



ENERGY

Kidston Solar Project (Source: Genex)



ENERGY

OVERVIEW

Secure, reliable and affordable energy is vital to our communities and businesses. It underpins our economy and quality-of-life, with exciting new technologies including hydrogen production paving the way for a sustainable future and creating more jobs in more industries.

Queensland enjoys an enviable energy supply that is supported by significant generation and network infrastructure. The state government plays a major role in the energy industry, owning the vast majority of network infrastructure and majority ownership of generation. This delivers reliable and affordable energy, and will support our 50 per cent renewable energy target by 2030.⁴⁷ With our globally significant resources, we've experienced a boom in renewable energy infrastructure investment at the household and industry level. This has been driven by falling costs, a skilled workforce and industry base, and the state government's stable investment environment, putting us on the path to becoming a renewables and hydrogen superpower.

Queensland's generation landscape is changing, reaching a significant milestone of 20 per cent renewable energy generation in 2020. Continuing to leverage our competitive advantages will support further investment and economic growth and achieve zero net carbon emissions by 2050.⁴⁸

Queensland's renewable energy zones (QREZ) will unlock the next wave of large investment. They will create long-term, sustainable, and diversified employment opportunities, matching industrial energy demand with renewable energy, decarbonising industry and our electricity network. For instance, the Central Queensland QREZ creates the potential for Gladstone to become a world-leading renewable hydrogen and clean manufacturing hub.

Cheap, reliable, and accessible renewable energy will also be an integral part of Queensland's rapidly developing hydrogen industry, which is another vital plank in the state's lower emissions future. Renewable energy is also a key enabler for other sectors to reduce emissions, presenting opportunities with electrification of industry, greener buildings and electric vehicles. It can also help development of new industries, including hydrogen production and green metals.

As we globally move towards decarbonisation and electrification, the next wave is forming for our resources sector to supply, process and manufacture the new economy minerals essential for emerging technologies, renewable energy components, electric vehicles and batteries. Capitalising on this demand will be critical with the government's draft QRIDP setting out a vision to grow and transform the resources sector to take advantage of these opportunities.

As the uptake of new technologies and renewable energy generation continues to increase, we will need to modernise our infrastructure with energy storage a crucial element in transformation of the energy system. It smoothes out the variable output from wind and solar and peak times in electricity demand, supporting overall system stability and resilience.

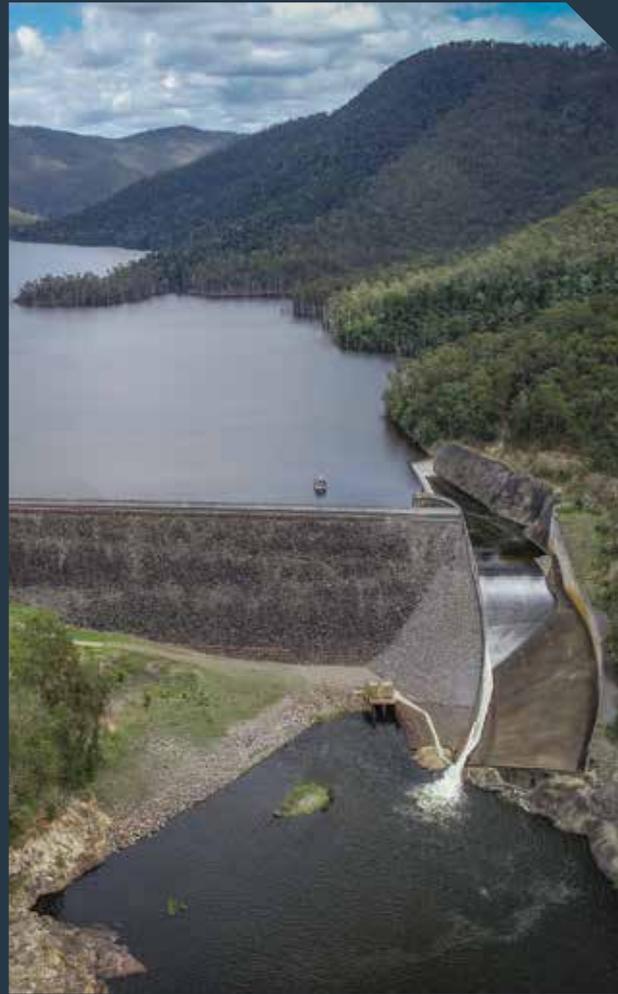
There are various types and sizes of energy storage and given the diversity of system needs going forward, a range of energy storage solutions will be needed. There is a role for both short-term storage – such as small and large-scale battery storage systems – and longer-duration storage – such as pumped hydro – to ensure that the energy supply remains secure and reliable.

Customers, global investors and markets are converting to renewables to reduce emissions. For Queensland industries to maintain and grow their global competitiveness, it is imperative there is support to transition to lower-emission sources of energy. We can achieve this by taking the opportunities presented by our plentiful and cheap renewable energy sector to grow existing and new industries.

The speed and scope of this transformation means there is a greater need for coordinated infrastructure planning to continue to meet the affordability, reliability, and security needs of Queensland customers. The Queensland Government is developing an Energy Plan that will outline a credible pathway to achieve the 50 per cent renewable energy by 2030 target and support transformation of the energy system.

CURRENT KEY INITIATIVES

- ▼ **Queensland Renewable Energy Zones**
The government has committed \$145 million for three Renewable Energy Zones (QREZ), located in the Northern, Central and Southern regions, as part of *Queensland's COVID-19 Economic Recovery Plan*.
- ▼ **Queensland Hydrogen Industry Strategy**
The *Queensland Hydrogen Industry Strategy 2019–2024* released in 2019, sets the direction for sustainable hydrogen industry development, building on Queensland's competitive advantages.
- ▼ **Queensland Renewable Energy and Hydrogen Jobs Fund**
Established as part of the \$3.34 billion Queensland Jobs Fund (QJF), the \$2 billion Queensland Renewable Energy and Hydrogen Jobs Fund is assisting Queensland's energy transformation, by supporting government-owned energy corporations (GOCs) to increase investment in commercial renewable energy and hydrogen projects, along with supporting infrastructure, including in partnership with the private sector.
- ▼ **Borumba Dam Pumped Hydro Study**
The government has invested \$22 million from the QREZ to investigate the potential to construct a pumped hydro energy storage facility at Borumba Dam, near Gympie.



Borumba Dam (Source: Seqwater)

TRENDS



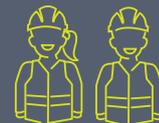
Combined with the growth of rooftop photovoltaic (PV), the increase in large-scale renewable energy has resulted in Queensland's share of renewable energy jumping from **7 PER CENT** in 2016 to **20 PER CENT** in 2020–21



Queensland has led the way with renewable generation. With increasing renewable generation, there will be an

INCREASED NEED TO STORE RENEWABLE ENERGY

in both small and large-scale batteries. In order to facilitate grid stability, this could range from using EV batteries powering homes to large pumped hydro facilities



Employment in **RENEWABLE ENERGY** is predicted to increase by between **5,000 AND 8,300 JOBS** to 2035, with 75 per cent in regional Queensland⁴⁹



ENERGY

CHALLENGES

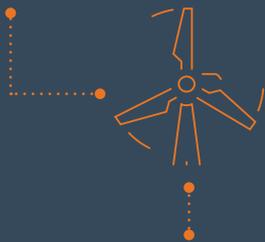
COVID-19 impacts

The pandemic has created key shifts in energy consumption and behaviour brought about by working from home, online shopping and consumer savings. The impact of these in the longer term is not yet clear.



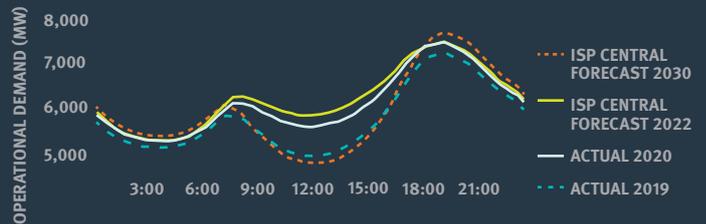
Energy security, reliability, and affordability

The increasing amount of renewable energy generation coming online, as well as changes in consumption and demand, has the potential to impact reliability, security of supply and cost within the network. Renewable generation, variable by nature, needs to be complemented by other technologies such as energy storage. This is being actively managed by Queensland's electricity networks, and the state government through various network, generation, and storage projects. Demand management and energy efficiency measures are also used to better manage peak demand, improving grid resilience.



Managing disruption from new technology and decentralisation of the energy system

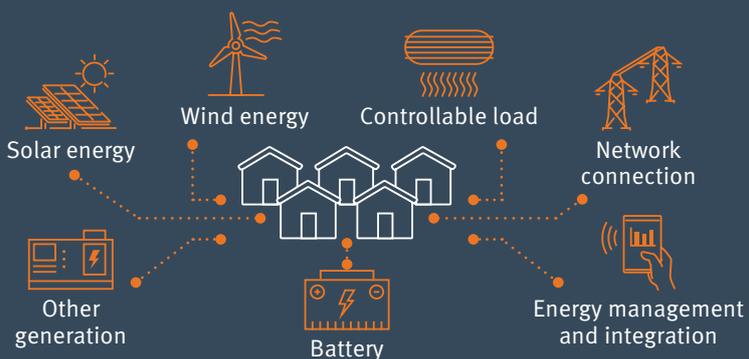
More than 700,000 solar PV systems are installed in Queensland homes and businesses.⁵⁰ This form of distributed energy resource brings many benefits to customers, but it also presents new challenges for managing the system. Increasing solar uptake reduces the load drawn from the grid in the middle of the day, when solar resources are at their highest, as demonstrated in the following graph:



This low system load during the middle of the day, followed by a quick ramp-up to meet peak load as the sun sets, can make it more difficult to keep the system operating smoothly. Work is underway at national and state levels to ensure issues relating to this phenomenon, such as maintaining system strength services and balancing supply and demand in emergencies, are addressed to ensure the system continues to allow greater amounts of distributed energy resources.

Energy in remote communities

Energy supply in remote communities is logistically difficult and can be expensive. These communities are too far from the national energy grid to be connected easily and need to rely on diesel generators, small-scale distributed generation (e.g. solar, wind, geothermal) or nearby large companies. Nonetheless, Ergon Energy retail customers in these communities pay the same electricity prices as other customers across regional Queensland, due to the Queensland Government's Uniform Tariff Policy and Community Service Obligation payment of about \$500–\$550 million in 2021–22.



Stand-alone power system (SAPS) adapted from Energy Networks Australia⁵¹

OPPORTUNITIES

Global push towards renewable energy

The Queensland Government is committed to transitioning to a low-carbon energy future by achieving zero net emissions by 2050 under the Queensland Climate Adaptation Plan 2020–2030, including the 50 per cent renewable energy target by 2030.⁵² The state is on track to achieve this, with renewable energy generation increasing its overall share.



The state government will continue to support renewable developers through large-scale project facilitation and planning and network connection assistance. It will also continue to advocate for stable and integrated national climate and energy policies.

Supply chain development

Renewable energy and hydrogen present an opportunity to grow local manufacturing and develop a true value chain to become a renewable and hydrogen superpower. The government is supporting the development of locally made renewable and hydrogen production components, providing certainty to manufacturers to set up operations here through a guaranteed pipeline of work.



Emerging renewable energy enabled industrial hubs

Co-locating industrial hubs, such as renewable hydrogen and ammonia production, metal refining and advanced manufacturing, can be facilitated as renewable energy becomes more readily accessible. Strategic planning will be required to ensure we capitalise on these opportunities.



Industrial decarbonisation

There is scope to reduce the emissions intensity of key industries through demonstrated and mature solutions (e.g. electrification and greater adoption/use of renewables). Emerging solutions such as high-grade heat electrification, solar thermal and hydrogen have the potential to achieve deeper emissions cuts.



Future energy mix

As the state moves towards a more renewable future with greater renewable energy generation, the role of gas, coal, petroleum, biofuels and hydrogen will change.

The opportunity to decarbonise for many businesses will be renewable energy provided through electrification or clean hydrogen. Advanced biofuels may be the way forward for those industries that will be more challenging to decarbonise, such as aviation.

This will provide opportunities for innovative technologies to enter the market to help address the challenges associated with the integration of greater levels of renewables and Distributed Energy Resources (DER). For example, utility-scale energy storage and pumped hydro can act as a solar soaker to use excess solar PV generation.⁵³





ENERGY

PRIORITY ACTIONS

1 50 per cent renewable energy target (DEPW)



Queensland has committed to a 50 per cent renewable energy target by 2030 while maintaining an affordable, reliable and secure electricity supply. This target will assist in achieving zero net emissions by 2050.

2 Developing an Energy Plan for Queensland (DEPW)



The energy plan will set out actions to achieve 50 per cent renewable energy by 2030 and a cleaner, affordable, and reliable energy system that powers a pipeline of jobs and opportunities. This will put Queensland on the world-stage as a renewable and hydrogen leader, with thriving regional communities and clean industry growth.

3 Develop Queensland's Hydrogen Industry (DEPW, DSDILGP)



Implement the *Queensland Hydrogen Industry Strategy 2019–2024* so there is a framework for working with private enterprises and government to sustainably develop the industry.

4 Queensland Renewable Energy and Hydrogen Jobs Fund (QT)



The Queensland Renewable Energy and Hydrogen Jobs Fund (QREHJF) is supporting GOCs to increase investment in commercial renewable energy and hydrogen projects, along with supporting infrastructure, including in partnership with the private sector.

5 Energy storage (DEPW, EQL)



Growing Queensland's energy storage through batteries, pumped hydro and hydrogen is key to fully realising our renewable energy opportunities and contributing to reliability and affordability. A detailed study is investigating Borumba Dam as a potential pumped hydro site. Five locations across regional Queensland will host a large-scale, network-connected battery trial aimed at supporting the state's continual uptake of renewable energy. The government is also investing \$147M to support the connection of Genex's 250 MW Kidston Pumped Storage Hydro Project in North Queensland.

6 Northern QREZ (DEPW)



Unlocking renewable wind energy development in this region has been a logistical challenge due to its location and distance from load centres. Development of the Northern QREZ, including transmission capacity, has the potential to resolve some of these challenges, while providing an economic stimulus in sustainable and diversified employment opportunities.

7 Capturing the benefits of Queensland's renewables and hydrogen transformation (DEPW)



Queensland's renewable and hydrogen sectors will support the decarbonisation of existing industry and attract new industry powered by low-cost, reliable, clean energy. We will:

- ▶ unlock opportunities to match renewable energy with economic opportunities
- ▶ work with industry in strategic locations to deliver access to affordable energy, including renewable hydrogen and achieving economies of scale for investment and jobs
- ▶ support the establishment of new industries and decarbonisation of existing ones.

8 Central QREZ (DEPW)



Development of the Central QREZ, including transmission capacity, will facilitate growth in green manufacturing industries, creating a thriving export economy from the Port of Gladstone. Prospective new industries could include hydrogen production, hydroxide, chlorine polyvinyl chloride, hydrochloric acid, green aluminium and ammonia, new economy minerals and other manufacturing.

9 Southern QREZ (DEPW)



Development of the Southern QREZ in the Darling Downs and South West will take advantage of an existing strong network that has spare capacity and good quality wind resources. Renewable energy development will support growth in agribusiness by diversifying electricity used in agricultural processing facilities, as well as in other industries due to its proximity to the SEQ load centre.

10 Stand-alone power systems (DEPW)



Work is underway to identify strategic pathways that will deliver improved electricity services to customers in regional and remote areas of the grid. This includes supplying customers on the fringes with standalone power systems.

11 Distributed energy resources and storage (DEPW)



Give customers the opportunity to access new value streams from their investment in distributed energy resources, such as rooftop solar, batteries, EVs and demand management using incentives to change behaviours and move to active participation. This enables greater levels of DER to be safely integrated into the energy system.

12 Future energy needs for the North West Minerals Province (DEPW)



Options to reduce the cost of energy in the North West Minerals Province are being explored. This will open up opportunities for the development of new earth and rare earth minerals, providing the cobalt, copper, scandium, nickel, vanadium, and other minerals needed for batteries, zero-emission vehicles and solar panels.

13 Represent Queensland's interests (DEPW)



In the interests of developing a national energy policy, the Queensland Government will work with the Australian Government, its state counterparts and the National Energy Market to ensure its renewable energy aspirations are supported.

14 Readiness of the energy system and new technologies such as EVs (DEPW)



Ensure the energy grid is able to support and integrate with technologies such as EVs. This will address EVs using the grid for charging and feeding back into the system.

15 Assisting reduction in industrial emissions (DEPW)



Work with large industrial customers to consider industrial energy needs, local availability of renewable energy and support for industry to increasingly adopt technologies and renewable energy.

16 Future Fuels (DSDILGP, DEPW)



Queensland will continue to support and encourage the development of future fuels to complement Queensland's future energy mix.



Wind Farm, Ravenshoe (Source: Energy and Public Works)

INFRASTRUCTURE OBJECTIVES



Encourage jobs, growth and productivity



Develop regions, places and precincts



Enhance sustainability and resilience



Adopt smarter approaches



ENERGY

▼ CASE STUDY

Hydrogen

Hydrogen industry development is occurring across the state with facilities planned for Brisbane, Townsville and Gladstone. Gladstone has been chosen by Fortescue Future Industries (FFI) as the location for Queensland’s first hydrogen equipment manufacturing facility. FFI is partnering with the Queensland Government to build the Green Energy Manufacturing Centre which, when operational, will have the capacity to build up to two gigawatts of electrolysers annually. Future plans include opportunities to increase scale or production and expand into other renewable energy technology manufacturing which is expected to support other regional investments including hydrogen production. In addition, companies such as Stanwell, Rio Tinto and H2U™ The Hydrogen Utility are at various stages of investigations into developing hydrogen projects in the Gladstone region.⁵⁴

The industry is supported by government investment and partnerships delivering the skills needed to support this growing industry, including a hydrogen and renewable energy training facility in Townsville and investment in facilities at Gladstone State High School.⁵⁵

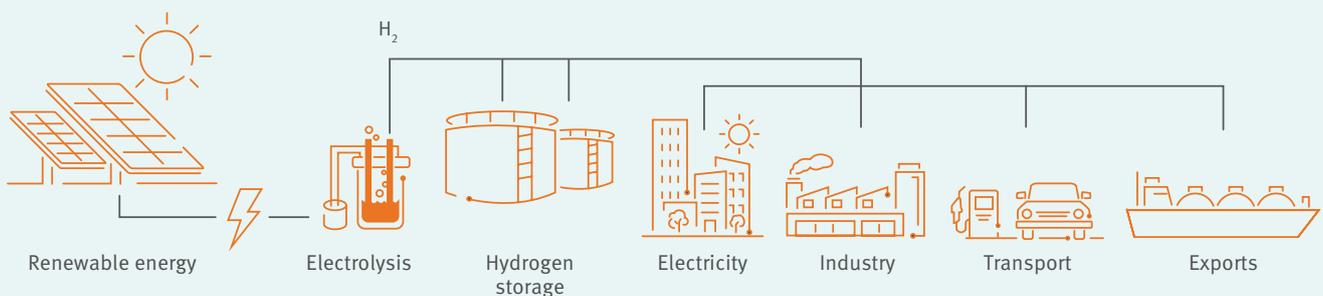
Hydrogen has a wide range of uses and can be substituted for just about any energy resource. It can be used to store renewable energy, generate electricity, fuel vehicles and in industrial manufacturing processes. This versatility is driving significant interest and public and private investment.

Hydrogen produced using renewable or *green* energy sources such as solar, wind or biomass is referred to as green hydrogen. Another key input for producing hydrogen via electrolysis is water.

Queensland is ideally positioned to capitalise on the growing worldwide demand for *green* hydrogen as an energy exporter with superior renewable energy resources. The government has allocated \$25 million to the Queensland Hydrogen Industry Development Fund (HIDF). The HIDF is also part of the Queensland Government’s \$3.34 billion Queensland Jobs fund which is boosting the state’s industry footprint, creating jobs and strengthening Queensland’s economy. The Queensland Jobs Fund includes the \$2 billion Renewable Energy and Hydrogen Jobs Fund and the \$350 million Industry Partnership Program.



Hydrogen fuelled car (Source: Energy and Public Works)



Renewable hydrogen and its uses (source: Adapted from Queensland Hydrogen Industry Strategy)