# Independent Review into the Future Security of the National Electricity Market
# BHP Billiton Submission

**3 March 2017**

# Contents


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|---|---|
| Executive summary | 1 |
| BHP Billiton brings a unique perspective to this review | 3 |
| A range of challenges are impacting the security and cost of supply through the NEM | 4 |
| Short and long term reforms are required to enhance the structure and operation of the NEM | 6 |
| Responses to specific questions | 9 |

# Executive summary

The development of the National Electricity Market (NEM) was a landmark microeconomic reform that enhanced electricity markets in eastern Australia. It is clear, however, that the design of the NEM has not adequately adjusted to the growth in intermittent renewable generation. Nor has sufficient consideration been given to the impact of state-based renewable energy targets on the existing market structure.

The need for change is urgent. Increasing energy prices and supply disruptions hinder the competitiveness of Australian businesses and threaten future investment (particularly given the global mobility of capital in the manufacturing and resources sectors). System instability in South Australia, for example, is expected to cost Olympic Dam US$135 million this financial year (including US$105 million attributable to power outage). This impost has nearly negated the year-to-date profitability of Olympic Dam (given that the asset recorded an underlying EBIT[1] for the half year ended 31 December 2016 of $16 million). Just as importantly, unplanned power outages put at risk the integrity of our infrastructure (and, in turn, the long term productivity of our assets), and undermine the safety and attractiveness of living in a regional area like Roxby Downs.

Principles-based reforms are required to enhance the structure and operation of the NEM. These reforms should accommodate policy objectives while providing security and affordability of supply for industrial and residential users.

## Principles for reform

1. Energy security, energy affordability and emissions reduction should be considered on an integrated basis.
2. Technology neutrality (i.e. policy settings that do not favour particular fuels or technologies) provides industry with the necessary flexibility to achieve energy and climate goals at the lowest possible cost
3. Open and transparent markets in energy are the best means of promoting Australia's economic interests.

## Proposals for reform

- **Addressing the immediate issues of security and cost of supply in South Australia** – the first priority should be stabilising the market in South Australia to manage the high levels of intermittent generation within the state portion of the NEM. We believe this can be most effectively achieved in the short-to-medium term by incentivising one or more generators to provide baseload generation when required, at least until longer term solutions are in place.
- **Stable and effective climate change policy** – the Australian Government's upcoming Review of Climate Change Policies presents an opportunity to develop a climate change policy that provides: (1) an effective and lowest cost means of achieving the Government's emissions reduction targets; and (2) the certainty of reliability and cost necessary to underpin operational continuity and investment decisions.
- **Integrated energy and climate change policy** – the effective integration of energy and climate change policy is essential to providing a strong basis for future investment, supporting continued economic growth, realising emissions reductions in line with international obligations at lowest possible cost and improving energy security. To this end, we support:
  - Embedding technology neutrality in climate change and energy policies at the Commonwealth and State and Territory levels
  - Establishing clear and transparent emissions and security requirements within the NEM
  - Repealing state-based renewable energy targets in favour of pursuing a national approach to emissions reduction in the electricity generation sector.
- **Enhanced energy supply and markets to meet supply constraints –** Australian governments should ensure that policy and regulatory settings support open and transparent gas markets, and avoid interventions that impede access to supply (e.g. moratoria and prohibitions on onshore gas development) and dull incentives for innovation and investment (e.g. gas reservation policies). We also support maintaining Australia's current petroleum fiscal regime. Changing the Petroleum Resources Rent Tax (PRRT) could reduce Australia's appeal

[1] Earnings before interest and tax.

as an investment destination; which, in turn, could threaten Australia's ability to produce sufficient supplies of natural gas to meet domestic demand.

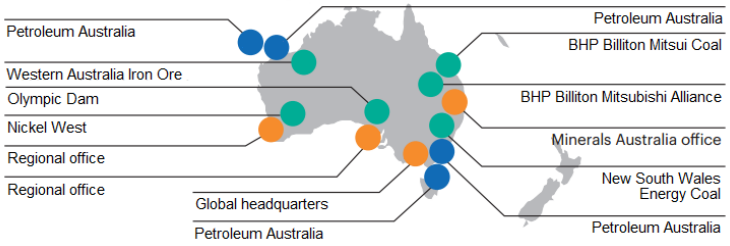
- **Fit-for-purpose infrastructure** – NEM infrastructure in South Australia should be examined to ensure that it is fit-for-purpose to prevent a reoccurrence of the events that contributed to the 'black system' event in September 2016 (while avoiding the 'gold-plating' that has historically distorted electricity prices in Australia).

# BHP Billiton brings a unique perspective to this review

BHP Billiton is among the world's top producers of major commodities, including iron ore, metallurgical coal, copper and uranium. We also have substantial interests in oil, gas and energy coal.

We have an extensive presence in Australia, including iron ore and nickel assets in Western Australia, copper, gold and uranium assets in South Australia, metallurgical coal assets in Queensland, energy coal assets in New South Wales, and offshore oil and gas assets in northwestern and southeastern Australia (see Figure 1). In addition, our global headquarters is based in Melbourne, and we have offices located in Adelaide, Brisbane and Perth.

**Figure 1: Our presence in Australia**




BHP Billiton is a major consumer of electricity from the NEM. Our projects in the eastern states currently have a total average load of 309 MW per annum. As Table 1 outlines, Olympic Dam accounts for approximately 7-8 per cent of total demand for electricity in South Australia (making it the largest energy user in the state). Queensland Coal also accounts for a relatively large share (2-3 per cent) of total demand in Queensland.

**Table 1: BHP Billiton and the NEM**

| Project | Location | Commodity type | Average load per annum | Estimated share of state demand |
|---|---|---|---|---|
| Queensland Coal (BHP Billiton Mitsubishi Alliance, BHP Billiton Mitsui Coal) | Queensland | Metallurgical coal | 167 MW | 2-3% |
| Olympic Dam | South Australia | Copper, gold, uranium, silver | 130 MW | 7-8% |
| New South Wales Energy Coal | New South Wales | Energy coal | 12 MW | <1% |

*Note: Estimated share of state demand is derived from: Department of Industry, Innovation and Science (2016), Australian Energy Update, Canberra.*

In addition to being a major user of electricity, BHP Billiton is a major producer of energy in Australia. In 2015-16, our Australian assets produced 325.7 billion cubic feet of natural gas and 17.1 million tonnes of energy coal. Our production of natural gas accounts for approximately one-fifth of the east coast gas market (excluding the demand of Queensland-based liquefied natural gas plants). The overwhelming majority of the energy coal we produce in Australia is exported to international markets.

BHP Billiton is proud of the contribution it makes to the Australian economy and the benefits this contribution brings to Australia's standard of living. We have paid US$58 billion in Australian taxes and royalties over the last ten years. In 2015-16, we paid $US2.5 billion in wages and benefits to our approximately 16,000 Australian direct employees, and US$8 billion in payments to our suppliers and contractors in Australia. We also invested US$179 million in community programs and activities across the globe.

# A range of challenges are impacting the security and cost of supply through the NEM

The development of the NEM was a landmark microeconomic reform that enhanced electricity markets in eastern Australia. A number of factors, however, are increasingly hindering the effective and efficient operation of the NEM. This, in turn, is impacting the security and cost of supply.

## Factors hindering the efficiency of the NEM

There are three main factors that are hindering the effective and efficient operation of the NEM:

1. **Shifts in the energy mix have reduced system stability**. The NEM was designed at a time when thermal generation (such as coal or gas) represented almost all of Australia's generation capacity. These generation types are inherently stable and, as such, security of supply is assumed rather than specifically required. The growth of renewables (driven, in large part, by the Commonwealth Renewable Energy Target (RET) and the revenue streams created from Renewable Energy Certificates) has brought more inherently intermittent generation into the market, and subsequently, high levels of system integration costs. As a consequence, the security of the network as a whole has reduced. Comparatively high energy prices are increasing pressure on energy-intensive and high energy-cost businesses. The design and operation of the NEM have not adequately adjusted to this new complexity.

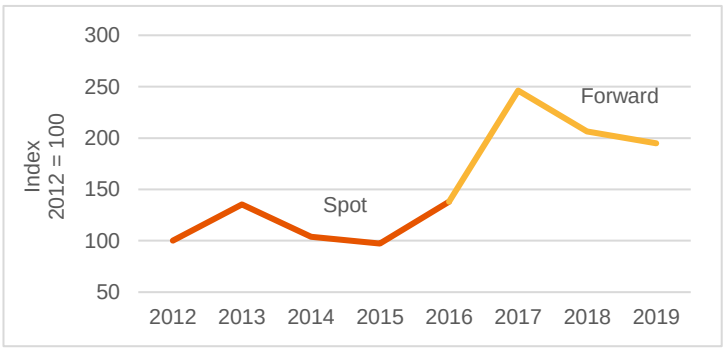
2. **The NEM does not sufficiently incentivise the security of supply**. While power system security is a statutory function of AEMO, the market does not provide incentives to drive security of supply. The market does not provide for, as an example, contractual arrangements requiring suppliers to meet a certain reliability target, as is common across many of the inputs into our business. In addition, there are no provisions within the NEM to incentivise tradeable commodities such as capacity and 'no mechanism to encourage planning for the reliability and security of the whole of the NEM'[2].

3. **Onshore gas policy settings are exacerbating security and cost of supply issues**. The east coast gas market and the NEM are inextricably linked (given that natural gas accounts for an increasing share of electricity generation). Recent increases in gas prices have therefore impacted both the cost and security of supply through the NEM. This increase in gas prices is largely a reflection of changes in supply and demand (including, most notably, the expansion of liquefied natural gas export projects). The efficiency of the east coast gas market is being impeded by structural factors including the immaturity of trading hubs and wholesale market arrangements as well as State initiated policy settings that restrict access to new supply (e.g. moratoria and outright prohibitions on onshore petroleum exploration and production activities.)

## Security and cost of supply impacts

As a consequence of the factors outlined above, the operation of the NEM has become increasingly sub-optimal. This has impacted our business in two key respects. First, it has increased the cost of supply. Prices for electricity at our assets in the eastern states increased by 42 per cent from 2015 to 2016, and are expected to increase by a further 78 per cent in 2017 (Figure 2). Such increases challenge our ability to operate globally competitive assets – particularly given that Australia is already one of the higher cost mining jurisdictions in the world.

**Figure 2: Volume weighted average price, index**




[2] Anne Kallies (2016), 'Chief Scientist's report lays a solid foundation for reforming Australia's electricity network', available at: https://theconversation.com/chief-scientists-report-lays-a-solid-foundation-for-reforming-australias-electricity-network-70268.

Second, the sub-optimal operation of the NEM has reduced the security of supply. For a business such as ours, power outages can have a larger financial impact than purely an increase in electricity prices. This is because we have high fixed costs and any loss of production goes straight to the bottom line. Furthermore, unexpected power losses have the potential to cause damage to our infrastructure, which would have even greater financial impacts on our business (due to lost production in the time taken to repair damaged infrastructure, as well as the costs incurred in repairing the damaged infrastructure).

The scope and magnitude of the impacts described above are best illustrated at our Olympic Dam operations in South Australia (see Box 1).

**Box 1: Olympic Dam**

Located 560 kilometres north of Adelaide, Olympic Dam is one of the world's largest deposits of copper, gold and uranium and it also has a significant deposit of silver.

Unlike many mines in Australia, Olympic Dam operates a fully integrated processing facility from ore to metal. It produces copper, gold and silver as final metals, and uranium as a uranium oxide concentrate. This downstream processing results in significant extra jobs and economic activity in Australia. Olympic Dam employs around 3,000 people directly.

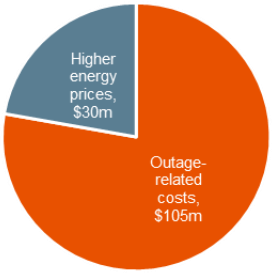
Due to their integrated nature, our Olympic Dam operations are energy intensive. As detailed in Table 1, Olympic Dam has an average load of 130 MW, representing 7-8 per cent of the average demand in South Australia. Our share of average state demand is likely to increase – due to expected growth in our consumption and the projected decline in total consumption across South Australia.[3]

Cost of supply has been an ongoing concern for our Olympic Dam operations. An existing price divergence has escalated in this financial year as the full impact of the removal of coal fired generation from the South Australian grid was realised. Over the past 12 months, electricity prices in South Australia have averaged 50 per cent more than those in Victoria. There have been days where the average prices is 10 times that of Victoria. We anticipate that higher electricity prices will have an impact of US$30 million for Olympic Dam in 2016-17 (compared to actual prices paid in 2015-16).

The 'black system' event on 28 September 2016 was a very serious incident that had a significant impact on Olympic Dam. The 14-day outage, and the subsequent ramp-up of operations, resulted in lost production of more than 15,000 tonnes. This had a financial impact of US$105 million.

The Olympic Dam team is working hard to build a globally competitive business and has been successful in substantially reducing costs in the face of declining commodity prices. The impacts described above undo some of this work. If high energy prices and market volatility persists, there will likely be a flow-through impact on future investment in Olympic Dam, as the asset competes against other attractive investment opportunities within BHP Billiton.


Anticipated financial impacts on Olympic Dam, 2016-17




[3] See: AEMO (2016), *South Australian Electricity Report*, August.

# Short and long term reforms are required to enhance the structure and operation of the NEM

Principles-based reforms are required to enhance the structure and operation of the NEM. These reforms should accommodate policy objectives while providing security and affordability of supply for industrial and residential users.

## Principles for reform

1. **Energy security, energy affordability and emissions reduction should be considered on an integrated basis.** Climate change policy should work with, and not outside, the electricity market. The RET has succeeded in increasing levels of renewable energy in the NEM, but forcing in new intermittent capacity creates challenges over efficient dispatch of existing generation and providing clear price signals for investment and divestment.

2. **Technology neutrality provides industry with the necessary flexibility to achieve energy and climate goals at the lowest possible cost**. Electricity markets need to be both fuel and technology neutral, and not artificially favour one type of technology over another. Governments should instead focus on providing clear and stable energy and emissions reduction goals. It would then be up to industry to determine the most effective and least cost means of achieving these goals. Such an approach would likely spur innovation and avoid a scenario where less-efficient technologies are 'locked in' and/or potentially more efficient technologies are 'locked out'. A neutral technology approach will take into account cost, operational performance and emissions intensity, and final investment will be based on a range of additional criteria including convenience, expected project life span, life-cycle emissions, strategic regional advantage, land utilisation and proximity to natural resources and customers. This can result in a range of generation technologies being implemented, including wind, coal, solar, gas and hydro. The simplest way to do this is to put a price on carbon emissions for the electricity system and to require technologies to offer a secure product to the market.

3. **Open and transparent markets in energy are the best means of promoting Australia's economic interests**. BHP Billiton believes that societies and economies can be strengthened by policy and regulatory settings that are risk-based and developed in an open, transparent manner. This is particularly important in energy markets where the cost impacts of poor market interventions are high, flow across much of the economy and can persist in the market long after being discontinued. To ensure Australia can boost its international competitiveness in the supply of energy, Commonwealth and State and Territory policy settings need to facilitate an efficient market. Government intervention in resources and energy markets should only be in response to a demonstrated market failure and informed by cost-benefit analysis.

## Short term proposals for reform

### Addressing the immediate issues of security and price of supply in South Australia

As the broader process of reforming the NEM is underway, it is critical that steps are taken to address the immediate issues of security and price of supply that have occurred in South Australia and which have had a significant impact on the competitiveness of businesses in the state and Australia internationally.

The first priority should be stabilising the market in South Australia to manage the high levels of intermittent generation within the state portion of the NEM. We believe this can be most effectively achieved in the short-to-medium term by incentivising one or more generators to provide baseload generation when required, at least until longer term solutions are in place.

## Long term proposals for reform

### Stable and effective climate change policy

BHP Billiton accepts the Intergovernmental Panel on Climate Change (IPCC) assessment of climate change science which has found that warming of the climate is unequivocal, the human influence is clear and physical impacts are unavoidable.

Over the past three decades, 'Australia's commitment to climate action' has been 'inconsistent and lacking in direction'.[4] The Australian Government's upcoming Review of Climate Change Policies presents an opportunity to develop a climate change policy that provides:

- An effective and efficient means of achieving the Government's emissions reduction targets – either on an economy wide or (using complementary measures) a sector-by-sector basis
- The certainty necessary to underpin investment decisions.

### Integrated energy and climate change policy

The effective integration of energy and climate change policy is essential to providing a strong basis for future investment, supporting continued economic growth, realising emissions reductions in line with international obligations at lowest possible cost and improving energy security. To this end, we support:

- Embedding technology neutrality in climate change and energy policies at the Commonwealth and State and Territory levels. We maintain that such an approach would provide the broadest possible range of options to achieve energy security and climate change goals at the lowest possible cost. This will include renewables, efficient coal and gas. We must also look at efficiencies in generation and transmission, as well as abatement technologies such as carbon capture and storage (CCS) (noting that the IPCC has recognised CCS as essential in the mix of climate mitigation technologies necessary to avoid the effects of climate change). Development of large-scale battery storage has the potential to improve stability of supply as the contribution of intermittent renewable generation increases
- Establishing clear and transparent emissions and security requirements within the NEM. The market operator would be accountable for meeting these targets through market design. It would be then up to market participants to provide target levels of security and emissions reduction at the lowest possible cost
- Repealing state-based renewable energy targets in favour of pursuing a national approach to emissions reduction in the electricity generation sector. Climate change is a global problem. Australia must introduce national policies to meet our international commitments to tackle climate change. Separate action by states or territories is likely to distort the implementation of national policies and increase costs with no net environmental benefit.

### Enhanced energy supply and markets to meet supply constraints

Reliable, secure and competitively priced energy is crucial to the Australian economy and society. Within this framework, oil and gas play a key role in meeting many of our energy needs. Australia's abundant natural gas resources, in particular, place the country in the enviable position of being able to maintain long term, cleaner energy security.

We welcome recent efforts by the COAG Energy Council to enhance wholesale market mechanisms, regulatory settings for gas transmission pipelines and the provision of market information in the east coast gas market. The efficiency of the east coast gas market, however, is being hampered by a number of policy settings. These include:

- Moratoria and other regulatory restrictions on onshore gas development – which impede access to supply. In our view, an individualised approach to project approval would provide a more appropriate means of managing specific environmental and/or community considerations relating to individual projects, while helping to mitigate the economic consequences of constrained gas supply
- Gas reservation policies – the available evidence suggests that such policies dull incentives for innovation and investment, and threaten long-term supply.

Moving forward, Australian governments should ensure that policy and regulatory settings support an open and transparent east coast gas market (underpinned by rigorous cost-benefit analysis).

We also believe the Review should give consideration to the role that Australia's fiscal regime plays in underpinning the supply of natural gas. Oil and gas projects in Australia are subject to the PRRT. This tax aims to encourage the exploration and production of petroleum, while ensuring an adequate return to the community. We believe the

[4] A Talberg, S Hui and K Loynes (2016), 'Australian climate change policy to 2015: A chronology', Parliament of Australia, Research Paper Series, 5 May.

PRRT, as currently designed, is achieving this balance.[5] Changes to the PRRT could reduce Australia's appeal as an investment destination (particularly given the maturity of Australia's basins and the increasing accessibility of other supply regions with more attractive geology and fiscal terms). A reduction in investment would threaten Australia's ability to produce sufficient supplies of natural gas to meet domestic demand.

### Fit-for-purpose NEM infrastructure

NEM infrastructure in South Australia should be examined to ensure that it is fit-for-purpose to prevent a reoccurrence of the events that contributed to the 'black system' event in September 2016 (while avoiding the 'gold-plating' that has historically distorted electricity prices in Australia). Particular aspects that should be examined include:

- The transmission infrastructure between Adelaide and Davenport – this infrastructure is vital to supporting key industry in South Australia, including Olympic Dam, Arrium, Nyrstar and Prominent Hill
- Interconnector capacity between South Australia and Victoria – the South Australian market has a substantially different generation mix to the rest of the National Electricity Market, and needs to be better integrated.

[5] For more information on BHP Billiton's views on the PRRT, see: http://www.treasury.gov.au/~/media/Treasury/Consultations%20and%20Reviews/Reviews%20and%20Inquiries/2016/Review%20of%20Petroleum%20Resource%20Rent%20Tax/Submissions/PDF/BHP_Billiton.ashx

# Responses to specific questions

In the sections below we detail our responses to specific questions raised in the Preliminary Report.

## Consumers are driving change

*2.3 How do we ensure the needs of large-scale industrial consumers are met?*

The cost of supply through the NEM is increasing, while the security of supply is decreasing. Both of these trends are impacting the competitiveness of our operations in eastern Australia. For instance, as we outline in Box 1, we anticipate that the increasing electricity prices in South Australia and the 'black system' event on 28 September 2016 are likely to have a financial impact of $135 million on Olympic Dam this financial year.

We believe the first priority of Australian governments should be stabilising the market in South Australia to manage the high levels of intermittent generation within the state portion of the NEM. We believe this can be most effectively achieved in the short-to-medium term by incentivising one or more generators to provide baseload generation when required, at least until longer term solutions are in place.

Beyond this immediate issue, we believe the needs of large-scale industrial consumers can best be met through policy and regulatory settings that:

- Prioritise energy security, energy affordability and emissions reductions
- Are technology neutral – enabling industry to pursue the lowest cost option to meet emissions and security requirements
- Promote open and transparent markets in energy.

## The transition to a low emissions economy is underway

*3.2 What is the role for natural gas in reducing greenhouse gas emissions in the electricity sector?*

*3.5 What is the role for low emissions coal technologies, such as ultra-supercritical combustion?*

Australia's climate change and energy policies should be technology neutral. We maintain that such an approach would provide the broadest possible range of options to achieve energy security and climate change goals at the lowest possible cost. This will include renewables, efficient coal and gas. We must also look at efficiencies in generation and transmission, as well as abatement technologies such as CCS (noting that the IPCC has recognised CCS as essential in the mix of climate mitigation technologies necessary to avoid the effects of climate change). Development of large-scale battery storage has the potential to improve stability of supply as the contribution of intermittent renewable generation increases.

*3.4 What are the key elements of an emissions reduction policy to support investor confidence and a transition to a low emissions system?*

BHP Billiton accepts the IPCC assessment of climate change science, which has found that warming of the climate is unequivocal, the human influence is clear and physical impacts are unavoidable.

We believe the world must pursue the twin objectives of limiting climate change to the lower end of the IPCC emission scenarios in line with current international agreements, while providing access to reliable and affordable energy to support economic development and improved living standards. We do not prioritise one of these objectives over the other – both are essential to sustainable development.

Under all current plausible scenarios, fossil fuels will continue to be a significant part of the energy mix for decades. Therefore, an acceleration of effort to drive energy efficiency, develop and deploy low-emissions technology and adapt to the impacts of climate change is needed. We believe there should be a price on carbon, implemented in a way that addresses competitiveness concerns and achieves lowest cost emissions reductions.

## Integration of variable renewable electricity

*4.1 What immediate actions could be taken to reduce the emerging risks around grid security and reliability with respect to frequency control, reduced system strength, or distributed energy resources?*

We believe the first priority of Australian governments should be stabilising the market in South Australia to manage the high levels of intermittent generation within the state portion of the NEM. We believe this can be most effectively achieved in the short-to-medium term by incentivising one or more generators to provide baseload generation when required, at least until longer term solutions are in place.

## Prices have risen substantially

*6.1 What additional mechanisms, if any, could be implemented to improve the supply of natural gas for electricity generation?*

We welcome recent efforts by the COAG Energy Council to enhance wholesale market mechanisms, regulatory settings for gas transmission pipelines and the provision of market information in the east coast gas market. The efficiency of the east coast gas market, however, is being hampered by a number of policy settings. These include:

- Moratoria and other regulatory restrictions on onshore gas development – which impede access to supply and place upward pressure on prices. In our view, an individualised approach to project approval would provide a more appropriate means of managing specific environmental and/or community considerations relating to individual projects, while helping to mitigate the economic consequences of constrained gas supply
- Gas reservation policies – the available evidence (including the 2014 inquiry into microeconomic reform in Western Australia[6]) suggests that such policies dull incentives for innovation and investment, and threaten long-term supply.

Moving forward, Australian governments should ensure that policy and regulatory settings support an open and transparent east coast gas market (underpinned by rigorous cost-benefit analysis).

We also believe the Review should give adequate consideration to the role that Australia's fiscal regime plays in underpinning the supply of natural gas. All oil and gas projects in Australia are subject to the PRRT. This tax aims to encourage the exploration and production of petroleum, while ensuring an adequate return to the community. We believe the PRRT, as currently designed, is achieving this balance.[7] Changes to the PRRT could reduce Australia's appeal as an investment destination (particularly given the maturity of Australia's basins and the increasing accessibility of other supply regions with more attractive geology and fiscal terms). A reduction in investment would threaten Australia's ability to produce sufficient supplies of natural gas to meet domestic demand.

## Energy market governance is critical

*7.1 Is there a need for greater whole-of-system advice and planning in Australia's energy markets?*

There is a need for greater national coordination in Australia's energy markets, particularly in relation to network security and emissions reduction. We support:

- Establishing clear and transparent emissions and security requirements within the NEM. The market operator would be accountable for meeting these targets through market design. It would be then up to market participants to provide target levels of security and emissions reduction at the lowest possible cost
- Repealing state-based renewable energy targets in favour of pursuing a national approach to emissions reduction in the electricity generation sector. Climate change is a global problem. Australia must introduce national policies to meet our international commitments to tackle climate change. Separate action by states or territories is likely to distort the implementation of national policies and increase costs with no net environmental benefit.

[6] Economic Regulation Authority Western Australia (2014), *Inquiry into Microeconomic Reform in Western Australia: Final report*, June.

[7] For more information on BHP Billiton's views on the PRRT, see: http://www.treasury.gov.au/~/media/Treasury/Consultations%20and%20Reviews/Reviews%20and%20Inquiries/2016/Review%20of%20Petroleum%20Resource%20Rent%20Tax/Submissions/PDF/BHP_Billiton.ashx