



The 30-year electricity strategy

Directions paper

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Ministerial statement

A better energy future for Queensland

Queensland's electricity system powers the state's economy. It drives our economic development and underpins our enviable standard of living.

At the flick of a switch Queenslanders have access to secure, reliable and, until recently, competitively priced electricity. While many of us take this convenience for granted, every kilowatt delivered to our homes and businesses travels along a multibillion dollar network, serviced by tens of thousands of people operating in one of the world's most sophisticated and complex energy supply chains.

Ensuring the electricity sector remains adaptive, resilient and customer-focused is crucial—particularly as we transition through a period of major change driven by new technology, changing patterns of energy production and use, and major market reform. Energy supply reliability is becoming increasingly important to industry, commerce and residents as new electricity-dependent technology is rolled out.

Equally important to our economy and way of life is a need for electricity to be provided efficiently—at prices that support industry and are cost-effective for domestic users. Over the past six years, electricity prices have risen by more than 80 per cent. Price shocks such as these are unsustainable and indicate a serious problem with the current system.

To proactively meet emerging challenges, the Queensland Government has embarked on an ambitious path that will deliver a 30-year strategy for the state's electricity sector. The government is putting the entire electricity supply chain under the microscope to identify challenges and opportunities, target efficiencies and ultimately ensure that Queenslanders are getting the most secure, reliable and cost-effective supply of electricity possible.

The Queensland Government is committed to securing the state's electricity needs now and for the future. This directions paper is the first step in the process. It outlines the context for the reform program, the challenges we are facing and the steps we need to take to develop a 30-year electricity strategy for Queensland. The aim of developing the strategy is to focus not only on the issues of today, but to take a horizon view of what opportunities and challenges lie ahead for the sector in the decades to come.

In the first half of 2013, I will be releasing a discussion paper—the opinions, ideas and solutions of Queensland businesses and householders will be essential to ensure the government can deliver a reform process that meets the needs of all Queenslanders. Broad input into this process will be critical, as the ultimate success of the long-term energy reform program will depend on the shared vision and accountability of government, industry and ultimately customers. The process will culminate in the delivery of a 30-year electricity strategy in the second half of 2013.

Our ambition is to set out a clear vision and road map for realising an adaptive and resilient electricity supply system, which is capable of meeting the changing needs of Queenslanders long into the future.

Honourable Mark McArdle MP

Minister for Energy and Water Supply

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1. Introduction

Electricity—powering our state, now and into the future

Electricity is essential to our economy and way of life. It powers everything from our household appliances to the multibillion dollar mining infrastructure that keeps our economy on track.

The electricity industry directly employs thousands of Queenslanders (approximately 1.8 per cent of the Queensland workforce¹) and contributes over \$5.8 billion (or 2.41 per cent) to the \$241 billion gross state product.²

But the electricity sector’s contribution to the state is much greater. The strength of Queensland’s four pillar economy—agriculture, tourism, resources and construction—is dependent on the reliability, security and cost-effectiveness of our electricity supply system. Over the past decade, growth in electricity consumption in Queensland has been among the highest in the country, averaging over 2.2 per cent per annum. Despite the recent slowdown in the resources sector following the global financial crisis, Queensland still has the highest electricity use per dollar of gross state product of the three largest Australian economies (Figure 1).

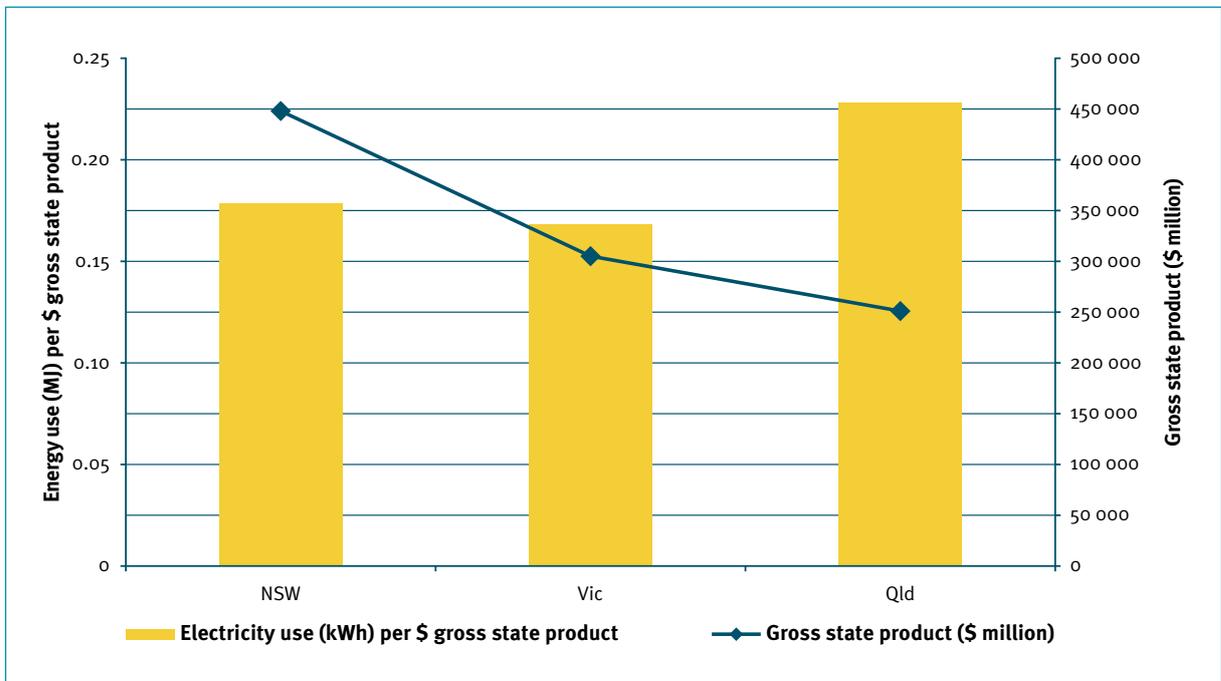


Figure 1 Electricity intensity of Australia’s three largest economies (2010–11)

1 In combination with water, gas and waste services employers (source: Australian Bureau of Statistics, Labour Force cat. no. 6291.0.55.003)

2 Source: Australian Bureau of Statistics, Australian National Accounts cat. no. 5220.0

Queensland's electricity consumption is driven by a diverse mix of customer groups, as shown below (Figure 2).

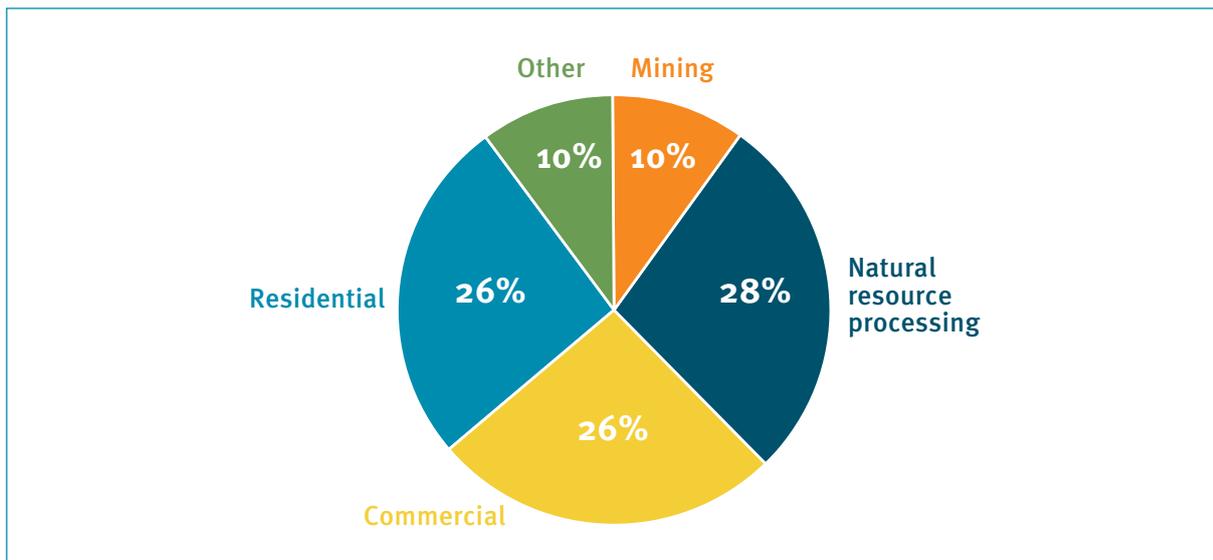


Figure 2 Electricity consumption of end users in Queensland (2010–11)*

*Excludes electricity consumed in the production and transportation of electricity

While each customer group may have distinct usage patterns and requirements, they all require secure, reliable and cost-effective supply of electricity to sustain them in the future.

Driving Queensland's electricity intensity is a small number of very large users. In 2010–11, mining and natural resource processing made up more than a third of Queensland's total electricity consumption (Figure 2). Refineries such as aluminium and zinc smelting consumed more than 15 per cent of Queensland's overall electricity, while mining industries (primarily coal) consumed a further 10 per cent.

The electricity sector underpins Queensland's commercial and small businesses, which are also critical to sustaining our economy. Queensland has nearly 400 000 small businesses that make a significant contribution to the state. Secure, reliable and cost-effective electricity is a crucial component of the small business sector's ongoing competitiveness and profitability.

An equally important function of our electricity supply system is its contribution to our communities, homes and enviable lifestyle. The residential sector uses more than 25 per cent of the state's total electricity consumption, and is currently a strong focus for electricity reform. While, for some families, electricity bills do not represent a significant proportion of household expenditure (averaging around 2–3 per cent of household income), recent price rises are putting greater cost-of-living pressures on families. The impact of rising prices is being felt most heavily by Queenslanders with high and unavoidable levels of consumption, and those suffering hardship.

Over the next 30 years, our population could reach more than 7 million, and our communities and industries will need to change and adapt to a range of new social, economic and technological drivers. Further, the development of a \$50 billion liquid natural gas export industry will create a fundamental shift in the Queensland economy, and add considerable demand on our electricity system.

To meet these challenges successfully, the sector must be ready to adapt without comprising the fundamentals of secure, reliable and cost-effective supply that, until recently, have set Queensland apart.

While it is not possible to accurately predict what the future will be like in 2042, an adaptable, resilient and efficient electricity supply sector will be required to support Queensland's long-term economic prosperity and lifestyle aspirations.

2. Achieving a 30-year electricity strategy

Background

The Queensland Government is committed to working with all stakeholders to help ensure the state's highly complex electricity supply system operates as efficiently as possible. To perform this role effectively, government must demonstrate leadership and develop short-term, medium-term and long-term policy and regulatory settings that look to the future and plan beyond a single term of government.

In May 2012, the government set about achieving this objective when it commenced an immediate short-term reform agenda, specifically to address the dramatic increase in electricity prices that Queensland has seen in recent years. An Interdepartmental Committee on Electricity Sector Reform was established (supported by an Independent Review Panel on Network Costs), with a clear mandate to focus on all aspects of the sector that impact on the cost of electricity including supply, network costs and retail competition. This work is critically important to ensure customers, both large and small, can have confidence that the electricity being delivered to their door is secure, reliable and cost-effective.

In July 2012, recognising the need for a strategic and long-term vision that will build on the work of the interdepartmental committee, the Queensland Government committed to the state's first ever 30-year electricity strategy.

Purpose of this directions paper

Developing a comprehensive, meaningful, long-term electricity policy will take time and the government is committed to taking all Queenslanders and key industry stakeholders on the journey.

This directions paper is the first step.

The purpose of the paper is to:

- signal the government's broad approach to the immediate, medium-term and long-term reform agenda
- outline the scope and a methodology for the policy development process
- establish a road map for the finalisation of the 30-year electricity strategy, including consultation with the market, customers and other key stakeholders.

With the release of this directions paper, the government is asking all interested stakeholders to consider electricity sector issues that matter most to them. When the government releases the discussion paper early next year, it is hoped that the community and industry will be ready to provide input and help challenge conventional thinking. The government is particularly keen to receive innovative ideas and solutions to help realise a better electricity future for Queensland.

Stakeholder feedback is also encouraged at this stage of the process. Throughout this directions paper issues are highlighted for consideration—responses will be valuable in helping develop the discussion paper and the final strategy.

A three-stage process

The 30-year electricity strategy is being developed in three stages.



Figure 3 The three stages of strategy development

Scope

To get this reform process right, the government will need to critically examine every step along the electricity supply chain from generation, transmission, distribution and retail, right through to the customer.

The process will consider those fuel-supply issues where they directly impact on electricity provision (such as gas and coal) and will include consideration of future resource availability, costs and usage patterns.

Creating a shared vision

The government recognises that it cannot create a long-term vision for the sector without the input and shared responsibility of key stakeholders:

- **Customers**

In the past, customers showed little interest in engaging with the sector. Historically, as electricity was supplied through a largely predictable and non-competitive market, there were limited incentives to participate. But this has changed in recent times, with growing concerns over cost increases, and customers starting to embrace the competitive retail market and gain a stronger understanding of how their consumption patterns and choices can drive future prices.

- **Market**

Long gone are the days when state governments had full ownership and responsibility for electricity supply in their individual jurisdictions. Today, we have a National Electricity Market that is comprised of a diverse mix of privately and publicly owned businesses, operating across a complex supply chain and subject to a range of different regulatory and competitive environments. Industry players are now an essential part of the sector and will play a critical role in helping define our evolving market.

- **Government**

Government (both federal and state) plays a direct role in making sure the sector operates efficiently, safely and reliably, while ensuring customers have adequate protections. To encourage an innovative sector capable of meeting emerging challenges, significant private capital will need to be invested. This can only happen where industry has policy and regulatory certainty, and confidence that governments will not intervene unnecessarily.

The 30-year electricity strategy will be framed around an engagement and accountability model (Figure 4). The aim is to encourage participation by these key stakeholders to drive a better electricity future for Queensland.

This engagement and accountability model is used to frame discussion throughout this directions paper.

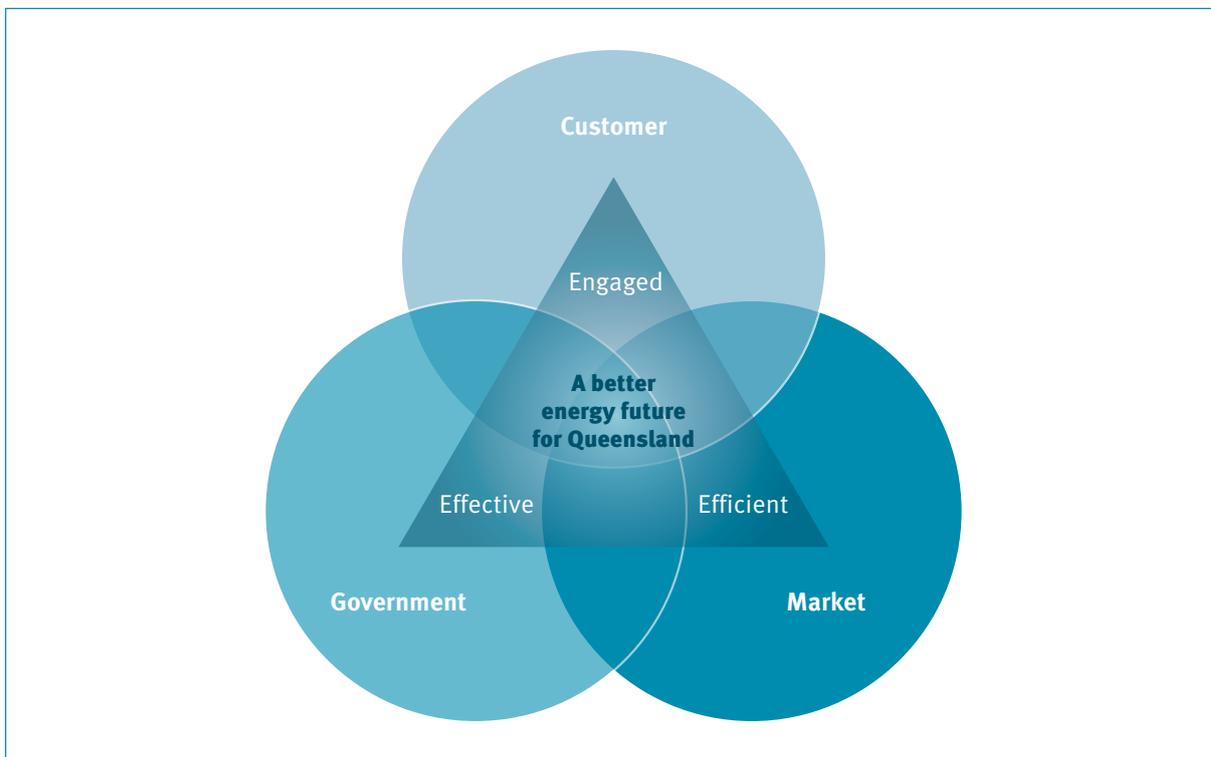


Figure 4 Engagement and accountability model

The government is inviting all stakeholders to get on board and challenge current thinking, as it turns its focus to the long-term reform agenda. Stakeholder input and shared responsibility will be critical to creating an adaptive and resilient electricity sector for Queensland.

Guiding principles

As the 30-year electricity strategy will be developed in consultation with the electricity supply market and the community, it is important to establish the guiding principles that will be adopted when working together.

The strategy will be developed by:

- using an evidence-based approach to identify the key problems and assess the strategies for transforming the sector
- working in partnership with stakeholders to understand their views, develop a shared vision for the state and agree on an accountability model for delivering solutions
- balancing competing objectives and priorities to deliver optimal outcomes and ensure a long-term sustainable energy future
- considering short-term reform priorities in the context of the medium-term and long-term vision for the electricity sector
- challenging current thinking to develop a framework that enables the sector to innovate and respond flexibly to a changing world.

Consultation

The government is seeking initial stakeholder feedback in response to issues raised in this directions paper. Following this, a detailed discussion paper will be released in the first half of 2013. The discussion paper will be informed by the directions paper feedback and the outcomes of the Interdepartmental Committee on Electricity Sector Reform and the Independent Review Panel on Network Costs, and will include key recommendations and potential reform options arising from these reviews. The discussion paper will also outline the key challenges for the electricity supply chain, which will need to be addressed as part of the 30-year electricity strategy.

The main focus of the discussion paper will be to engage the community and industry, and to gather responses to key questions on specific issues associated with short-term reform outcomes and the medium-term and long-term future of the sector in Queensland. The government will undertake extensive consultation to ensure the opinions, ideas and solutions of Queensland residential customers, businesses and market participants are taken into account when defining the 30-year electricity strategy for Queensland.

It is envisaged that this consultation process will occur in the first half of 2013, with the final strategy released in the second half of 2013.

Time frames

Given the importance of electricity sector reform, the government is committed to implementing a range of immediate reform priorities while it develops the medium-term and long-term policy agenda.

Accordingly, the 30-year electricity strategy will be structured in line with the implementation time frames of three plans:

- Plan 1—Immediate action plan (2012–13 to 2013–14 financial year)
- Plan 2—Medium-term action plan (2014–15 to 2018–19 financial year)
- Plan 3—Long-term action plan (2019–20 to 2041–42 financial year).

Table 1 Implementation of the three plans

Plan 1—Immediate action plan (2012–13 to 2013–14)
Action taken to date
<ul style="list-style-type: none">• Froze the domestic electricity tariff for 2012–13 to immediately reduce the cost pressure on households while the government prepares a viable long-term strategy to control electricity costs.• Lowered feed-in tariff subsidies for solar power to avoid the future cost burden shared by Queensland electricity customers.• Directed the Queensland Competition Authority to develop a methodology for determining notified electricity prices for the next three years to provide certainty for industry regarding the price-setting framework.
Short-term review of the electricity sector
<ul style="list-style-type: none">• Established an interdepartmental committee to analyse drivers of electricity prices over the short term, medium term and long term, and recommend policies and strategies to manage electricity supply-chain costs.• Established a panel of electricity experts to make recommendations to the interdepartmental committee on ways that network costs can be reduced by making Ergon Energy, Energex and Powerlink more efficient.
Long-term strategy
<ul style="list-style-type: none">• A 30-year electricity strategy will be developed, and released in the second half of 2013.

Plan 2—Medium-term action plan (2014–15 to 2018–19)

Implement reforms and medium-term priorities

- Continue the medium-term reform agenda stemming from the interdepartmental committee and independent review panel reviews.
- Respond to recommendations of the Commission of Audit review of state finances relating to the electricity sector.
- Implement medium-term reforms identified in the 30-year electricity strategy, including opportunities for structural reform of the electricity sector.

Plan 3—Long-term action plan (2019–20 to 2041–42)

Develop a long-term vision and reform agenda

- Build on the medium-term action plan and implement long-term reforms identified in the 30-year electricity strategy to deliver on the government’s commitment to help ensure a better electricity future for Queensland.
- Formally review the progress of the 30-year electricity strategy to build on and measure the success of the reform agenda. This will include examination of emerging challenges and new opportunities to help ensure the ongoing resilience of Queensland’s electricity supply system.

Objectives

Short-term reform objectives

The first stage of our reform process is being developed through the work of the interdepartmental committee. The objectives of the committee are to ensure:

- electricity in Queensland is delivered in a cost-effective manner for customers
- Queensland has a viable, sustainable and competitive electricity industry
- electricity is delivered in a financially sustainable manner (from the Queensland Government’s perspective).

The committee objectives were developed as part of a short-term review program, focused on addressing immediate cost pressures on electricity prices.

Medium-term and long-term reform objectives

In developing the 30-year electricity strategy, the government will be considering whether the interdepartmental committee’s objectives remain appropriate for a medium-term and long-term strategic reform agenda. Early engagement with consumer and industry groups suggests that there may be benefits in adopting broader objectives. The medium-term and long-term objectives may require a focus on different ambitions that are more strategically aligned to achieving a secure, reliable and cost-effective sector over the long term.

Figure 5 overleaf shows possible objectives that may help frame a future vision for the electricity sector.

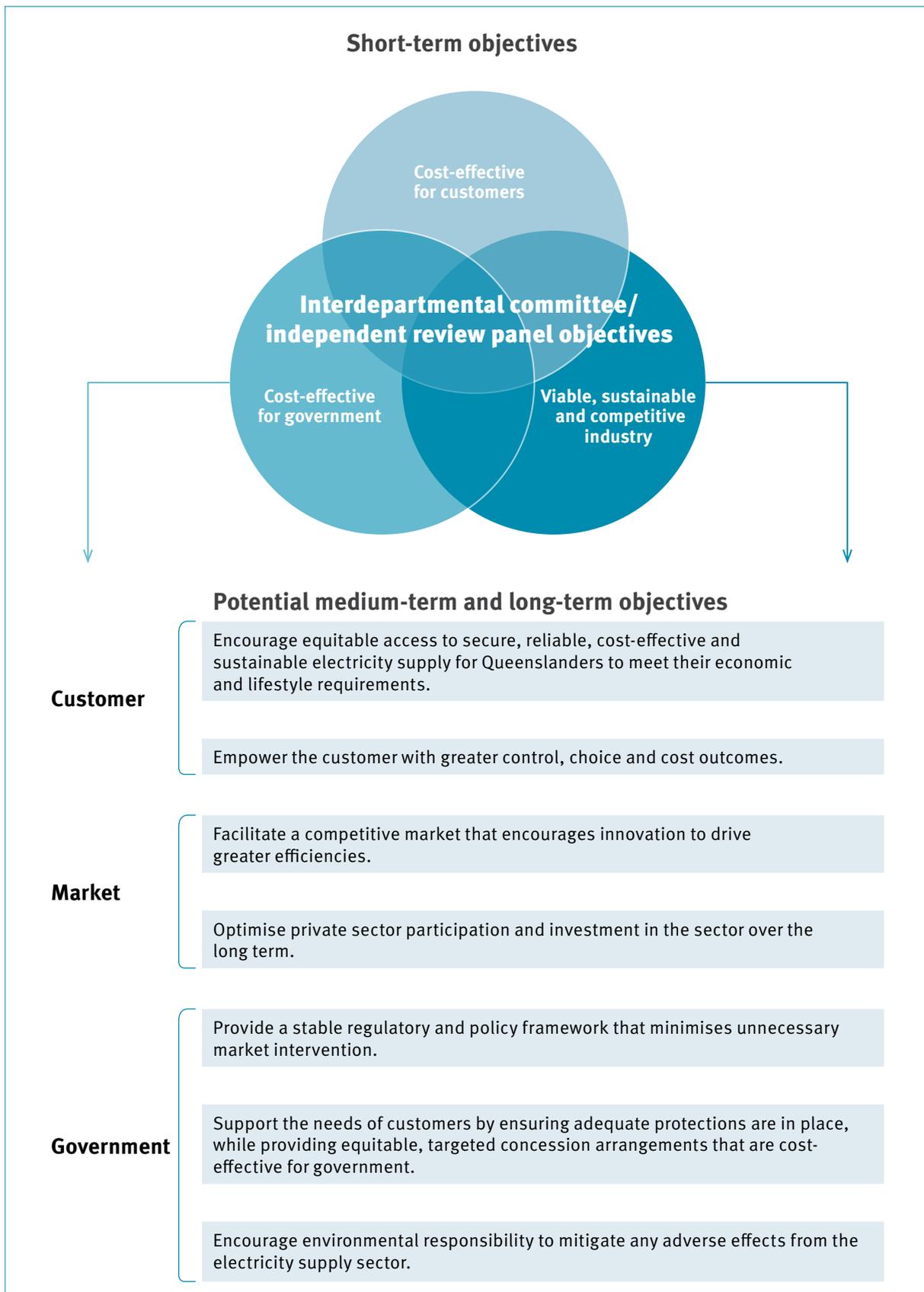


Figure 5 Current, medium-term and long-term electricity sector reform objectives

Have your say

Are the draft objectives appropriate for the development of the 30-year electricity strategy?

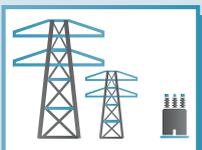
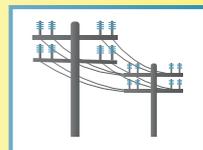
3. The current state of the sector

A snapshot of the Queensland electricity sector

Queensland’s electricity network is part of the National Electricity Market, which operates to supply electricity to grid-connected customers across all states and territories in Australia, except Western Australia and the Northern Territory.

The Queensland electricity sector involves a complex supply chain comprising generation, transmission, distribution and retail. Together, these distinct components operate to deliver electricity to customers. Each component of the supply chain operates within distinct regulatory environments, and is subject to differing cost drivers and market influences.

Table 2 Snapshot of the Queensland electricity sector—key components along the supply chain

 Generation	 Transmission	 Distribution	 Retail
Supply-chain component			
Electricity is generated by large power plants and small generators (e.g. solar power).	Electricity is transmitted long distances along the high-voltage network.	Electricity is reticulated through the distribution network (poles and wires).	Electricity is sold to customers.
Features			
Approx. 14 500 MW total generation capacity: <ul style="list-style-type: none"> • 59% coal fired • 26% gas fired • 9% renewables • 3% pumped-storage hydro • 3% distillate 	More than 13 000 km of high-voltage lines	More than 200 000 km of powerlines (equivalent to wrapping around the planet five times)	Full retail contestability was introduced in 2007, giving many customers a choice in retailer.
Cost drivers			
Reflects the cost of producing electricity, such as plant capital and operating costs (including fuel). Carbon costs are incurred for fossil-fuel plants.	Reflects the cost of transporting electricity, including the capital cost of building, maintaining and operating the high-voltage network.	Reflects the cost of transporting electricity, including the capital cost of building, maintaining and operating the distribution network (poles and wires) to a standard capable of meeting peak demand.	Reflects the cost of purchasing wholesale electricity (including the cost of matching the customer’s demand with supply) and customer service functions.
How prices are set			
Prices are set in a competitive market by bidding supply into a wholesale electricity spot market, and by future supply contracts based on that market.	Operates in a geographic monopoly business market where prices are set by a national regulator (the Australian Energy Regulator).	Prices are set through a combination of regulated prices set by the Queensland Competition Authority, or market contracts offered by retailers at agreed prices.	
Ownership in Queensland			
The government owns or controls 65% of National Electricity Market-connected generation (CS Energy and Stanwell Corporation) and the remainder is privately owned.	The government owns 100% (Powerlink Queensland).	The government owns 100% (Energex and Ergon Energy).	There are 27 licensed privately owned retailers, with 18 active providers operating mainly in South East Queensland. Publicly owned Ergon Energy provides retail services in regional Queensland.

Electricity cost drivers

Queensland, like other states, has historically enjoyed stable, low-cost electricity supply where prices increased annually, generally in line with the rise in the consumer price index (Figure 6).

However, from mid 2007 onwards, Queensland has experienced sharp increases in electricity prices. This has resulted in an unsustainable increase in residential electricity prices of more than 80 per cent in nominal terms, and considerable increases for non-residential customers over this time. These increases have prompted a considerable number of reviews at state and national levels, attempting to explain the reasons for these unsustainable price rises.

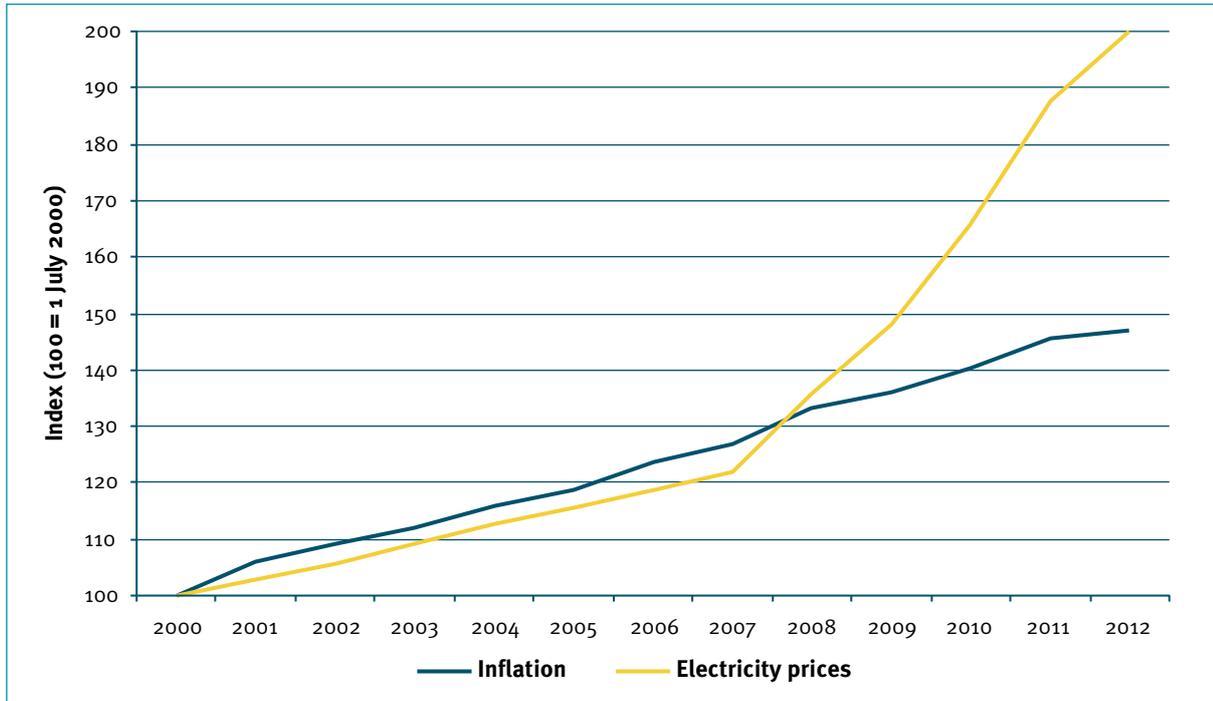


Figure 6 Electricity price rises compared with inflation

In trying to better identify and understand these cost drivers, it is worthwhile considering each of the main components of the electricity supply chain. The diagram below (Figure 7) illustrates the breakdown of a typical residential electricity bill in Queensland in 2012–13.

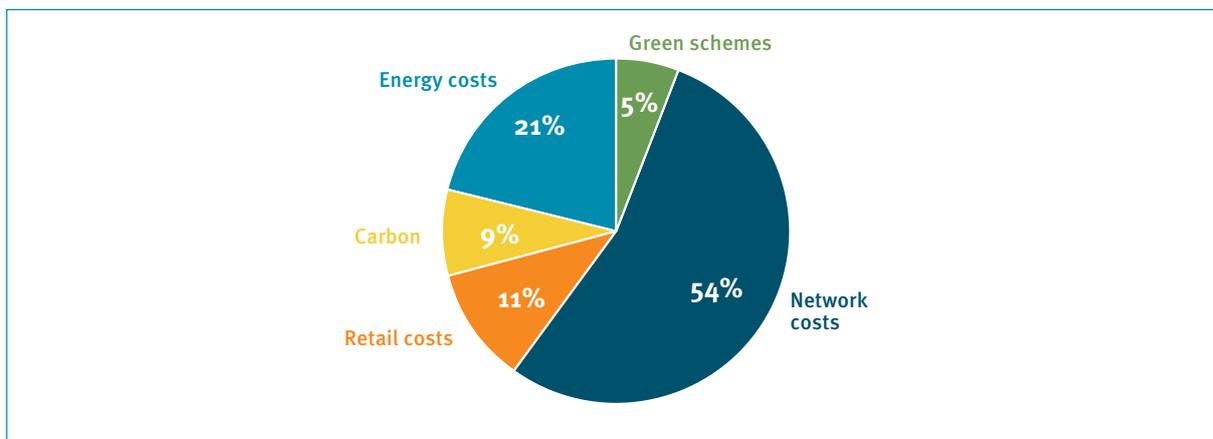


Figure 7 Estimated components of a typical residential electricity bill (2012–13)

What this diagram clearly shows, and what electricity customers often do not realise, is the significant contribution the networks (in particular the poles and wires) make to our electricity bills. In 2012–13, the electricity transmission and distribution networks will account for over half an average residential electricity bill.

Figure 8 below shows that it has been these network costs that have been the primary driver of price increases, doubling in nominal terms in the past six years to meet high reliability standards, cope with peak demand growth and replace ageing infrastructure. While the retail cost components have shown more moderate growth over this period, the emergence of green schemes and a price on carbon are now adding significantly to electricity bills. Offsetting these increases, electricity costs (excluding carbon) are currently lower than they were in 2007–08 due to an oversupply in generation.

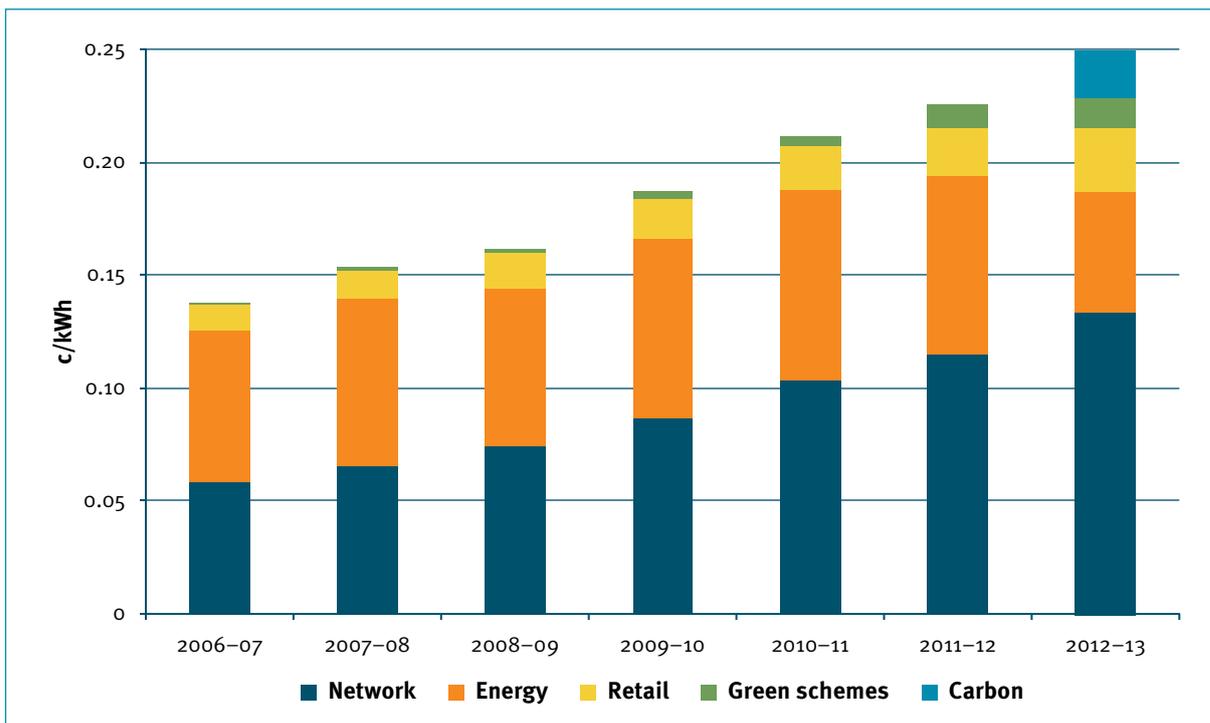


Figure 8 Components of electricity price rises since 2006³

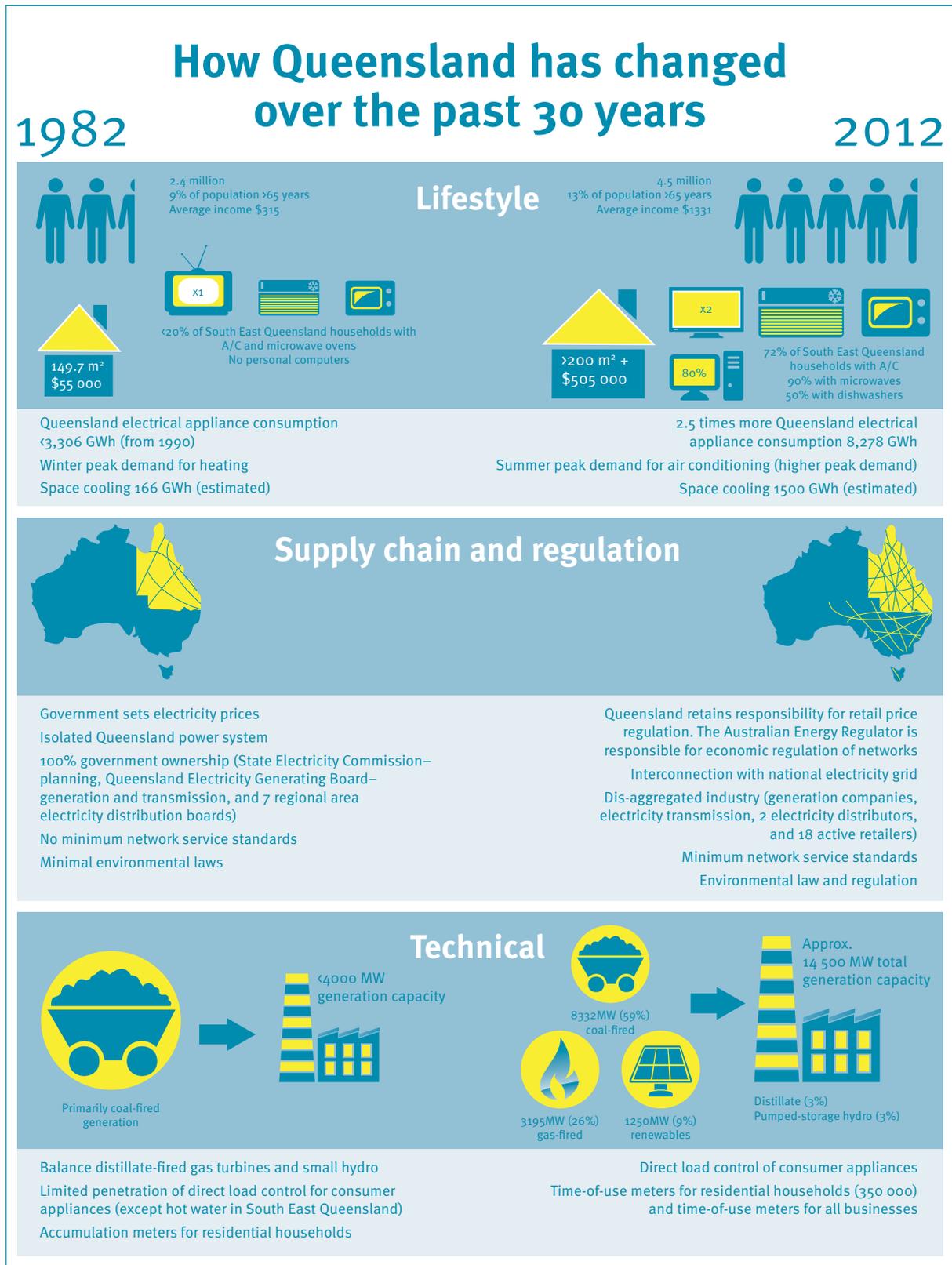
Within each of the components considered above, there are multiple drivers that can influence and sometimes exacerbate problems across the supply chain. This is why an holistic review of the entire electricity sector is required. In this way, government and other stakeholders can better understand the key trends and drivers that are most likely to cause future price shocks, and act accordingly.

3 The 2006–07 to 2011–12 data is based on Queensland Competition Authority determinations, and the 2012–13 data is based on Department of Energy and Water Supply modelling. All figures assume annual Tariff 11 consumption of 5147 kWh.

The impact of 30 years of change

It is easy to underestimate the amount of change that can occur in 30 years. It is useful to look to the past to help us better prepare for the future, particularly as the government tries to understand the drivers and challenges that are likely to impact electricity supply and demand in the coming three decades.

Figure 9 The impact of 30 years of change—1982 and today



Key themes and trends

Looking back to 1982 reveals some important trends that should be considered when planning for the next 30 years. These trends have been considered within the engagement and accountability model that includes customers, market and government.

Customers

- Continued economic growth and improving lifestyles have driven higher electricity prices.
 - Average economic growth in Queensland has been higher than any other state since the late 1980s. Household disposable incomes have increased by approximately 39 per cent, which has led to higher overall consumption and an increase in lifestyle appliances (on average, Queensland households now have 67 appliances).
 - This increase (particularly energy intensive appliances such as air-conditioners) has resulted in increased peak demand, particularly in the early evening, which has driven high levels of investment in network infrastructure. This has led to increased electricity bills for customers.
- Recent overall electricity consumption has reduced, creating pricing challenges.
 - Until recently, electricity demand over the past 30 years had been steadily increasing. Overall demand is now dropping, potentially in response to higher electricity prices, increasing energy efficiency, the fallout from the global financial crisis and the uptake of solar power.
 - This, along with increased peak demand, has resulted in lower network utilisation, leading to an increase in prices as the cost of the expanded network is spread across lower overall consumption levels.
- Community expectations about reliability have driven higher levels of network investment.
 - Since the 1980s, community expectations about secure and reliable electricity supply have increased, particularly following the blackouts in South East Queensland in 2004.
 - The minimum service standards introduced following these blackouts have led to a further \$14 billion investment in network assets. These costs flow through to electricity prices.

Market

- Queensland now participates in a national market, with increasing rules, regulation and complexity.
 - Complex rules now govern the operation of the National Electricity Market, including the regulation of network businesses.
 - The national regulatory framework (including the Australian Energy Regulator) has been widely criticised for being ineffective in constraining network investment and costs.
- Small customers in South East Queensland now have access to retail competition, with increased choice and access to discounted offerings.
 - Small customers in South East Queensland now have a choice of retail providers and product offerings, potentially allowing them to access tailored products to better suit their needs.
- The non-network part of electricity supply is now competitive, leading to changed market dynamics.
 - The competitive parts of the market are now dominated by vertically integrated players (who own both generation and retail businesses).
 - This has led to an increase in investment in gas-fired and intermediate peaking plants, as well as a suppression of wholesale pool prices.

Government

- Regulation of the industry is now more complex, spread across state and federal responsibilities.
 - Since 1982, Queensland has transitioned to a National Electricity Market, offering benefits and additional security through an interconnected market.
 - In this transition, Queensland retains responsibility for retail price regulation, while the federal institutions are responsible for the
 - operation of the wholesale electricity market, which is now managed by a national market operator (Australian Energy Market Operator)
 - making of rules relevant to the National Electricity Market (Australian Energy Market Commission)
 - economic regulation of networks, through the Australian Energy Regulator.
 - There is a need for better alignment between the regulatory frameworks and market segments to ensure the best outcomes from a whole-of-supply chain perspective.
- Environmental schemes have been introduced, adding significant costs.
 - Concerns about climate change have caused governments to provide incentives to shift towards a lower carbon economy.
 - The introduction by the federal government of the Renewable Energy Target scheme (incentives for investment in renewable energy) and the carbon price mechanism have added significant costs to the supply of electricity.
 - The former state government’s introduction of solar feed-in tariff incentives for rooftop solar power have added further costs, which are passed through to customers.
- Increasing prices have contributed to greater levels of fuel poverty for disadvantaged customers.
 - There are concerns that the incidence of fuel poverty (a term used to describe the situation where a customer spends more than 10 per cent of their income on electricity to maintain an adequate standard of living) may be increasing.
 - Governments (both at federal and state levels) are being called upon to provide more equitable access to hardship concessions.

The above trends clearly show the considerable transformation that Queensland’s electricity sector has experienced in the past 30 years.

This has seen a transition from an isolated, publicly owned system to a sophisticated, interconnected and maturing National Electricity Market comprised of a number of participants who play an important part in the electricity supply chain.

The non-network parts of the market are now competitive, with strong involvement from private owners who are supporting the future transformation of the sector through further investment and innovation.

However, as with any evolving market, additional reform and market adjustment will be needed to address existing shortcomings, as well as adapt to future challenges and opportunities that emerge in the decades to come.

Governments will need to play a vital role in supporting this continuing market transformation. As seen in the last 30 years, ill-considered or misaligned policy and regulatory settings have the potential to distort the market, often with industry or customers paying the price.

Governments at all levels must work with industry, customers and each other today to provide the right settings for the development of a secure, reliable and cost-effective electricity supply system tomorrow.

4. The future state

It is impossible to precisely define the likely future of the electricity supply sector in 2042. The only certainty is that the sector is unlikely to look like it does today.

As discussed earlier, the last 30 years has seen considerable changes in the Queensland and national electricity markets. The rates of change over the next 30 years could surpass historical trends, with globalisation, changes in market structure and consumer behaviour, and technological advancements all gathering pace. While many sectors are experiencing changing conditions, the electricity sector is likely to be facing sustained periods of transformation.

The experience in Queensland is not unique. The world is facing enormous electricity supply challenges in the medium to long term. With the world's population likely to exceed 8.5 billion in 2035, the International Energy Agency estimates that global energy consumption will increase by 40 per cent in this period, with 90 per cent of this growth being driven by non-Organisation for Economic Cooperation and Development countries.

This needs to be managed within the context of environmental constraints, rapid globalisation of markets and considerable technological advancements. In developing its 30-year electricity strategy, the government needs to draw on collective experiences from across the world to address the key challenges and opportunities that lie ahead.

The strategy's success will ultimately depend on key customer, market and government stakeholders taking shared ownership of the issues to help create the most effective solutions. Innovation must underpin these solutions in order to realise the fundamental changes (step-changes) required to achieve an electricity supply system that meets Queensland's future needs.

Drivers of change

While the future of the sector may be uncertain, it is possible to identify some of the likely drivers of change.



Figure 10 Likely drivers of change

These drivers have the potential to create significant challenges and opportunities as the sector adjusts. Each of these drivers is likely to have differing impacts across the electricity supply chain, from generation and networks through to retail.

Some are likely to directly influence specific components (such as the effects of carbon constraints on our fossil fuel sector), while others may have a more indirect effect (such as the impact of renewable energy on the network as there is increased deployment of embedded generation).

Either way, given the interconnected nature of the sector, it is clear that most drivers will play a role in shaping all aspects of the future electricity supply chain.

Have your say

What other drivers will influence Queensland’s energy future?

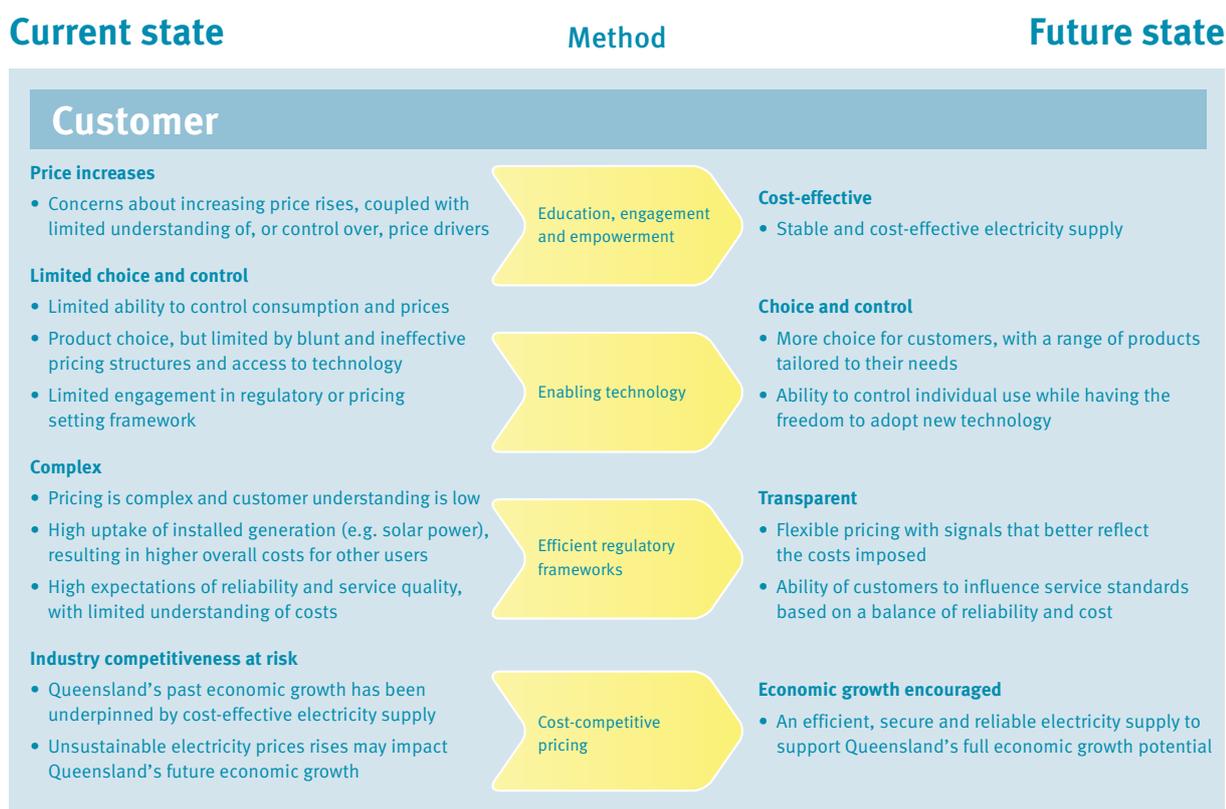
What are the key challenges and opportunities across the electricity supply chain that government will need to consider when developing the 30-year electricity strategy?

Transition to the future state

Our current vantage point does not provide sufficient insight to allow us to be prescriptive about what will emerge in the decades ahead. Instead of trying to predict what our electricity supply sector will look like in 2042, the government has identified the key features of our current state (what we have today) and a possible, desired future state (what we need tomorrow). This has been framed around the engagement and accountability model of customer, market and government.

The purpose of this is to identify possible critical success factors for a future state as well as potential methods to help get there. A clearly defined future vision will be crucial to strategically guide the government’s short-term, medium-term and long-term planning and reform agenda, and will provide greater certainty for customers and those participating in the market.

Table 3 Key features of the current state and of a possible future state



Current state

Method

Future state

Market

Supply chain issues

- Barriers to creating efficiencies and the flow of benefits from reform
- Unintended consequences from policies targeted at one component of the supply chain (e.g. solar power driving up network costs)

Efficient regulatory frameworks

Efficient supply chain

- Alignment of supply chain to efficiently accommodate innovative technology (e.g. embedded generation technology, battery storage and electric vehicles)
- A framework that provides incentives to innovate and create benefits for customers
- A system capable of efficiently integrating lower emission generation technology

Inefficient use of assets

- Falling productivity of supply-chain assets (i.e. more is being spent to create and deliver less energy)

Effective price signals and incentives

Efficient use of assets

- Price signals and incentives to maximise use of assets
- Use of technology to drive greater efficiencies (e.g. smart networks and meters)

Strong reliance on fossil fuels

- Generation assets are largely non-diversified with strong reliance on coal-fired and gas-fired plants, with emergence of the renewable energy sector

Supportive regulatory frameworks

Choice in generation mix

- Supportive regulatory and policy framework to allow the market to invest in the best choice in generation technology to respond to emerging needs

Investment uncertainty

- Policy and regulatory uncertainty and difficulties accessing capital

Stable policy and regulatory environment

Investment attraction

- Stable policy and market environment that encourages investment and innovation by the private sector

Varying levels of competition

- Absence of effective retail competition in parts of the market, particularly regional Queensland
- Barriers to competition in network-related activities (such as metering), which is limiting innovation and customer choice

Minimal Government intervention

Competitive markets

- Effective competition that delivers appropriate returns to investors and improved cost and product outcomes for customers

Current state

Method

Future state

Government

Misaligned environmental schemes

- Green schemes and carbon pricing have been introduced by the federal government to address climate change concerns
- The alignment between schemes and their respective benefits relative to the costs remain unclear

Effective incentives targeted to outcomes

Sustainable and cost-effective supply

- An environmental policy and regulatory framework that mitigates the adverse effects from the sector in the most cost-efficient and effective way
- A sustainable and secure electricity supply that makes the best use of Queensland's natural resources, including fossil fuels and renewable energy sources

Poor infrastructure planning

- Concerns about overbuilding network assets and driving up costs
- Community concerns about new powerlines and new technology (e.g. wind farms)

Effective planning and consultation frameworks

Effective infrastructure planning

- Improved statewide planning processes to avoid unnecessary infrastructure development
- Effective community engagement in the planning, development and construction of electricity infrastructure to reduce impacts

Complex regulation

- Complex regulation across federal and state jurisdictions
- Concerns about the effectiveness of regulatory frameworks has led to numerous reviews
- Role of government(s) is sometimes unclear (including the role of policymaker, regulator and asset owner)

Role clarity for Government(s)

Effective regulation

- Clearly defined state and federal functions to provide greater certainty and increase market confidence
- Alignment of regulation and policy frameworks to drive efficient outcomes
- Removal of unnecessary market intervention to create a more certain and sustainable market

Hardship challenges

- Current concessions framework has shortcomings in providing equitable access to customers suffering hardship

Targeted support frameworks

Equitable and sustainable hardship support

- Appropriate support measures for customers most in need, which are financially sustainable for the state

The government is seeking specific input from market participants and customers on the critical success factors for the desired future state. Unconventional and diverse views are encouraged to ensure the government looks far enough over the horizon when defining the future state for the sector.

Have your say

Within the engagement and accountability model of customer, market and government, what is missing in the government’s vision for a future state?

Planning for a range of futures

Even with a clear vision, it is possible that a range of realities could unfold. These will largely be defined by external influences that fundamentally change the way in which electricity is used and supplied in the future.

The government recognises that it will need to play a critical role in enabling the market and customers to adjust in a timely and efficient way. To do this, the government, and indeed the market, must be able to understand and anticipate potential future scenarios and be ready to respond flexibly to these external forces as they emerge.

Scenario planning will be used as an important tool to inform the development of the 30-year electricity strategy.

Table 4 Potential future scenarios

Scenario 1— Low demand growth	Scenario 2— High demand growth	Scenario 3— Rapid transition to low carbon	Scenario 4— Removal of carbon constraint	Scenario 5— Step-change technology	Scenario 6— Unforeseen system shock
Demand for electricity remains low due to low domestic and/or global activity	Demand for electricity increases at a faster rate than expected to meet domestic and/or global activity	Steepened emission reduction trajectories to meet domestic and/or international commitments	Removal of carbon constraint due to shift in federal policy and legislation	Introduction of technology (e.g. storage or embedded generation) that fundamentally changes the electricity supply chain	Commonly referred to as a ‘Black Swan’ scenario—this considers unforeseen events

Each scenario will impact the future electricity supply chain in a different way, presenting unique challenges and opportunities. The following diagram illustrates the range of scenarios that could occur, depending on the impact of policy, technology and market drivers.

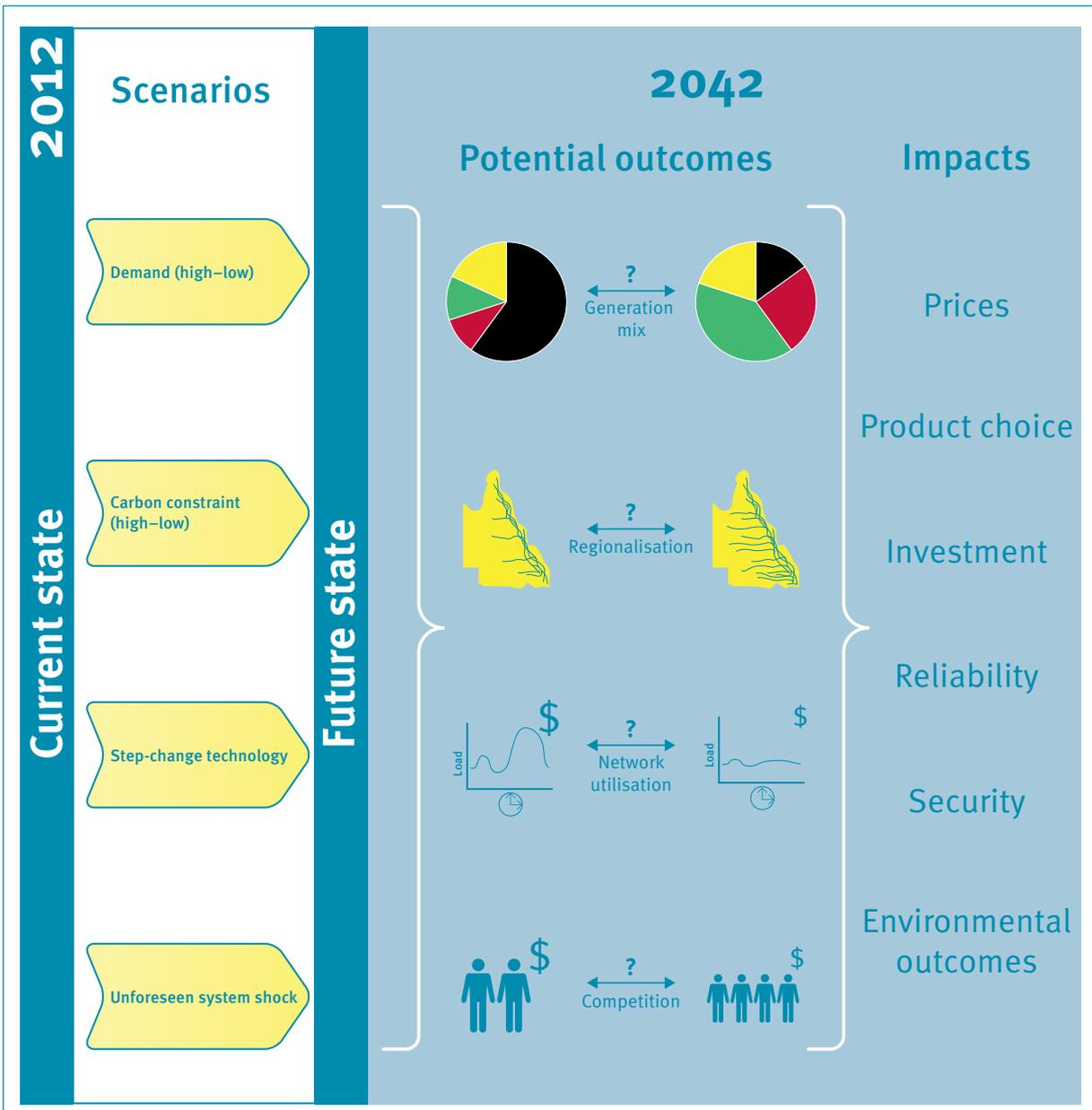


Figure 11 Possible long-term outcomes for the electricity sector

Have your say

What are the possible long-term scenarios for the electricity sector and what broad impacts need to be considered as part of the 30-year electricity strategy?

What should the government do in the short term to best position the sector for the range of possible future scenarios?

Questions to consider

The Queensland Government needs to consider each component of the electricity supply chain and how it will have to respond, depending on external influences.

See Table 5 for some of the key questions that may arise under different scenarios.

Table 5 Key questions in response to different scenarios

<p>Generation</p>	<p>Fuel security</p> <ul style="list-style-type: none"> • Will fuel security and availability be a future risk in Queensland? • If gas prices escalate significantly in the medium term, what impact will that have on electricity prices and the generation mix? • Will fuel constraints emerge that encourage a shift to alternative fuel sources for generation? <p>Generation mix</p> <ul style="list-style-type: none"> • What will the future generation mix look like? • Will renewable energy and low-emission technology replace fossil fuel-dependent generation (such as coal and gas) over time? • Will cost-effective, low-emission base load technology be available to replace conventional coal-fired generation, or will coal remain a key feature of the generation landscape? • Will investors be prepared to fund emerging technology and/or technology at risk of becoming displaced? <p>Wholesale electricity pool</p> <ul style="list-style-type: none"> • Will there still be a wholesale pool for electricity operating in the way it does today? • Will continual structural market shifts (such as vertical integration and embedded generation) transform the market design? 	<p>Interesting facts</p> <p>According to a recent International Energy Agency study, 9 out of 10 low-carbon technologies are failing to meet deployment aims and time lines.</p> <p>The only mature technologies that offer a viable lower emission alternative to fossil fuels are hydro, biomass, onshore wind, solar power and nuclear.</p>
<p>Networks</p>	<p>Network utilisation</p> <ul style="list-style-type: none"> • Will network utilisation continue to decline, posing an asset-stranding risk for existing infrastructure? • Will more efficient regulatory frameworks, effective tariff structures and technology combine to improve the way we build and use our infrastructure? • What role will planning play in ensuring we build an efficient network where and when we need it? <p>Breakthrough technology</p> <ul style="list-style-type: none"> • Will technology transform existing and future infrastructure into truly smart networks, capable of serving a wide variety of customers and generation sources? • What impact will electric vehicles have on network infrastructure? • Will breakthrough technology (e.g. embedded generation and battery storage) fundamentally change the way we source and deliver electricity in the future? <p>Smart networks and integrated systems</p> <ul style="list-style-type: none"> • What impact will digital and automated controls, integrated communications and smart metering have on our electricity networks and electricity supply system? • What incentives and changes to the regulatory frameworks will be required to enable these changes? 	<p>Interesting facts</p> <p>The Electric Power Research Institute is leading research into the development of nanotechnology to improve reliability and effectiveness of electricity networks.</p> <p>This technology may offer prospects for developing a self-healing network that is capable of repairing itself.</p>

Customer and retail

Customer engagement

- How can customer engagement be improved to better realise whole-of-system efficiency?
- Will customers want to engage with electricity suppliers to better manage their requirements and costs?

Price signals

- What price signals and incentives need to be put in place to drive better outcomes for both the individual customer and the system as a whole?

Effective competition

- What regulatory frameworks need to be in place to drive effective competition?
- Will retail competition come from non-traditional sources (such as fuel companies bundling electric transport solutions)?

Interesting facts

In 2011, global energy think tank, VaasaETT, conducted a major global research project to assess the benefits of over 100 demand-response programs, broken down into 460 pilot samples involving over 450 000 households.

Based on 22 potential success factors, it found that consumer engagement through a combination of technology and information (such as smart meters) was critical to create effective demand responses.

Key components of successful programs included customer involvement through engagement, education, consumption feedback and supporting technology.

Have your say

What other questions should be considered when shaping the 30-year electricity strategy?

Next steps

This directions paper is the first step in the journey to achieve a 30-year electricity strategy for Queensland. The government has set the scene, outlined its policy development methodology and described some of the key challenges and opportunities for the sector. Now, as a precursor to the release of a detailed strategy discussion paper in the first half of 2013, the government is keen to begin an engagement strategy and invite input on some of the issues described in this directions paper.

Your feedback is encouraged in response to any or all of the following questions:

- Are the draft objectives outlined in Figure 5 (page 8) appropriate for the development of the 30-year electricity strategy?
- What drivers will influence Queensland's energy future?
- What are the key challenges and opportunities across the electricity supply chain that the government will need to consider when developing the 30-year electricity strategy?
- Within the engagement and accountability model of customer, market and government, what is missing in the government's vision for a future state?
- What are the possible long-term scenarios for the electricity sector and what broad impacts need to be considered as part of the 30-year electricity strategy?
- What should the government do in the short term to best position the sector for the range of possible future scenarios?
- What other questions should be considered when shaping the 30-year electricity strategy?

Your input will be valuable in developing the discussion paper and will help to appropriately frame some of the key issues the government must consider when developing the 30-year electricity strategy.

Feedback should be submitted by 5 pm, Friday 25 January 2013.

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PO Box 15456
City East QLD 4002

Email: electricitystrategy@dews.qld.gov.au

Please indicate if you would prefer any elements of your feedback to remain confidential. Elements that are not marked as confidential may be quoted in public documents.

For more information, call the Department of Energy and Water Supply on 13 43 87.

Links to the 30-year water strategy

The future of Queensland's water sector is a key priority for the Queensland Government. The government has also committed to releasing a 30-year strategy for this sector. The electricity and water reform agendas have a number of synergies that will be captured throughout the policy development process.

Great state. Great opportunity.

