



AUDIT INSIGHTS

25 November 2021

# Managing Queensland's transition to renewable energy

Report 5: 2021–22

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The Honourable C Pitt MP  
Speaker of the Legislative Assembly  
Parliament House  
BRISBANE QLD 4000

25 November 2021

This report is prepared under Part 3 Division 3 of the *Auditor-General Act 2009*.



Brendan Worrall  
Auditor-General



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# Contents

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<b>Report on a page</b>	<b>1</b>
<b>1. Recommendations</b>	<b>2</b>
<b>2. Renewable energy in Queensland</b>	<b>3</b>
<b>3. Managing the transition</b>	<b>11</b>
<b>Appendices</b>	<b>20</b>
A. Entity responses	21
B. How we prepared this report	30
C. Renewable energy funding in Queensland	31

# Report on a page

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In June 2017, the Queensland Government committed to a renewable energy target (the target). To meet the target, 50 per cent of all energy consumed in Queensland must come from renewable sources, such as sunlight, wind, and water, by 2030. The Department of Energy and Public Works (the department) is responsible for managing Queensland's energy policy. We examined the department's management of the transition to renewable energy.

## Queensland's renewable energy was around 19 per cent in 2020–21

Rooftop solar is the greatest renewable generation source in the state, but wind and large-scale solar generation are rapidly increasing. The department reports on the growth in renewables but does not publish a clear definition on how the target is calculated.

In the next four years, a number of new renewable projects are planned to start operating. The department estimates this will see Queensland reach around 35 per cent renewable energy in 2025. Queensland's progress will then depend on the progression of future projects in early-stage planning. Growth in rooftop solar and green hydrogen production could help achieve the target.

## Government is playing a greater role in the transition

Early renewable energy initiatives encouraged the private sector to deliver the transition to renewable energy. The government's new \$2 billion Queensland Renewable Energy and Hydrogen Jobs Fund will increase its direct role in the transition. Under this fund, government owned energy corporations may significantly increase their development and ownership of renewable energy generation. They may also access the fund to support the development of private sector renewable energy projects.

## A new ten-year energy plan is in development

Beyond its 50 per cent target, the department has not yet set out its ambitions for the energy system towards 2030. The government has announced the development of a new ten-year energy plan. This would help inform investors, communicate its overall vision for the transition to renewable energy and provide information on its desired end state.

## Network infrastructure must support growth and stability

The transmission network may need upgrades to accommodate increasing renewable generation. There have been limited locations within Queensland with sufficient network conditions for new generation projects. Additional renewable generation has also caused network instability in certain regions.

The government's recently announced Queensland Renewable Energy Zones (in which it plans to invest in infrastructure and encourage new renewable generation projects) will partially address this issue, but further network improvements are likely to be needed to maximise renewable generation.

## Drivers for new investment are changing

Increasing renewable generation is contributing to falling average energy prices. While Queensland's total energy demand is forecast to remain stable this decade, government policy and investor demand for decarbonisation may offset the impact of lower prices. Queensland is also competing with other states for renewable energy investment. The department will need to actively monitor and manage these areas.

We recommend the department communicates its overall vision and objectives for the transition and conducts an interim review by 2025 to formally assess its progress and consider further actions needed to achieve the target. We also recommend the department updates its calculation of progress against the target and improves its public reporting on the transition to renewable energy.



# 1. Recommendations

## Achieving the renewable energy target

Transitioning Queensland's energy system to a minimum of 50 per cent renewable energy by 2030 requires coordinated action and complementary investments by government and industry. To support this, we recommend the Department of Energy and Public Works:

1. publicly communicates its overall vision and objectives for the transition to renewable energy and sets out more information on its desired end state in its ten-year energy plan (Chapter 3)
2. conducts an interim review by 2025 to formally assess its progress towards the target and to consider further actions to support its achievement of the target. These could include additional investment on network infrastructure, increased support for renewable generators or other actions to address external factors (Chapter 3).

## Improving public reporting

To improve the transparency and accuracy of public reporting on the transition to renewable energy, we recommend the Department of Energy and Public Works:

3. publishes a detailed public statement of how Queensland's renewable energy target is defined and measured (Chapter 2)
4. updates its calculations of progress against the target to fully account for all relevant renewable energy, such as small-scale renewable, and non-renewable energy, such as diesel generation (Chapter 2)
5. reports more information on:
  - actual renewable generation including, for example, the amount of energy generated from wind, solar and other sources
  - the assumptions which support its renewable energy forecast (Chapter 3).

## Reference to comments

In accordance with s. 64 of the *Auditor-General Act 2009*, we provided a copy of this report to the Department of Energy and Public Works. In reaching our conclusions, we considered its views and represented them to the extent we deemed relevant and warranted. The department's formal response is at [Appendix A](#).



## 2. Renewable energy in Queensland

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The Queensland Government has committed to increasing the proportion of renewable energy in Queensland's energy system. This change aligns with many other national and international energy policy initiatives.

Renewable energy comes from resources that are naturally replenished, like sunlight, wind, and water. Renewable energy can be captured through technology like photovoltaic cells (solar), wind turbines, electrolysis and hydroelectricity.

The Queensland renewable energy target (the target) requires 50 per cent of all energy consumed in Queensland to be from renewable sources by 2030. The Department of Energy and Public Works (the department) is responsible for managing Queensland's energy policy, including progress towards the target. Queensland operates in a national electricity market, which is affected by Australian Government policy settings, and the state has advocated for stable and integrated national policies.

This report examines the Queensland Government's management of progress towards the target.

This chapter outlines:

- how Queensland's renewable energy target is measured
- recent growth in renewable energy in Queensland
- the changing mix of renewable generation sources in Queensland
- new renewable energy projects being tracked by the department
- additional generation required for Queensland to meet the 2030 goal.

### Defining and measuring the target

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The Queensland Government's commitment to the renewable energy target followed a Queensland Renewable Energy Expert Panel report in 2016 that set out pathways to achieving a 50 per cent target by 2030. The report also recommended the renewable energy target be measured as a proportion of energy consumed in Queensland, rather than energy generated.

#### DEFINITION

**Generation** refers to the total electricity generated in Queensland over a period of time. This is normally measured in megawatt hours (MWh) or gigawatt hours (GWh).

**Consumption** refers to all electricity used in Queensland. It is normally measured in gigawatt hours. Consumption can be more or less than the sum of all generation as Queensland may import or export electricity.



The department uses the calculation in Figure 2A to measure progress towards the renewable energy target.

**Figure 2A**  
**Department's calculation for measuring progress**

$$\text{Percentage of renewable energy in Queensland} = \frac{\text{All renewable generation in Queensland}}{\text{All energy consumed in Queensland}} \times 100$$

Source: Queensland Audit Office analysis of Department of Energy and Public Works information.

The department calculates progress using data reported by generators operating in the National Electricity Market (which is the market that connects electricity systems in Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia, and Tasmania). It also uses estimates of energy that is not included in the national market reporting. The estimates include:

- energy generated by small-scale facilities, such as bioenergy generators that use organic waste material to generate energy
- energy generated for use in the North West Minerals Province. This includes energy generated in the Mount Isa and Cloncurry regions, which are not connected to the national market.

### Reported progress in 2020–21 is higher than actual progress

The department's service delivery statements for the 2020–21 budget show an 'estimated actual' of 20 per cent as the percentage of renewable energy in Queensland. However, this calculation:

- does not include all non-renewable energy, for example diesel generation, that is generated outside the national market. Around 1,000 GWh of this type of energy was produced in Queensland in 2020
- does not add the energy generated by small-scale facilities to the total energy consumed
- assumes all bioenergy generators achieve the same performance as the largest bioenergy generator.

We re-calculated performance against the target and found Queensland's progress was around 19 per cent. This is an important difference as each percentage point change in the level of renewable energy translates into a sizeable change in Queensland's energy system.

There are also major industrial facilities, such as liquified natural gas plants, which generate non-renewable energy to use in their operations. We have not included these facilities in our calculations.

#### Recommendation 4

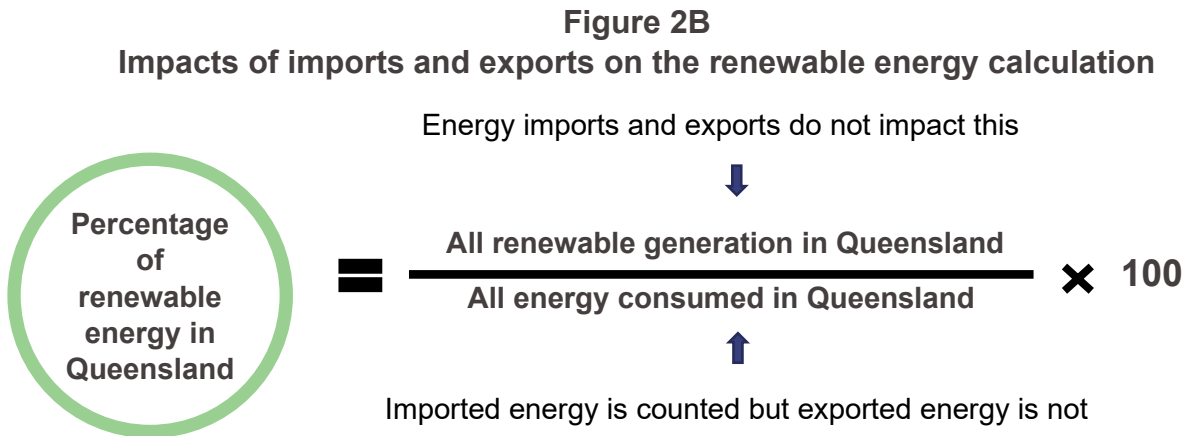
We recommend the Department of Energy and Public Works updates its calculations of progress against the target to fully account for all relevant renewable energy, such as small-scale renewable, and non-renewable energy, such as diesel generation.

### Energy imports and exports are counted differently

The department measures progress against the target by comparing renewable energy generated in Queensland to the total energy consumed within Queensland. This approach is based on the department's interpretation of the Queensland Renewable Energy Expert Panel report.

The department’s measurement approach includes energy imported into Queensland from other parts of the National Electricity Market but excludes energy that is exported from Queensland. For example, over the past five years, Queensland exported an average of nearly eight per cent of all energy generated in the state. It imported an average of less than 0.5 per cent. Because the exported energy was not consumed in Queensland, it was not reflected in the renewable energy calculation.

Figure 2B outlines how imports and exports are factored into the renewable energy calculation.



Source: Queensland Audit Office analysis of Department of Energy and Public Works information.

The current approach to measuring progress against the target:

- treats the calculation of renewable energy differently to the calculation of other energy
- results in a higher proportion of renewable energy when Queensland is exporting energy.

If progress against the target was measured as either the proportion of energy consumed from renewable sources, or the proportion of energy generated from renewable sources, then Queensland’s performance in 2020–21 would be around one percentage point lower.

Some states in the National Electricity Market with a renewable energy target measure their progress by considering energy generation only.

### There is limited information on how the target is measured

The department sets out the renewable energy target and its estimated performance in its annual service delivery statements. But these do not describe how the department treats various elements of this calculation. For example, they do not define how the department includes energy imports or exports, or energy from domestic solar and other small-scale renewable generators in the renewable energy calculations.

#### Recommendation 3

We recommend the Department of Energy and Public Works publishes a detailed public statement of how Queensland’s renewable energy target is defined and measured.

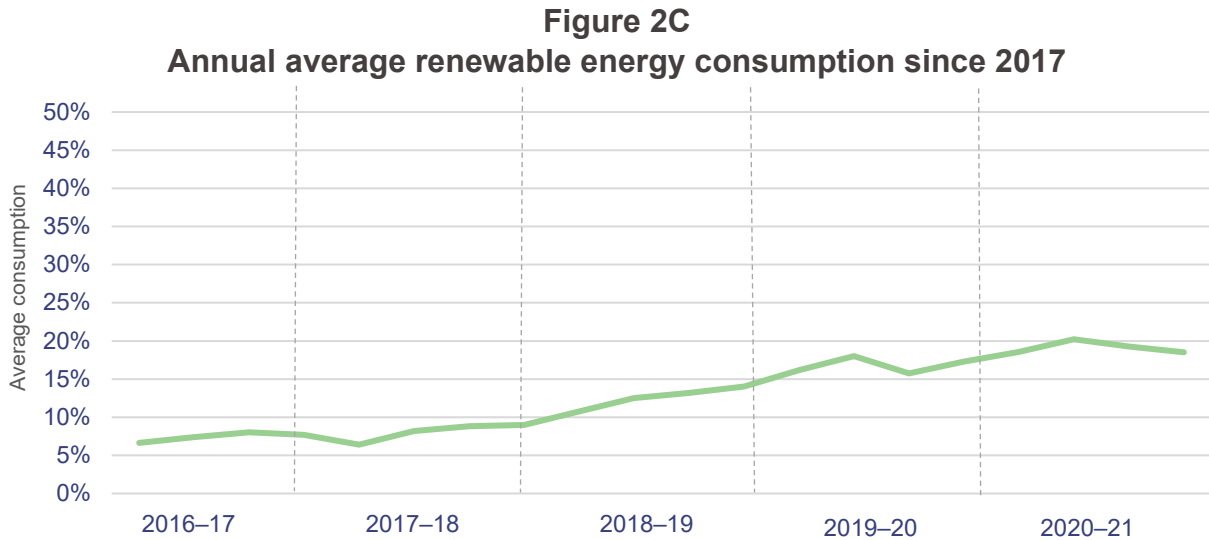




## Queensland's current energy mix

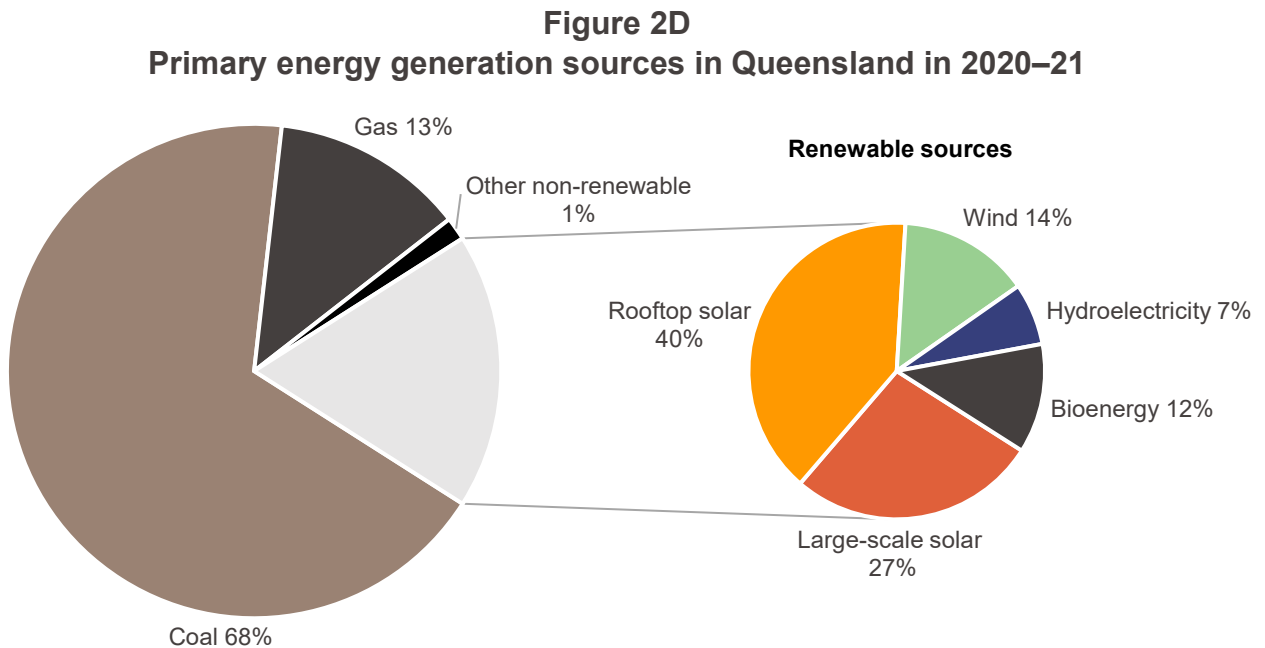
### Renewable energy in Queensland has grown

In 2017, Queensland's renewable energy consumption was around seven per cent of total energy consumed. Figure 2C shows Queensland's consumption of renewable energy since then. The increase has been driven by multiple factors, including market forces and government incentives.



Source: Queensland Audit Office analysis of OpenNEM data, Australian Energy Statistics data, and Department of Energy and Public Works data.

Most of Queensland's energy is generated from thermal sources, like coal and gas. Figure 2D shows the primary renewable and non-renewable energy sources and their contribution to total energy generation in Queensland.



Note: Around 18 per cent of all energy generated in Queensland in 2020–21 was from renewable sources. This is lower than Queensland's consumption of renewable energy in this period because of the treatment of energy imports and exports, as outlined in this chapter.

Source: Queensland Audit Office analysis of OpenNEM data, Australian Energy Statistics data, and Department of Energy and Public Works data.

## Most of Queensland's renewable generation is from solar

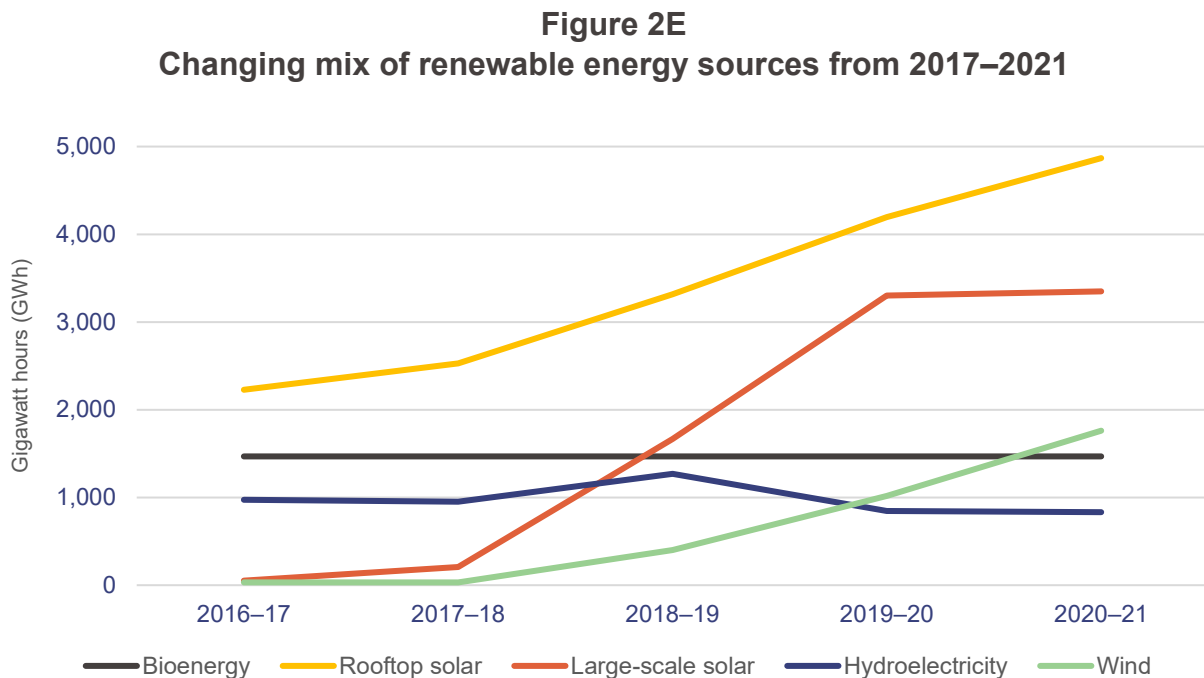
Rooftop solar is the single largest source of renewable energy generation in Queensland. When combined with large-scale solar generation (or solar farms), it represents around 67 per cent of all renewable generation in Queensland.

Solar energy is only generated when the sun is shining, resulting in high levels of solar generation in the peak of the day. This does not align with when demand for energy is highest, which is typically in the morning and evening when people are at home. A diverse mix of renewable energy sources and storage, such as large-scale batteries or pumped hydroelectricity (which uses water reservoirs to store energy), is needed to supply renewable energy when solar is unavailable.

## The renewable generation mix is changing

While rooftop solar has been the greatest contributor to renewable energy in Queensland since 2017, wind and large-scale solar energy have increased rapidly in recent years.

Figure 2E shows the changing mix of different renewable sources in Queensland since 2017.



Source: Queensland Audit Office analysis of OpenNEM data and Department of Energy and Public Works data.

## Queensland's future renewable projects

### The department tracks potential renewable projects

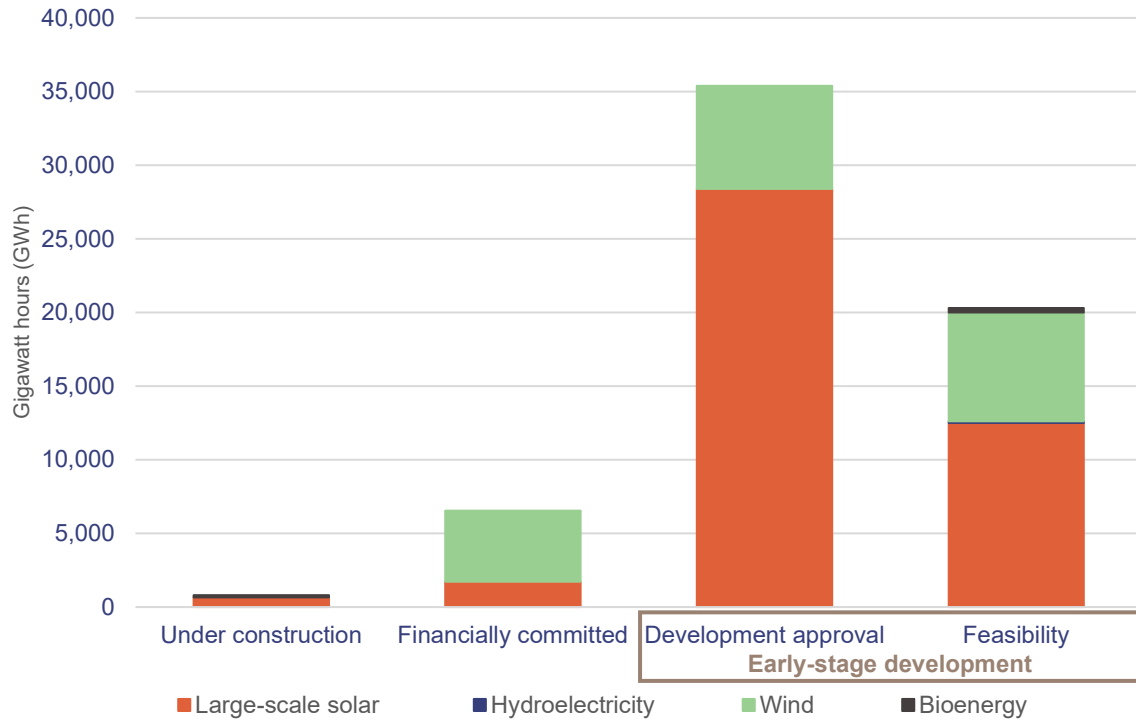
The department maintains a list of planned renewable energy projects in Queensland, across three broad categories:

- **Early-stage development**—these projects have been announced but have not yet secured financial investment. They are separated into two sub-categories: development approval and feasibility.
- **Financially committed**—these projects have secured financial investment, but construction has not yet commenced.
- **Under construction**—construction has begun on these projects, but they are not yet operational.



Figure 2F shows the total proposed generation from each of the department's project categories. We have not validated the department's list of future projects.

**Figure 2F**  
**Potential annual generation from future projects**



Note: Data does not include energy storage projects such as pumped hydroelectricity and battery storage.

Source: Department of Energy and Public Works project tracking data as at March 2021.

### There is a long list of potential renewable projects

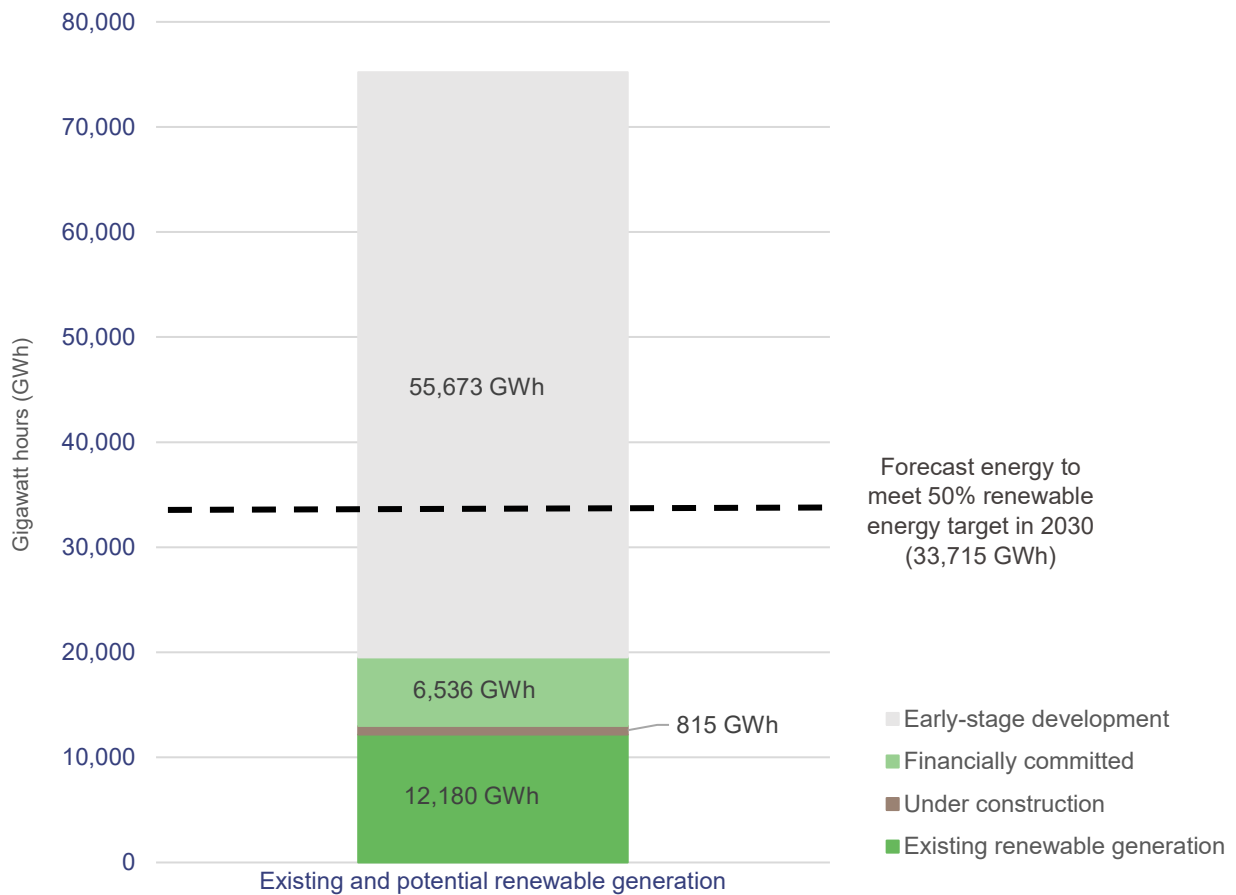
The department expects that by 2025 around 35 per cent of all energy consumed in Queensland will be from renewable sources. This is based on the department's project construction forecast and assumes most renewable projects that are under construction or financially committed will become operational.

As shown in Figure 2G, based on the current demand forecast for 2030, Queensland would then need around one-quarter of all generation from current early-stage development projects to go ahead to reach the 50 per cent renewable energy target in 2030.

The list of early-stage development projects may not be exhaustive, and additional projects may be announced in coming years. The required generation to hit the target could also be impacted by other factors, such as increased rooftop solar generation or increased energy consumption in Queensland. For example, the *Queensland Hydrogen Industry Strategy 2019–2024* aims to increase the use of renewable energy in the production of green hydrogen.



**Figure 2G**  
**Existing renewable generation and potential generation from future projects**



Source: Queensland Audit Office analysis of OpenNEM data, Australian Energy Market Operator data, and Department of Energy and Public Works project tracking data as at March 2021.

The total generation from all proposed renewable generation is around four times the existing level. If all these projects go ahead, it will significantly reshape Queensland's energy generation profile.

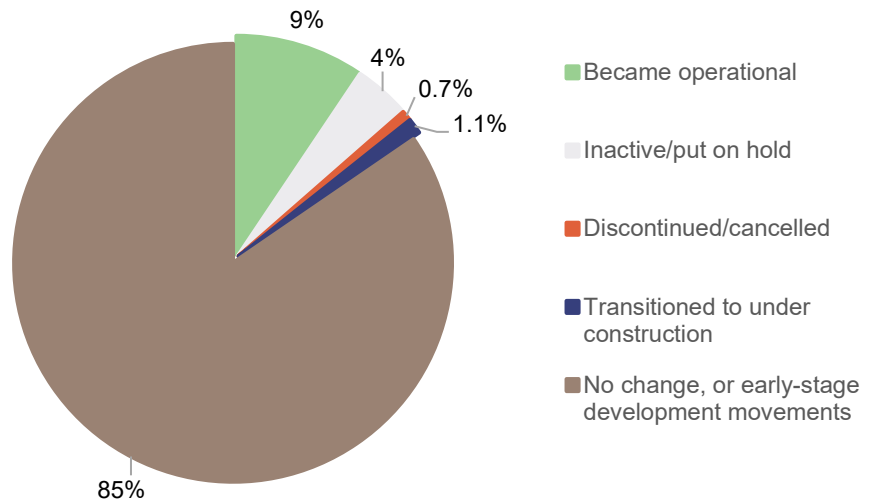
### Many early-stage projects may not be operational by 2030

While projects that are under construction or financially committed have a high likelihood of reaching completion, it is unlikely that all early-stage development projects will become operational by 2030. Many do not yet have finance or development approval and are exposed to a variety of market risks.

The department does not report on the status of proposed projects or how these change over time. Using its project tracking data, we found that projects representing nine per cent of potential renewable energy generation became operational between June 2017 and March 2021. Meanwhile, projects representing 85 per cent of potential renewable energy generation had no significant change in status. A further six per cent either transitioned to construction, were put on hold, or were discontinued. This is shown in Figure 2H.



**Figure 2H**  
**Progression of renewable energy projects through the development life cycle, 2017 to 2021**



Note: Percentages represent the potential energy generation of the 158 projects tracked by the department. Percentages do not equal 100 per cent due to rounding.

Source: Queensland Audit Office analysis of Department of Energy and Public Works project tracking data as at March 2021.

The department does not assess the likelihood of individual early-stage projects becoming operational, nor does it estimate how many early-stage projects will reach completion by 2030. Without this information, it cannot be certain the current pipeline of early-stage projects is sufficient.

The conversion rate outlined in Figure 2H reflects historic market conditions and past government actions. If projects continue to become operational at this historic rate, there may not be enough renewable generation in Queensland by 2030 to meet the target. However, the average size of renewable projects reaching financial close has been increasing. Converting larger projects will bring Queensland closer to the target. Other factors, such as growth in rooftop solar and green hydrogen generation, could also assist Queensland to achieve the target.

The department advised its current renewable energy initiatives are targeted at improving investment conditions to support renewable generation projects in Queensland. We discuss this in Chapter 3.



## 3. Managing the transition

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In 2020–21, around 19 per cent of all energy consumed in Queensland was from renewable sources. The Queensland Government's target of 50 per cent renewable energy by 2030 represents a significant change to Queensland's energy landscape.

The transition will require sustained action and coordination by government and industry. The Queensland Government has committed over \$3 billion since 2017 to achieve the target. The Department of Energy and Public Works (the department) is steering the shift, working with infrastructure providers and energy generators.

We would expect a program of this significance and duration to be carefully managed to achieve the best results.

This chapter examines how the Queensland Government is managing the transition to renewables, including:

- key renewable energy initiatives, and how these have changed over time
- how the department communicates its overall approach and key objectives
- how the department monitors progress to keep the transition on track
- risks and challenges to a successful transition.

### Key renewable energy events since 2017

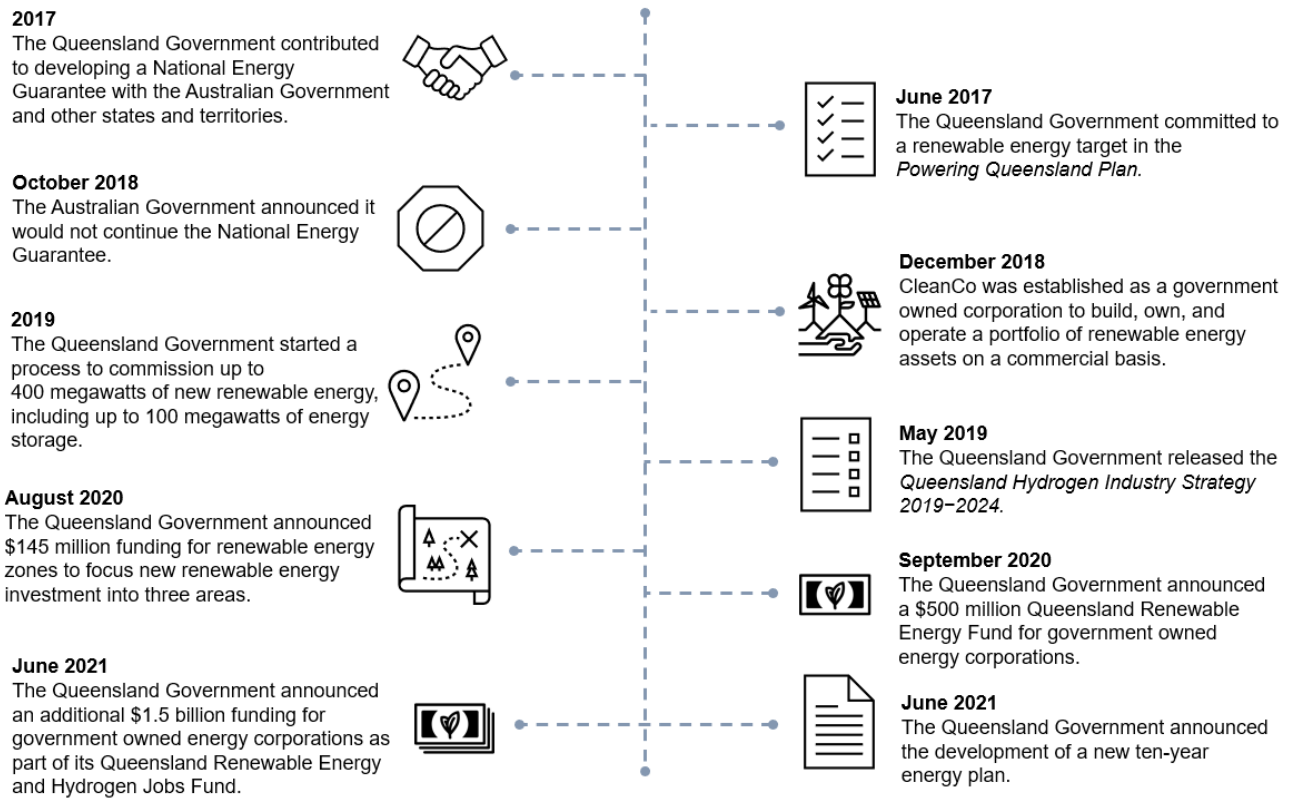
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The Queensland Government formalised its commitment to the target in June 2017. This report focuses on significant government actions since then. Queensland is also part of a changing national energy policy landscape. We outline some of these national policies below for context.

The timeline in Figure 3A outlines key renewable energy events in Queensland.



**Figure 3A**  
**Key events in Queensland's transition to renewable energy since 2017**



Source: Queensland Audit Office.

## Early actions focused on market delivery and national coordination

In 2016, the Queensland Renewable Energy Expert Panel said the Queensland Government should encourage the market to deliver renewable energy to the ‘fullest extent possible’. The department accepted this recommendation and approached the transition as a market-led policy.

Early government actions encouraged commercial investment in renewable energy, through approaches such as:

- reverse auctions, where suppliers bid their lowest price to deliver renewable energy
- financial support for four large-scale solar energy generators
- improving the facilitation of large-scale renewable projects.

In 2018, the Queensland Government established CleanCo Limited (CleanCo) to build, own, and operate a portfolio of renewable energy assets on a commercial basis. Queensland’s other government owned corporations, CS Energy and Stanwell Corporation, are also involved in renewable energy generation.

The government designed these initiatives to develop the renewable energy market and increase its overall capability to deliver Queensland’s transition to 50 per cent renewable energy.

The government committed to advocate for integrated national energy policies through this period. Most notable was the National Energy Guarantee led by the Australian Government, which sought to lower energy prices and emissions. The National Energy Guarantee was discontinued in 2018.

## The government adjusted course in 2020

In early 2020, the department identified that private sector investment in new renewable energy may significantly reduce. It noted the number of financially committed projects (projects with financial investment but not under construction) had reduced from 17 in 2017 to only two in 2019.

The department attributed this to declining private investment conditions. These included:

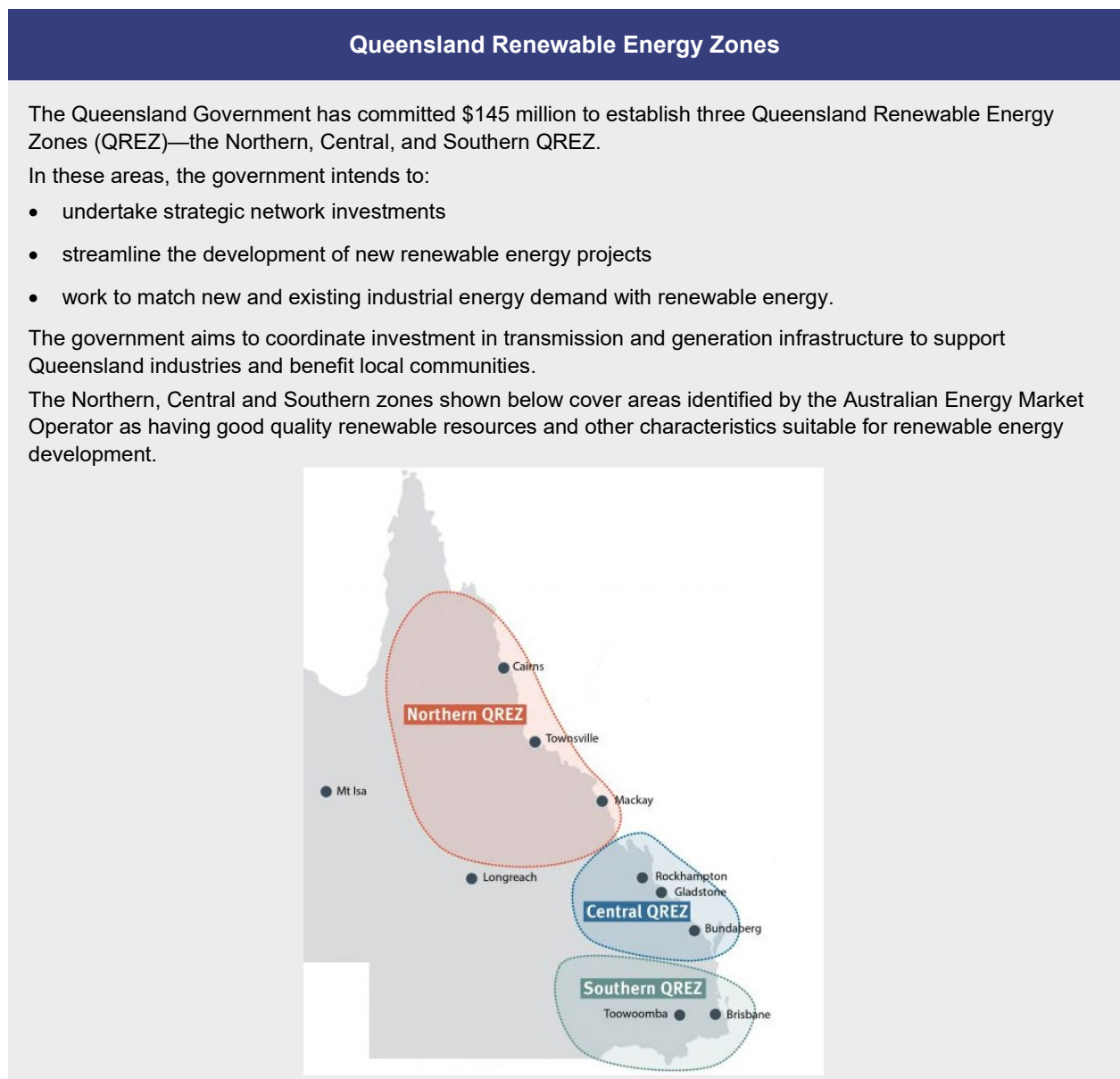
- the closure of the Australian Government's Large-scale Renewable Energy Target
- lower wholesale energy prices (the prices retailers pay for energy to supply to their customers) during times when solar-generated energy output is high
- more stringent requirements for energy projects to connect to the national energy grid.

Around the same time, the COVID-19 pandemic impacted Queensland's business and industries. This led to a series of actions and investments in the 2020–21 and 2021–22 state budgets. These investments focused on economic recovery and creating jobs for Queenslanders.

In response to changing market conditions and government priorities, the Queensland Government now intends to directly invest significant funds through its government owned energy generators. This is a shift from its prior market-led approach.

Figures 3B and 3C detail two current renewable energy initiatives in Queensland.

**Figure 3B**  
**Government investment in Queensland Renewable Energy Zones**

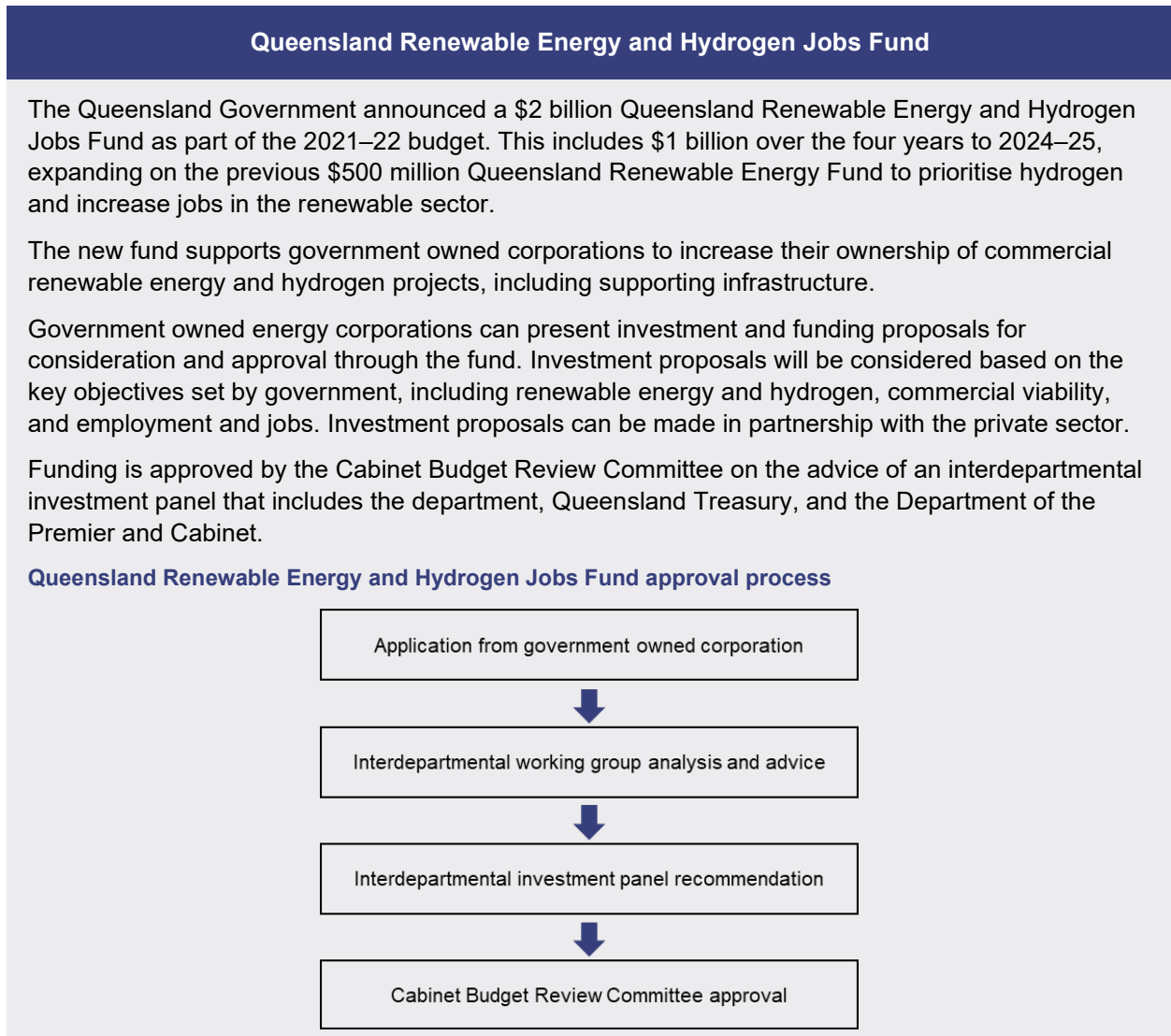


Source: Department of Energy and Public Works.





**Figure 3C**  
**Government investment in the Queensland Renewable Energy and Hydrogen Jobs Fund**



Source: Queensland Audit Office analysis of Department of Energy and Public Works and Queensland Treasury information.

## The government intends to publish a ten-year energy plan

The Queensland Government's new fund can only be accessed by government owned corporations, either solely or in partnership with the private sector. This may increase government's ownership of renewable energy generation or supporting infrastructure in the next four years.

While this approach allows government to direct renewable investment into priority areas and renewable technologies, the implications of this change have not yet been communicated to stakeholders or industry. For example, the government has not set out:

- the reasons for its new course
- its ambitions for the direct delivery of renewable energy by government owned generators
- what the new approach may mean for CleanCo
- the implications for private sector renewable energy providers and investors.



In June 2021, the Premier and Minister for the Olympics announced the development of a new ten-year energy plan that sets out the government's intentions for Queensland's energy system.

**Recommendation 1**

We recommend the Department of Energy and Public Works publicly communicates its overall vision and objectives for the transition to renewable energy and sets out more information on its desired end state in its ten-year energy plan.

## Monitoring the transition

The department monitors progress against the renewable energy target, working with other government departments, the renewable energy industry, and government owned corporations to:

- collect data on the transition, including the amount of generation from renewable sources and information on proposed renewable energy projects
- assess the risk of not achieving the target and develop strategies to increase the likelihood of a successful transition
- report on current progress, new initiatives, and expected developments in renewable energy.

### The department provides limited information in its public reporting

The department's public reporting includes an annual target for the consumption of renewables. This is its estimate of renewable generation in the following year, based on known projects.

Its targets and actual results are outlined in Figure 3D.

**Figure 3D**  
Reported progress against the Queensland renewable energy target

Service standard	2019–20 Target	2019–20 Actual	2020–21 Target	2020–21 Actual	2021–22 Target
Renewable energy as a percentage of total energy consumed in Queensland	9.9%	17.9%	20%	20%	22%

Source: Department of Energy and Public Works service delivery statements.

The department's reporting could be expanded to better inform energy stakeholders and provide more transparency about the transition to renewable energy. For example, it could report on:

- how much energy has been generated from solar, wind, and other sources
- how it has calculated the actual energy generated
- what assumptions it makes to set future targets. For example, it could set out which projects are expected to finish construction and start to generate energy in the next 12 months.



**Recommendation 5**

We recommend the Department of Energy and Public Works reports more information on:

- actual renewable generation including, for example, the amount of energy generated from wind, solar and other sources
- the assumptions which support its renewable energy forecast.

## Risks that may impact on achieving the target

The department's energy division considered the risk of not achieving the renewable energy target to be its highest energy-related risk in 2020. We expect a risk of this significance to be actively managed, with a documented risk assessment and management strategy. However, the department's corporate risk management register includes only one renewable energy risk. The entry is titled 'Deliverable depends on inputs, which change unexpectedly' and was initially recorded in November 2018. The register does not record any management control, action, or other response to address this risk.

Figure 3E sets out the key risks we identified during this audit.

**Figure 3E**  
**Key risks to Queensland's renewable energy target**



**Coordinating industry and government is challenging**

Renewable projects take time to plan and build. With only nine years remaining, effective program management is needed to sustain industry momentum.



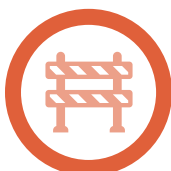
**Network infrastructure must continue to adapt**

There are limited locations with sufficient network conditions for new generation projects across Queensland. Increasing renewable generation is causing network instability in some areas.



**Drivers for new investment are changing**

Wholesale energy prices are trending lower. Further price falls could discourage new investment and negatively affect Queensland's progress towards the target.



**Other external factors could affect progress**

The economic and supply chain impacts of COVID-19 may cause some renewable energy projects to slow down or become unviable as they compete for skilled staff or physical resources. Renewable energy policy developments in other states could also divert investment from Queensland.

Source: Queensland Audit Office analysis.

## Coordinating industry and government over a long time is challenging

The renewable energy target is a long commitment, requiring sustained action by industry and government over 13 years. A transition over this length of time is difficult, as it requires:

- coordinating many public and private sector entities in a rapidly changing sector
- maintaining consistent policy and objectives to support long-term investments and major infrastructure projects—for example, the time required to start hydroelectric energy generation in a new location can be 10 years or longer
- adapting to future changes in critical areas such as overall policy, market conditions, or renewable energy technologies, while delivering diverse and stable energy generation for Queensland.

These challenges are made more complex as the path to the renewable energy target may not be linear but could involve an acceleration of renewable energy generation in the early, middle, or end stages of the decade.

Beyond its 50 per cent target, the Queensland Government has not yet set out its ambitions for the energy system in 2030 or its expectations for progress this decade. For example, it has not set out its desired combination of generation from wind, solar or hydroelectricity sources; nor has it set out in detail its preferred locations for renewable development. As a result, it is difficult to know whether the transition to renewables is on track or whether the department should adjust its objectives or processes.

An interim review could serve as a useful checkpoint to ensure the transition is on track. For example, it could provide a formal trigger for the government to intervene further in the market if the transition to renewable energy slows and the department no longer expects to achieve the target. Similarly, a review could show that continued direct government support is no longer required.

## The transmission network must support increasing renewables

Queensland's energy transmission and distribution network was not designed to accommodate increasing renewable energy. Renewable generators are smaller and more geographically dispersed than traditional thermal generators (such as coal and gas), requiring more transmission infrastructure to connect them to the grid.

Renewable generation can also affect the energy network's stability. Renewable energy generators like wind and solar have variable energy outputs that can cause imbalances in areas of the network. Similarly, rooftop solar generation sends energy into the network from households and businesses, reversing the direction of traditional energy flows. At high levels, this can weaken the network's stability or overall performance.

The department has recognised that it needs to overcome limitations in the energy network to achieve the renewable energy target. It has:

- commissioned Powerlink (the Queensland electricity network operator) to examine the expansion of renewable energy in Queensland and recommend appropriate actions to maintain the network's performance
- established three Queensland Renewable Energy Zones, which are designed to coordinate investment in infrastructure for transmission and generation. This initiative includes \$40 million to upgrade transmission lines between Cairns and Townsville
- supported developments to ease network pressure, including changes to energy storage infrastructure, such as its recent commitment to invest \$22 million to investigate the potential for pumped hydroelectricity at Borumba Dam.

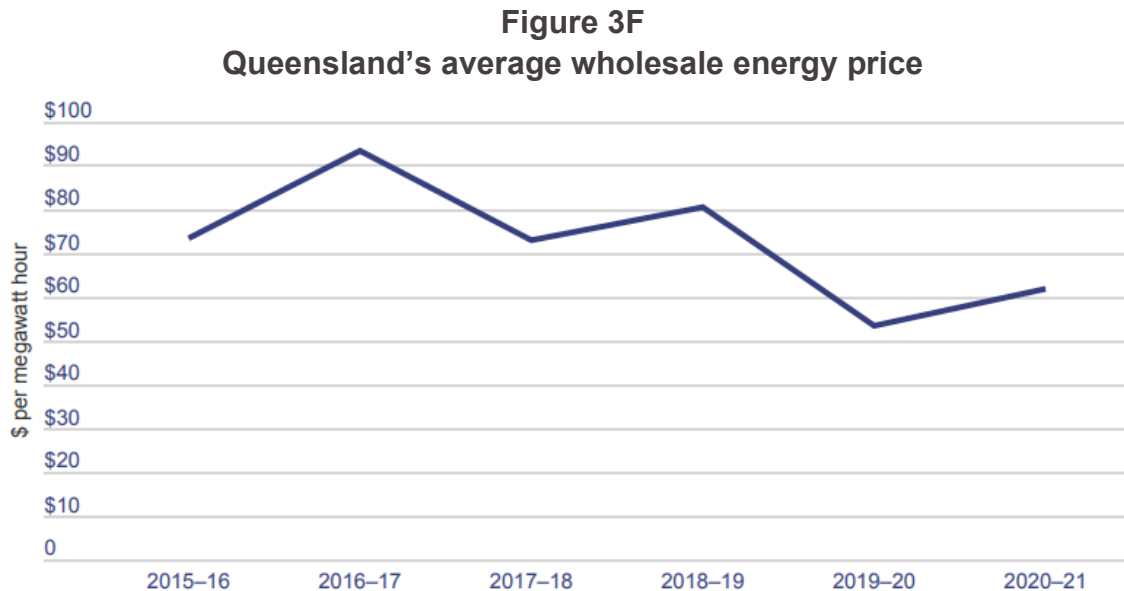
Network infrastructure challenges will require ongoing management as they evolve. It is likely that further investments will be needed as renewable generation increases.



## Drivers for new investment are changing

The Australian Energy Market Operator (AEMO) forecasts demand for energy in Queensland will remain stable throughout the 2020s. AEMO notes that improvements in energy efficiency and the adoption of rooftop solar are likely to offset demand growth driven by population changes.

Because Queensland's demand outlook is currently flat, additional renewable generation is likely to put downward pressure on wholesale energy prices, unless demand for energy grows. Figure 3F shows the average wholesale price for energy in Queensland over the past five years.



Source: Queensland Audit Office analysis of Australian Energy Market Operator data.

A decrease in wholesale energy prices may reduce the profitability of existing generators. Our report *Energy 2020* (Report 11: 2020–21) sets out implications of lower prices on electricity generators, including a lower asset value of over \$1.1 billion in 2019–20.

Lower prices are particularly relevant for thermal generators, which often have higher operating costs and less production flexibility than renewable generators.

Falling prices may also discourage new renewable generators from entering the market. However, investor preferences and government policies that promote lower carbon emissions may offset the impact of price falls.

## Other external factors could affect progress

The success of Queensland's transition to renewables depends on many factors. For example, the economic and supply chain impacts of COVID-19 may impact on the viability and timelines of renewable projects. Additionally, the availability of suitable land, materials, and skills could present barriers to new projects.

Policy developments regarding renewable energy in other jurisdictions could also divert investment from Queensland. For example, New South Wales' *Electricity Infrastructure Roadmap* expects to attract \$32 billion in energy investment by 2030.

The Queensland Renewable Energy Zones and Queensland Renewable Energy and Hydrogen Jobs Fund may partially overcome external market factors. However, the department currently has no formal assessment that demonstrates how these initiatives will sufficiently address external challenges.

The Queensland Government committed to advocate for stable and integrated national energy policies in the *Powering Queensland Plan*. We note that national policy settings impact the transition to renewables.

**Recommendation 2**

We recommend the Department of Energy and Public Works conducts an interim review by 2025 to formally assess its progress towards the target and to consider further actions to support its achievement of the target. These could include additional investment on network infrastructure, increased support for renewable generators or other actions to address external factors.



# Appendices

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<b>A. Entity responses</b>	<b>21</b>
Comments received from Minister for Energy, Renewables and Hydrogen and Minister for Public Works and Procurement	22
Comments received from Director-General, Department of Energy and Public Works	26
<b>B. How we prepared this report</b>	<b>30</b>
Audit scope	30
<b>C. Renewable energy funding in Queensland</b>	<b>31</b>



# A. Entity responses

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As mandated in Section 64 of the *Auditor-General Act 2009*, the Queensland Audit Office gave a copy of this report with a request for comments to the:

- Director-General, Department of Energy and Public Works
- Minister for Energy, Renewables and Hydrogen and Minister for Public Works and Procurement.

We also provided a copy of the report to the following entities with an invitation to respond:

- Premier and Minister for the Olympics
- Director-General, Department of the Premier and Cabinet.

The head of the entity is responsible for the accuracy, fairness, and balance of its comments.

This appendix contains its detailed responses to our audit recommendations.





# Comments received from Minister for Energy, Renewables and Hydrogen and Minister for Public Works and Procurement



Minister for Energy, Renewables and Hydrogen  
Minister for Public Works and Procurement

Your Ref: PRJ02731  
Our Ref: MN08101-2021

1 William Street  
Brisbane Queensland  
GPO Box 2457 Brisbane  
Queensland 4001 Australia  
Telephone +617 3719 7270  
E: epw@ministerial.qld.gov.au

11 NOV 2021

Mr Brendan Worrall  
Auditor-General  
Queensland Audit Office  
PO Box 15396  
City East QLD 4002

Dear Mr Worrall *Brendan*

Thank you for your report on Managing Queensland's Transition to Renewable Energy.

The Palaszczuk Government has a strong track record in progressing the uptake of renewable energy and in doing so, creating jobs for Queenslanders.

I acknowledge the Director-General of the Department of Energy and Public Works has provided a response to the report recommendations.

Further, I understand the Director-General has also outlined the work the Department does to pursue a nationally consistent agenda for energy policy that benefits Queenslanders.

Additionally, I provide the following commentary on the Palaszczuk Government's ongoing initiatives in renewable energy.

#### Track Record

In 2016, the Government-appointed Renewable Energy Expert Panel (the expert panel) found a 50 per cent renewable energy target for Queensland by 2030 was feasible. The expert panel estimated 5,500 megawatts of additional renewable capacity would be required by 2030 to meet the target.

The expert panel recommended the Government should pursue the integration of climate and energy policy settings at the national level as the most efficient way to increase the uptake of renewable energy.

The expert panel also recommended against legislating the Queensland Renewable Energy Target (QRET) at that time. The Government accepted the recommendations of the expert panel, and actively advocated for national energy and climate reforms until the failure of national policy development resulted in States having to 'go it alone'.

In 2017, the Government committed to achieving the QRET of 50 per cent renewables by 2030. QRET is not legislated but is supported by planned and measured investments and facilitation work.



The Palaszczuk Government has ensured significant growth in both small and large scale renewables. In 2017, Queensland had just 1,700 megawatts of rooftop solar, this has now reached over 3,700 megawatts in only four years.

Queensland's policy settings have ensured the number of installed residential photovoltaic systems has grown to 676,000 and the total number of installed rooftop systems has now passed the milestone of 700,000.

The Palaszczuk Government's strong record also includes:

- Supporting investment in over 5,100 megawatts of renewable generation with over forty wind and solar farms built and 7,000 construction jobs supported through our 50% renewable energy target
- Taking renewable generation from 7 per cent to more than 20 per cent
- Delivering a Queensland Hydrogen Industry Strategy ahead of the National Hydrogen Roadmap and committing more than \$60 million to support hydrogen projects and training facilities
- Committing \$145 million to develop renewable energy zones, including a \$40 million investment to upgrade over 300km of transmission infrastructure between Cairns and Townsville which will enable up to 500 megawatts of new renewable energy connection capacity including the 157-megawatt Kaban wind farm
- Providing \$147 million to build the transmission line to support the Genex Kidston 250 megawatt pumped hydro project to financial close
- Installing solar panels at more than 800 state schools to generate over 60 megawatts of solar power
- Delivering Australia's first electric vehicle superhighway; and
- Entering into an implementation agreement with CopperString 2.0 on a proposal to connect the North West Minerals Province with the National Electricity Market.

#### State-based Initiatives

The Queensland Solar Bonus Scheme was committed to and established in 2008. The scheme provided a feed-in-tariff to support residential consumers to increase their uptake of domestic solar systems.

The release of the Powering Queensland Plan in 2017 led to the announcement of numerous renewable energy commitments including:

- A commitment to a 50 per cent renewable energy target by 2030.
- A commitment to establish CleanCo as a government-owned clean energy generator with a goal of achieving 1000 megawatts of new renewable generation by 2025.
- To deliver a reverse auction of 400 megawatts of renewable energy capacity (R400).

I can advise CleanCo was established in 2018 and will exceed its original 1000-megawatt commitment.

Since 2015, enabled by the aforementioned policy initiatives, there are now 48 large scale renewable energy projects in operation or in various stages of delivery, and when complete in approximately 2025 will push Queensland's renewable energy capacity to over 10,000 megawatts or almost 45 per cent of all generation capacity.

The Government's commitments have established the direction and focus for the Queensland market and laid the foundations for the Queensland energy sector ahead of the arrival of COVID-19, which led many Queenslanders and local governments to re-focus their attention on efforts to drive economic recovery and restore Queensland's positive social footing.



Since 2020 however, Queensland has continued to facilitate significant growth in renewables with new policy settings and programs.

These include \$145 million in 2020 to establish Queensland Renewable Energy Zones (QREZ), signalling to energy developers and investors desirable locations for the establishment of renewable energy projects and effective integration of projects into the energy system.

In September 2020, the Government asked for renewable energy projects to register their interest in investing in the Northern, Central and Southern QREZ. The response exceeded expectations, with 192 renewable projects making submissions representing over 60,000 megawatts of renewable energy potential.

Building on this strong investor interest, I have today released a Discussion Paper on QREZ design and access, which as a first stage identifies a combined 3,300 megawatts of new renewable connection capacity. The Government has worked closely with Powerlink Queensland (the publicly-owned transmission business and Jurisdictional Planning Body), to prepare a proposed framework for the first stages of unlocking investment in each QREZ.

A \$500 million commitment to a Queensland Renewable Energy Fund was announced in 2020 to enable government owned corporations to complement private sector investment.

This was expanded to \$2 billion with the announcement of the Queensland Renewable Energy and Hydrogen Jobs Fund in 2021, further signalling the government's intentions to grow the renewables and hydrogen sector and create jobs by supporting government owned corporations to partner with industry to drive the sector forward.

The projects from this fund (yet to be announced) will demonstrate the effectiveness of government investment in this sector.

In 2021, the Palaszczuk Government committed \$22 million to undertake a detailed design and cost analysis for a one gigawatt 24 hour pumped hydroelectric storage facility at Borumba Dam. Tenders for design work are due to open in coming weeks.

A range of other initiatives are underway and include the Government's Queensland Electric Vehicle Strategy and the QFleet Electric Vehicle Strategy.

#### Green Hydrogen

The Government has ensured positive change in Queensland's renewable energy transformation. What began as small incremental changes in the Queensland energy sector has now translated to significant commitments and the establishment of Queensland as a renewable energy and hydrogen superpower.

In 2019, The Palaszczuk Government released the Hydrogen Industry Strategy 2019-2024 and the \$15M Hydrogen Industry Development Fund (HIDF). The HIDF is supporting further uptake of renewable energy, with the four projects funded so far including a renewable hydrogen gas blending trial, remote renewable hydrogen power systems and renewable hydrogen fuel-cell transport projects. A further round of projects enabled by the HIDF are to be announced shortly.

In October 2021, Fortescue Future Industries (FFI) and the Palaszczuk Government announced a new partnership for one of the world's largest hydrogen-equipment manufacturing facilities to be constructed in Gladstone.

Amongst other initiatives, the Government has supported publicly owned Stanwell Corporation in partnership with Japan's Iwatani Corporation to develop a proposed 3 gigawatt hydrogen electrolyser plant in the state's Gladstone region, and we have formalised our partnership with



Sumitomo Corporation, Gladstone Ports Corporation, Gladstone Regional Council, CQUniversity Australia, Australian Gas Infrastructure Group and publicly owned CleanCo to develop Australia's first hydrogen ecosystem in Central Queensland.

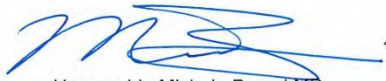
Energy Plan

Thank you for acknowledging the development of the Energy Plan as announced by the Premier and Minister for the Olympics in Townsville in June 2021.

I am pleased to advise that development of the plan is well progressed with stakeholder and community engagement currently underway, including the design and access arrangements for QREZ.

Based on current performance, Queensland is progressing well to meet its 50 per cent QRET, but more work is required, and it is expected the Energy Plan will chart a course to ensure the achievement of the target concurrently with cheaper, cleaner electricity and more jobs, in more industries in Queensland.

If you require any further information or assistance with this matter please contact [REDACTED]



Honourable Mick de Brenni MP  
**Minister for Energy, Renewables and Hydrogen**  
**Minister for Public Works and Procurement**



## Comments received from Director-General, Department of Energy and Public Works



Department of  
**Energy and Public Works**

Your Ref: PRJ02731

8 November 2021

Mr Brendan Worrall  
Auditor-General  
Queensland Audit Office  
PO Box 15396  
City East QLD 4002

Dear Auditor-General

Thank you for providing the draft Queensland Audit Office (QAO) report on *Managing Queensland's transition to renewable energy*, and associated recommendations for our review and response. The Department of Energy and Public Works (the department) has now reviewed the draft report and considered the recommendations.

In 2017, the Queensland Government committed to achieving the Queensland Renewable Energy Target (QRET) of 50 per cent renewables by 2030. QRET is not legislated but is supported by planned and measured investments and facilitation work.

The QRET is calculated as the state's total amount of renewable electricity output as a proportion of total electricity consumed in Queensland at any time. The calculation is based on energy consumed within Queensland as Queensland is an electricity generation powerhouse and net exporter of electricity across the border to southern states..

#### National Market Reform

The framework that governs the National Electricity Market (NEM) determines how the physical and financial electricity market operates nationally, including in Queensland, and how effectively it supports the adoption of renewables and other emerging technologies such as battery storage and distributed energy resources.

1 William Street  
Brisbane Queensland  
GPO Box 2457 Brisbane  
Queensland 4001 Australia  
Telephone +617 3008 2934  
Website [www.epw.qld.gov.au](http://www.epw.qld.gov.au)

In 2019, the former Council of Australian Governments (COAG) Energy Council approved a Strategic Energy Plan for the NEM. This plan built on the recommendations in the 2017 Finkel Review covering the transition in the NEM from large scale thermal generation (mainly coal fired) towards large and small scale renewable generation (mainly wind and solar). The plan identifies Energy Ministers' objectives for the NEM and actions to achieve those objectives ([Strategic Energy Plan - November 2019 \(energyministers.gov.au\)](#)).

The Energy Security Board, which comprises the heads of each of the NEM market bodies (the Australian Energy Market Commission, the Australian Energy Regulator, and Australian Energy Market Operator), is tasked with providing strategic advice to Energy Ministers and reviews progress against the Strategic Energy Plan each year. This annual report (the [Health of the NEM](#)) also summarises the major reform work underway across the NEM.

The Queensland Government is directly involved in work to evolve and reform the NEM to meet the challenges of the transitioning market, through the Energy National Cabinet Reform Committee (ENCRC – replacing the former COAG Energy Council) and Energy Ministers' Meeting.

These two groups are comprised of Energy Ministers from each NEM jurisdiction, and they collectively have oversight of all the major NEM reforms, determining their direction and endorsing major change before it occurs. The Ministers' forums are supported by a working group of Senior Officials (heads of department) from each NEM jurisdiction.

In these forums, Queensland advocates for reform outcomes that deliver value for electricity customers to address Queensland's energy needs. At a departmental level, the Queensland Government also engages directly with the market bodies, who lead much of the reform work on Ministers' behalf. Queensland also participates in working groups, consultations and liaises with industry and consumer groups to advocate for Queensland's interests and to ensure the perspectives of Queensland stakeholders are represented.

A key project for delivering a market design for the NEM, that accommodates the transition to renewables underway and expected in the future, is the Energy Security Board led Post-2025 Market Design project. This is a multi-year project to introduce immediate and long-term changes to the design of the market to ensure that the future market is fit for purpose to accommodate the energy transformation underway.

In addition to the new settings we are pursuing at a national policy and framework level, Queensland has also been highly effective at increasing uptake of renewables through its numerous state-based initiatives. I understand the Honourable Mick de Brenni, Minister for Energy, Renewables and Hydrogen and Minister for Public Works and Procurement is also responding to you on Queensland-based initiatives.


#### Your recommendations

The government's proposed Energy Plan, announced in June 2021, is progressing and will address recommendation one. During that planning process, consideration will be given to appropriate review points for progress towards 2030 (recommendation two).



3

The department notes the differences in methodology for the treatment of data preferred by the QAO in relation to the calculation of QRET (recommendations four and five). Based on QAO's preferred methodology, Queensland is at 20.02 per cent for the past 12 months, as of 1 November 2021, which is a significant achievement in only a few short years. The department will publish the details of the QRET methodology on its website (recommendation three).

If you require any further information about this matter, 

Yours sincerely



Paul Martyn  
**Director-General**



## Responses to recommendations



### Department of Energy and Public Works

#### *Managing Queensland's transition to renewable energy*

Response to recommendations provided by Paul Martin, Director-General, Department of Energy and Public Works on 19 November 2021

Recommendation	Agree/ Disagree	Timeframe for implementation (Quarter and financial year)	Additional comments
<p>We recommend that the Department of Energy and Public Works:</p> <ol style="list-style-type: none"> <li>Publicly communicates its overall vision and objectives for the transition to renewable energy and sets out more information on its desired end state. This could include its optimal generation mix, desired locations, and preferred ownership model for new renewable energy in Queensland (Chapter 2).</li> </ol>	Agree	Q2 2022-23	The Queensland Government's proposed Energy Plan, announced in June 2021, is progressing and will address recommendation 1.
<ol style="list-style-type: none"> <li>Conducts an interim review by 2025 to formally assess its progress towards the target and to consider further actions to support its achievement of the target. These could include additional investment on network infrastructure, increased support for generators or other actions to address external factors (Chapter 2).</li> </ol>	Agree	Q4 2025-26	The Queensland Government's proposed Energy Plan, announced in June 2021, is progressing and consideration will be given to appropriate review points for progress towards 2030.
<ol style="list-style-type: none"> <li>Publishes a detailed public statement of how Queensland's renewable energy target is defined and measured (Chapter 1).</li> </ol>	Agree	Q4 2021-22	
<ol style="list-style-type: none"> <li>Updates its calculations of progress against the target to fully account for all relevant renewable energy, such as small-scale renewable, and non-renewable energy, such as diesel generation (Chapter 1).</li> </ol>	Agree	Q4 2021-22	<p>The Department notes the differences in methodology for treatment of data preferred by the QAO in relation to the calculation of QRET.</p> <p>The Department has updated its assumptions around the calculation of QRET.</p>
<ol style="list-style-type: none"> <li>Reports more information on:                             <ul style="list-style-type: none"> <li>actual renewable generation including, for example, the amount of energy generated from wind, solar and other sources</li> <li>the assumptions which support its renewable energy forecast (Chapter 2)</li> </ul> </li> </ol>	Agree	Q4 2021-22	The Department notes the differences in methodology for treatment of data preferred by the QAO in relation to the calculation of QRET.





## B. How we prepared this report

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### Audit scope

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The Queensland Government committed to a renewable energy target in June 2017. Our audit objective was to set out how the Department of Energy and Public Works is managing Queensland's transition to 50 per cent renewable energy by 2030.

We did not examine other factors associated with the transition to renewables, such as energy security, energy affordability, or the broader economic and social impacts of a changing energy system. We note the Queensland Government aims to balance these issues through a range of initiatives that are not discussed in this report.

### Entities subject to this audit

We audited the Department of Energy and Public Works.

Government owned corporations, including electricity generators, were not within the scope of our audit.

### Audit approach

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We performed this audit in accordance with the *Auditor-General Auditing Standards*.

During the audit, we:

- interviewed relevant departmental staff responsible for program governance, risk management, performance monitoring, and reporting
- interviewed key energy stakeholders, including government owned corporations, Queensland Treasury, and regulators
- reviewed key departmental policies, procedures, and frameworks on the transition to renewable energy
- reviewed departmental monitoring and reporting, including modelling and forecasting where available. We also reviewed external reporting from the Australian Energy Market Operator (AEMO) and other central energy bodies.



## C. Renewable energy funding in Queensland

The Queensland Government formalised its commitment to the 50 per cent renewable target when it launched its *Powering Queensland Plan* in 2017. Since then, it has allocated funding of over \$3 billion to support its renewable energy ambition. Figure C1 includes details and costs of the most significant renewable energy initiatives during this time.

**Figure C1**  
**Funding to key renewable energy initiatives since 2017–18**

Initiative	Details	Cost
Solar Bonus Scheme	The Solar Bonus Scheme was launched in 2008 and is now closed for new applications. The scheme pays owners of home solar systems for electricity that is generated and exported to the electricity network. The scheme will expire on 1 July 2028.	\$1.08 billion
Renewables 400	The Renewables 400 scheme was a reverse auction for up to 400 megawatts of renewable energy including up to 100 megawatts of energy storage. Under the scheme, the Queensland Government has entered into an agreement with a private provider of wind-generated energy.	\$325,000
Queensland Renewable Energy and Hydrogen Jobs Fund	The Queensland Government has established a fund to support jobs and growth in renewable energy, including hydrogen-based energy. This initiative is discussed in Chapter 3.	\$2 billion (committed)
Queensland Renewable Energy Zones	The Queensland Government has established three Queensland Renewable Energy Zones to support the coordinated development of renewable energy. This initiative is discussed in Chapter 3.	\$145 million (committed)
Other	Other initiatives to support specific segments of the Queensland community include interest-free loans, support for decarbonising remote communities (reducing carbon dioxide output by, for example, minimising the use of coal and gas), and support and loans for solar-generated electricity on domestic rooftops of rental and public housing residences.	\$23.8 million
<b>Total funding for key initiatives</b>		<b>\$3.25 billion</b>

Source: Queensland Audit Office.







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T: (07) 3149 6000  
E: [qao@qao.qld.gov.au](mailto:qao@qao.qld.gov.au)  
W: [www.qao.qld.gov.au](http://www.qao.qld.gov.au)  
53 Albert Street, Brisbane Qld 4000  
PO Box 15396, City East Qld 4002