30-Year Electricity Strategy

Discussion paper

Supporting material

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Section 1

How the electricity sector works

• The electricity supply chain

Queensland's electricity supply system involves three key elements:

Making electricity 	Power stations transform energy sources like coal, gas and renewables into electricity. The National Electricity Market provides a wholesale market for the supply and purchasing of electricity between generators and wholesale customers.
Moving electricity 	High voltage transmission power lines move electricity long distances from power stations to local distribution areas. The distribution network consists of low voltage power lines that then move electricity to end-users.
Selling and consuming electricity 	Retailers buy electricity from the wholesale market and sell it to residential and commercial customers. The retail market in the South East is privatised and a number of private retailers compete for customers. Ergon Energy is the dominant retailer in regional Queensland.

• Queensland is part of the National Electricity Market (NEM)

Queensland operates within the National Electricity Market (NEM)—a wholesale market in which generators and retailers trade electricity. The key characteristic of the NEM is a competitive wholesale pool for the supply and purchasing of electricity between generators and wholesale customers (such as retailers and large industrial connections).

The NEM operates through interconnected transmission and distribution networks connecting electricity generators and customers across the Australian Capital Territory, New South Wales, Queensland, South Australia, Victoria and Tasmania. It stretches for more than 5,000 kilometres from Port Douglas in north Queensland to Tasmania to the south and to Port Lincoln in South Australia to the west. This makes the NEM the longest alternating current electricity system in the world.[1]

Mount Isa and a number of small, isolated communities across north western Queensland are *not* connected to the NEM due to their distance from the transmission backbone. They receive their electricity from local generators and distribution networks.

[1] AEMO Overview of Australia's Energy Markets

• How does the NEM work?

It is not possible to store electricity or distinguish between which generator produced the energy consumed by a particular customer. As a result, the wholesale electricity market uses the concept of a pool where all electricity generated is centrally pooled and scheduled to meet demand. This pool is not a physical structure but represents a set of rules and procedures administered by the Australian Energy Market Operator (AEMO).

All electricity generation in the NEM, regardless of being generated by publically or privately owned power stations, is dispatched and traded through the pool.

Further information on the operation of the NEM is available at www.aemo.com.au/corporate/0000-0262.pdf

Overview of Queensland's electricity sector

• Making electricity - the generation sector in Queensland

The bulk of Queensland's electricity requirements are provided by large coal and gas-fired generators with a small but increasing proportion from renewable sources.

The Queensland electricity generation sector includes a mix of public and private ownership. Government-owned generation corporations Stanwell and CS Energy together control around 63 per cent of the generation capacity in Queensland. Public and private generators must compete equally in the NEM. The private sector has supplied all new capacity in Queensland since 2007. It continues to increase its share of generation capacity and signals a strong intention to invest to meet future needs through a number of projects at varying stages of planning and development.

• Moving electricity - the networks sector in Queensland

Three monopoly businesses provide network services in Queensland:

- Powerlink: transmission of high-voltage delivery of electricity over long distances
- Energex: distribution of lower-voltage electricity from the transmission backbone to customers across South East Queensland
- Ergon Energy: distribution across regional Queensland.

The Queensland networks operate as monopoly businesses. This means customers cannot choose a competing network to deliver their electricity. A regulatory framework exists to prevent network operators from over-charging or building excessive amounts of capacity. How much network businesses can spend (and how much they can recover from customers) is ultimately decided by an independent regulator, the Australian Energy Regulator (AER).

Networks are comprised of long-lived and costly assets. Maintaining a system of poles and wires that covers a state as large as Queensland requires significant investment. Capital expenditure on Queensland's electricity network has increased significantly in recent years to improve reliability, meet peak demand growth and replace ageing infrastructure.

Changes in the way customers use electricity (how much and when) are also creating pressures for the system. High levels of peak demand at the same time as falling electricity consumption is increasing the cost of an expanded network as it is spread across lower overall consumption level (i.e. more is being spent to transport less energy).

- **Selling electricity – the retail sector in Queensland**

Queensland's more than two million electricity customers primarily interact with the electricity system through electricity retailers. Retailers buy electricity in the NEM and then sell it to their customers, as well as arrange connections, billing and other customer services. Since 2007, most customers have had the option to select their own electricity retailer (retail competition). Access to a choice of retailer has resulted in many new retailers entering the market in South East Queensland. There was one retailer for small customers in 2007 but 17 active retailers by 2013. Up to 70 per cent of customers in South East Queensland are now on market contracts.

In Queensland, electricity prices are regulated and are calculated each year by the Queensland Competition Authority (QCA) on behalf of the Queensland Government. Retailers must offer standard price packages, where tariffs are set by the QCA (regulated tariffs). They are also free to develop and compete on price packages that suit their business and customers' needs (market contracts). Retail costs historically made up a small proportion of electricity bills but have grown in recent years due to greater transparency of retail costs and increasing administrative costs.

How are electricity bills calculated?

The three main cost components of an electricity bill are network, energy and retail costs. Costs stemming from the Carbon Tax, Renewable Energy Target (RET) and Solar Bonus Scheme policies also have a material impact on end-user prices. Figure 1 shows a breakdown of the underlying cost components for a typical customer on the standard residential tariff (Tariff 11) with an annual bill of $1,451 including GST (consuming 4,250 kilowatt hours).

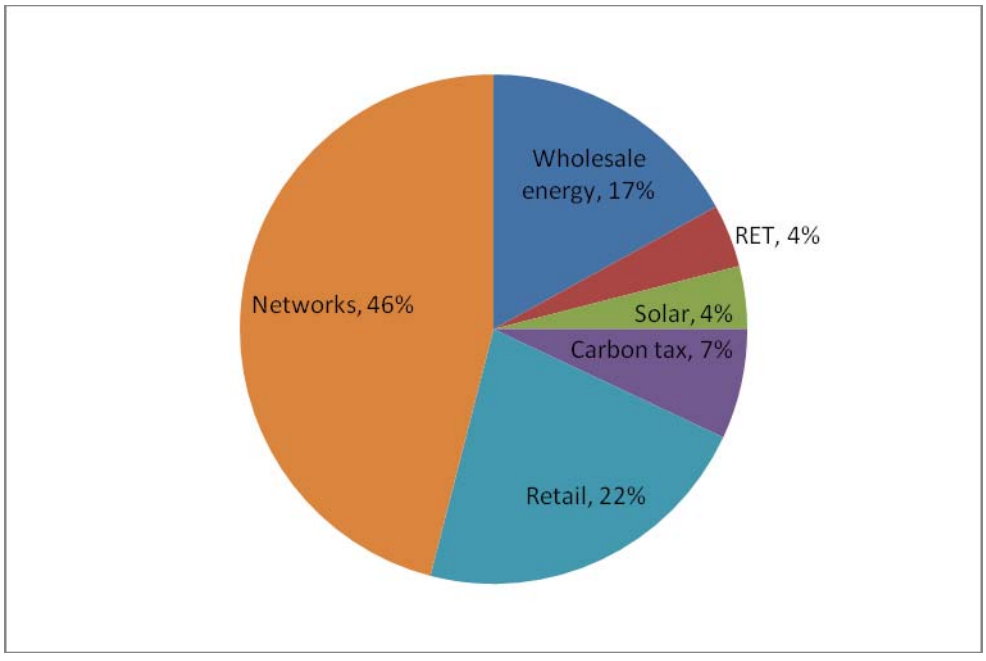


Figure 1 Queensland Tariff 11 Cost Component Breakdown 2013-14 (QCA)

- ## Network Costs

These are costs associated with building and maintaining network infrastructure. These costs are regulated by the AER. Network costs have been the main driver of electricity price rises and have more than doubled since 2006-07. Network costs currently contribute approximately **46 per cent** of a typical Tariff 11 bill and are responsible for approximately half of the 22.6 per cent increase to Tariff 11 in 2013-14.

- ## Green Scheme Costs

The Carbon Tax, RET and the Solar Bonus Scheme collectively contribute around **15 per cent** to the annual bill of a typical Tariff 11 customer. This amounts to an annual cost of over $200 for the typical household consuming 4,250 kilowatt hours on Tariff 11.

- ## Energy Purchasing Costs

The QCA is required to determine the cost that a standard retailer will face when purchasing electricity from generators over the course of the tariff year. These costs, which make up approximately **17 per cent** for a typical residential customer in 2013-14, are based on forecasts of the spot price of electricity generation sold into the NEM and on estimates of the hedging costs that retailers are likely to incur in order to manage the risk of spot price volatility in this market.

- ## Retail Costs

The cost of the services a retailer performs – such as billing, customer administration and marketing – are passed through to customers. The QCA also makes an allowance for a retail margin and headroom in order to encourage and improve competition in the South East Queensland retail electricity market. Collectively these costs contribute around **22 per cent** of a typical annual Tariff 11 bill.

Section 2

Moving to price monitoring in South East Queensland

What is proposed?

The Queensland Government will remove regulated price-setting for the South East Queensland retail electricity market and replace it with price monitoring by 1 July 2015, subject to certain preconditions including:

- ensuring there is sufficient competition in South East Queensland to benefit customers
- implementing appropriate support mechanisms to protect customers (refer Section 3)
- improving customer engagement in the market to allow consumers to reap the full benefits of increased competition and drive a more responsive sector (refer Section 4)
- establishing an effective regulatory framework with clearly defined roles and responsibilities for retailers, the QCA and government
- ensuring a credible and viable methodology is in place to determine regulated retail electricity prices in regional Queensland.

Why move from price regulation to price monitoring?

Retailers are required to offer regulated prices to customers on a standard retail contract. Prior to, and during the initial years following the introduction of full retail competition in South East Queensland in 2007, regulated prices provided a safety net (price cap) for customers. However, given the maturity and competitiveness of the market, which now supports a mix of retailers from small new entrants to large incumbents, the need for a regulated price-setting approach has diminished and may even have become detrimental to the further development of competition in South East Queensland.

Where competition is effective, there should be no need for price regulation. Regulated prices will almost always be an imperfect substitute for prices determined by competitive market processes and as such, could distort the market. Given the difficulty for regulators in attempting to forecast future costs and prices in a complex and rapidly changing market environment, regulated prices can be set too low, deterring investment and innovation, or too high, to the detriment of consumers.

In contrast, a price monitoring approach would benefit consumers by increasing competition, encouraging greater customer engagement, and improving access to information so consumers can better understand the choices on offer. Retailers will have the flexibility to develop price packages that take into account their own particular costs and will have more incentive to offer discounts to entice new customers. In the longer term, strong market rivalry between retailers should place downward pressure on prices and improve customer choice and service.

What protections will be in place?

Before moving to price monitoring, the Government will ensure certain preconditions are met. This includes:

- ensuring there is sufficient competition in South East Queensland to benefit customers
- implementing appropriate regulatory mechanisms to protect customers
- improving customer engagement in the market to allow consumers to reap the full benefits of increased competition and drive a more responsive sector.

Existing services such as the Energy and Water Ombudsman Queensland will also be maintained.

Under a price monitoring approach:

- the QCA would monitor the performance of the retail market in South East Queensland and publish information on pricing trends
- retailers would be required to publish a 'standing offer' which represents what customers would be charged if they do not negotiate a market contract and
- the Queensland Government would retain a reserve power to reintroduce retail price regulation if the effectiveness of competition was found to have significantly declined.

Is price monitoring used anywhere else?

The Victorian Government removed retail electricity price regulation for residential customers in 2009. In addition to providing a product comparator, the Victorian Government provides quarterly reports on the product range and prices offered by retailers across Victoria.

South Australia deregulated retail electricity and gas prices in 2013, moving to a price monitoring system supported by consumer protections contained in the National Energy Customer Framework. The Essential Services Commission of South Australia monitors pricing on the South Australian Government's behalf.

When will price monitoring commence in South East Queensland?

The Government proposes to introduce price monitoring in South East Queensland by 1 July 2015 once the pre-conditions above and any other conditions are met. The final 30-year electricity strategy will include an implementation plan to facilitate the move to price monitoring and outline steps to ensure appropriate customer protections are in place.

What will happen if price monitoring is not introduced in South East Queensland?

Competition in the retail electricity sector will slow unless pricing supports competition. This will mean limited choices for consumers and possibly less access to innovative products and tariffs.

What about competition outside South East Queensland?

Due to the limited competition outside South East Queensland, access to regulated retail electricity tariffs will be maintained for these customers.

Section 3

Strengthening customer protections – the National Energy Customer Framework (NECF)

What is proposed?

The Queensland Government will aim to implement NECF in 2014. An industry/customer working group will be established to examine options to further enhance protections and engagement of Queensland customers.

What is NECF?

Electricity retailers now operate across borders in the NEM, and many states and territories have different rules and regulations. This means that protections offered to customers differ from state to state. Compliance with differing regulatory frameworks also increases costs for retailers and may be a barrier to new retailers entering the market.

NECF aims to change this and provide a standard approach to retailer licensing and customer protections across the states. This will be implemented by transferring some current responsibilities of the states and territories to a single set of national laws, regulations and rules. Queensland will maintain responsibility for price regulation and small customers will continue to have access to the Energy and Water Ombudsman and state-based concessions and rebates.

What are the benefits of NECF?

- Stronger protection and better assistance for customers struggling to pay their bills. This includes more formal requirements for retailers to maintain and apply hardship programs and stricter regulatory oversight of those programs.
- New performance standards for retailers, including how they respond to customer complaints.
- Better access to concessions and rebates as well as new disconnection protections for consumers who are not direct retail customers (such as those in caravan parks).
- Customers will be able to compare offers and products from retailers more easily as they will have to be more consistent in the information they provide to consumers. Queenslanders will have access to the AER's Energy Made Easy website (www.energymadeeasy.gov.au), which allows householders to more easily compare price offers for retailers in their postcode.
- Implementing NECF also supports increased retail competition because nationally-harmonised regulations mean lower costs and easier market entry for retailers operating across state borders.
- Important elements of the existing Queensland framework will be maintained such as:
  - the right of customers to end their contact without paying a fee if the contract price rises above the regulated price

- provisions supporting retail pricing and customer protections in regional Queensland.

Future enhancements to NECF

Work is underway at the national and Queensland level on new customer protections and customer engagement measures that may become part of the NECF package in future such as:

- Better information on bills so that customers can better manage their consumption and costs
- giving customers new rights of access to their electricity metering data so that they can better understand and manage their electricity use and
- examining new customer protections and enabling greater customer engagement with the electricity market.

Section 4

Customer engagement with the electricity market

What is proposed?

The Queensland Government will establish an industry/customer working group to help develop a strategy to increase levels of customer engagement with the market. The strategy

Why is this necessary?

Until recently, Queensland electricity customers had limited reasons to actively participate in the electricity market. However, retail competition and increased commentary on electricity price rises mean customers are now subjected to more and more messages about the electricity market and electricity use. The market has also become more complex with additional products and suppliers. A 2012 Choice survey of electricity customer experiences across Australia suggested a low level of effective customer engagement[2]. Choice found customers lack confidence in their choice of retailer and find it difficult to make an accurate comparison of retailers and their products.

International case-studies demonstrate stronger engagement benefits for customers

New Zealand has shown that effective customer engagement can dramatically change the market for the better. The approach in New Zealand recognises that if customers have a propensity to switch suppliers then retailers must continue to improve prices, products and service levels. The New Zealand campaign prompts customers to investigate whether they would be better off on a different electricity contract and backs this up with readily-accessible and comprehensive comparison tools. Since its launch, New Zealand customers report greater confidence in their ability to compare and assess electricity deals. Those households that have changed retailers have reportedly saved an average of NZ$165 per year and the strategy has constrained retail price growth.

In addition, a study of 17 US states has also found that customer participation is a key factor in lower prices[3]. The study found that, where participation is relatively high, a competitive market lowered prices (with or without regulated price controls). In markets with lower customer participation, having a competitive market contributed to increased prices.

[2] Choice. *Electricity providers perform just as poorly as the big four banks for customer satisfaction.* Media Release. 10 October 2012.
[3] Swadley, A. and Yucel, M. 2001. *Did residential electricity rates fall after retail competition? A dynamic panel analysis.* Federal Reserve Bank of Dallas Energy Policy 39 (2011) 7702-7711

Effective engagement must account for diverse customer motivations

Not all electricity customers are the same. The International Energy Agency (IEA) has identified a variety of non-economic factors such as values, beliefs, attitudes and norms which determine electricity customer behaviour[4].

Customers can be grouped into segments based on some of the factors identified by the IEA and illustrated in figure 2.

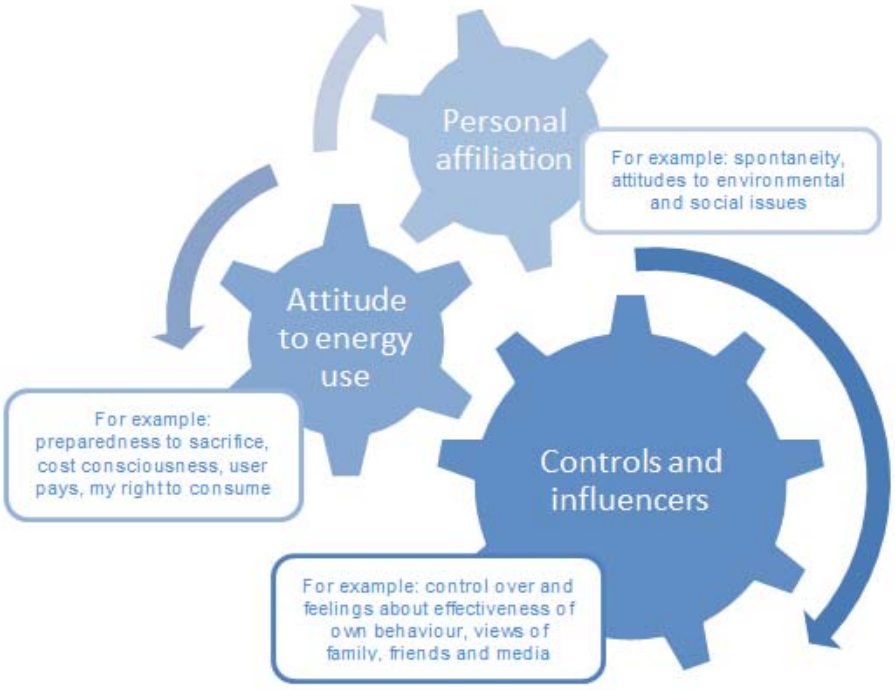


Figure 2 Factors shaping customer electricity use

Developing an effective engagement strategy

The proposed engagement strategy will draw on international research insights to develop effective engagement mechanisms which reflect the diversity of customer behaviours, values and motivations.

In addition, the development of the proposed engagement strategy may consider:

- how best to understand customer behaviour in and attitudes towards the Queensland retail electricity market
- how best to trigger increased customer engagement (including the communication mechanisms and messages for different customer groups)
- how to measure the effects of improved customer engagement.

[4] International Energy Agency. 2010. *Energy Technology Perspectives.* p598.

Section 5

Reviewing the Electricity Rebate

What is proposed?

The Queensland Government will review the eligibility criteria and structure of the Electricity Rebate to better target assistance to those most in need as part of the development of a holistic hardship framework.

What is currently provided?

An Electricity Rebate of $282.54 (GST inclusive) per year is available to eligible pensioners and seniors. It is converted to a daily rate and applied to each bill based on the billing days.

Considering the eligibility settings

The Queensland Electricity Rebate is available to electricity customers who hold a current:

- Pensioner Concession Card
- Department of Veterans' Affairs Gold Card[5] or
- Queensland Seniors' Card.

Unlike in other states, holding a Health Care Card does not provide eligibility for the main electricity rebate in Queensland. However, Health Care Card holders generally have similar or lower incomes than holders of the Pensioner Concession Card. At the same time, the Queensland Seniors' card is not means tested. It is available to anyone over the age of 65 who is not working full time.

These eligibility arrangements mean that there may be some households currently receiving the Electricity Rebate that may not have as great a need for help with their electricity costs as other low-income households that are ineligible.

Considering the structure of the rebate

In addition to setting appropriate eligibility criteria, the type or structure of rebate offered can also impact the effectiveness of the assistance.

The flat rebate currently provides the same dollar amount to low-consumption households as higher consumption households. This means the rebate meets proportionately less of a higher-consumption household's bill - but quite often it is these households who need the most assistance. Typically, households with more people in them tend to consume more than the average amount of electricity. Some consumption such as that associated with the number of showers taken and the amount of food requiring refrigeration and cooking is difficult to reduce.

[5] If also receiving the War Widow Pension or special rate TPI pension.

What alternative structures are there?

Some jurisdictions, including Victoria, Western Australia and the Northern Territory have moved to electricity cost-based rebate structures. Victoria administers its main electricity concession as a percentage of the bill and Western Australia provides fixed concessions as well as additional concession amounts to households based on the number of dependent children.

The relative merits of flat rebates and electricity cost-based rebates are open to debate. However, cost-based rebates may provide more assistance to households who consume more electricity. This may result in a system where those who need the most help, receive the most help.

Section 6

Reforming electricity tariff structures

What is proposed?

The Queensland Government will facilitate the development of a long-term electricity tariff strategy by July 2015.

The implementation of new tariffs will be supported by consumer education and engagement, and protections for vulnerable consumers. The strategy will be aimed at encouraging more efficient use of the electricity system and reducing the strain on the network, particularly over peak demand periods. This should assist in alleviating some of the existing price pressures in

What are electricity tariffs and why is tariff reform important?

Tariffs are the charges which apply for the supply of electricity to customers. Basic tariff structures in Queensland were developed many years ago. New technology and the different ways in which we consume electricity mean these tariffs are now out-dated.

Current tariff structures disguise variations in costs

As detailed in Section 1, recent electricity price rises have largely been driven by increasing network costs. These are in part due to investment in additional network capacity to accommodate growing demand for electricity at peak times. For Queensland households, the general supply tariff (Tariff 11) represents the average cost of supply over the year. For this tariff no price signal is given to consumers about the higher demand for, and therefore higher value of using, electricity during peak periods. Nor does it provide a signal about the costs of having large energy intensive appliances that demand large amounts of electricity at any one time. This increases the need for network expansions to meet demand peaks.

Another way of putting this is that all customers generally pay the same unit price for electricity despite some customers' consumption behaviour requiring greater investment in the network, as illustrated in figure 5. This means there is no price incentive for customers to change their behaviour, even though they may be able to do so without sacrificing comfort or enjoyment from their appliances.

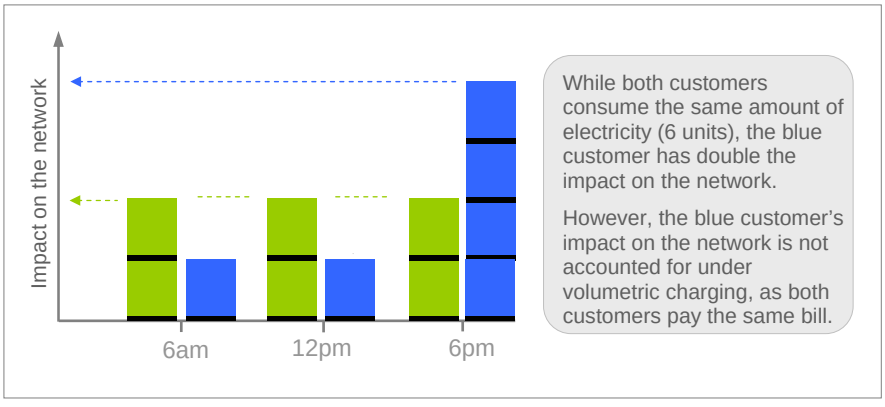


Figure 5 Customer behaviour can drive network prices

Customer respond to different types of tariffs

There are different types of residential electricity tariffs currently in use in Queensland. There are also a number of alternative tariff structures that could be implemented that have different features and require different metering technology. These could be considered for introduction in the future. Each tariff sends a different price signal to customers about the cost of supplying their electricity (refer table below).

During 2011 and 2012, Energex and Ergon Energy engaged over 3,800 customers in Brisbane, Cairns and Toowoomba in a trial to test customer acceptance and behaviour under alternate tariff structures. The trial involved:

- a time-of-use tariff coupled with a dynamic peak price and
- a capacity-based tariff which charged more for high usage on critical peak days.

More than 90 per cent of participants changed their behaviour on peak demand days, largely driven by the financial benefit of doing so. The trials indicated that while time-of-use charging encouraged some shifting of electricity consumption away from peak times, dynamic pricing signals were the most effective at changing customer behaviour, followed by capacity pricing.

Tariff	How it works	Notes
Current residential tariffs available in Queensland		
Flat rate tariff (T11)	Same rate per unit (cents per kilowatt hour) no matter how much is used	Standard household tariff
Load control tariffs (T31, T33)	Discounted rate for allowing distributor to control supply for certain appliances. Supply guaranteed for certain number of hours per day.	Commonly used for pool pumps, hot water, dishwashers. Used in conjunction with Tariff 11. Almost 60% of households have an appliance connected to T31 or T33.
Basic time-of-use tariff (T12)	Applies a different unit price to electricity consumed at different times of the day.	Provides a price signal to customers of the difference in supply costs at different times of the day (peak/shoulder/off-peak).
Combination load control plus time-of-use tariff (T13 PeakSmart)	Gives distributor control over a demand-response enabled air-conditioner. The unit price varies depending on the time of day.	New in 2013-14. Energex's Cool Change trial indicated it is possible to reduce power to air-conditioners for short periods without customers noticing any temperature difference.
Possible future tariffs		
Real Time Price tariff	Prices follow wholesale energy market price. Consumers are advised of the unit price in advance so they can adjust their use.	Available in the USA. Wholesale market prices in the NEM are highly volatile.
Critical or dynamic peak pricing tariff	Charges a significantly higher rate during declared 'peak events', with consumers notified in advance so they can adjust use accordingly.	Peak events are called when the wholesale price is expected to be highest or when the electricity network is severely strained.
Demand or capacity-based tariff	Charged according to maximum monthly demand, or at a fixed rate based on an agreed amount of capacity being available.	Charges more accurately allocate a share of the costs for customers who make high demands on the system at certain times. Commonly used by

		large business customers.

Tariff reform must benefit customers

Careful consideration needs to be given to the suite of tariffs to be provided over the long-term. Different tariff structures will trigger different levels of customer response. Different patterns of use impose different costs on the system.

In addition, customer understanding of tariff options, particularly how specific pricing structures relate to their individual circumstances, is crucial. Not all customers have the same ability to adjust their usage in response to price signals and not all customers have the same attitudes, values and motivations in relation to electricity use. Some customer groups, particularly those who consume low amounts of electricity, may not be able to reduce their consumption, particularly if it is driven by the use of basic appliances or medical needs. These factors mean that not all tariff types are right for everyone nor will all customers be able to respond in the same ways. Specific tariff rules or other policy provisions may be required to protect some customer groups.

Section 7

Demand Management

What is proposed?

The Queensland Government will develop a demand management and energy efficiency strategy which will include:

- working through the national reform process to implement the recommendations of the Australian Energy Market Commission's (AEMC) Power of Choice review into demand-side participation
- reforming tariffs to improve price signals and energy management options (refer Section 6)
- supporting a customer-driven rollout of advanced metering to enable provision of improved tariffs and other energy management products (refer Section 8).

What is demand management?

Demand management involves changing how and when customers use electricity. It can include electricity conservation, shifting demand outside peak times, using alternative energy sources, and improving appliance energy efficiency. Demand management can help address the problem of rising peak demand, a major driver of new energy infrastructure investment which leads to rising electricity prices. Effective demand management can result in lower costs for consumers and more efficient utilisation of transmission and distribution networks, and in some cases, may defer or even avoid the need for additional investment in generation capacity.

Queensland's demand management initiatives to date

Energex and Ergon Energy have a strong record of demand management initiatives including:

- controlling the electricity load for hot water systems in peak periods by offering customers substantial savings through off-peak tariffs. This measure enables a large amount of electrical demand to be shifted to periods of low demand, significantly reducing the need for new network infrastructure
- residential trials which showed that appliances such as air conditioners and pool pumps could be controlled externally by the network operator for short periods of time without reducing customer comfort or amenity
- trials of alternative tariff structures which found that customers can and do adjust when they use electricity to take financial advantage of different tariff types and
- large demand reductions from commercial and industrial customers by improving air conditioning and lighting efficiencies, upgrading building management systems, load curtailment arrangements and use of standby generation.

The Power of Choice Review

- ***Giving consumers options in the way they use electricity***

The Power of Choice Review was undertaken by the AEMC to investigate what was needed to achieve efficient investment and use of demand side participation in NEM. The overall objective of the review was to make the NEM more efficient and ultimately lower electricity costs for consumers. The review was the culmination of a five year investigation of how to help consumers better manage their energy consumption.

- ***Outcomes of the Power of Choice Review***

The Power of Choice report proposes a substantial reform package which will pave the way for retailers and other parties to offer products and services to consumers that will encourage greater demand-side participation. A number of the recommendations aim to refine incentives and market rules to make the best use of demand-side solutions and avoid relying on new infrastructure to serve peak demand.

Many of the recommendations require changes to the National Electricity Rules and so will take time to implement. They are expected to come into effect from 2014 onwards, with new electricity products and services to follow over time. The changes consumers can expect to see as a result include:

- improved access to electricity consumption data, helping to show the link between energy consumption decisions and expenditure
- changes to how retail tariffs are structured with more flexible pricing options being introduced so consumers can choose when they use electricity
- new technologies becoming available that give consumers greater control over their electricity use, such as automation to turn certain appliances on when electricity is cheapest and
- retailers, as well as new participants, offering products and services, such as energy advice and direct load control for control of priority appliances like air conditioners.

The final report and a number of factsheets aimed at consumers and industry are available on the AEMC website: http://www.aemc.gov.au/market-reviews/completed/stage-3-demand-side-participation-review-facilitating-consumer-choices-and-energy-efficiency.html

- ***What does this mean for Queensland?***

The Queensland Government has given in-principle support to the report recommendations, as have other states and territories. An implementation plan has been agreed to by the states and will be managed by the Australian Government and the AEMC.

The Queensland Government will participate in implementation to ensure reforms are aligned with the outcomes of its own state electricity sector reviews and are appropriate for, and bring benefit to, Queensland consumers. The Queensland Government also proposes to develop a long-term tariff strategy to provide Queensland customers with greater control and choice over their electricity use and to address price pressures arising from peak demand (refer Section 6).

Section 8

Advanced metering

What is proposed?

The Queensland Government supports a customer-driven rollout of advanced meters where a range of different service providers can compete to offer customers advanced metering services and associated product choices. Customers can choose to adopt the technology based on their own assessment of the benefits.

Why is metering reform important?

Electricity meters record the amount of electricity used by electricity customers. The majority of Queensland's existing electricity meters have limited functionality which restricts demand management options, opportunities to improve billing practices (e.g. offering monthly billing based on actual consumption data) and tariff reform. Metering reform is a crucial enabler for Government to achieve its medium to long term objectives to educate and empower consumers while driving efficiency outcomes along the entire electricity supply system.

Metering Types

Accumulation meters

- Majority of meters currently used in Queensland.
- Basic metering technology which measures the total volume of electricity consumed.
- Can only record consumption for one tariff and are read manually by meter readers who visit each customer's premises.
- Support the use of simple tariff structures only – either a single flat rate (like the current residential tariff) or block tariffs, where different prices apply for an initial amount of energy consumed and for one or more subsequent blocks of energy, up to the total amount consumed in the billing period.
- Provide no information on the time of energy use or the maximum rate of use, the main driver of supply capacity requirements.

Advanced meters

- Interval meters measure electricity consumption in small time intervals, usually half an hour, providing information on both the time of use and the maximum rate of use.
- So-called "smart meters" are an advanced form of interval meter, with extra functions, such as:
  - remote communications which enable access to real-time electricity consumption data through an in-home display, personal computer or smart phone
  - two-way communications between networks, retailers and consumers for remote meter reading, fault detection and repair, emergency messaging and event notification
  - remote disconnection/reconnection of supply following blackouts and when moving premises.

Where else has advanced metering been rolled out?

Smart meters have been rolled out in the United Kingdom, New Zealand, Italy, Holland, Sweden, Finland, Denmark, France, Ireland and many states in the USA.

In NSW, up to 30,000 smart meters will be rolled out as part of the Smart Grid, Smart City project. In Western Australia, electricity distributor Western Power is trialling the technology ahead of a possible rollout by 2015. A mandatory, distributor-led rollout is underway in Victoria. The Victorian experience has shown the risks and disadvantages of a mandatory approach, as detailed in the following case study.

Case study: Victorian smart meter rollout

In 2006, the Victorian Government mandated the rollout of smart meters, replacing existing accumulation meters in approximately 2.66 million Victorian homes and small businesses. The rollout commenced in 2009, and is due for completion in late 2013.

Distributors were responsible for the rollout in each of the five Victorian distribution regions and costs are being passed through to customers in a process approved by the Australian Energy Regulator.

The rollout has been heavily criticised for a blow-out in costs from the original estimate of around $900 million to over $2 billion, resulting in extra costs to consumers.

However, the benefits of the program are now flowing through to customers. Some distributors and retailers have developed portals where customers can view their consumption information in near real-time, providing them with a better opportunity to understand their consumption patterns and see the impact of any changes they make.

Customer opposition to the rollout has been a major issue, mainly due to costs, a lack of engagement with customers, and poor communication about the use of these meters and potential benefits for customers.

What issues need to be considered in rolling out advanced meters?

- ***Consumer protections***

  Strong protections for consumers are essential, particularly for data privacy and vulnerable customers. Many protections already exist in current laws but changes to national legislation are proposed to strengthen them further.

- ***Consumer engagement and education***

  Some consumers have opposed advanced metering due to an association with time-of-use pricing. While advanced metering enables customers to access these types of tariffs, government policies give customers the choice on whether to accept these options.

  Other consumers oppose advanced metering on the assumption that the communication technologies used in Victoria will be adopted here. This is not necessarily the case. Alternative technologies using existing electricity infrastructure and broadband internet are showing excellent potential to deliver the same results.

- ***Communication of benefits***

  The proponents of advanced metering must be able to show consumers that the benefits of any rollout outweigh costs, if any, to them. To enable this, customers must be able to access their own data easily and be given the power to authorise other parties to help them better understand the opportunities to manage and make savings on their electricity consumption.

Section 9

Scenario analysis in the 30-year electricity strategy

Looking forward - planning for an uncertain future

The future for Queensland's electricity supply system is unknown. The only certainty is that the sector will not look and operate the way it does today. Over the next three decades, a multitude of different pathways will materialise, shaped by new and existing drivers, challenges and opportunities. The Queensland Government will explore these critical transformative factors in developing the 30-year electricity strategy.

Scenario analysis is a tool for strategic planning and option analysis

Scenario analysis is not intended to pick the most likely future scenario. Instead it aims to use a number of scenarios to explore possibilities and test options. Scenario analysis overcomes a weakness of traditional forecasting approaches which assume that historical trends provide a good guide to the future but fail when there are unforseen developments, shifts or shocks. Scenario analysis focuses on areas of uncertainty and interdependencies and identifies driving forces and the relationship between cause and effect.

Building the scenarios - examining how and why

The Queensland Government undertook qualitative analysis of key drivers and interdependencies in the global, national and Queensland electricity systems. A storyline for each chain of events was then created, considering the timing of events, forces for and against each possibility and the outcomes and impacts of each possibility. This included an examination of:

- interactions, cause and effect relationships
- how global and national forces affect Queensland
- relative certainties and uncertainties
- the likely outcome of the certainties and
- the events and outcomes likely to be most challenging and relevant.

The scenarios do not indicate any preferences for the future. Rather, each scenario relies on a combination of assumed external factors to test the sector's readiness for response. The scenarios are not mutually exclusive: there are common elements in each which may result in varying impacts depending on the combined impact of other drivers.

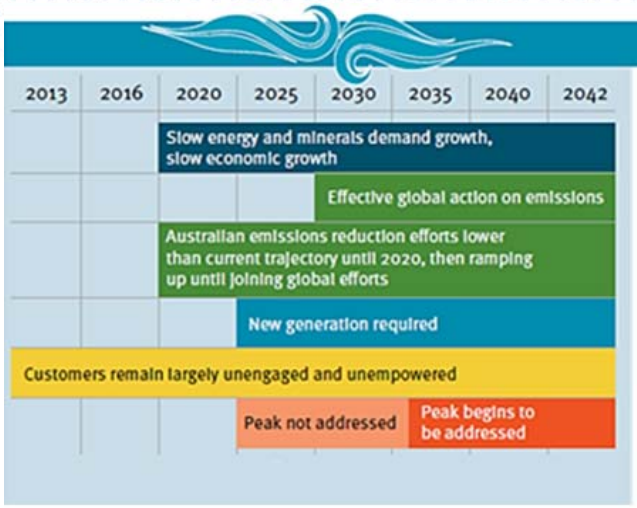
The scenarios were scrutinised by an internal panel of energy sector experts and by a Strategic Reference Group comprising industry executives, academics and advocacy organisations.

Overview of data used to build the scenarios

In developing the scenarios, the Queensland Government has not undertaken detailed quantitative modelling. Instead, extensive quantitative data and trend analysis from a range of reputable organisations including AEMO, CSIRO, Shell, Ofgem, the University of Queensland and the International Energy Agency have been relied upon. The table below sets out some of the data and inputs that were used in informing the development of the scenarios.

Indications of high/moderate/low growth in the scenario narratives refer to the general trend over the period and should be taken to include normal seasonal and cyclical variations within this trend.

Scenario element	Data	Source
Global economic growth	Global annual average real GDP growth in the medium to long-term is projected to be 3.6%. The outlook for economic growth shows significantly stronger growth in the developing Asia region at 8% per year compared to 4-6% in other developing economies and 2-3% in advanced economies.	International Monetary Fund
Global electricity demand	Global electricity demand between 2009 and 2035 grows at an annual average growth rate of 2.4% in a medium growth projection. However, the growth in global electricity demand is not evenly distributed, with around 80% of the growth in demand occurring in non-OECD countries.	IEA
QLD economic and population growth	Projections of electricity demand are driven by population and economic growth. Gross state product to grow at compound average annual rate of between 1.7 - 4% to 2035. In 2012, Queensland's population was approximately 4.5 million. By 2042, the OESR predicts a population of 7.7 million under a medium growth projection.	National Institute of Economic and Industry Research, OESR
Mining sector impacts	Value of mining production is projected to grow at compound average annual rate of between 4 - 6% to 2035.	
QLD electricity demand	Consumption of electricity is projected to grow at compound average annual rate of between 1 – 1.8%, reaching between 61,000 and 71,000 GWh per year in 2032.	AEMO
Global action on emissions	At the UN Climate Change Conference in Doha in 2012, governments committed to working towards a global climate change agreement to cover all counties by 2020. While, this is considered optimistic individual actions (e.g. by UK, US, China, India, Japan) could also create critical mass that achieves significant emissions reductions.	Shell UK action on emissions
Australian action on emissions	The carbon price is currently $24.15 per tonne. By 2020 it could range from $0 to approximately $36 and could reach up to $122 per tonne by 2033-34 according to Australian Government modeling.	AEMO, Cwth Treasury modeling
Capacity requirements	In 2012, AEMO estimate 79 MW additional capacity will be required by around 2020. Alternatively, a continuing low demand trend may further defer the need for new capacity.	AEMO
Load profile	Electricity demand is elastic. Trials have shown that customers can shift their consumption pattern to reduce peak demand by 5 – 34 % under different tariff structures, particularly when pricing pressures are combined with technologies which support load control/shifting.	Energex presentation citing Faruqui



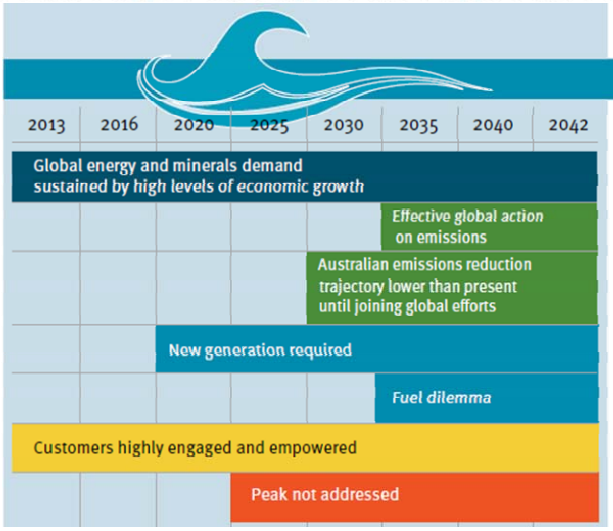
The Queensland electricity supply system is in for a bumpy ride. Slow demand growth and inefficient use of assets see price pressures increase. The market is forced through the first set of rapids—new generation is required but investor uncertainty, a lack of finance and no viable, cost-effective, low emissions technology make this costly. As the scenario progresses, unengaged customers contribute to peak demand, which is further exacerbated by new technology such as electric vehicles. This forces the market through another set of rapids as it attempts to manage the peak and drive down costs.

Economic growth eases in China impacting global markets more broadly, including Australia. This translates into more gradual growth in electricity demand across the Queensland economy, particularly in the extractive industries which face lower demand from export markets. These factors relieve pressure on generation fuel costs (gas and coal) and reduce the demand for new generation capacity.

From midway through the scenario period, the gradual build-up of demand means there is a need for investment in large-scale generation capacity. Global and local emissions actions are starting to coalesce. Limited international emissions-reduction action up until this time means there are few competitive, large-scale low-emission technology options. This, together with continued peakiness of demand, means gas remains the most attractive fuel for new generation. However, a tight upstream gas market along with difficulties in accessing affordable finance as a result of economic conditions, limit the number of firms able to invest in new plant. This forces the market through the first set of rapids as it must adjust and overcome these constraints to meet demand.

Despite high price pressures due to inefficient asset utilisation driven by peakiness of demand, customers remain largely unengaged with the electricity market for the majority of this scenario. This occurs in part because the market is slow to address customer confusion about electricity pricing. While new products are eventually offered, customers are apprehensive and many resist becoming more involved in a market which was historically homogenous and straightforward. Customers continue to expect government to ‘manage the market’ including price. This limits the effectiveness of demand-side measures in addressing peak demand and residential uptake of embedded generation grows slowly. The electricity price debate remains highly contentious and imposes a high financial burden on the state. By the second half of the scenario, uptake of electric vehicles is increasing, spurred by international emissions-reduction actions which drive price reductions and improvement in this technology.

These factors combine to force the market through a second set of rapids: distributors and new entrant service providers explore business models which allow them to manage customers’ load and supply electricity more cost-effectively. This includes offering bundled embedded generation, storage and vehicle management services to assist customers who do not wish to manage those services themselves. Initially, the slow market response to low customer engagement means many of these products rely on passive or set-and-forget measures to change the impact of customer behaviour on the system. However, customers respond to new service models which are more accommodating of their needs and this drives a shift towards more flexible usage patterns and a flatter load profile overall.



The Wave

It is smooth sailing for Queensland electricity customers in the first part of this scenario. A price-driven, customer-led shift in electricity use drives market evolution and keeps prices low. But there are storm clouds on the horizon. Late, stringent international emissions action sees a wave of change hit an underprepared sector. The sector faces a 'fuel dilemma'. Investment in coal and gas generation risks becoming uneconomic but there are limited low emissions options.

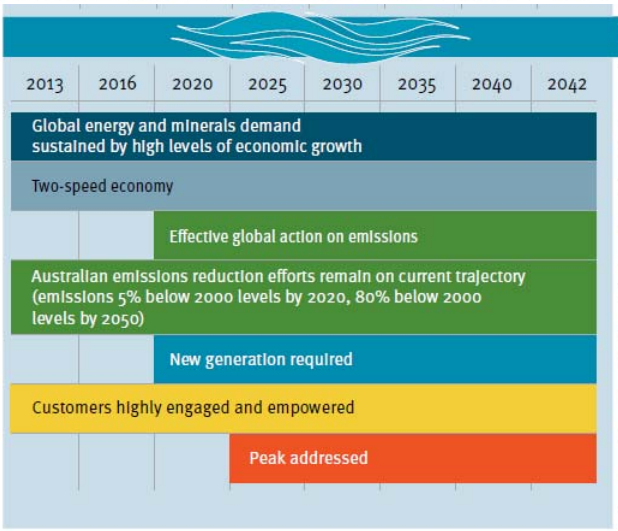
Strong economic growth in China, India and other emerging economies, as well as continuing recovery in the OECD, drive high global demand for energy. In Queensland this translates into economic prosperity. It also results in high prices and a potentially difficult contracting environment for gas as local market conditions align with export markets. Strong global economic growth leads to low credit risk premiums and high levels of capital liquidity, leading to high levels of private sector investment capacity.

These factors mean there is significant competition amongst private sector firms to deliver new generation capacity by around 2020. However, the lack of effective global action on emissions and local policy uncertainty (reducing the appetite for private sector investment in coal) means there are limited technology options other than gas. The tight gas market means this is a more costly generation fuel than it is today.

Peak demand continues to drive overall price rises. Customers see a greater portion of their household budgets being consumed by electricity costs and seek greater flexibility and control in managing their energy use. The market responds with a range of new products. Energy management systems and embedded generation are deployed and economies of scale result in price reductions. This boom drives technology development which sees rapid step-changes in storage technologies such as batteries and fuel cells further increasing the energy independence of both small and large customers. This fundamental shift increasingly disrupts those traditional business models which presume a linear electricity supply chain and risks stranding some network assets.

A broad range of new market entrants compete to offer customers products which better enable them to manage their energy use and costs. Some customers are drawn to products which enable their active involvement in day-to-day energy management such as time-of-use and dynamic peak pricing packages and home area networks. Others prefer set-and-forget energy management services. The market caters adequately for the range of customer preferences, motivations and values and the load profile flattens.

The development of effective global action on emissions late in the scenario means reduction targets are severe and costly. A 'fuel dilemma' becomes apparent as steep emissions-reduction trajectories mean that the emissions-intensity of gas is problematic. At this stage, investment in gas locks in infrastructure which may pay a high emissions price or become uneconomic before the end of its technical life. However, a lack of mature, competitive, large-scale technologies at this point in time limits alternatives and gas prices remain high. This leads to increasing consideration of nuclear power. The sector faces significant, swift reshaping.



Currents

This scenario sees strong currents—climate change policy, technology and economic drivers—shape Queensland's electricity system. Climate change action drives low emissions technology deployment. New technologies, services and providers also compete to break into the market in response to a consumer-led shift in energy use. Strong global economic growth and cost-effective electricity sees Queensland's resources sector boom—placing pressure on other parts of the economy. While the electricity market is nimble, the force of these currents puts increasing pressure on the traditional electricity supply chain.

Strong global economic growth drives high global demand for energy for most of the scenario period. A range of global and national carbon emissions actions are effective in driving the technology development, changes in use of generation fuels and energy efficiency necessary to reduce carbon emissions. Strong global economic growth leads to high levels of private sector investment capacity.

Gas remains the most suitable large-scale generation fuel for the first half of the scenario period. However, high global energy demand results in a potentially difficult contracting environment for gas customers as local market conditions align with export markets.

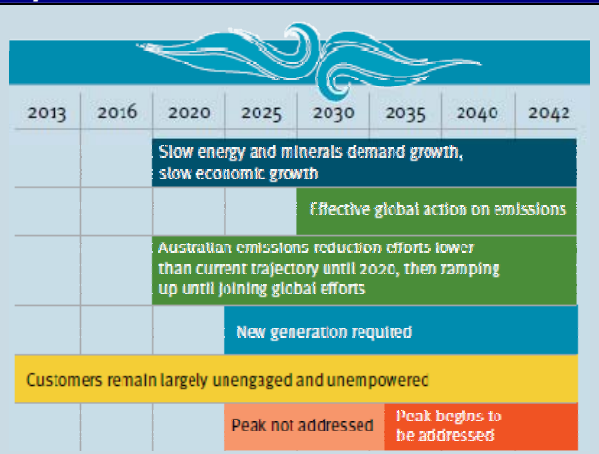
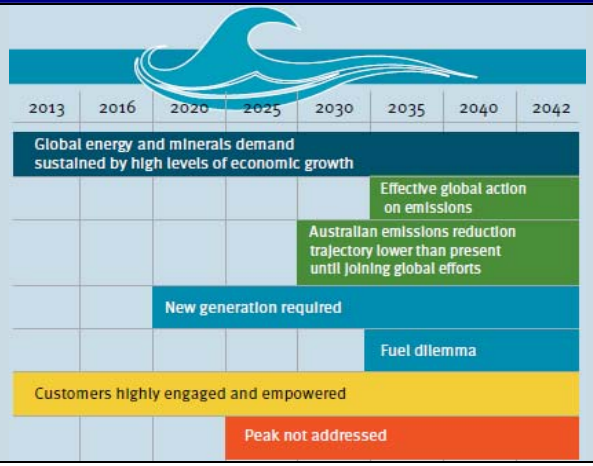
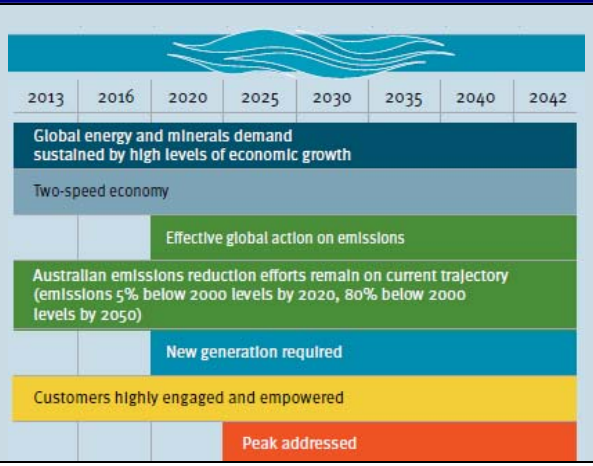
In the second half of the scenario period, the much flatter demand profile means a greater range of generation technologies are suitable for meeting the load profile. Emissions-reduction action means renewables, combined with effective storage technologies to manage intermittency of supply, are competitive options, particularly as international gas prices remain high. Carbon capture and storage (CCS) and nuclear are debated as low-emissions, baseload options. They both face significant investment costs and public acceptance issues.

Effective international emissions-reduction action provides good prospects for the successful deployment of CCS and nuclear overseas, contributing to ongoing high demand for export coal, uranium and gas. For the first half of the scenario, the state experiences a two-speed economy as the mining sector grows rapidly, crowding out investment in other sectors to some extent. Mining uses an increasing portion of the state's electricity and investment in both generation and networks is increasingly driven by its needs. Growth in this sector leads to significant expansion of some regional population centres.

In areas where the economy is not growing as strongly, overall energy consumption declines while peak demand remains high in the first part of the scenario. This and the cost of emissions-reduction create a build-up of price pressures. Customers respond by demanding significantly greater control over their energy usage. The market caters for a diverse range of customer preferences with new pricing and load management products. The uptake of embedded generation and energy management technologies also grows rapidly in response to both peak- and emissions-related pricing pressures. Along with competition from a new range of energy service providers, this increasingly disrupts traditional business models. The most successful networks adopt 'smart grid' technology to accommodate increasing bilateral energy flows. Many incumbent suppliers reshape themselves as energy management firms.

In the commercial and industrial sectors, these price pressures put increasing strain on the competitiveness of energy-intensive industries, particularly those that are trade-exposed such as minerals processing.

Comparing the scenarios

	Rapids	The Wave	Currents
Scenario timeline			
Summary	The Queensland electricity supply system is in for a bumpy ride. Slow demand growth and inefficient use of assets see price pressures increase. The market is forced through the first set of rapids—new generation is required but investor uncertainty, a lack of finance and no viable, cost-effective, low-emissions technology make this costly. As the scenario progresses, unengaged customers contribute to peak demand, which is further exacerbated by new technology such as electric vehicles. This forces the market through another set of rapids as it attempts to manage the peak and drive down costs.	It is smooth sailing for Queensland electricity customers in the first part of this scenario. A price-driven, customer-led shift in electricity use drives market evolution and keeps prices low. But there are storm clouds on the horizon. Late, stringent international emissions action sees a wave of change hit an underprepared sector. The sector faces a 'fuel dilemma'. Investment in coal and gas generation risks becoming uneconomic but there are limited low-emissions options.	This scenario sees strong currents shape Queensland's electricity system. Emissions reduction action drives low-emissions technology deployment. New technologies, services and providers also compete to break into the market in response to a consumer-led shift in energy use. Strong global growth and cost-effective electricity sees Queensland's resources sector boom—placing pressure on other parts of the economy. While the electricity market is nimble, the force of these currents put increasing pressure on the traditional electricity supply chain.
Economic growth	Slow, leading to slow electricity demand growth	Rapid, leading to strong electricity demand growth	Rapid, leading to strong electricity demand growth
Emissions-reduction action	In the medium-term	In the late-term	Early
Demand shape	Peaky	Flattening	Flattening
Customer role	Passive, low engagement initially	Reasonably active, moderate engagement	Active, high engagement
Price pressures	Peakiness of demand/inefficient asset utilisation, uncertainty about emissions action	High gas prices, uncertainty about emissions. Mitigated by degree of investment capacity, market competitiveness and flatter demand profile over time.	High gas prices, emissions-reduction action, mitigated by market competitiveness and flatter demand profile over time
Supply chain disruption	Limited stimulus for change initially due to lack of effective customer response to price signals. But continuing peak demand leads to late deployment of disruptive technologies (but initially only those requiring limited customer engagement).	Continuing peak demand stimulates deployment of disruptive technologies to meet customer demand for greater control over costs/energy use.	Disruptive technologies evolve sooner due to emissions mitigation actions e.g. competitive embedded generation and storage. Continuing peak demand also stimulates deployment of disruptive technologies.
Investment climate	Lower investment capacity (higher policy uncertainty, higher cost and less access to capital) limits number of firms able to invest in new plant.	Higher capital availability but policy uncertainty regarding emissions-reduction.	High capital availability, early clarity on emissions-reduction policy settings. Competing fuel sources and specialized technology firms
Coal and gas market impacts	Less global demand for gas, less price pressure but continued reliance on gas to meet peak. Coal price pressures less due to lower global demand.	High gas demand, high price. Ongoing reliance on gas due to lack of competitive alternatives. High coal demand, high price for most of the scenario period.	High gas demand, high price. Less reliance on gas as generation fuel as other techs develop and load flattens High coal demand, high price. Less reliance on coal sooner as other technologies develop
Low emissions tech development	Limited development until halfway through scenario period due to slow development of global emissions action and constraints on investment capacity.	Limited development due to late emissions action.	Higher chance of quicker technology maturation and wider deployment.