APPENDIX 14

Demand management strategy

Energex

Demand Management Strategy
Current – 2020 & Beyond

Asset Management Division

energex

positive energy

Version control

Version	Date	Description
1.0	10/10/2014	Final version for submission

Energex Limited (Energex) is a Queensland Government Owned Corporation that builds, owns, operates and maintains the electricity distribution network in the growing region of South East Queensland. Energex provides distribution services to almost 1.4 million domestic and business connections, delivering electricity to a population base of around 3.2 million people.

Energex's key focus is distributing safe, reliable and affordable electricity in a commercially balanced way that provides value for its customers, manages risk and builds a sustainable future.

Group Manager
Corporate Communications
Energex
GPO Box 1461
BRISBANE QLD 4001

Table of Contents

Executive Summary

Demand Management (DM) has been a critical component in the efficient design; construction and operation of the Energex network, from the LV network through to bulk supply substations, for decades and has helped contribute to the record low levels of forecast growth related augmentation in 2015-2020. Energex has managed residential hot water load as part of its business-as-usual operations for several decades and this program has been developed and refined over the years. This hot water load management program provides a significant reduction (over 550 MVA diversified[1]) for winter peak demand and, if this load control capability did not exist, Energex would have needed to build additional network capacity to meet this demand.

While growth in demand has reduced recently, in response to a range of factors (reduced consumption, mild weather, etc.); long term forecasts generally indicate future growth in peak demand which will lead to a renewed need for additional investment in network capacity. When effectively implemented as a first response solution as part of Energex's everyday operations, DM will continue to reduce forward growth in demand resulting in lower future infrastructure related electricity costs for consumers and will also enable more efficient management of technical issues on the Energex network.

Through establishment and delivery of its DM programs, Energex has facilitated the development of a market for DM products and services (including Air-conditioning, Power Factor Correction and pool pumps). Customers have responded strongly and embraced the choice and cost savings that Energex's DM programs offer through discounted tariffs and direct incentives. This is evidenced by strong participation rates with more than 65 per cent of residential customers enrolled in a DM program and with more than 80,000 customers joining the programs in the 2010-2015 period. Results from recent customer research[2] demonstrate that customers believe Energex have a strong responsibility for DM and see it as an important community initiative.

Energex's 2015-2020 strategy is to implement a suite of concurrent, co-ordinated programs to implement DM where it can cost effectively deliver reductions in future peak demand. These programs will leverage Energex's existing DM capability and established markets to deliver our DM requirements. By continuing to provide strong customer choice and effective DM products, Energex is able to continue to reduce customer costs through the operation of DM while also positioning itself effectively to manage the emergence of new residential demand drivers, such as batteries and electric vehicles.

To achieve these outcomes this DM Strategy is split into a short term (2015-2020) view and a longer term (beyond 2020) view. This approach will continue to embed DM operations in 2015-2020 and to begin to transition effectively for likely scenarios in the long term.

The four core elements of Energex's DM strategy are outlined in Figure 1.

[1] Because not all customers use electricity at exactly the same time or in the same way, there is a natural "diversity" of usage between customers. Hence the magnitude of customer connected load is typically much higher than the diversified load seen at a local network level. Diversified load is the coincident load that contributes to times of peak demand.
[2] A copy of the research is available on the Energex website https://www.energex.com.au/__data/assets/pdf_file/0007/196126/Research-Summary-Report_v2_120314.pdf

Figure 1 – DM Strategic Core Elements

DM Strategies	
1) Business DM	Business DM programs in areas where the Program of Work indicates significant network capital investment is expected within a 1-10 year horizon
2) Residential DM	Residential DM programs based on analysis of the demand growth deferral benefits that broad penetration and customer adoption can achieve on a localised level
3) Tariff Reform	Working with pricing stakeholders to develop an improved tariff structure which sends better signals to customers regarding the impact of their demand on the network
4) Demand Management Innovation Allowance (DMIA[3])	Utilisation of DMIA to develop solutions and frameworks to manage emerging drivers of demand and to develop emergent DM solutions

In the longer term, there are many unknowns in terms of how the usage of the network may change. Investing in further establishing DM choices and capabilities will provide Energex with an important tool to manage network risk associated with these changes. Energex therefore plans to focus on developing an adaptive DM platform to ensure that its DM programs remain relevant and cost effective. Energex will also look to employ complementary strategies around tariffs and standards to achieve maximum effectiveness in its suite of DM measures.

Energex will continue to work closely with customers, industry and stakeholders and continue to periodically revisit its DM strategy in light of emerging market changes, to ensure that DM programs contribute to the goal of improving utilisation of the network and ultimately reducing costs for our customers.

[3] DMIA is a component of the AER's Demand Management Incentive Scheme (DMIS). It is expected that the DMIS will transfer to the Demand Management & Embedded Generation Connection Incentive Scheme (DMEGCIS) sometime in 2015-2020 period.

1 Purpose and Vision

1.1 Purpose of DM

One of Energex's aspirational goals is to achieve better utilisation of network assets so that this benefit can be passed on to all electricity customers in the form of lower network prices that reflect the real cost of customer demand.

In order to achieve this objective, a key component of Energex's Asset Management strategy is to implement a suite of DM initiatives that will provide strong customer choice and reduce the need to spend capital to increase network capacity to meet long term peak demand growth.

As part of preparations for the 2015 – 2020 Regulatory Determination Period, Energex has revisited its DM Strategy to ensure it is aligned with the wider strategies of Energex and to ensure the Strategy takes account of recent market and regulatory changes. This DM Strategy will be incorporated into the business cases which form the DM contribution to the Energex 2015-2020 Regulatory Submission. In addition to underpinning detailed DM activities and initiatives in the near term this Strategy will also guide activities and initiatives into the longer term.

1.2 Vision

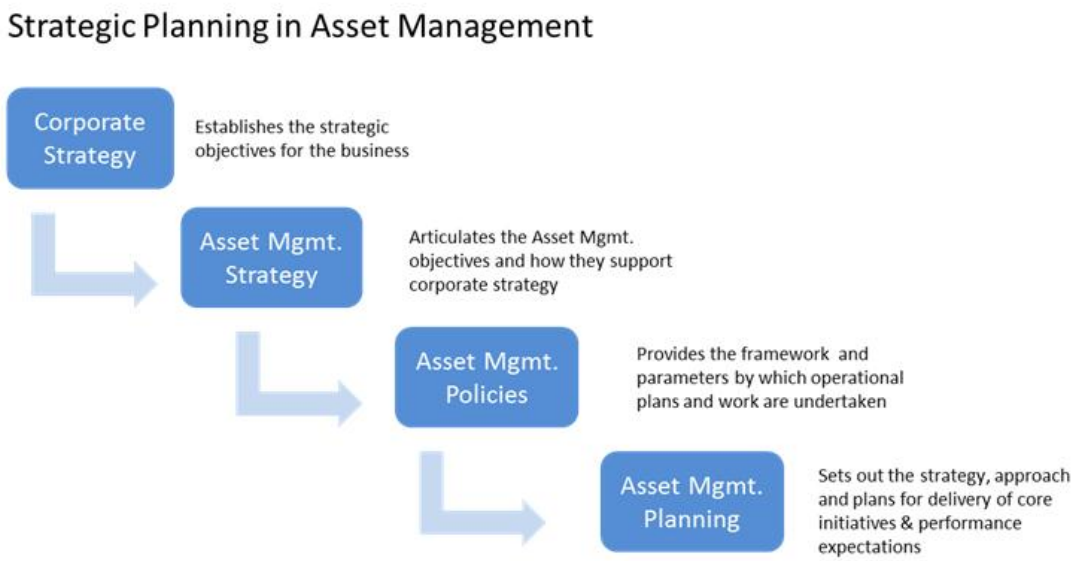
DM is a key function in ensuring that use of the network is optimised and with this view, the Energex DM vision is:

"Demand Management is the first response to address and optimise investment in the network where it is the most economical solution to do so. This will assist in achieving a highly utilised and efficiently managed network to keep costs to a minimum, for the benefit of our customers."

2 Strategic Direction

This Strategy is part of an overall strategic planning process that ensures that the corporate strategic objectives are operationalised within the business. This framework is characterised by the inter-linkages detailed in Figure 2.

Figure 2 - Energex's Strategic Planning Process



2.1 Network Asset Management Strategy

Energex's network asset management strategy aims to achieve the following objectives:

- compliance with statutory obligations including safety, environment, and regulation and Energex Distribution Authority, policies and standards
- business outcomes achieved and customer and stakeholder expectations met including acceptable levels of network reliability
- investment principles and optimised asset investment plans that balance network risk, cost and performance (service) outcomes
- a focus on asset life cycle management including asset data and information and communication technology (ICT) initiatives (data adequacy and quality)
- modernisation of the network to meet required business and customer outcomes
- further development of Energex's asset management system (practice).

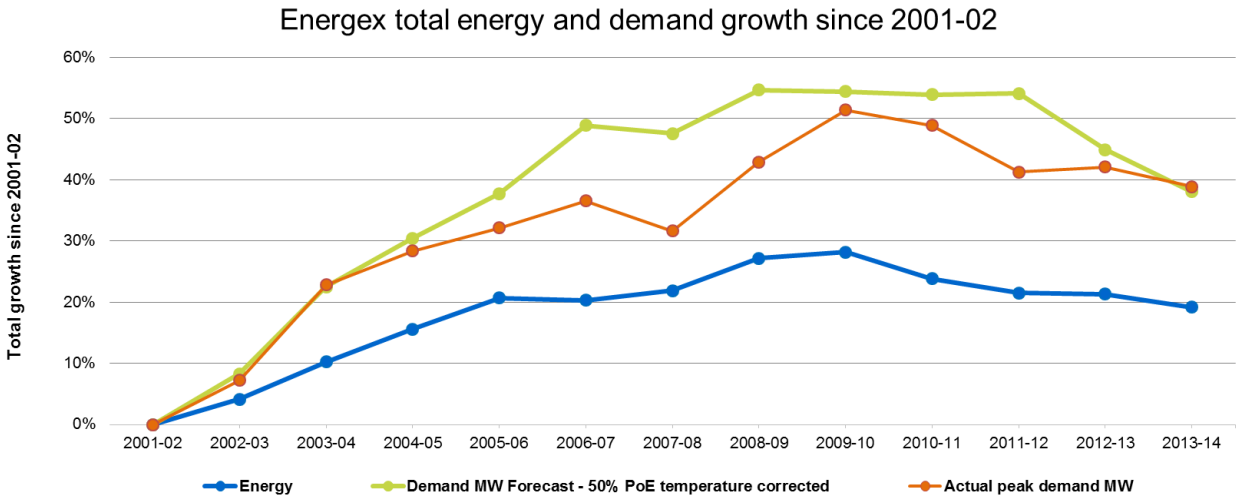
The network risks being managed as part of this strategic plan will be assessed in accordance with the Network Risk Framework. Detailed network risk information will be incorporated in the specific project/program planning documentation.

3 Current Energex DM Environment

3.1 The relationship between peak demand and investment in the network

Electricity costs have risen steadily in recent years. A significant contributing factor to these increases is growth in electricity demand at peak times, which was strong over the period 2001 to 2006, but has stabilised and declined at a system level in recent years. In proportional terms, demand has increased more than energy consumption since 2001, as set out below in Figure 3.

Figure 3 - Energex annual energy and demand growth

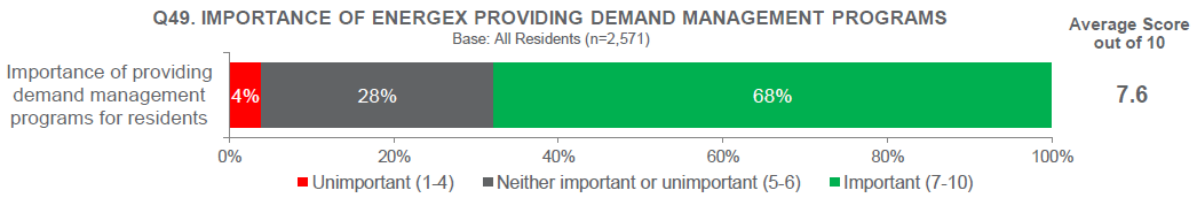


The peaks in demand have also become more pronounced over time, driven by residential appliances, predominantly air-conditioning, and the load profiles of commercial and industrial customers. These peaks are further exacerbated by the operation of other large 'base load' appliances including swimming pool filtration pumps and electric hot water systems at peak times.

3.2 Customer Support for DM

The success of Energex's DM programs to date is due to providing customers with simple, effective and attractive means of reducing their electricity costs. Recent customer engagement highlights that customers still expect Energex to drive DM as a key means of helping reduce electricity costs. This is shown below in Figure 4.

Figure 4 – Customer Engagement Research (2014)[4]



[4] Colmar Brunton Customer Engagement Research February 2014

3.3 Energex's DM response

Energex has a long history of load control having commenced a DM program many decades ago, when it began offering controlled hot water load tariffs, by using its robust ALFC (Audio Frequency Load Control) system to switch this load off at peak times and on again during the night off-peak period. This hot water load management program continues today, with 65% customer enrolment rates, and provides a significant reduction (over 550 MVA diversified) in winter peak demand loading thereby providing more efficient utilisation of the Energex network.

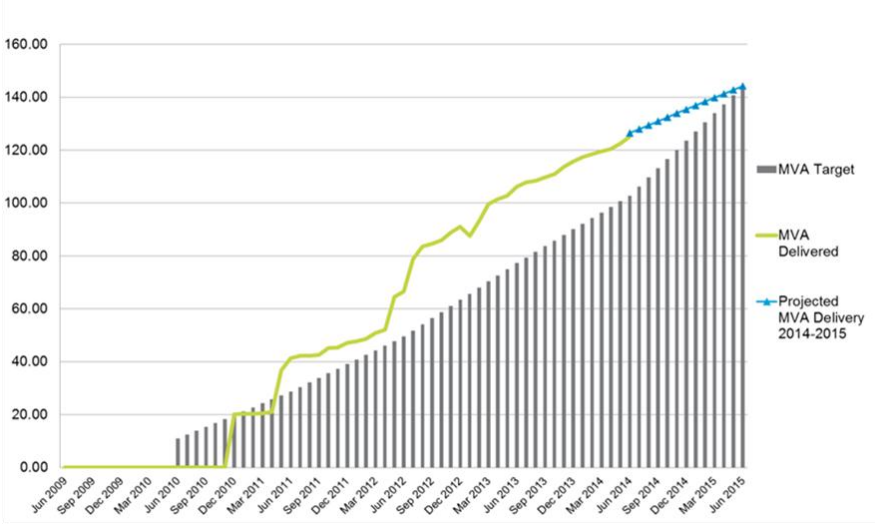
In the early 2000s, several events occurred which changed how Energex managed demand. Firstly, there was a spike in demand driven mainly by air-conditioning, moving the network from a winter peak to a predominantly summer driven peak. Secondly, there was a change in security standards in 2004, which meant that Energex was required to have greater capacity to manage this new and growing peak demand. In response to these factors, Energex recognised that DM was an even more critical tool for managing the network, but that it needed to evolve. Accordingly, Energex began to diversify its DM program to address these changes in peak demand drivers.

Energex has now successfully invested in programs to establish DM capability in air-conditioning at the residential level, and has implemented programs to incentivise the use of more efficient pool pumps as well as encouraging increased participation in the off-peak load control of pool pumps. Energex continues to encourage the uptake of hot water load control via controlled load tariffs, and a tailored website has been created to centralise information for customers in regard to how to save money in meeting their energy needs. These DM programs are leveraging Energex's existing communications system (AFLC) and are not reliant upon or impacted by changes in metering and communications technologies.

Energex has also worked with commercial and industrial customers to assist them to reduce their demand at peak times through initiatives such as power factor correction and accessing customer generators.

In developing these programs, Energex committed that it would achieve 144 MVA of load under control by 2015. Energex is well on track to achieve this target (see Figure 5 below).

Figure 5 - Energex DM Program 2010 to 2015 as at 30 June 2014 (144 MVA target)



This DM target will be achieved at a lower cost than originally planned. The reduced cost to serve established to date is due to the scale of operations and due to strong customer and industry support that has been established through delivery of these programs. The success of these programs (to date) in providing customers with choice and options to manage their electricity costs is summarised in Table 1 and Table 2 below.

Table 1 - Residential DM programs 2010 - 2015 performance outcomes

<table>
<tr><th colspan="3">Programs</th><th>Target MVA 2010-2015</th><th>Actual MVA 2010-2014</th><th>Actual MVA</th><th>Performance outcomes as at June 2014</th></tr>
<tr><td rowspan="6">DM program</td><td rowspan="4">Residential programs</td><td rowspan="3">Residential DM Programs: Continue to expand existing broad-based residential programs, including direct load control of air-conditioners, pool pumps, hot water systems combined with energy efficiency measure where appropriate</td><td rowspan="3">67 MVA</td><td rowspan="3">48.7 MVA</td><td>Hot Water Load Control
13.6 MVA</td><td>• Reduced barriers to customers participating in load control tariffs
• Engaging with industry channels to encourage customers to switch to load control tariffs. Over 1500 rebates paid to customers
• Optimised the (AFLC) Load control program to increase load under control</td></tr>
<tr><td>Pool Pump Peak Load Reduction
15.0 MVA</td><td>• Over 13,500 rebates paid to customers switching their pools to (Tariff 33) off-peak load control or purchasing and installing 5 star rated or better energy efficient pumps
• Over 19,000 pool pumps are connected as a result of the Positive Payback campaign
• Engaging industry channels to overcome barriers to off-peak pool load control</td></tr>
<tr><td>Air-Conditioning Direct Load Control
20.1 MVA</td><td>• Over 27,000 air-conditioners enrolled in the program since 2008 through Cool Change & ECC (now disbanded as the PeakSmart program is well established)
• Of this number, over 13,000 activated PeakSmart air-conditioning units with strong manufacturer support
• Strong industry sales & installation support & strong delivery channels established</td></tr>
<tr><td>RBT: Development of reward based tariff structure trial</td><td colspan="3">Delivery of a trial report defining & quantifying the impact that 1) Consumption Tariffs & 2) Capacity Tariffs have on residential peak demand</td><td>Trial demonstrates an 17-23% average household consumption reduction during peak events</td></tr>
<tr><td>Energy Conservation Communities:</td><td colspan="3">Work with communities to provide ways to reduce demand & conserve energy</td><td>Targeted residential campaigns designed to educate customers about DM initiatives, reduce peak demand & establish delivery models for DM programs.
Actual MVA included above.</td></tr>
</table>

Table 2 - C&I DM programs 2010 to 2015 performance outcomes

Programs			2010-2015 Targets	Detail	Actual MVA	Performance outcomes as at June 2014
DM program	C&I	**C&I:** Provide EC&DM projects that match Commercial & Industrial customers with appropriate technology solutions to deliver whole network benefits	77 MVA	Power factor Correction, Demand Response (Embedded Generation & Load Curtailments), Energy Efficiency	**77.6 MVA** of either peak load reduction in place & avoidable loads contracted	• 20.5 MVA of demand reduction gained by power factor improvements • 10.5 MVA of permanent demand reduction through energy efficiency (lighting, HVAC, refrigeration and motors) • 46.6 MVA of demand response through generation and load curtailment. • The average cost to serve from 2010 to 2014 has been $215/MVA • Strong and increasing support from suppliers and manufacturers • Repeated collaboration with dozens of nationally recognised brands • Multiple collaborations with local councils on energy efficiency initiatives for small-medium enterprises, better building working groups, district energy feasibility projects

3.4 National Electricity Law: Regulatory Obligations & DM

Energex operates in a participating jurisdiction which has adopted the National Electricity (South Australia) Act 1996. This Act requires Energex to observe the National Electricity Law Objective. DM supports these objectives by promoting efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity.

In particular, DM supports the NEL by; reducing the costs that customers pay for the network; maintaining quality of supply by managing, shifting and smoothing peak loads, and; by contributing to reliability and security of supply by reducing loads and stress on the network at peak times.

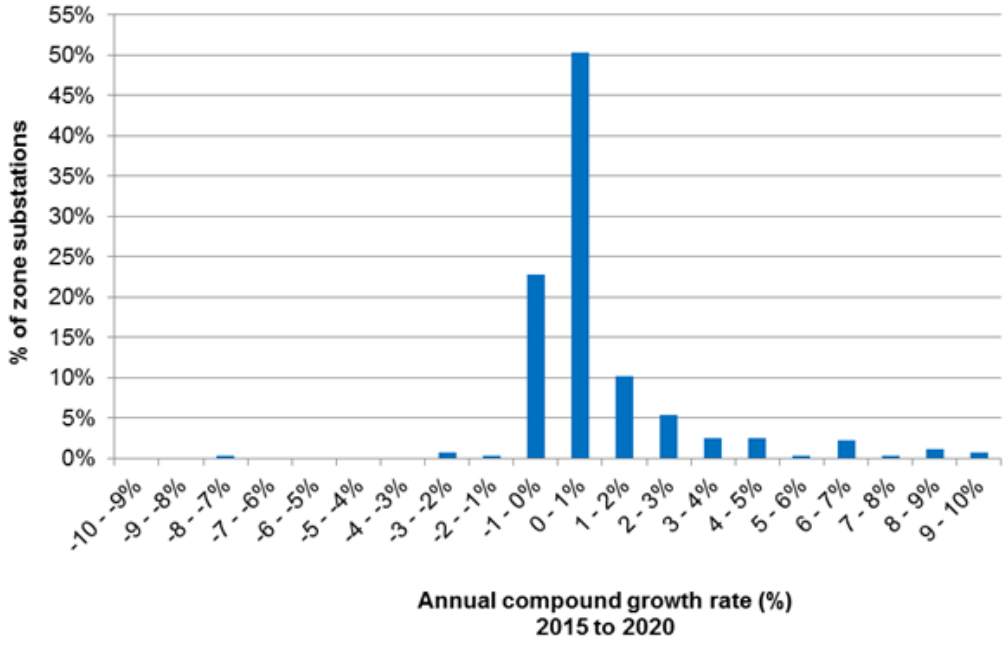
3.5 The future of peak demand

While Energex has experienced great success through these DM programs, Energex has reconsidered its position on DM due to the moderation and decline in demand over the past few years. Analysis has shown that factors such as weather, consumer conservation, increasing energy efficiency of appliances and lighting will continue to affect demand growth, and these factors have been incorporated into Energex's forward projections for peak demand growth. However, even with these changes factored in, it is expected that in the longer term, there will continue to be demand growth and consequently network constraints at localised levels. This is supported by independent commentators such as AEMO and NIEIR. Additionally, if Energex fails to sustain current DM programs and operations, then the forecast future, localised growth in peak demand will be further exacerbated by the

unmanaged return of over 650MVA of diversified peak load (currently managed in DM programs).

Given the recent reductions in system demand growth, in combination due to mild weather, consumer conservation and energy efficiency there have been reductions in forward growth projections. However, long-term demand forecasts consistently predict growth in localised peak demand (see Figure 6 below). By continuing to empowering customers with a range of DM product choices, and when effectively implemented as a first response solution as part of Energex's everyday operations, DM will reduce forward growth in demand resulting in lower future infrastructure related electricity costs for consumers.

Figure 6 - Forecast localised sub-station load growth 2015-2020



Importantly, demonstrating the lumpy nature of growth driven network investment, demand peaks occur at local substation level, even where there has not been a system-wide peak. These local peaks create localised network constraints which need to be addressed, either by DM or by augmenting the network.

On the basis of its successful programs to date and the ongoing need for DM into the future, Energex took a strategic decision in 2012 to move from an initial business model of piloting a range of DM products, to a business-as-usual (BAU) model which embedded DM into the network planning process. This BAU model has overseen the implementation of a range of projects and processes that have integrated the growing range of DM programs into Energex's everyday operations and systems. Work has also been undertaken to establish strong and ongoing support from industry channels to further embed Energex's DM programs as a normal part of managing the network.

This work has enabled Energex to deliver DM programs at a cost less than the equivalent LRMC of network investment and Energex plans to continue to invest in DM programs during the coming period of low network investment (2015-2020) due to the long term economic benefits of addressing localised growth in peak demand. The anticipated replacement of existing appliance stock provides a significant opportunity to grow the capability to address residential peak demand during 2015-2020.

4 Future Drivers of Change

While Energex's initial DM programs have proven successful in achieving load under control, the long term success of DM in deferring network capital and reducing costs to customers – particularly in an environment of more restrained demand growth – relies on Energex evolving and adapting these programs as changes continue to occur in the regulatory framework, energy technology market, the wider electricity and DM industry, and in how customers use electricity.

4.1 Changes in the regulatory environment

There are a number of changes in the regulatory environment which have the potential to significantly impact Energex's DM programs.

- The Queensland Government is developing a 30 year electricity strategy roadmap for how the state's electricity is to be delivered reliably and cost effectively now and into the future. This includes; improving retail competition; reforming tariffs and; providing more choices for energy consumers to improve control of electricity prices.

- Recent changes to the existing Regulatory Test process are designed to ensure distributors implement efficient non-network alternatives. The rule change and introduction of RIT-D signal an increased emphasis on engagement with non-network providers and third party aggregators.

- The recent AEMC Power of Choice review aims to introduce competition in the supply of meters, and to empower customers to be compensated for their ability to manage and reduce demand. This poses challenges for distributors around potentially losing access to metering capability and metering data, as well as providing opportunities in stimulating the market for Demand Side Participation by customers, which may provide more options for accessing DM. Energex is working with regulators to ensure that these issues are understood, while continuing to consider how its DM programs can operate effectively in a world where it may not own all meters, and where third party aggregators may be operating in a new market between Energex and its customers.

- Changes to network security standards are designed to maintain reliability at current levels rather than continue to improve them, in order to reduce prices to customers. This will drive network business to improve capabilities to manage the risks of loss of supply or network events and drive improved network efficiencies.

The upshot of these changes is that regulatory bodies will continue to expect distribution businesses to improve efficiency and productivity to improve customer price outcomes, and this will increase pressure to undertake cost effective DM programs.

4.2 Changes in how customers use electricity

As noted earlier, residential peak demand is forecast to continue to grow at a localised level, driven in part by the use of large appliances in households. Electric hot water systems, pool pumps and air-conditioners continue to contribute significantly to peak demand.

Importantly, while air-conditioning has increased dramatically over the past 10-15 years in Queensland, many of these air-conditioners are now reaching the end of their useful life (the average life of an air-conditioner has been estimated at 12 years). This provides a once in 12 year window of opportunity to replace these air-conditioners with demand management addressable, PeakSmart air-conditioners. Consequently, this remains a central plank of Energex's DM programs into the next regulatory period.

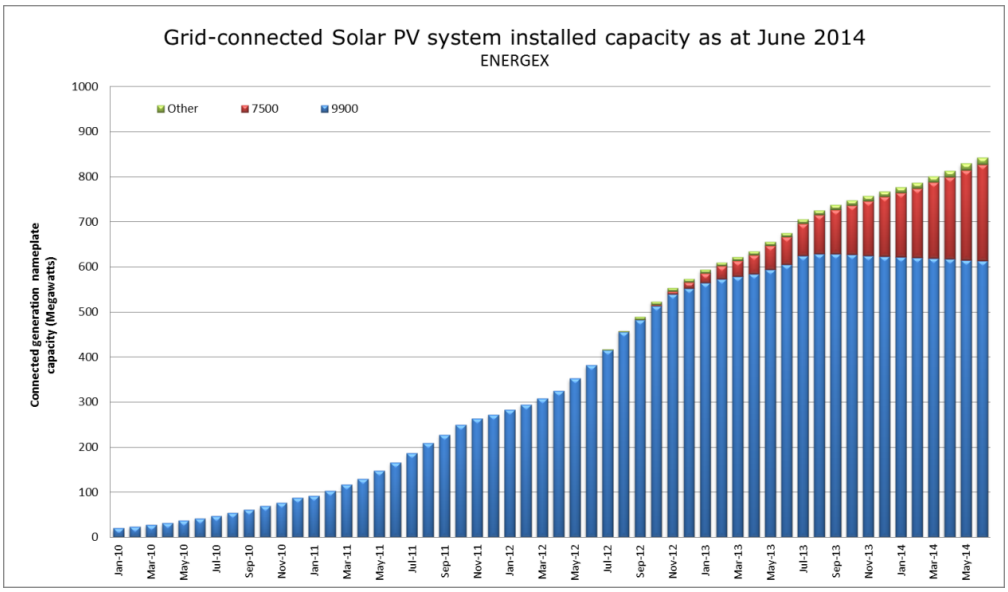
PeakSmart air-conditioning represents the first steps in what will be a growing smart appliance market – smart appliances being those that can respond to signals to reduce or change their energy consumption. As supporting standards (AS4755 – Demand Response Capability in Appliances) mature, the opportunity to replace old appliances with demand response capable ones will also accelerate. These standards will also provide demand management capabilities and choices as customers adopt emerging technologies such as electric vehicles and battery storage systems.

Recent increases in electricity prices and advances in technologies have driven an acceleration in the adoption of increasingly efficient products, such as LED lighting and LCD flat screen TVs. Into the future, customers will continue to look for smart and efficient appliances which reduce their energy and demand consumption, potentially also seeking to link these to home energy management systems to automate management of their energy costs in response to changed market conditions.

4.3 The drive by customers to generate and store electricity

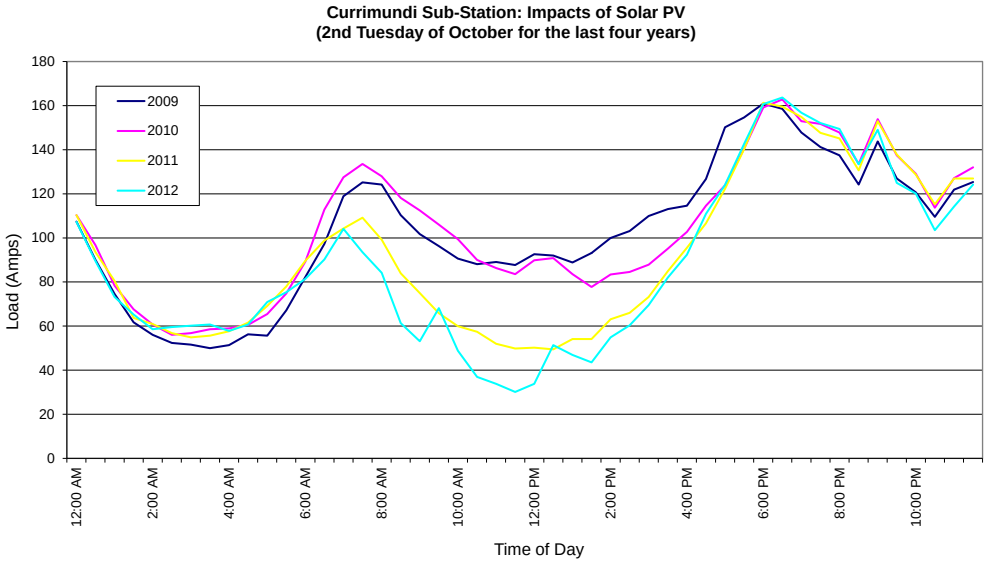
The penetration of solar generation across the Energex network has accelerated significantly due to incentives available under the Solar Bonus Scheme (SBS) and the Queensland Government Feed-in Tariff (FIT). While the FIT has recently been removed, the penetration of solar PV continues to grow. Currently, there is over 800MW of connected solar generation capacity installed by 220,000 customers across the network (see Figure 7 below). Ongoing reductions in the costs of solar panels are expected to see this growth continue for the foreseeable future.

Figure 7 - Energex network growth in connected solar-PV



This growing generation capacity has resulted in a reduction in residential consumption, but has only had a minimal impact on residential peak demand. Figure 8 demonstrates how PV generation has impacted consumption on residential substations in terms of a year on year comparison.

Figure 8 - Zone Sub-Station Yearly Comparison of Growing Impact of PV Generation



The recent changes to the FIT encourage new customers to consume more PV in the home, rather than exporting to the grid, but these customers will still only have a limited impact on residential peaks (which mostly occur later in the evening when solar PV is not generating). As a result of the change in FIT, solar PV businesses are also adjusting their business models to recognise the potential benefits of combining energy storage (batteries) with solar PV. It is anticipated that this market opportunity will provide a potential entry point for a battery storage market to develop. Subsequently, as battery storage technologies become more affordable, it is anticipated that battery penetration will begin to accelerate, reinforcing the already strong PV market.

The emergence of battery storage technology in a material way on the Energex network has immense potential as a tool to manage peak demand as well as to address the voltage issues caused by large scale penetration of PV. While it remains unclear at what rate battery penetration will emerge on the network, Energex is preparing for growth in residential systems by exploring ways of managing this growth, including use of tariffs, connection policies and incentives. This work will focus on maximising and harnessing the anticipated potential peak reduction benefits of battery storage, while avoiding problems that charging of batteries might cause in terms of increasing demand on the network at peak times. This will form a major focus for Energex's DM program into the medium term and supports Energex's Asset Management Strategy to accommodate and effectively integrate distributed generation and storage devices into the network.

Equally, battery storage brings with it the possibility that some customers will seek to reduce reliance on the grid, or in extreme cases, permanently disconnect from the Energex network or seek to use the network for backup purposes only. The commencement of such a cycle has the potential to grow into a "death spiral", where those remaining fully reliant on the network pay increasing charges to maintain it, creating further incentive to disconnect or reduce dependence upon the network.

It is important that Energex understand the combination of technologies and incentives that may lead to this outcome, and accordingly, work is underway to quantify the point at which it may become economical for customers to disconnect from the grid. As with Energex's current programs, the key to successfully managing these technologies is engaging customers with choices and products that help save money and address changing lifestyle needs.

4.4 A vision of 2020

In examining the drivers for change, a vision emerges of what the DM world could look like in 2020. Some possibilities include:

- real-time customer participation in a national Demand Response market in response to dynamic time based price signals
- automation of DM responses through technology
- greater use of battery storage in combination with embedded generation (solar, gas)
- widespread deployment of interval capable meters and potential emergence of third party owned meters
- integration of Home Area Networks to automate management of household demand in real-time, including managing greater numbers of smart appliances
- increasing penetration of electric vehicles in the automotive market
- increased participation and competition in the energy market with retailers, aggregators and other third parties providing arrays of offers to customers to manage their energy and costs leading to new industry relationships, partnerships and business models
- increased DM capabilities providing Energex with an additional means of managing the emergence of new grid-side technologies.

These drivers are examined further in Table 3. While some of these factors will increase utilisation of the Energex network if managed well, others have the potential to negatively affect peak demand. Energex's DM programs will need to adapt to these changes as they unfold, if they are to remain relevant and efficient in achieving Energex's goals.

Table 3 - Technological changes towards 2020 and the impact on Energex's network

Technological Changes	Potential Implications towards 2020
The grid of the future	The potential key elements of the grid of the future impacting DM are: • Increased exchange of digital information and control technology to improve reliability, security and efficiency of the grid • Dynamic optimisation of grid operations and resources • Increased uptake and integration of distributed energy resources and generation • Deployment of 'Smart' technologies for metering, communications and distribution automation • Integration of 'Smart' appliances and consumer devices to the network which allows provision to consumers of timely information and control options • Increased uptake of advance electricity storage and peak-shaving technologies, including electric vehicles and batteries • Development of standards for communications and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid • Identification and lowering of barriers to adoption of smart grid technologies, practices and services which facilitate DM and demand side participation in energy markets Energex will need to identify the best transition path from its current one-way broadcast load control platform to a system that can address a highly networked customer base. Enabler technologies, such as smart meters, are emerging in viable forms and as these technologies mature, in combination with ubiquitous communication protocols, networks could begin to facilitate DM opportunities not previously available. Ultimately, Energex's aim will be to leverage whatever solutions provide the best overall (full value chain) value to network customers. Higher penetration of Distributed Energy Response (DER), increased real-time information and remote control functions will expose Energex to an interactive grid, potentially increasing volatility in the load profiles if appropriate DM strategies are not implemented. Energex will need to understand the network and commercial effects from increased uptake and application of DER. This will include understanding, and interacting with, increased DER and interoperable standards for communications (both customer side and grid side of the meter).
Home energy management	In the future, Home Area Networks (HANs) will communicate with intelligent endpoints giving consumers (& other parties) the ability to remotely monitor and manage their electricity usage. • Currently the industry is witnessing the early stages of the development of a market for tools to help customers manage their home energy. These include various 'smart' technologies (real time, automated, interactive technologies) that optimise operation of appliances. • The next generation of technology being developed will include smart appliances capable of communicating with each other. When mature, and connected to appropriate communications platforms, this technology will provide significant opportunity from within the home (for either the customer or another party) to manage residential demand in response to incentives or price signals. • In the longer term it is anticipated that this market (as well as demand side participation wholesale market) will become attractive to new market entrants (e.g. aggregators) who will derive value from the integration of open access, communications, control and smart appliances.
Appliance loads	• Future network (localised) peaks will be affected by both the current and emergent suite of appliances. Appliance technologies are constantly changing (flat screen televisions); many appliance loads continue growing (air-conditioning) while others are yet to emerge (electric vehicles). Further customer growth and increased housing density will continue to increase the

	intensity of residential peaks. • Energex will need to anticipate and manage appliance saturation trends, including the take up rates of appliances, the likely demand and energy usage patterns, as well as any energy efficiency improvements within the typical suite of residential appliances over the next 20 years. Energex will need to be actively involved in the development of standards (e.g. MEPS) and legislation related to these appliances to ensure DM strategies are optimised.
Distributed energy resources (localised generation & storage)	• Opportunities for customers to purchase and install their own storage and generation are likely to become cost effective (cheaper than grid connection alone) in the medium term. Once price parity occurs these technologies will become more prevalent and it would be possible to see uptake accelerate and mirror that of solar PV over the last decade. • Energex will need to develop new ways to reward and motivate customers to manage their contribution to demand (or lack of contribution) on the network. Islanded off-the-grid residences may become commonplace or connections that only use the grid for emergency supply could become the norm - if these scenarios occur DM would still be an important tool for network management of potential increasingly volatile loads.

5 Energex DM Strategy 2015-2020

The DM Strategy is split into a short term 2015-2020 view and a longer term view. The aim of this short term portion of the strategy is to build a firm platform for operations in the 2015-2020 Regulatory Period and to begin to transition towards likely scenarios in the long term.

Energex's proposed DM Strategy is based upon proven capability and historical success in developing programs to manage peak loads, combined with a forward looking program of exploring the impacts of the emerging drivers for change. The strategy is comprised of the Business DM, Residential DM, tariff reform and the DMIA as outlined in Figure 1.

5.1 Strategy 1 – Business DM

This Strategy involves a focus on near term identified constraints and longer term anticipated areas of network investment. This Strategy is aimed at deferring the network Program of Work where it is cost effective to do so, by targeting areas where the network is becoming constrained. Through the early implementation of DM programs in anticipated areas of growth Energex can reduce the need for growth driven CAPEX investment. Timing is critical in the implementation of business DM as appropriate time needs to be allowed for DM products to reach penetration adequate to address growth in these areas.

Where a near term constraint emerges in a specific network area, the process to be followed is as outlined in the RIT-D procedures[5]. If initial analysis shows that a non-network option could form part of a potential credible option, or provide a credible option in its own right, a report will be published inviting non-network providers to respond to the opportunity. If no providers provide a feasible proposal then Energex will assess the costs/benefits of conducting its own targeted non-network programs to address the identified network constraints. If there is no viable non-network option then the most economic network solution is selected.

For all long-term network limitations identified in the Energex Program of Work, i.e. greater than five years away, Energex will undertake an assessment of the possibility of conducting a targeted DM campaign in that network area. Where Energex believes a project deferral can be achieved through peak DM, a targeted DM campaign will be initiated where it is cost effective to do so. These campaigns may target large commercial and industrial customers, as well as provide extra incentives to residential customers beyond standard broad-based measures (see section 5.2).

Whilst the customer sectors of residential and larger businesses have been well catered for in existing DM programs, Energex is also exploring the potential for Small to Medium Enterprises (SMEs) to be targeted as a segment for future DM programs. These customers can range in size and type and do not necessarily belong to a particular tariff class.

[5]Further detail on Energex's approach to engaging Non-Network Service Providers is outlined in the Energex Demand Side Engagement Strategy: https://www.energex.com.au/__data/assets/pdf_file/0003/162273/Demand-Side-Engagement_31_August_2013.pdf

Therefore, there are a number of DM solutions that could be deployed that may include Energex's range of residential products such as PeakSmart air-conditioning or any of a number of business solutions such as improvements to building management systems, power factor correction or demand response.

The strategy for Business DM is outlined in Table 4.

Table 4 - DM Strategy 1

DM Strategy 1 – Business DM programs (1-10 years)	
Business DM	Energex's Business DM program will focus on: • Permanent load reductions • Energy efficiency • Power Factor Correction • Projects such as District cooling; CBD better buildings program; CBD Generation investigation; CBD EV charging station investigation; or SME programs.
Residential DM	Additional incentives and customer engagement activities will be provided to customers located within identified targeted areas to increase the number of customers participating in the programs.

5.2 Strategy 2 – Residential DM

This Strategy aims to continue to expand the existing broad-based residential programs to achieve increased penetration of DM capabilities across the network. Sustained growth in the penetration of DM capabilities, through sustained customer choice, in 2015-2020 will deliver a range of benefits, including:

- Load control capacity capable of deferring localised growth related augmentation up to and beyond 2020
- Improved capacity to mitigate the risks associated with customers gradually accepting reduced network security standards to reduce network costs
- Increased ability to deal with voltage problems on the Energex low voltage (LV) network and, for some feeders, reverse power flows caused by the rapid increase in solar penetration.
- Continued support of customer choice through ongoing development and support of markets providing DM products and services enabling customers to manage electricity costs and respond to new tariff signals.

Energex will continue to build on the success of its historical hot water load management program and, more recently, upon the successful establishment of the Positive Payback PeakSmart air-conditioning and pool pump programs. These programs provide customers with options to manage their electricity costs and to address the major drivers of residential peak demand (currently hot water systems, air-conditioners and pool pumps).

As new appliances become demand response enabled, and/or Home Area Networks begin to emerge, these will be incorporated into the broad-based residential DM programs. In

particular, work has already commenced on a policy position on connection of electric vehicles and battery storage, seen as the next most likely influences on the domestic demand profile. Into the future, such customer choice will be supported by appropriate tariff signals (see section 5.3) and potentially by the regulation of appliance and related building standards. Energex will look to explore both these complementary strategies to ensure that full value is realised from its broad-based programs. This strategy is outlined in Table 5.

Table 5 - DM Strategy 2

DM Strategy 2: Residential DM programs	
Residential hot water load control	Through work conducted in 2010-2015 the current load control program has been optimised to better manage the growing range of electric hot water systems. This program is now mature and Energex seeks to: • Continue to build on current load control capability by expanding the current broad-based 'economy' and 'super economy' (Tariff 33 & Tariff 31) load control tariffs • Influence regulation for connection of smaller hot water systems to appropriate load control tariffs and/or demand response enabling technologies (AS 4755)
Residential pool pump load control	Through work conducted in 2010-2015 pool pumps can now easily be connected to load control tariffs and Energex's load control programs. This program is now mature and Energex seeks to: • Continue to build on improved pool pump load control capability by expanding the current broad-based 'economy' and 'super economy' (Tariff 33 & Tariff 31) load control arrangements for pool pump connections • Influence regulation for improved connection rates of pools to load control tariffs and/or demand response enabling technologies (AS 4755)
Residential & SME (PeakSmart) air-conditioning load control	Work conducted through 2010-2015 has firmly established strong industry support for demand response capable (AS 4755) air-conditioning technologies. The PeakSmart program has established proven delivery models through industry channels and this program will now be expanded by: • Growing industry support for PeakSmart air-conditioning • Developing sustainable industry-led delivery models for PeakSmart air-conditioning units • Developing sustainable PeakSmart price signals • Influencing standards and regulations to support the widespread delivery of PeakSmart demand response capable technologies and appliances
www.yourpowerQld.com.au	Continue to maintain website as collective authority in fields of energy efficiency, energy conservation and DM for Queensland energy users and stakeholders
Emergent DM Products	The DM program will assess new potential drivers of demand and as new DM solutions are available these will be incorporated into the DM program suite of products and offers. This will apply to likely emergent DM tools such as residential storage (batteries), electric vehicles, smart appliances and home energy automation platforms

Energex currently manages its broad-based programs through the operation of its AFLC communication platform managed by its Load Control System (LCS). While the AFLC technology is relatively old, it is still capable of meeting the needs of the network business at a very low cost. Also, this LCS platform can be operated without the need for smart meters

or other related smart enabling technologies. Energex proposes to build on its current LCS to:

- Ensure that new DM technologies can be integrated into the LCS
- Ensure that the AFLC is transitioned (where it is cost effective to do so) so that it is capable of interacting with emergent communications protocols or technologies
- Influence market models and DM programs to ensure Energex's AFLC can transition relevantly into emergent business models and demand side energy market of the future.

Energex's aim in enacting this strategy is to incrementally improve and adapt the current LCS so that this system meets Energex's needs at a low cost and addresses changing customer lifestyles, while ensuring that Energex does not overinvest in technology that will become out-dated or obsolete. The current system is being steadily upgraded and provides a solid platform from which it is expected that Energex will be able to execute DM until 2020 and potentially beyond. Importantly, Energex's growing DM programs can be operated effectively with existing load control communications platforms but equally can be operated successfully if metering technology or communications technologies change.

Additionally, Energex is developing deployment options for its DM programs which do not rely on Energex owning the meter at residential premises. The Energex LCS can be operated to signal load control devices (e.g. relays) separate of meters and this will be important in a future which sees the introduction of contestability in the metering space.

Accordingly, Energex is preparing plans to share access to meter data and load control. The current one-way broadcast AFLC system, while robust and expected to maintain an operational life for considerable time to come, will eventually need to be replaced by a more granular and two directional communications platform. Work will be done to investigate what options Energex has to maintain load control both in the instance where metering ownership is retained and where metering ownership is lost or shared. Where possible these options will be designed to optimise the operational life of the existing AFLC LCS, to keep costs as low as possible for customers.

5.3 Strategy 3 – Tariff reform

The right combination of appropriate price signals and incentives is required to motivate customers to enrol in DM programs and products. The historical success of customer enrolment in load control tariffs (Tariff 31 and Tariff 33) indicates the penetration that price signals can achieve in well-constructed DM products. More recently, Energex's Rewards Based Tariff trial demonstrates that customers can change their demand significantly to respond to peak time rebates or peak time price signals. Further work is required to develop price signals that effectively motivate customers to reduce peak demand and enrol in DM programs, and Energex is currently reviewing longer term strategies for tariffs.

In the meantime, Energex will continue to incentivise customers directly to enrol in programs as has been done successfully for some time through the Energex's Positive Payback programs. This strategy allows Energex to target incentives to principal drivers of demand and DM products, such as PeakSmart air-conditioners as well as shaping incentives to drive support through supporting market channels (e.g. air-conditioning retailers). As new tariffs or price signals are developed, these programs will be transitioned away from direct incentives. The use of direct incentives to support tariffs allows Energex and the DM market to target

and engage with customers while avoiding market distortions such as the generous Feed-in Tariffs bought in as part of the Solar Bonus Scheme.

5.4 Strategy 4 – Utilisation of DMIA[6]

The Demand Management Innovation Allowance (DMIA) is an allowance provided to invest in understanding future DM issues. Over the last seven years Energex has successfully implemented a range of initiatives such as the Cool Change trials, Rewards Based Tariff Trial and PeakSmart pilots. As with all of these initiatives, Energex aims to apply its learnings in a way that incrementally improves Energex's current and proven DM capabilities while also improving customer choice.

As outlined earlier in this paper, Energex anticipates that a number of significant changes will occur across the industry during 2015-2020. For example, the way that consumers use energy will continue to change as pricing mechanisms change, new technologies such as EVs, batteries, HANs and smart appliances become more affordable and as a greater array of market participants respond to increased contestability.

To prepare for future challenges, Energex proposes to utilise DMIA to appropriately grow and transition the DM program. Initial proposals, as shown in Table 6 will examine the impacts of the following:

Table 6 - DMIA proposals

Programs	Description
Residential initiatives	Residential initiatives will be applied to: • Explore how to integrate Residential Battery Storage, Smart Appliance, Distributed Generation and Electric Vehicle technologies into DM programs • Explore how to integrate Home Area Network and Home Energy Automation Technologies into DM programs • Improve load management modelling to optimise load management programs across a range of smart DM products
Emergent DM technologies	Explore opportunities and feasibility for emergent technologies to build and improve upon current DM capabilities including: • Development of a Demand Response Management System that integrates effectively with Energex's LCS (Load Control System) • Analysis of potential DM available by targeting the SME Sector • Analysis of changes and advancements in load management technologies

[6] DMIA will transfer to the Demand Management & Embedded Generation Connection Incentive Scheme (DMEGCIS) in 2015

6 Long Term (Beyond 2020) Strategic Implications

The market and technology changes introduced between now and 2020 will begin to change market dynamics in a way that will have significant impacts on Energex DM programs in the longer term. While it is currently unclear exactly how the electricity industry will evolve in relation to these emerging trends, Energex is currently designing its DM programs with the flexibility required to adapt to a range of likely industry changes and scenarios.

In preparing for the future, Energex has explored a number of possible scenarios looking beyond 2020, to glean insights which will help shape the DM programs in the short to medium term. These scenarios include:

1) **Customer control** – customers adopt a growing range of technologies to help manage their energy but maintain full control over these.
2) **Market control** – the demand side participation market develops to the point where customers voluntarily allow third parties to control their household loads.
3) **Hybrid control** – a dynamic market emerges where customers can choose to manage their own demand and volunteer all or part of their load management to third parties.

Further details are contained in Appendix 1, and themes drawn from this analysis are outlined below.

6.1 Creating an adaptive DM capability

Energex will strive to identify and develop DM capabilities to manage emergent drivers of demand and appliance loads as they become apparent. In the short term, as discussed earlier, new drivers of demand can be incorporated into existing program delivery structures. However in the longer term, more fundamental questions may need to be addressed. For example:

- What is the value in electric vehicles and battery charging in terms of managing demand and addressing voltage issues?
- What charging options will customers want and how could Energex engage customers to optimise the value of charging through DM mechanisms?
- What are the implications of widespread and automated demand response for the network?
- Should Energex invest in grid-side demand response to manage peak demand or focus on working to manage the growing base of customer-side demand response (which options provide better end-to-end cost outcomes for customers)?
- How can Energex ensure that distributor needs are represented in the development of future standards, particularly appliance standards, and legislation related to these areas?

Technology changes will also impact on Energex's ability to deliver DM. Longer term key questions that need to be considered include:

- How can Energex understand the potential network impacts of customers choosing to introduce residential demand response capable technologies, eg. Home Area Networks?
- How can Energex access this demand response capability and use it to manage peak demand, particularly in an environment where Energex may not manage load control directly via an Energex meter?
- How can Energex evolve its LCS to support smart appliance and smart control communications and potential load control and data access by third parties?
- What new enabling technologies, such as advanced meters and other enhanced automation technologies, can support DM? What opportunities do these provide for dynamic pricing, low cost two-way communications and improved system feedback? How should such technologies be deployed (network wide versus incremental targeted rollout) and who should deploy them?
- How can Energex partner with aggregators and other market participants who may emerge to ensure that its needs are met by the developing market?
- How can Energex use technology to give customers more choice and a better customer experience around their electricity usage?

6.2 Complementary strategies

The scenario analysis conducted highlights the critical importance of pricing signals and mechanisms in supporting DM participation in both a distributor controlled DM environment and a customer controlled or third party controlled DM environment.

Work must continue to understand the future of retail and network tariffs and to assess customer acceptance of different price signals in motivating DM outcomes to benefit the network.

- The DM program must continue to support the Network Pricing Strategy to develop cost reflective network tariffs that support network management and network utilisation outcomes. This will involve continuing to build on the findings of the Rewards Based Tariff trial and investigating potential applications in constrained areas of the network with high residential energy use.
- Analysis needs to be conducted to understand how price signals in network tariffs are passed through to end users by energy retailers (and potentially other market entrants). In particular, costs and benefits of sending direct signals to end users, as opposed to via a retail tariff, will need to be assessed.

Further work will also be invested in the costs and benefits of mandating appliance and building standards. From a whole of society view, the benefits of targeted regulation have the potential to be very significant.

Ongoing scanning of lead indicators and the industry environment will provide insight into changing trends and changes impacting DM programs and strategies.

6. References

AEMC. (2012). *Power of Choice Review: Final Report - Giving Customers Options in the way they use Electricity*.

AEMC. (2012). *Power of Choice Review: Final Report Implementation Plan*.

Australian Government Department of Resources, Energy & Tourism. (2009). *Energy White Paper: National Energy Framework 2030*.

Energex. (2011). *2030 Strategic End-State*.

Energex. (2013, August 31). *Demand Side Engagement Strategy*.

Productivity Commission. (2013). *Electricity Network Regulatory Framework*.

Queensland Government. (2013). *Queensland Government response to the Interdepartmental Committee on Electricity Sector Reform*.

Queensland Government. (2013). *The 30 Year Electricity Strategy: Discussion Paper*.

Queensland Government. (2014). *PowerQ: A 30 year strategy for Queensland's Energy Sector*

7. Appendix 1: DM Scenario Analysis

This section articulates the different longer term DM scenarios that might conceivably unfold given the drivers of change outlined in the previous section.

As outlined, a (relatively) rapid and unprecedented series of changes will fundamentally transform the historically stable status quo business model of the energy industry. These change drivers will inevitably impact Energex's DM programs. Currently, Energex operates a mostly one-way, command-and-control DM program but must transition to a program of the future which will most likely look very different to the current fairly simple market model.

Regardless of how these industry changes and critical drivers unfold, distributors like Energex will still need to ensure that energy flow and demand on the grid manifests in a way that optimises management and utility of distribution assets. Therefore it is critical that DM programs evolve and change appropriately to ensure that new market models and emergent technologies integrate with the grid in a way that improves rather than worsens load factor and asset utilisation.

Consideration of the scenarios outlined below provides longer term direction for Energex's DM programs and also outlines the technological changes and likely market changes that Energex will need to begin to prepare for and transition towards in the shorter term. The path to the longer-term will most likely manifest as a combination of the scenarios outlined, however consideration of these potential pathways will assist in exploring the possibilities that Energex's DM program will have to contend with.

The following scenarios and implications and recommendations for Energex's DM programs are explored:

- **Customer control** – Customers adopt a growing range of technologies to help manage their energy but maintain full control over these.
  - High levels of Grid interactivity
  - Low levels of Grid interactivity
- **Market control** – The demand side participation market develops to the point where customers voluntarily allow third parties to control their household loads.
  - Energex maintains direct management of customer loads
  - Energex has to interact with third party intermediaries to manage customer loads
- **Hybrid control** – A dynamic market emerges where customers can choose to manage their own demand and volunteer all or part of their load management to third parties.

Scenario 1: Customer Control

Table 7 below outlines customer control.

Table 7 - Customer control

Customer Control		
Market model	• Simple contract models where a customer's main relationship is with their retailer. Retailers offer simple ranges of pricing options which customers choose based on their own preferences and energy needs. The market is predominantly customer (not market) driven.	The energy market becomes decentralised and disaggregated with customers buying a range of emergent technologies (batteries, DER) to maximise their own utility and mostly automate their household energy usage with simple home energy automation systems (HEMs). Customer adoption takes many forms as customers each purchase technologies to manage their own costs in relation to relatively simple time based pricing mechanisms. Most customers use set and forget systems, though a small portion of customers prefer to interact with their systems more dynamically. Customers drive the market choosing to interact directly with price structures and market mechanisms.
Metering	• Metering is capable of monitoring time based usage but may not be more granular than half hourly consumption. • Ownership of metering is inconsequential as customers interact independently of metering infrastructure • Customers can access energy data either from the meter or from in home energy monitoring devices.	
Pricing	• Simple ranges of time based pricing models offered to customers. These prices reflect the costs of using the Grid. More dynamic prices are made available to customers who want to bid directly into the market – where appropriate.	
Technology	• Home energy automation systems are ubiquitous with simple interoperability with a wide range of smart appliances, storage and distributed energy technologies common in most households.	
Customer	• Customers purchase ubiquitous smart appliances (sold as standard) and simple storage & DER technologies to suit their lifestyle preferences. • Home energy management systems (HEMs) are simple set and forget with simple interoperability making it easy for customers to set energy management preferences matched to simple pricing structures.	

In a customer control future simple automation technologies make it easy for customers to manage their household energy to suit their lifestyle. However, the way in which this manifests could take different pathways and these are further explored in the following sub-categories.

Customer control – high levels of grid interactivity

In this scenario Smart Grid technologies are common with high levels of interoperability and two-way information flow. Connectivity is simple and customers are able to bid into the

market simply and easily through automated settings on their home energy management systems. In this way the energy industry is able to signal demand events to the market in a way that customers are able to respond to easily. Customers still select how their systems and households respond but are able to interact with the grid directly.

Customer control – low levels of grid interactivity

This scenario sees customers choosing their own technologies and choosing how they interact with the grid but with much higher levels of market disaggregation and much lower levels of information flow and interoperability across the Grid. Customers may island themselves or use network infrastructure for security purposes but in both cases do so to maximise their individual amenity independent of anything happening across the Grid more generally.

What customer control could mean for Energex?

In these scenarios the energy industry, including distributors, has little interaction with customers other than through pricing contracts. Customers can choose to purchase a range of simple and widely available energy management, generation, storage and automation technologies which integrated simply with their household needs. In this scenario Energex must influence price signals in the market to ensure customers manage their demand on the network at a localised level.

Scenario 2: market control

Table 8 outlines market control.

Table 8 - Market control

Market Control		
Market Model	• The market develops an aggregated demand side participation model in which retailers, distributors, aggregators and other third parties interact. • Market participants offer customers a range of different contracts and products to either help them minimise their electricity costs or bid into the market • Contract arrangements between market participants are complicated and common.	The energy market is highly aggregated and competitive as a growing range of market participants seek to package technologies and pricing offers to provide customers with competitive value offerings. This environmental context is predominantly market driven. The market is typified by competition and market participants will offer to manage customer loads (or simplify management of customer loads) to suit the different types of contract arrangements in place. Contractual arrangements between market participants may become common place to maximise value across the value chain. However, customers can make different contractual arrangements simultaneously with different market participants. The market transitions to an open access model where a range of service providers can use Energex infrastructure or use their own infrastructure.
Metering	• Metering ownership is decentralised with different parties providing meters to customers dependent on product offerings provided • Meters are advanced with interoperable two-way communications facilitating a gateway between customer and the market • Control signals can be sent via meters (but not in all cases)	
Pricing	• A range of pricing structures exist and the market offers these dependent on contract arrangements (most pricing options are time based though some dynamic, event based pricing structures and penalties may also be commonplace) • Customers can choose fairly basic retail contracts or can contract with several parties at the same time for different outcomes (e.g. retailer contract, demand response contract with aggregator and/or direct load control contract with DNSPs)	
Technology	• Different home energy management systems, smart appliances, DERs, storage technologies are offered by multiple parties to suit different contract arrangements. Competition in the market to lock customers in through technology offers. • Technologies will likely be offered as part of contract packages (i.e. low cost packages or demand response packages).	
Customer	• Customers will be faced with a wide array of market contracts and offers • Technology offers will be based around contract offers and (like mobile offers today) customers will choose from a wide array of products and configurations • Many customers will choose simple contract arrangements and select simple ranges of appliances and HEMs to interact with these. • Some customers will have complicated ranges of DER, Storage and home energy automation technologies to leverage an array of market contractual arrangements.	

The energy industry is highly networked, shaped by advances in technology and connectivity, both in the home and the Grid. Communications and control platforms will provide two-way information flow, two-way control and energy flow. The modernisation of the network will allow increased use of DER and facilitate dynamic communication between industry participants and customer appliances. The market offers customers simple automation technologies as part of product packages to assist customers in saving money under different pricing structures or mechanisms. Energex must consider different potential roles being available within the market:

Market control – Energex maintains direct manage to customer loads

In this scenario Energex could continue to upgrade its load control and metering capabilities to communicate with customer HEMs, smart appliances and to activate DM when required. In this scenario Energex may still own metering assets (Customer gateway) and may allow other parties to access this gateway, but Energex is able to directly call load control events as and when required.

Market control – Energex acts through third party intermediaries to manage loads

In this scenario Energex may lose ownership of metering assets and may have to collaborate or work through other market intermediaries to access customer loads for the purposes of peak load management. In this situation Energex should influence how other parties manage loads so that network utilisation is not harmed. Pricing structures, signals and agreements will play a key part in any such relationships.

What market control could mean for Energex

In both of these scenarios Energex must prepare to interact with technologies that will become increasingly smart, interactive and dynamic. The energy industry will become more contestable and competitive and Energex will need to determine what role to play in such a situation. If Energex maintains load management capabilities in this market, Energex assets will have to be upgraded to interact with the emergent communications and technology capabilities and protocols.

- Energex must interact with the energy market to influence that load management outcomes.
- Energex must influence regulatory and incentive frameworks to ensure that customer behaviours and market arrangements facilitate efficient operation of and investment in the network.

Scenario 3: Hybrid control model

This model considers combined influences from the two models outlined above. In this instance the market is fragmented and disaggregated with no dominant standards or market models. In this fragmented scenario customers hold significant power, making choices on how to manage their energy and who to contract with. This is detailed below in Table 9.

Table 9 - Hybrid model

Hybrid Model		
Market Model	• The market is fragmented with a combination of aggregators, retailers and individual customers all interacting with the demand side participation market in different ways and for different outcomes • There are no obvious standard communications platforms or clearly dominant market participants though several diverse but strong models exist • Many individual customers choose to control their own loads directly in response to price signals or market contract arrangements (customers often hold several contracts with different market participants)	The energy market becomes fragmented with customers responding to a range of market participants in different ways. Many customers will choose to manage their own household energy needs autonomously. No dominant aggregators or retail models emerge with many parties vying to increase customer share. Distributors likely to retain significant direct enrolment in load control programs in a largely disaggregated market. In many instances customers may enrol with several market participants at the same time. Due to its fragmented nature standard open access communications protocols may not emerge with many different communications platforms and technologies operating in parallel but not necessarily in unison.
Metering	• Metering is diverse with many parties providing different types of meters • Some meters are smart but others have much simpler functionality and the market is typified by a wide range of meter offers • DNSPs may still retain ownership of a considerable portion of meters	
Pricing	• Like meters there are a range of pricing offers available in the market. • Customers can choose from a wide range of pricing options and contracts each designed to achieve different outcomes. • No clear standard price signal exists	
Technology	• Different home energy management systems, smart appliances, DERs, storage technologies are offered by different parties to suit different contract arrangements. There will be competition amongst market participants to lock customers in through contracted technology offers. • Many technologies are readily available outside of market contract arrangements and many customers purchase different types of smart technologies to serve different outcomes (some customers are contracted to aggregators, some island themselves, some have basic market contracts with retailers while others enrol in DNSP load control programs)	
Customer	• Customers will be faced with a wide array of market contracts and choices • With no clear dominant choices the market becomes fragmented with customers responding to and interacting with the market in a range of different ways	

What a Hybrid Market Model could mean for Energex

In this scenario Energex will have to interact with a range of market participants while also continuing to manage significant customer programs directly. Direct cooperation between market participants may be rare with each competing to achieve their own market objectives. Customers will hold a lot of power, deciding how to manage their loads or which market participants to contract with and on what basis. Market participants able to offer simple and attractive packages will be popular. Infrastructure may have to develop to cater for a range of communications and control protocols and, while not heavily networked, will be capable of dealing with a diverse range of technologies and smart energy capabilities. However, if Energex is able to retain a strong direct load management presence this may allow Energex to continue to operate with its own communications protocols regardless of other common communications platforms. This complex operating environment will pose a range of challenges to distributors as customers and industry participants seek to manage different energy resources across the network at different times for different outcomes.

- Energex must interact with a wide variety of Energy market participants to ensure that load management outcomes are achieved.
- Simultaneously Energex must continue to invest in and operate significant load control programs and platforms and explore how other parties could share or pay for access to these programs.
- Energex must work with regulatory and incentive frameworks to ensure that customer behaviours and market arrangements facilitate efficient operation of and investment in the network.