EXECUTIVE SUMMARY

Queensland can achieve net zero emissions by 2050

How the Sunshine State stands to benefit by taking action while managing the risks of transition
Queensland can achieve net zero emissions by 2050 and stands to benefit by taking action while managing the risks of transition

The Paris Agreement is driving coordinated global action to reduce emissions

As a result of the United Nations 2015 Paris Agreement, over 190 governments around the world – including Australia – have committed to holding the increase in the global average temperature to well below 2 degrees and to pursue efforts to limit it to 1.5 degrees above pre-industrial levels. This commitment will require a significant increase in effort to reduce emissions in the short term and reach net zero emissions globally by the second half of the century. The Paris Agreement enters into force on 4 November 2016 and has been ratified by a growing number of countries including the United States, China and India.

In Australia, a growing number of states and territories have also joined this commitment, with Victoria, South Australia and the Australian Capital Territory committing to net zero emissions by 2050. Leading corporate and financial actors are also making the shift from seeing climate change mitigation as a cost, to realising it as an opportunity.

The question for Australia is no longer if we should act on climate change, rather, how quickly we can transition our whole economy and position ourselves for a prosperous, low carbon future. With increasing global and national action to reduce emissions, the risks of delayed inaction are significant and will result in lost opportunities for Queensland, as well as higher costs later.

Limiting global temperature rise to well below 2 degrees and pursuing efforts to limit the rise to 1.5 degrees implies a global carbon budget

The Paris Agreement implies a physical limit on the amount of greenhouse gases that can be released into the atmosphere before the 1.5 or 2 degree average temperature increase is breached, in other words a ‘carbon budget’. Keeping within this budget requires that carbon dioxide emissions reach net zero globally by around 2050 and all other greenhouse gases reach net zero by around 2070. The carbon budget has profound implications for encouraging short-term emissions reduction efforts now, as the greater the volume of emissions ‘spent’ now, the faster and deeper emissions reductions will need to be in the future, at greater cost and risk.
Queensland’s emissions in the Australian context

Effective action to reduce Queensland’s emissions and decarbonise the state’s economy will be essential to meeting Australia’s emissions reduction targets and international obligations.

The implications of a global carbon budget place Queensland at a significant crossroad. Queensland has the highest share of Australia’s emissions by state - representing 28 per cent of Australia’s total emissions (see Figure 1). Queensland also has the third highest emissions per capita amongst Australian states and territories. Queensland emissions equated to 31 tonnes of CO₂e per person in 2014, close to double the rate of NSW (17 tonnes) and South Australia (16 tonnes). Queensland also has the second most energy intensive state economy. Delaying further action to reduce Queensland’s emissions therefore risks significant impacts through higher costs and more rapid structural and economic adjustment.

Figure 1: Australia’s greenhouse gas emissions by state, 2014, MtCO₂e
**Under Business as Usual (BAU), Queensland’s emissions will be 31 per cent higher in 2050**

Under a Business as Usual (BAU) scenario, where little or no mitigation action is taken, energy use across all sectors is expected to grow by 85 per cent while demand for grid electricity is expected to grow by 76 per cent (despite strong uptake of rooftop solar PV), primarily due to economic and population growth. As shown in Figure 2, this energy use translates to Queensland’s emissions growing steadily between 2015 and 2050. BAU improvements, particularly in the electricity generation sector, are unable to fully offset growth in energy use and therefore Queensland’s emissions continue to grow by 31 per cent by 2050 (see Figure 2). However, it’s worth noting that Queensland is seeking to increase the uptake of renewable energy and has established a Renewable Energy Expert Panel to assess the credibility of a 50% target.

**Figure 2: Queensland emissions projections by end-use sector**, BAU, MtCO₂e

Industry is one of the largest drivers of emissions growth, with emissions expected to grow by 54 per cent, contributing almost half the state’s emissions by 2050. This can be attributed to growth in mining and gas extraction, as well as the non-energy emissions associated with these industrial activities, such as fugitive emissions.

Land use and agriculture emissions remain the second largest contributor to Queensland’s emissions to 2050 and are significantly higher than the national average.

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1 The ‘power’ sector corresponds with transmission and distribution (T&D) losses and electricity generation auxiliary consumption. All other emissions from electricity generation are attributed to the end-use sector that consumes the electricity.
Under BAU, Queensland faces significant transition risks

In a world where total emissions are limited by coordinated international action under the Paris Agreement, economies whose activities remain relatively emissions-intensive will likely be disadvantaged, facing higher risks of stronger future emissions constraints both domestically and internationally, and becoming less attractive for investment.

The global transition has significant implications for emissions-intensive resource-based economies such as Queensland’s. Even if Australia and Queensland were to take no further action on climate change, the economy will be affected by the mitigation efforts of other countries. This is likely to be felt through reductions in exports of fossil fuel resources, and the risk of locking in emissions from related infrastructure. This is also seen through capital markets factoring in higher investment risks because of the relatively high emissions intensity of the economy.

By taking action now, Queensland can better manage these transition risks

As the world begins moving towards net zero emissions, embracing the challenge of decarbonising Queensland’s economy sooner rather than deferring action offers major benefits.

The Paris Agreement objectives, and the global carbon budget it implies, indicate that any delay in climate mitigation action must still be made up at a later date. In other words, the emissions reduction trajectory for Queensland would be steeper if strong state action is delayed in the short to medium term. Sharper reductions later would risk highly disruptive structural and economic adjustments for Queensland.
A robust state-based emissions reduction target could provide clear signals to unlock opportunities for Queensland

In addition to mitigating transition risks, maximising profitable emissions reduction opportunities like energy efficiency also increases the availability of capital to minimise the costs of decarbonisation.

Many decarbonisation actions also produce co-benefits in areas such as health, productivity, amenity and environment. Designing a locally appropriate decarbonisation strategy increases the state’s opportunities to access co-benefits of action.

Seizing opportunities around a decarbonising economy that facilitate innovative technologies, practices, services and business models can also attract investment and encourage growth, revenue and employment opportunities within the state such as servicing renewable energy installations.
Setting a long term state target is in Queensland’s interest and can help drive the state’s transition to net zero emissions by 2050

While there is no Paris requirement for sub-national governments to set emission reduction targets, setting a long term state-based target that guides decision-making and policy development within the state will assist in realising the aforementioned benefits.

Targets are signals of intent and future direction. Targets do not directly reduce emissions, rather, they guide the emission reduction policies that governments implement and inform business expectations regarding the future. In doing so, they play an important role in linking near-term decisions with longer-term timeframes and ultimately, with global climate objectives.

A combination of approaches commonly used for setting sub-national emissions reduction targets indicate that Queensland’s fair share of emissions reduction range between -90 per cent and -100 per cent (i.e. net zero emissions) by 2050.

In assessing potential trajectories against a set of criteria, it would be both achievable (as seen below) and advantageous for the Queensland Government to:

- Set a target of net zero emissions by 2050
- Define a mid-term emissions gateway of 30 to 50 per cent reductions on 2005 levels by 2030
- Set a firm emissions reductions target of at least 20 per cent reductions on 2005 levels by 2025
- Establish a review of the 2030 and 2050 goals in 2019

Figure 4: Queensland emissions trajectory to net zero by 2050 and % reductions relative to 2005 levels
Queensland can achieve net zero emissions by 2050, by following a ‘four pillars of decarbonisation’ approach

The technical emissions reduction potential across each sector of the Queensland economy has been assessed around four ‘pillars of decarbonisation’. The four pillars framework is based on the Pathways to Deep Decarbonisation in 2050 modelling, prepared by ClimateWorks Australia, the Australian National University, CSIRO and the Centre of Policy Studies in Victoria University. The framework focuses on technology solutions, and only considers technologies that are proven. Broadly, these pillars are: ambitious energy efficiency; low carbon electricity; electrification and fuel switching; and non-energy emissions.

Figure 5: Four pillars of decarbonisation framework

1. USE ENERGY MORE EFFICIENTLY
   Choose assets and equipment that uses less energy to get more out of the energy we do use - in areas such as buildings, industry, transport and infrastructure

2. PRODUCE LOW CARBON ELECTRICITY
   Transition to zero carbon electricity sources such as solar, wind and geothermal

3. SWITCH TO ELECTRICITY & CLEANER FUELS
   Switch every energy-using activity we possibly can to electricity (powered by clean energy), and everything else to low emissions alternatives (e.g. coal and oil to biofuels)

4. NON ENERGY EMISSIONS
   These are reduced through process improvements and carbon capture and storage (CCS) in industry and we offset the rest through bio-sequestration
This approach assumes a holistic transformation of the energy system to achieve deep emissions reductions where opportunities are implemented concurrently, and is different from a typical incremental emissions reduction approach.

Whilst consultations with stakeholders were undertaken to account for state-specific context, technical emissions reduction potential in this analysis does not attempt to quantify the potential impact of economic, policy or social considerations which may affect the achievability or realised proportion of this identified potential. Nor does the analysis consider economic, political, social or administrative barriers to the ambitious uptake of these emissions reduction opportunities. Therefore it is likely that some proportion of the identified potential may not be realised.

Conversely, it is important to also recognise that this assessment conservatively does not include development of predicted future technologies or behaviour change. Future technological breakthroughs, innovations and behaviour change over a 30 plus year time horizon have the potential to produce additional emissions reduction opportunities beyond those modelled and to reduce costs. Levels of abatement that may seem ambitious or unachievable now would therefore become increasingly feasible.

By implementing all technical emissions reduction opportunities identified across the four pillars of decarbonisation, Queensland could reduce emissions by 56 per cent, compared to BAU in 2050 (see Figure 6), equivalent to a 49 per cent reduction relative to 2005 levels. A previous study shows that Australia could achieve net zero emissions in 2050 while Australia (and Queensland) maintain economic growth.

In order to reach net zero emissions in 2050, Queensland will need to offset any residual emissions through bio-sequestration, available through regrowth and environmental planting. It’s worth noting however, that changes to technology, industry structure and behaviour may lead to lower residual emissions, and this would in turn, reduce the amount of bio-sequestration required.

Figure 6: Emissions reduction and bio-sequestration potential by pillars for Queensland, MtCO\textsubscript{2}e

![Figure 6: Emissions reduction and bio-sequestration potential by pillars for Queensland, MtCO\textsubscript{2}e](image)
Implementing early emissions reduction opportunities identified through this analysis could lead to a number of co-benefits for Queensland including:

- **Employment and economic diversification opportunities** through increased opportunities in energy services, renewable generation, biofuels and bio-sequestration.
- **Productivity improvements** stemming from more efficient processes and equipment.
- **Improved health outcomes** from reduced local air pollution.
- **Environmental benefits** including increased habitat and biodiversity, and reduced sediment run-off in rivers and coastal environments.
- **Improved liquid fuel security** from reduced reliance on fuel imports.

There are also significant opportunities for energy-intensive industries in a decarbonised global economy transitioning into newer energy sources such as low carbon electricity. Australia’s potential to generate energy from renewable resources offers a competitive advantage relative to other nations.

Existing industries could also benefit from a decarbonised economy, for example, through the revival of energy-intensive manufacturing industries such as aluminium smelting (powered by zero emissions electricity) and the potential to deliver renewable energy carriers for export markets such as biogas or hydrogen. As a July 2016 report from Queensland’s Department of Natural Resources and Mines suggests, the state also has significant rare earth and mineral deposits which have high value in emergent and green technologies required for a decarbonising world.

To realise the opportunities, Queensland will need to address barriers to pursuing a net zero emissions by 2050 target

While there are significant opportunities and benefits for Queensland through a state based target, barriers to the implementation of emissions reduction efforts will hamper progress, if they are not addressed. Addressing these barriers would allow greater uptake of technical abatement potential.

These barriers include:

- **Policy uncertainty and the absence of a national carbon price** which removes financial incentives to reduce emissions and reduces investment confidence.
- **Upfront cost** where access to capital is difficult, payback periods are longer or uncertain, split incentives exist or technologies are yet to become cost effective.
- **Impacts on legacy industries** through reduced employment and the need to support transition in affected communities and local economies.
- **Information and capacity barriers** where opportunities are poorly understood, or where knowledge, skills and capacity are insufficient.

Achieving net zero emissions by 2050 will require action across the Queensland economy

Substantial opportunities to reduce emissions have been identified across all sectors of the Queensland economy. Government has a key role to play in facilitating the achievement of a net zero emissions by 2050 outcome, by ensuring the enabling policies, incentives and settings are in place so that these opportunities can be taken up by all stakeholders in Queensland.

ClimateWorks Australia supported the Queensland Department of Environment and Heritage Protection’s (EHP) current climate change mitigation policy development by quantifying Queensland’s potential to reach net zero emissions by 2050. Results are presented in the full report, which includes modelling and analysis of the potential technical emissions reduction opportunity across all sectors of the Queensland economy, as well as the bio-sequestration potential in Queensland’s land sector. Analysis demonstrates there is an achievable net zero emissions pathway to 2050 for Queensland.

This analysis uses the same framework as ClimateWorks’ Pathways to Deep Decarbonisation in 2050 for Australia, which was developed in partnership with Australian National University and features updated modelling by CSIRO and the Centre of Policy Studies at Victoria University. Similar analysis has been undertaken for the South Australian and Victorian State Governments.

Contributions by The Climate Institute include calculations of a long-term target for Queensland based on estimates of a Queensland carbon budget consistent with the Paris Agreement, and analysis of international emission reduction trends.
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Published by
ClimateWorks Australia
Melbourne, Victoria,
October 2016
© ClimateWorks Australia 2016
ISBN 978-0-9871341-5-8

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Founded by The Myer Foundation and Monash University, working within Monash Sustainable Development Institute to deliver equitable solutions to climate change.