demand Management Innovation Allowance, which is set by the AER for the development of demand management capabilities and knowledge.

While it is reported on separately, we are presenting a snapshot of the innovation activities below, as planned for the coming years. These will help develop our demand and energy management capabilities and will inform future initiatives.

Activities	Scope	Status
<b>LPWAN</b>	To test the use of Low Power Wide Area Networks for controlling demand in residences including residential hot water and PeakSmart appliances.	Projected completed. An IoT network and IoT load control devices installed and tested in selected homes in Townsville. Findings will inform long term approach.
<b>Centralised Energy Storage</b>	To develop the integrated network control systems and to test and validate those control systems for utilising network connected large scale energy storage integrated with renewable energy systems.	Project continuing. Stage 2 is currently underway with development of control algorithms, simulation models and engagement with the original manufacturer to help expand device functionality
<b>Residential Home Energy Management</b>	To develop a standard residential home energy management product and test the interaction, business models and performance of the systems under various tariff arrangements and validate the demand benefits from the systems and the interface capabilities between the systems and the network's control systems.	Project completed, with successful installation and testing of a next generation Home Energy Management System in the Cairns Innovation Laboratory.
<b>ADMD Calculator</b>	Evaluate an After Diversity Maximum Demand calculator tool for its accuracy in representing Maximum Demand, its ability to support developers in estate and housing design and integrate demand management into the building envelope.	Project completed. Completed with recommendations made for future development of suitable model.
<b>Value of Smart Meters</b>	To explore the value of smart meters and integration into Ergon Energy systems for enabling customer value, new tariffs and providing a richer source of network modelling data,	Project completed, with 1,500 meters deployed. Data will be used for analytics.

Activities	Scope	Status
<b>Feeder of the Future</b>	This project will apply in a real network environment many of our planned activities to validate the interactions between technologies, go to market methodologies, capability gaps and systems interactions.	Project completed. A preliminary customer load model was developed can be used to simulate the effects of battery systems and other loads on aggregate feeder load profiles
<b>Residential Energy Storage</b>	To test the price uptake points and the ability for energy storage to deliver network, consumer and retail benefits.	Project on hold. Battery storage incentives now being considered as part of the Energy Queensland Future Grid Roadmap.
<b>Solar Education</b>	Test using a customer education approach to maximise customer use of the energy generated during the day from solar rather than exporting back to the grid.	Program on hold, with solar education being considered as part of the Energy Queensland Future Grid Roadmap
<b>Integrated Customer Network Control</b>	To develop and validate control algorithms for controlling network performance on a localised basis and protecting against voltage and capacity excursions.	Program on hold, with load control being considered as part of the Energy Queensland Future Grid Roadmap.
<b>Customer Islanding Modelling</b>	To model the ability to island and re-join customers from the network in order to ensure network stability. The project will investigate both singular and micro-grid scenarios.	Program on hold, islanding being considered as part of the Energy Queensland Future Grid Roadmap.
<b>Advanced Communications</b>	To test the use of emerging internet based low costs communications systems for demand and energy management systems and to validate the cost benefit of such systems.	Program on hold, with communications. Being considered as part of the Energy Queensland Future Grid Roadmap.
<b>Direct Inverter Control</b>	To develop a control method and business model for interfacing to customer inverters in order to manage network security and stability.	Program on hold, with control of distributed energy resources being considered as part of the Energy Queensland Future Grid Roadmap.

The AER approved an allowance of \$5 million for the 2015-2020 regulatory period, which equates to around \$1 million per year. DMIA Projects have separate funding to Energex's Demand Management program.

## Expenditure 2017-18

The budget for DMIA projects for 2017-18 was \$1.0 million. Actual expenditure on DMIA projects was \$0.26 million. Details on actual spend for each project is included in Table 3.

Table 3: DMIA expenditure for 2017-18 and progress to date

Demand Management Innovation Allowance Activities	2017-18 Expenditure (\$'000)
Alternative communications LoRa	\$15
Technology and cost reflective tariffs. Grid advocacy	\$156
Large scale energy storage. Central energy storage	\$25
ARC Customer response and risk management	44
Large scale energy storage Lakeland	\$11
Home energy management systems	\$0
Alternate Demand Response Enabling Device	\$11
<b>TOTAL</b>	<b>\$262</b>

## Appendices

### Appendix A. 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
ARENA	Australian Renewable Energy Agency
ASI	Australian Solar Institute
ASL	Applied Superconductivity Lab
AUSTELA	Australian Solar Thermal Energy Association
AutoDR	Automated Demand Response – or another name for the commercial energy management system, which is the process of managing customer demand automatically
BAC	Brisbane Airport Corporation
CBD	Central Business District
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Constraint	A condition whereby a limit, that has been pre-set to a declared criteria, is exceeded.
CSP	Concentrated Solar Power
CST	Concentrating Solar Thermal
CTIP	Clean Technology Innovation Programme
CVR	Conservation Voltage Reduction
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 Side Management (DSM)	Demand Side 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.
DF	Distribution Feeder
DLC	Direct Load Control
DMIA	Demand Management Innovation Allowance
DMIS	Demand Management Incentive Scheme
DNSP	Distribution Network Service Provider
DR	Demand Reduction – amount of electrical load that can be removed for a period of time
DRED	Demand Response Enabling Device
GIA	Guided Innovation Alliance
GUSS	Grid Utility Support System
HID	High Energy Discharge Light usually Mercury Vapour or High Pressure Sodium
HTS	High Temperature Superconducting
ICC	Ipswich City Council

LCoE	Levelised Cost of Energy
LED	Light Emitting Diode
LRL	LED Roadway Lighting
LV	Low Voltage – 240V or the voltage used in residential houses
MD	Maximum or Peak Demand
NEM	National Electricity Market
NER	National Electricity Rules
NPV	Net Present Value
Network Limitations	<p>A network limitation can be defined as a situation when the high voltage network is unable to supply electricity to the customer in accordance with the following supply standards.</p> <p>Network limitations which relate to system peak loading are:</p> <ul style="list-style-type: none"> <li>(i) Acceptable standards of reliability of supply cannot be maintained.</li> <li>(ii) Acceptable network voltage levels cannot be maintained.</li> <li>(iii) The thermal rating of plant and equipment is exceeded.</li> <li>(iv) The fault rating of equipment is exceeded.</li> <li>(v) The age, condition or specifications of equipment renders its continued use operationally unsafe, unreliable or uneconomic</li> </ul>
PF	Power factor. The ratio of active power to apparent power. A unity power factor indicates no reactive power in the element.
PV	PV stands for Photo Voltaic which is a technical term for solar power generation.
QUT	Queensland University of Technology
RAG	Red Amber Greed, project rating
RIN	Regulatory Information Notice
SEM	Solar Energy Management System
Statcom	Static VAR compensator
SVR	Smart Voltage regulator
SWER	Single Wire Earth Return. Distribution to customers using a single wire conductor with the greater mass of Earth as the return path.
TCC	Townsville City Council
UG	Underground electrical network construction.
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