

Energex Demand Management Plan Performance Report 2016-17

August 2017



positive energy



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1. Executive summary

Energex'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 2016/17 the Positive Payback Program provided financial incentives to over 20,000 residential households that connected economy tariffs or installed PeakSmart to reduce energy use during network peak demand. In addition, over 70 projects were completed for businesses to achieve energy efficiencies and reduce peak demand.

So Energex set a target of 22.4 MVA through this program and achieved an actual peak load reduction of 29.6 MVA. Refer to Peak load reduction in section 4, 2016/17 Performance.

Additionally, the Demand Management program achieved its MVA target under the budgeted spend. The total spent was \$14.0 million compared to the budgeted spend of \$17.0 million. \$3.0 million remained unspent.

The underspend in operating expenditure is due to lower uptake of hot water and pool incentives and limited opportunities for load reduction for business customers in the eligible areas. There was also an underspend in capital expenditure due to the requirement of an over optimistic forecast for the purchase of PeakSmart devices for air-conditioning program. Refer to section 4, 2016/17 performance.

In addition, 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 Energex to invest in understanding future demand management issues. The budget for 2016/17 was \$1.4 million. In 2016/17 Energex spent \$0.4 on four DMIA projects:

- Battery energy storage systems (BESS) trial
- Real time tariff study
- Low voltage network power system static estimation project
- Solar enablement initiative.

2. Introduction

About Energy Queensland

On 1 July 2016 Energy Queensland was created with the merging of Ergon Energy and Energex. The combined business includes the two electricity distribution networks, Ergon Retail, the businesses' ICT provider SPARQ Solutions and a new energy services business.

Energy Queensland is the largest electricity distribution company in Australia, covering the entire state of Queensland with over \$24 billion in assets.

We connect and supply electricity to 2.1 million customers across Queensland. Our network has:

Network

- 33 isolated power stations
- 72 bulk supply points
- 571 zone substations
- 1.7 million km² geographic area covered
- 205,000 km of electricity network (overhead and underground).

Retail

We sell electricity to more than 700,000 customers in regional Queensland.

Energy Services

The energy services business is key to ensuring that Energy Queensland is able to meet and adapt to changes and developments in the rapidly evolving energy market.

The energy services business will provide a range of products and services to give customers greater control over their energy use and access to new and emerging technologies. The energy services business will build on existing partnerships and establish new partner relationships to deliver products and services to customers.

The driving force behind the merger is to make the electricity sector more efficient and to create an energy business ready for the future. Energy Queensland's vision is to:

“We Energise Queensland Communities”

Increasingly, customers have choice in the way they have electricity services delivered. New energy technologies in batteries, renewables and energy management systems introduce customer choice and control over energy consumption that was previously not possible.

Energy Queensland must respond to customers' changing energy needs by focusing on innovative products and services that meet the needs of our customers. Energy Queensland's purpose is to safely deliver secure, affordable and sustainable energy solutions with our communities and customers and values are:

- Safe
- Knowledgeable
- Innovative
- Leading
- Listening
- Engaged
- Diverse



About Energex

Energex is a subsidiary of Energy Queensland. Energex builds, operates and maintains the electricity distribution network in the growing region of South East Queensland. Energex's network spans approximately 25,000 square kilometres and provides distribution services to almost 1.4 million residential and business connections servicing a population base of 3.4 million people in the region (refer Figure 1 and Table 1).

At the core of the Energex business are high performing assets worth approximately \$12 billion, the expertise of our employees and a drive to provide customers with energy solutions that are safe, reliable, economically affordable, socially and environmentally acceptable and sustainable. As a distribution network service provider Energex operates under regulations established at both national and state levels.

The electricity network in South East Queensland

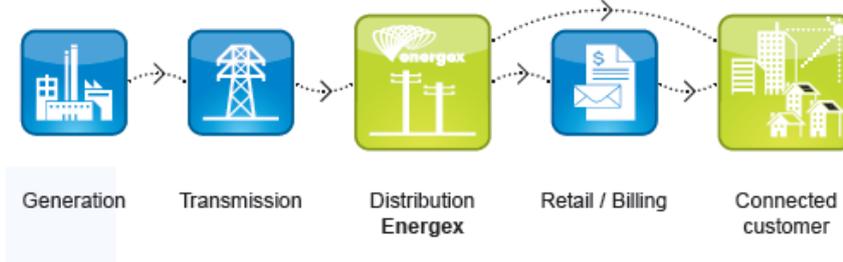


Figure 1: Energex network area

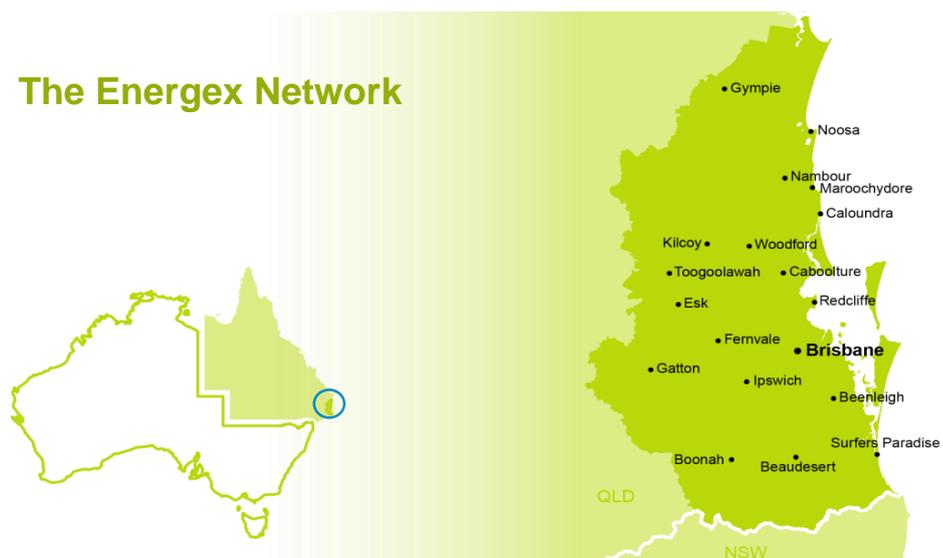


Table 1: Overview of Energex of network

Estimated population	Approximately 3.4 million people.
Customers	Approximately 1.4 million residential, commercial and industrial customers.
Network area	Approximately 53,000 kilometres of overhead and underground lines.
Energy delivered	21,141 GWh annually
Summer peak demand	4,633 MW ¹
Solar Photovoltaic (PV) connected to the network	Approximately 317,000 solar PV systems connected across South East Queensland with installed capacity of more than 1,126 MW.
Battery energy storage systems	Currently there are over 160 ² batteries installed on the Energex network, mainly with residential customers located in rural areas.
Electric Vehicles (EVs)	It is estimated that approximately 250 fully electric vehicles are being charged on the network.

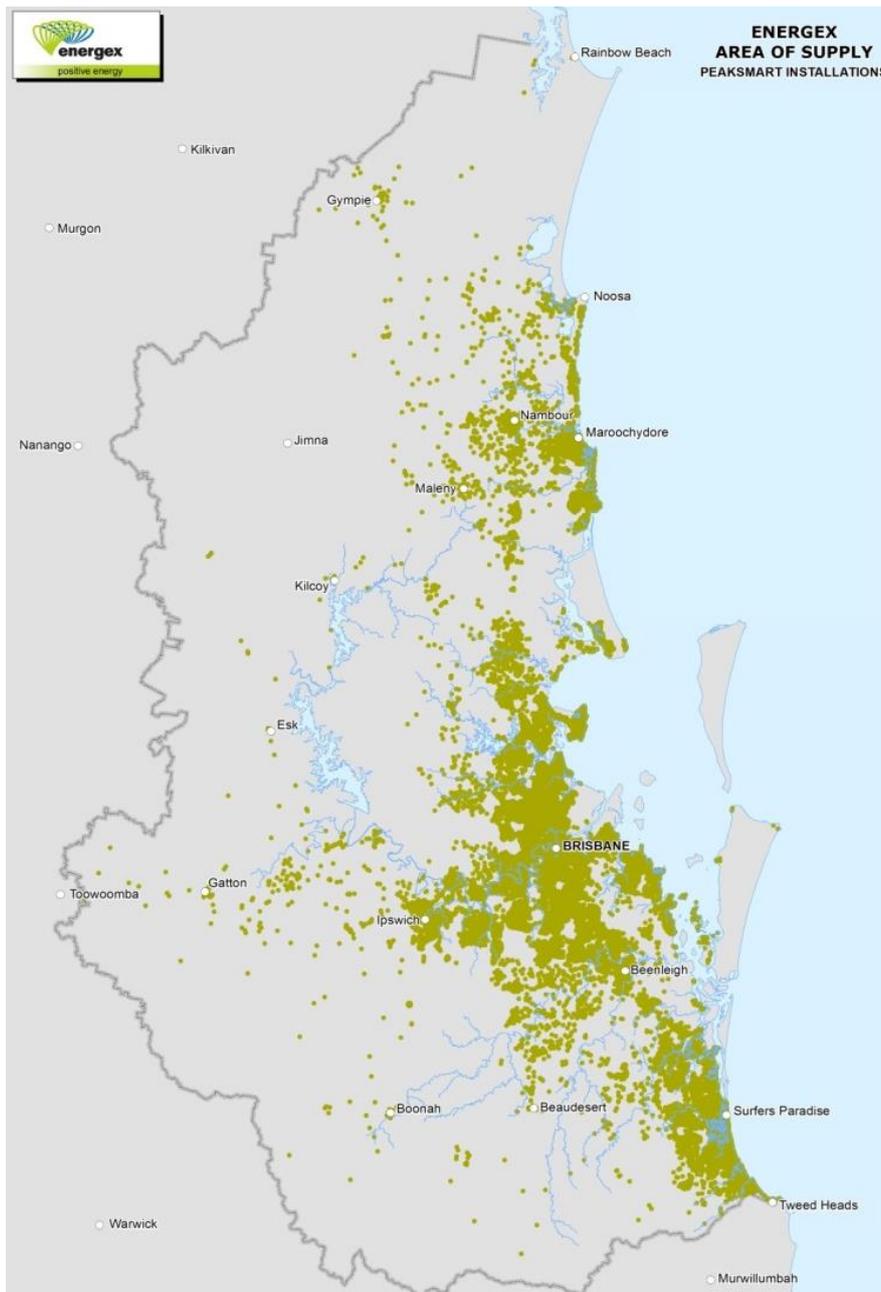
¹ Peak demand for 2015/16.

² Potentially there are more than 160 batteries on the network. There is currently no requirement for customers to inform Energex when a battery is installed.

About Energex's Demand Management program

Energex operates a very successful DM program which has facilitated the development of a market for DM products and services (including air-conditioning and power factor correction). Customers have responded strongly and embraced the choice and cost savings that Energex's DM programs offer through discounted tariffs and direct incentives.

Figure 2: PeakSmart air-conditioners installed on the Energex network



Positive Payback program

Positive Payback is our flagship DM program that rewards households and businesses that help us manage demand. Table 2 and Table 3 provide further detail on this program.

Table 2: Positive Payback program



The program provides incentives to households that connect electric hot water systems, pool pumps and PeakSmart air-conditioners to the Energex load control system. The program is supported by manufacturers, retailers, installers and builders.

PeakSmart air-conditioning

PeakSmart air-conditioners have a small signal receiver installed in the air-conditioner capping its energy consumption when the network reaches peak demand.

Over 70,000³ installed on Energex's network. Refer to Figure 2 which shows areas where PeakSmart air-conditioners have been installed.

Hot water systems connected to a controlled load tariff

Load control of hot water reduces peak demand and can be used to increase load during the day to absorb solar PV output.

Approximately 770,000 residential customers with hot water connected to a controlled load economy tariff.

Pool pumps connected to a controlled load tariff

Pool pumps connected to a controlled load tariff are operated outside of peak demand periods.

Approximately 28,000 pool pumps are connected to a controlled load economy tariff.

Table 3: Positive Payback for Business



This program offers incentives* to small, medium and large businesses that are located in an eligible area and install or upgrade equipment/appliances that reduce onsite peak electricity demand. Energex works with suppliers, industry associations, aggregators, energy retailers and national brands (with multiple premises) to access businesses in eligible areas.

Power factor correction (PFC)

Power factor is the measure of how effective incoming power is being used at a site. This can be improved by installing capacitor banks to correct energy supply inefficiencies and reducing peak demand.

Approximately 500 power factor correction installations.

Energy efficiency

Peak demand reduction through replacement/upgrade of lighting, motors, refrigeration and building management systems.

Approximately 230 installations or upgrades that lowered onsite peak electricity demand.

*Refer to the Energex website Positive Payback program pages for full terms and conditions, program details and reward values.

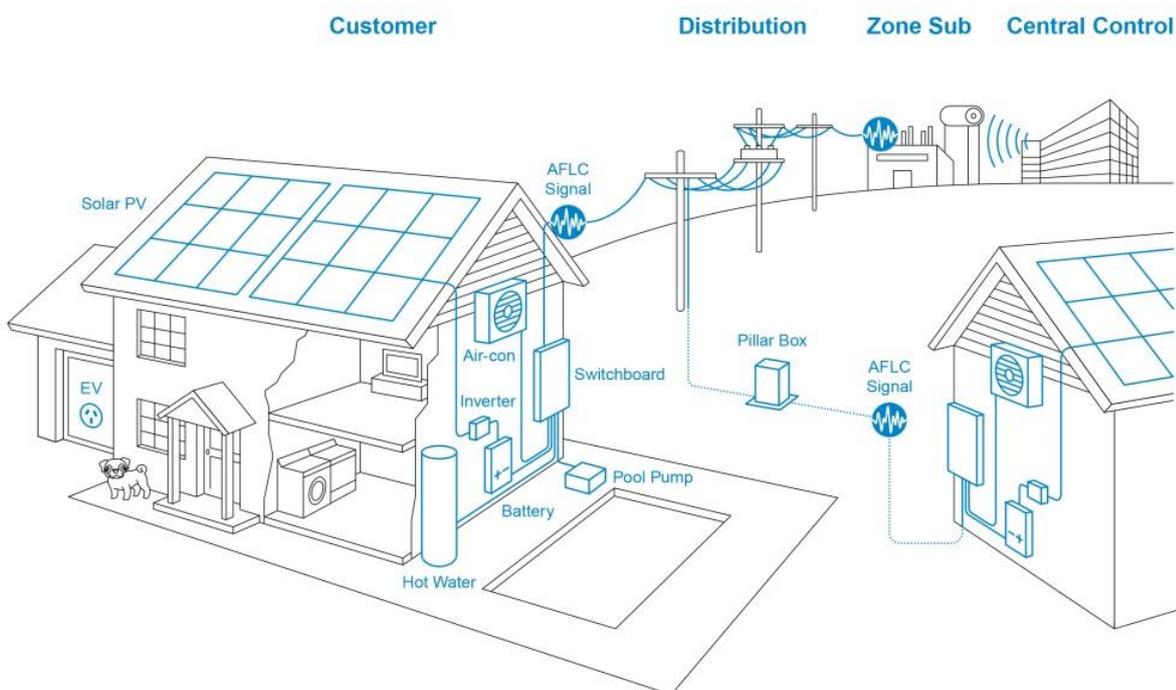
³ Not all customers who install a PeakSmart air-conditioner claim a reward. This figure is an estimate of the number of PeakSmart air-conditioners connected to the network.

Audio frequency load control

Current demand management solutions rely on Energex's ripple audio frequency load control (AFLC) system, which operates by the injection of a high frequency (1042 Hz) coded signal onto the high voltage network at Energex zone substations, to send signals to participating households. Through AFLC, loads at the customers' premises are controlled (turned off and on, or their consumption reduced) from a centralised system for the purpose of reducing localised demand at a zone substation level (refer Figure 3).

This AFLC system has been used to control hot water load since 1956 and more recently to control pool pumps and air-conditioners. The load control system is integrated with Energex's Distribution Management System and is able to deliver scheduled and ad hoc control signals to manage peak demand. This system is robust, capable of meeting the needs of the network business at a very low cost and expected to maintain an operational life for considerable time to come. This also allows Energex to deliver DM without the need for smart meters. Energex continually assesses new technologies to determine if they are able to complement or potentially replace the AFLC system.

Figure 3: Sending DM signals to customers



3. Compliance and regulation

This is Energex's report on its performance against Energex's Demand Management Plan 2016/17 (the Report).

Energex's 2016/17 Demand Management Plan was submitted to the Department of Energy and Water Supply (the Regulator, DEWS) on 14 April 2016 to comply with section 127C(4) of the Electricity Regulation 2006 (the Regulation).

In accordance with section 127D of the Regulation, DEWS approved Energex's 2016/17 Demand Management Plan on 20 May 2016.

The report has been drafted to ensure compliance with the Electricity Regulation 2006. Under section 127H of the Regulation, Energex, as the holder of a Distribution Authority is required to submit to the Queensland Energy Regulator, Department of Energy and Water Supply 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 4 sets out where each requirement has been met in the Report.

Table 4: 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)	Energex must, for each financial year, prepare a report comparing: a) The proposed initiatives stated in the entity's Demand Management Plan. b) The actual initiatives carried out in each year.	Requirement met. The submission of this Report satisfies section 127H(1).
127H(2)	Energex 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.

4. 2016/17 performance

Energex is delivering the yearly DM targets at a lower cost than originally budgeted. In 2016/17 Energex budgeted to spend \$17.0 million, comprising of operating expenditure of \$12.4million and capital expenditure of \$4.6 million, to deliver a peak load reduction of 22.4 MVA.

Peak load reduction

Energex has successfully exceeded its peak load reduction target of 22.4 MVA for the Demand Management program in 2016/17. The actual peak load reduction achieved for 2016/17 is 29.6 MVA. A breakdown of the indicative target and actual MVA delivered are included in Table 5. The actual MVA reduction includes 5.8 MVA for Demand Management Development from load optimisation which was not initially targeted as there was a greater focus on the Residential and Business programs.

Table 5: MVA reduction for 2016/17 Demand Management program

Program	Indicative target MVA	Actual MVA
Residential program	17.4	21.2
Business program	5.0	2.6
Demand Management Development	-	5.8
Total for DM program	22.4	29.6

Operating expenditure

The operating expenditure budget for the Demand Management program was \$12.4 million compared with actual spend of \$10.9 million for 2016/17. The breakdown of operating expenditure by program is detailed in Table 6. Explanations for the program underspend/overspend are provided in the upcoming sections for each program.

Table 6: Operating expenditure for 2016/17 Demand Management program

Program	Budget (\$,000)	Actual (\$,000)
Residential program	7,543.1	6,182.2
Business program	2,054.7	1,155.9
Bromelton	934.6	934.6
Demand Management Development	1,901.8	2,667.7
Total for DM program	12,434.2	10,940.4

Capital expenditure

For 2016/17, the capital expenditure budget for the Demand Management program was \$4.6 million compared with actual spend of \$3.1 million. The actual capital expenditure for the Demand Management program was below budget. This is due to the budget being calculated using an over optimistic forecast for the number of PeakSmart devices / Demand Response Enabling Devices (DRED) to be purchased in 2015/16 in addition to pre-purchasing approximately 6,000 DREDs in 2015/16. These pre purchased DREDs were issued for installation in the 2016/17. The breakdown of capital expenditure by program is included in Table 7.

Table 7: Capital expenditure for 2016/17 Demand Management program

Program	Budget (\$,000)	Actual (\$,000)
Residential program	4,562.7	2,963.7
Demand Management Development	-	141.1
Total for DM program	4,562.7	3,104.8

Cost to serve

Energex's Residential Demand Management program for 2016/17 was delivered efficiently at a lower cost to serve than the budgeted target cost to serve. This was due to a greater number of claims for larger air-conditioners (greater than 10 kW) resulting in a greater load reduction than originally budgeted.

The Business program was delivered at a higher cost to serve due to limited opportunities for kVA reduction in the current targeted areas as these have not changed during 2016/17.

There was no cost to serve target for Demand Management Development however 5.8 MVA was delivered as a result of load optimisation with a cost to serve of \$488 kVA for Demand Management Development. This is shown in Table 8.

Table 8: Cost to serve for 2016/17 Demand Management program

Program	Target \$/kVA	Actual \$/kVA
Residential program	\$695	\$431
Business program	\$411	\$452
Demand Management Development	-	\$488

5. Residential program

The Residential program rewards households that connect energy hungry appliances (e.g. electric hot water systems and pool pumps) to an economy tariff or install technologies that reduce demand during peak periods (e.g. PeakSmart air-conditioners).

The initiatives for the Residential program include:

- PeakSmart air-conditioners: a demand ready response air conditioner is enabled by a PeakSmart signal receiver. During demand events which may occur for short periods on a few days of the year, Energex sends a signal to the receiver to cap the energy used by the air-conditioner which continues to produce cool air without affecting the customers' comfort level.
- Pool pumps: connection of pool pumps to a controlled load tariff or the installation of an energy efficient pool pump.
- Electric hot water: connection of electric hot water systems to a controlled load tariff.

The program operates with the support of manufacturers, retailers, installers and builders. The program provides incentives to appliance retailers and installers for their support in encouraging customers to install PeakSmart air-conditioners.

Performance targets

The performance targets for the Residential program in 2016/17 were:

- To reduce peak load by 17.4 MVA.
- To deliver the Residential program at a cost of serve of \$695/kVA or less.

Table 9 provides details on the performance targets and opportunities for the Residential program in 2016/17.

Table 9: Performance targets and opportunities for the Residential program for 2016/17

Initiative	Description
PeakSmart air-conditioning	<ul style="list-style-type: none"> • Build on PeakSmart initiative through industry relationships • Increase instore promotion of PeakSmart • Increased focus on builders and developers to grow uptake in greenfield and brownfield areas • Continue to grow number of installers and specialty dealers • Continue to promote through third party partnerships • Raise awareness of new demand tariffs with key partners and stakeholders
Pool pumps	<ul style="list-style-type: none"> • Reward connection to controlled load tariffs

Initiative	Description
Electric hot water	<ul style="list-style-type: none"> Reward connection to controlled load tariffs Investigate opportunities for PeakSmart hot water on bulk metering Increase focus on builders and developers to grow uptake in greenfield and brownfield areas Raise awareness of new demand tariffs with key partners and stakeholders Continued implementation of alternative switching program to absorb solar PV output
Electric vehicles	<ul style="list-style-type: none"> Monitor and collate learnings on charging behaviour

Achievements in 2016/17

The Residential program target to reduce demand by 17.4 MVA was exceeded and the program was delivered at a lower cost to serve due to efficiencies from lower operating expenditure than originally budgeted. The program achieved the following:

Peak load reduction: The total load under control achieved for the Residential program was 21.2 MVA. This consists of:

- PeakSmart air-conditioners 20.9 MVA
- Swimming pools 0.1 MVA
- Electric hot water systems 0.2 MVA

Rebates: The total number of appliances rebated through the Positive Payback program in 2016/17 was 22,222. This consists of:

- PeakSmart air-conditioners 21,756
- Swimming pools 156
- Electric hot water systems 310

Cost to serve: The Residential program reduced peak load by 21.2 MVA and this was delivered at \$431/kVA which is lower than originally budgeted due to the MVA target being exceeded for the program.

PeakSmart air-conditioning: The PeakSmart air-conditioning initiative has grown by approximately 28% in 2016/17. This is reflected in the number of customers rewarded for the installation of PeakSmart air-conditioners during this period. The majority of the MVA reduction for 2016/17 Demand Management program was achieved from the customers installing PeakSmart air-conditioners.

The initiative is part of business as usual for Energex. Energex has continued to deliver this initiative through:

- Engagement with various industry channels including manufacturers, retailers, wholesalers, installers and other electrical contractors.
- Increased focused on engaging builders and developers to install PeakSmart air-conditioners which has proven to be successful as the proportion of rewards paid to builders and developers has increased in 2016/17.
- Partnering with two major appliance retailers to promote the PeakSmart air-conditioners as part of their advertising campaign.

Pool pumps: The Positive Payback program continues to reward customers that connect their pool pumps to a controlled load tariff, however take up has declined since 1 July 2015 with customers having to pay an upfront fee for connecting to a controlled load tariff. During 2016/17, 156 customers were rewarded for connecting to a controlled load tariff. This contributed to a load reduction of 0.1 MVA.

Electric hot water: The Positive Payback program continues to reward customers that connect their electric hot water system to a controlled load tariff, with a similar story to pool pumps where take up has declined as customers have to pay an upfront fee for connecting to a controlled load tariff. During 2016/17 310 customers were rewarded for connecting to a controlled load tariff. This contributed to a load reduction of 0.2 MVA.

Currently, Energex is investigating other opportunities on reducing demand through electric hot water systems. It is lobbying for manufacturers of electric hot water systems to incorporate demand response or DRED technology into electric hot water systems.

Electric vehicles: Energex is investigating opportunities to get a better understanding customer load profiles from charging of electric vehicles. Energex is in the preliminary stages of partnering with Wattblock to trial electric vehicle recharging in strata. Wattblock are investigating options for electric vehicle recharging solutions, while Energex seeks to gain an understanding of how electric vehicle charging stations impact the network.

Details on operating expenditure (budget and actual) for the Residential program are shown in Table 10. The actual operating expenditure of \$6.2 million was lower than originally budgeted resulting in efficiencies in the cost to serve.

The underspend in operating expenditure can be attributed to:

- A slow-down in customer uptake of hot water and pool incentives to connect to economy tariffs, primarily due to increased metering charges.
- The budget for the Residential program included reward payments for batteries connecting to the Energex load control system. Currently, 15 residential customers have batteries connected to the Energex network as part of a trial. At this stage it is too early to develop a program for batteries without a better understanding how customers use their battery and how this impacts the network.

Table 10: Residential program operating expenditure for 2016/17

Cost category	Budget (\$,000)	Actual (\$,000)	Variance (\$,000)
Labour	944.5	931.5	(13.0)
Customer payments	5,676.4	4,337.4	(1,339.0)
Contractors	83.6	109.4	25.8
Advertising	300.0	205.9	(94.1)
Other	-	1.2	1.2
Overheads	538.6	596.8	58.2
Total operating expenditure	7,543.1	6,182.2	(1,360.9)

The capital expenditure for the Residential program was \$3.0 million. This was less than budget due to an over optimistic forecast for the number of PeakSmart devices to purchase in 2016/17 and the pre-purchasing of 6,000 PeakSmart devices in 2015/16 which were not issued to the retailers/installers until early 2016/17. The pre-purchase of 6,000 PeakSmart devices resulted in very few devices purchased in the first two months of 2016/17. The breakdown of capital expenditure is included in Table 11.

Table 11: Residential program capital expenditure for 2016/17

Cost category	Budget (\$,000)	Actual (\$,000)	Variance (\$,000)
Materials	3,177.2	1,988.3	(1,188.9)
Overheads	1,385.5	975.4	(410.1)
Total capital expenditure	4,562.7	2,963.7	(1,599.0)

6. Business program

The Business program is offers funding to businesses that are located in an eligible area for the installation or upgrade of equipment/appliances that reduce onsite peak electricity demand.

Appliances and equipment include building management systems, air-conditioning, motors, lighting, refrigeration and power factor correction (PFC). Funding varies between large businesses and small to medium businesses. Energex works with suppliers, industry associations, aggregators, energy retailers and national brands (with multiple premises) to access businesses in eligible areas.

The initiatives for the Business program include:

- Energy efficiency: businesses in eligible areas reducing demand through energy efficiency improvements to motors, lighting, heating, ventilation and cooling systems.
- Power factor correction: aimed at businesses in eligible areas. Installation of power factor equipment to reduce demand on the electricity network by reducing reactive power which contributes to the customer's electricity bill but is not used.

Performance targets

The performance targets for the Business program in 2016/17 were:

- Permanent load reduction of 5.0 MVA.
- To deliver the Business program at a cost of serve of \$411/kVA or less.

The performance targets and opportunities for the Business program for 2016/17 are outlined in Table 12.

Table 12: Performance targets and opportunities for the Business program for 2016/17

Programs	Description
Energy efficiency	<ul style="list-style-type: none">• Continue to reward business customers for improvements to motors, lighting, heating, ventilation and cooling systems• Grow relationships with industry partners
Power factor correction	<ul style="list-style-type: none">• Continue to reward business customers that correct energy supply inefficiencies by installing power factor correction equipment• Monitor uptake of power factor correction by businesses on demand tariffs and refine targeted area approach in accordance with findings

Achievements in 2016/17

The Business program target for load reduction was lower than originally forecast. With the actual load under control being lower than expected, this increased cost to serve for the Business program. The program achieved the following:

Permanent load reduction: The total load under control achieved for the Business program was 2.6 MVA. The majority of the load reduction was achieved through power factor correction for business customers on a demand tariff within eligible areas.

Cost to serve: The Business program for 2016/17 was delivered at \$452/kVA which is greater than the budgeted cost to serve of \$411/kVA. This is due the demand reduction being lower than expected in 2016/17 while costs remained constant.

Energy efficiency: The energy efficiency initiative for businesses with eligible area is run part of Energex business as usual. In 2016/17 the initiative achieved an MVA reduction of 0.6 MVA through 24 applications. This is consistent with previous years as the targeted areas have not changed resulting in limited opportunities for energy efficient improvements within these areas.

Power factor correction: In 2016/17 there was a 1.9 reduction in demand as a result of business customers installing power factor correction equipment to reduce energy supply inefficiencies. There were 51 applications. This has declined as the eligible areas have not changed in 2016/17 resulting in limited opportunities within the eligible areas.

With the decline in opportunities for both the energy efficiency and power factor correction initiatives within the current targeted areas, Energex is investigating further demand response opportunities for businesses within these targeted areas.

Details on operating expenditure (budget and actual) for the Business program are shown in Table 13. The actual operating expenditure of \$1.2 million was lower than originally budgeted.

The underspend in operating expenditure is a result of the MVA target of 5.0 MVA not being met due to the limited opportunities within eligible areas. Any incentives paid are calculated on a \$/kVA basis for energy efficiency initiatives and \$/kVAR for power factor correction.

Table 13: Business program operating expenditure for 2016/17

Cost category	Budget (\$,000)	Actual (\$,000)	Variance (\$,000)
Labour	648.6	536.7	(111.9)
Customer payments	1,000.0	270.3	(729.7)
Overheads	406.1	348.9	(57.2)
Total operating expenditure	2,054.7	1,155.9	(898.8)

7. Network planning / non-network options

Energex has processes in place to ensure all significant capital works are only undertaken when no non-network alternative would present a lower cost option.

Augmentation projects with forecast cost of over \$5 million and refurbishment projects over \$2 million are subjected to rigorous non-network assessment. Targeted areas are identified earlier on in the planning process by identifying locations where load growth is likely to result in the need to supplement the network in a significant manner within the next 10 years. All targeted areas can be found on the Energex website.⁴

Bromelton is a large scale deferral of significant capital works. The project is a continuation of a non-network option initially identified in 2006 which has enabled deferral of reinforcement of 110 kV supply to the Beaudesert Bulk Supply Substation until at least 2019. The Bromelton generation facility consists of 15 individual LV diesel generators that can provide network support for up to 23.1 MVA.

Performance targets

The performance targets and opportunities for network planning / non-network options in 2016/17 are outlined in Table 14.

Table 14: Performance targets and opportunities for network planning / non-network options

Programs	Description
Non-network solutions	<ul style="list-style-type: none"> Assess augmentation projects (cost greater than \$5 million) and refurbishments (cost greater than \$2 million) for non-network options Screen for non-network options for all projects that require a Regulatory Investment Test for Distribution (RIT-D)
Targeted areas	<ul style="list-style-type: none"> Review targeted areas by identifying locations where load growth is likely to result in the need to supplement the network in a significant manner within the next 10 years
Bromelton	<ul style="list-style-type: none"> Load reduction of 23.1 MVA (MVA contracted and accounted for in previous determination period)
Demand side engagement obligations	<ul style="list-style-type: none"> Develop and document a demand side engagement strategy Engage with non-network providers

⁴ <https://www.energex.com.au/home/control-your-energy/positive-payback-program/positive-payback-for-business/business-rewards/eligible-areas>

Achievements in 2016/17

The achievements for network planning during 2016/17 are detailed below:

Non-network solutions: In 2016/17 five refurbishment projects were assessed to determine whether non-network options to defer capital expenditure is viable. There were no augmentation projects approved with credible options having an estimated cost of the augmentation component greater than \$5 million. Accordingly, there were no projects feasible for a non-network alternative solution.

Targeted areas: There were no changes in the targeted areas in 2016/17.

Bromelton: Generators at Bromelton were not dispatched for network support purposes during 2016/17.

Kilcoy: Following summer storm activity in December 2016, there was a requirement to use non-network mobile generation support at Kilcoy. This type of non-network support is required from time to time following summer storm activity. Energex was approached by a third party requesting to have access to Energex mobile generation unit(s) under the terms of an agreement to use generator (ATUG).

This was an opportunity for Energex to off-set the cost of running the mobile generators by facilitating the drafting and approval of the ATUG. This agreement offsets the cost of providing the required non-network support at Kilcoy of approximately 2.5 MVA.

Demand side engagement obligations: In 2016/17 Energex has complied with the demand side engagement obligations as outlined in section 5.13.1 of the National Electricity Rules (NER).

Energex has published its Demand Side Engagement Strategy with the requirements as specified in Schedule 5.9 of the NER. The Demand Side Engagement Strategy was last reviewed and updated on 1 July 2016. A copy of the Demand Side Engagement Strategy can be found on Energex's website: https://www.energex.com.au/data/assets/pdf_file/0017/342404/Demand-Side-Engagement-Strategy.pdf

Energex provides non-network providers, aggregators and other parties the opportunity to register on the Demand Side Engagement facility to receive notification on planning and expansion projects. This can be found on Energex's website: <https://www.energex.com.au/home/control-your-energy/demand-side-engagement>

Details of operating expenditure for non-network solutions⁵ are shown in Table 15. For 2016/17 the Demand Management program had budgeted \$0.9 million for network support services. Actual spend was \$0.9 million as budgeted.

Table 15: Operating expenditure for DM non-network options for 2016/17

Cost category	Budget (\$,000)	Actual (\$,000)	Variance (\$,000)
Bromelton	934.6	934.6	-
Total operating expenditure	934.6	934.6	-

⁵ Budget for DM non-network solutions only include Bromelton generators. Other activities associated with network planning are not included in DM's budget.

8. Demand Management Development

There are a number of functions within the business which support the Demand Management programs. This is incorporated into Demand Management Development.

Demand Management Development encompasses the management and optimisation of the load control system, continued work into the coordination of load on the network, development of strategies and the report obligations to DEWs and the AER.

Performance targets

The performance targets for Demand Management Development are outlined in Table 16.

Table 16: Performance targets for the Demand Management Development for 2016/17

Programs	Description
Optimise load control system	<ul style="list-style-type: none">• Implement load control system improvements• Control of new appliance
Increase load control capability	<ul style="list-style-type: none">• Reward customers through incentives and tariffs• Increase awareness and availability of smart appliances
Support the connection of more distributed energy resources (DER) to the network	<ul style="list-style-type: none">• Development of standards• Integration with load control system
Strategy, compliance and reporting	<ul style="list-style-type: none">• Development of strategies for the future, involvement in national standards and industry groups, and compliance and reporting at a national and jurisdictional level

Achievements in 2016/17

In 2016/17 the budget for Demand Management Development was \$1.9 million for operating expenditure. The actual expenditure for Demand Management Development was \$2.8 million which consisted of operating expenditure \$2.7 million and capital expenditure \$0.1 million. Although the expenditure for Demand Management Development was overspent, the overall Demand Management program was underspent and the targets were exceeded.

The achievements for Demand Management Development during 2016/17 are detailed below:

Optimise load control system: In 2015/16 Energex had identified a number of zone substations where there is an opportunity to optimise load profile by approximately 5 MVA. It is achieved by modifying the switching schedule resulting in improvement of the load factor of the zone substation.

During 2016/17 new switching schedules were developed for 10 zone substations while still maintaining guaranteed supply times. The changes made to the 10 zone substation resulted in total optimised load of 5.8 MVA.

Increase load control capability: The integration between Energex's Demand Management program and tariff strategy is key to providing the right combination of appropriate price signals and incentives to enable greater customer participation in demand management activities. It is anticipated that the Positive Payback program will enable greater adoption of load control services and enable customers to transition to cost reflective tariffs. The transition to demand tariffs will be supported by greater availability of demand response ready appliances such as air-conditioners, electric hot water systems and pool pumps.

During 2016/17 Energex has introduced a demand tariff for residential customers along with a smart control tariff on a voluntary basis. As this is still at early stages Energex has continued to reward customers for the installation of PeakSmart air-conditioners and for customers switching to a controlled load tariff for their electric hot water system or pool pump.

Connection of more DER to the network: *Development of Standards:* Energex continually works with standards and regulatory bodies to influence demand management related standards and policies. Through Energex's active participation in a range of industry working groups and committees, it gained support from industry for integration of demand response enabled products.

Integration with load control system: In 2016/17 Energex developed the PeakSmart performance measurement program to collect data from customers with PeakSmart air-conditioners installed to their premises. The data collected will be used to estimate the impact of managing peak load on Energex's network. In 2016/17, 195 customers enrolled to participate in the program. To encourage customer participation, installers were provided an incentive and at the same time customers were rewarded for participating in the program. Customers that have PeakSmart air-conditioners installed can continue to enrol in the program during 2017/18 until there are 289 customers participating in the program.

Strategy, compliance and reporting: In accordance with section 127C of the Queensland Electricity Regulation 2006, Energex submitted its 2017/18 Demand Management Plan to DEWS on 30 April 2017.

In addition, the AER issues a number of Regulatory Information Notices (RIN) where Energex provides the information requested. The RIN includes information on Energex's Demand Management program.

Operating expenditure for Demand Management Development is outlined in Table 17. The overspend in operating expenditure is due to funding of the Smart Energy Education House which was not originally budgeted as part of Demand Management Development.

Table 17: Demand Management Development operating expenditure for 2016/17

Cost category	Budget (\$,000)	Actual (\$,000)	Variance (\$,000)
Labour	897.8	1,391.3	493.5
Customer payments	492.0	70.9	(421.1)
Contractors	-	98.9	98.9
Materials	-	97.4	97.4
Other	-	7.9	7.9
Overheads	512.0	1,001.3	489.3
Total operating expenditure	1,901.8	2,667.7	765.9

The capital expenditure on Demand Management Development for 2016/17 was \$0.1 million. The costs relate to the construction of the Smart Energy Education House which was not originally budgeted as part of Demand Management Development. The breakdown of capital expenditure is included in Table 18.

Table 18: Demand Management Development capital expenditure for 2016/17

Cost category	Budget (\$,000)	Actual (\$,000)	Variance (\$,000)
Contractor	-	56.2	56.2
Materials	-	70.5	70.5
Other	-	0.6	0.6
Overheads	-	13.8	13.8
Total operating expenditure	-	141.1	141.1

9. Innovation

Energex will continue to invest in understanding future demand management issues. Innovation projects will be funded through the Demand Management Innovation Allowance (DMIA).

The AER approved an allowance of \$5 million for the 2015-2020 regulatory period. DMIA projects are funded through the corporate budget subject to approval by Energex's Investment Review Committee and so this is separate from Energex's Demand Management program.

Energex aims to apply its learnings from the DMIA projects in a way that improves and benefits Energex's demand management capabilities.

DMIA projects

In 2015/16 a number of projects were scoped, developed and received endorsement by Energex's Investment Review Committee. Table 19 provides a description of the DMIA projects have been approved and are currently in progress.

Table 19: Approved DMIA projects

Project	Description
Battery energy storage systems (BESS) trial	<p>The objectives of this trial are focused on:</p> <ul style="list-style-type: none"> • Gaining a better understanding of the customer value proposition and expectations from the electricity network in taking up BESS • How Energex can leverage off the load control system and existing tariffs to benefit both Energex and the customer • How the BESS technology will integrate with the electricity network
Real time tariff study	<p>The objective of this project is to research the impact of the new demand tariffs and complimentary load control tariffs on small, low voltage customers. This research will be conducted through partnerships with retailers, customer representatives, market participants and the Queensland Government.</p>
Low voltage network power system static-state estimation project	<p>This is a joint project between Energex, Ergon Energy and the University of Queensland. The project objective is to provide timely control inputs to a number of low voltage connected devices to improve the efficiency of the network, improve dispatch of distributed energy resources, improve DM response and minimise future network investment.</p>
Solar enablement initiative	<p>The solar enablement initiative will provide improved visibility and understanding of electricity network performance on seven medium voltage feeders in Queensland, Tasmania and Victoria. The initiative aims to reduce restrictions being placed on the capacity of new solar PV installations and their export into the Australian grid, thereby enabling an increase in the percentage of renewable energy connected to the grid. This is a joint project with ten partnerships including University of Queensland and Queensland University of Technology.</p>

Progress to date

The budget for DMIA projects for 2016/17 was \$1.4 million⁶. Actual expenditure on DMIA projects was \$0.4M. Details on actual spend for each project is included in Table 20 along with the progress to date for each project.

Table 20: DMIA expenditure for 2016/17 and progress to date

Project	Progress to date	OPEX (\$,000)	CAPEX (\$,000)
Battery energy storage systems (BESS) Trial	<p>For the market based battery trial 15 BESS were installed which have been audited by the Clean Energy Council and any installation issues rectified. Analysis has commenced to compare load profiles pre and post BESS installation. Analysis of demand response has commenced.</p> <p>The commercial BESS and solar PV located at Eagle Farm DC has been constructed and is in the process of final contract negotiations with key stakeholders to enable the site to be energised.</p>	316.5	36.1
Real time tariff study	<p>During 2016/17 phase one of the study has been completed with a small number of participants taking part in the study. Scoping of phase two is currently underway taking into consideration the results of the Customer Segmentation Research undertaken by QUT and CitySmart.</p>	85.6	-
Low voltage network power system static state estimation project	<p>The project is progressing with the state estimation algorithm based on real-time data from measurement devices complemented with static data tested and is functional. Capability to read measurement devices in real time was established and Energex 3G network performance confirmed as fast and reliable.</p> <p>Options are currently being explored with a potential candidate for load management within the project being multiple remote controllable EV fast chargers (AC with up to 22kW).</p>	1.7	-
Solar enablement initiative	<p>The project was only approved at the end of 2016/17 and is currently in the initial detailed scoping and establishment phase.</p>	0.3	-
Total OPEX / CAPEX		404.1	36.1

⁶ DMIA spend approved by Energex's Investment Review Committee for 2016/17.

If you have any questions about this plan,
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positive energy

