CLIMATE COUNCIL

AUSTRALIA'S CLEAN ENGINE ROOM: CENTRAL QUEENSLAND'S INDUSTRIAL FUTURE

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The Climate Council is grateful to the following interviewees for sharing their time and insights: Dr Amanda Cahill, CEO - The Next Economy; Kahn Goodluck, Deputy Mayor - Gladstone Regional Council; Leanne Martin, Acting Principal - Gladstone State High School; Ethan Frost and Katie Windsor, Grade 12 students - Gladstone State High School; Carol Holden and Hugh Bridge - Gladstone community members; Rob Williamson, COO - Alpha HPA; Cameron Smith, Head of Manufacturing - Fortescue Future Industries; and Kellie Charlesworth, Energy Transition Leader - Arup.

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Cover image: Construction at Fortescue Future Industries, photo by Climate Council.

The Climate Council acknowledges the Traditional Custodians of the lands on which we live, meet and work. We wish to pay our respects to Elders past, present and emerging and recognise the continuous connection of Aboriginal and Torres Strait Islander people to Country.

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Key findings

1

Central Queensland has the abundant natural resources, skilled workforce and existing industry base to be a leader in renewable energy and clean industries.

- Only 1 in 3 residents in the seat of Flynn want the government to prioritise investment in coal and gas over renewables and clean industries, according to YouGov polling commissioned by the Climate Council.
- Central Queensland jobs and its economy have historically been driven by the fossil fuel industry. As the global economy decarbonises, Central Queensland has a once-in-a-generation opportunity to prepare for the jobs and skills needed in renewables and clean energy industries.
- There are a large number of projects already underway in the region in renewable hydrogen, green metals, green chemical manufacturing, and associated services, as well as a major renewable energy generation pipeline.
- With an existing industrial base and established infrastructure, Central Queensland can realise many economic and job opportunities by decarbonising existing industries - and has natural advantages to attract new renewable and clean industries.
- Through its 10 year energy plan, the Queensland Government can send a clear signal to clean industries and investors that the sunshine state is open for business.

2

Investing in the development of renewables and clean industries is an investment in Central Queensland and its communities.

- Further investment and development in renewables and clean industries could unlock tens of thousands of new jobs (while protecting existing manufacturing jobs) as well as billions of dollars in investment in Central Queensland.
- For example, Central Queensland could see more than 5.6 gigawatts of battery, solar and wind projects built, which would increase renewable energy capacity by almost 20 times and create almost 9,000 jobs.
- Rio Tinto's recent proposal, to meet the energy needs of its local projects using renewable energy, could deliver a further 5,000 jobs in manufacturing, construction, and operations and maintenance for the region.
- Demand for clean exports will skyrocket as Australia's major trading partners and allies accelerate their move to net zero. We can ride this wave, or lose export opportunities and jobs.

3

Central Queenslanders are ready to lead this economic transformation, but need government leadership and support to take full advantage of the opportunities.

- Fewer than 2 in 10 people within Flynn believe their community is getting enough support to prepare for a future with less fossil fuels, according to YouGov polling commissioned by the Climate Council.
- The Federal and Queensland governments must work closely together to upskill local workers for jobs in new, clean industries and prioritise the rollout of new transmission infrastructure needed to connect the state's renewable energy zones.
- The Federal Government must boost energy storage via a mandated Renewable Energy Storage Target, plan ahead for coal closures with transition plans in place for coal-fired power stations by 2024, and end public funding for fossil fuels.
- The Queensland government must put in place the right policy measures and funding now, to realise the opportunities for Central Queensland. This includes powering Queensland by renewable energy by 2030, investing in the Renewable Energy Industrial Precincts program, and meaningful engagement to support First Nations and local communities to manage the impact of inevitable coal closures.

1. Introduction

Central Queensland has the abundant natural resources, skilled workforce and existing industry base to be a leader in the renewable energy and clean industry-led economy. From the Reef to the coalfields, the region has a proud and successful history in tourism as well as industry traditionally dominated by fossil fuel extraction and exports, fossil fuel heavy industries and power generation. Today, as the world moves beyond the use of polluting fossil fuels, Central Queensland has abundant economic and job opportunities for decarbonising the industries that already exist. Plus, a number of natural advantages for creating additional, renewable industries.

Local understanding and support for a shift towards decarbonisation has risen dramatically in recent years. Until early 2021, at least half of the participants in regional fora hosted by The Next Economy, an organisation that works with communities, governments and industry to build regional economies, expressed some scepticism about the need to plan for the decline of fossil fuel use. By the end of 2021, the overwhelming majority were acknowledging that fossil fuel use would eventually be phased out and that Australia is shifting to renewable energy (The Next Economy 2022). Today, more than half of the residents in the seat of Flynn, which includes the towns of Gladstone and Emerald, want the government to prioritise investment in renewable and clean industries over coal and gas, according to recent YouGov polling commissioned by the Climate Council. The same poll showed fewer than 1 in 5 people under the age of 35 want the government to prioritise investment in coal and gas.

Central Queensland is on the move. Changing public perceptions reflect the accelerating and inevitable transformation of the global economy towards net zero. This profound shift will fundamentally alter markets for Australia exports, decreasing demand for fossil fuels while ramping up opportunities for new clean exports, such as green hydrogen and ammonia. Today's challenge is to ensure that no one is left behind during the change and that the best possible opportunities and outcomes are secured for Central Queenslanders and Australians at large.

"With the right leadership and support, Central Queensland could be transformed into Queensland's clean engine room."

— **Nicki Hutley**

Figure 1: Gladstone State High School Grade 12 students, Katie Windsor and Ethan Frost, discussing how few of their peers stay in regional Queensland after graduating. Most leave Gladstone for universities in Brisbane. Greater investment will offer young people more opportunities and choice, like the $2 million committed in February 2021 to upgrade training facilities at Gladstone State High School to prepare students for jobs in the hydrogen industry.

Currently, 97 per cent of Australia's top ten exports, representing 60 per cent of total export value and 16 per cent of Gross Domestic Product, are fossil fuels or have high embodied emissions (Accenture 2021). The International Energy Agency (IEA) has suggested that global fossil fuel demand could decrease 50 per cent by 2040 (IEA 2021). This reduction, and the fact that countries which represent over 65% of Australia's export market share have set net zero dates of 2060 at the latest (Accenture 2021), means that an unstoppable and necessary transition is on its way.

The good news for Central Queensland is that new clean industries are most likely to develop in regions that have an existing industrial base and established infrastructure. This includes ports, transport, energy, and training infrastructure. Queensland has several such regional cities and industrial heartlands, including Townsville, Mackay, and the Gladstone region in Central Queensland (Garnaut, 2019). Of course 'hard' infrastructure alone – such as ports and grid connections – is not enough to capture clean energy opportunities. Skilled people and supportive communities are crucial, as is further support from various levels of government to ensure this transition occurs efficiently and effectively.

Three quarters of Flynn residents aged under 35 want their government to prioritise investment in renewables and clean industries.

Central Queensland is an area with many highly skilled workers, built up through the existing carbon-intensive industries concentrated near key infrastructure. Clean energy jobs can offer skilled workers and regions a good alternative when significant shifts away from carbon-intensive industries occur (Grattan Institute 2020). Fortunately, analyses have found that in all but a few cases 'green' investment created more jobs than the fossil fuel associated alternative (World Resources Institute 2021).

Few places have more to lose from the impacts of climate change than Central Queensland. At the same time, perhaps nowhere else has greater natural advantages in clean energy and is better placed to prosper as the world moves beyond fossil fuels. With the right support, including investment in transmission infrastructure, Renewable Energy Zones, and training for workers, Central Queensland is in for a very bright future.

Parts of Central Queensland that have traditionally depended on fossil fuels are also some of the best places to develop new clean industries.

Figures 2 and 3: In February 2022 construction began on Fortescue Future Industries' (FFI) Green Energy Manufacturing Centre in Gladstone, Queensland. Once completed it will be the largest electrolyser facility in the world (an electrolyser uses electricity to split water into oxygen and hydrogen). It's designed to meet growing hydrogen demand, which reached an estimated 87 million metric tons (MT) in 2020, and is expected to grow to 500–680 million MT by 2050 (World Bank 2022).

A NEW INDUSTRIAL FUTURE

Central Queensland is well placed in the electricity transmission system and will host two future Renewable Energy Zones (REZ). Transmission connectivity will allow renewably generated electricity to flow to where it is needed without constraint, as well as making the area ideal for a Renewable Energy Industrial Precinct (REIP). Central Queensland's green industrial future will help protect the Great Barrier Reef, which lies on the doorstep of the region.

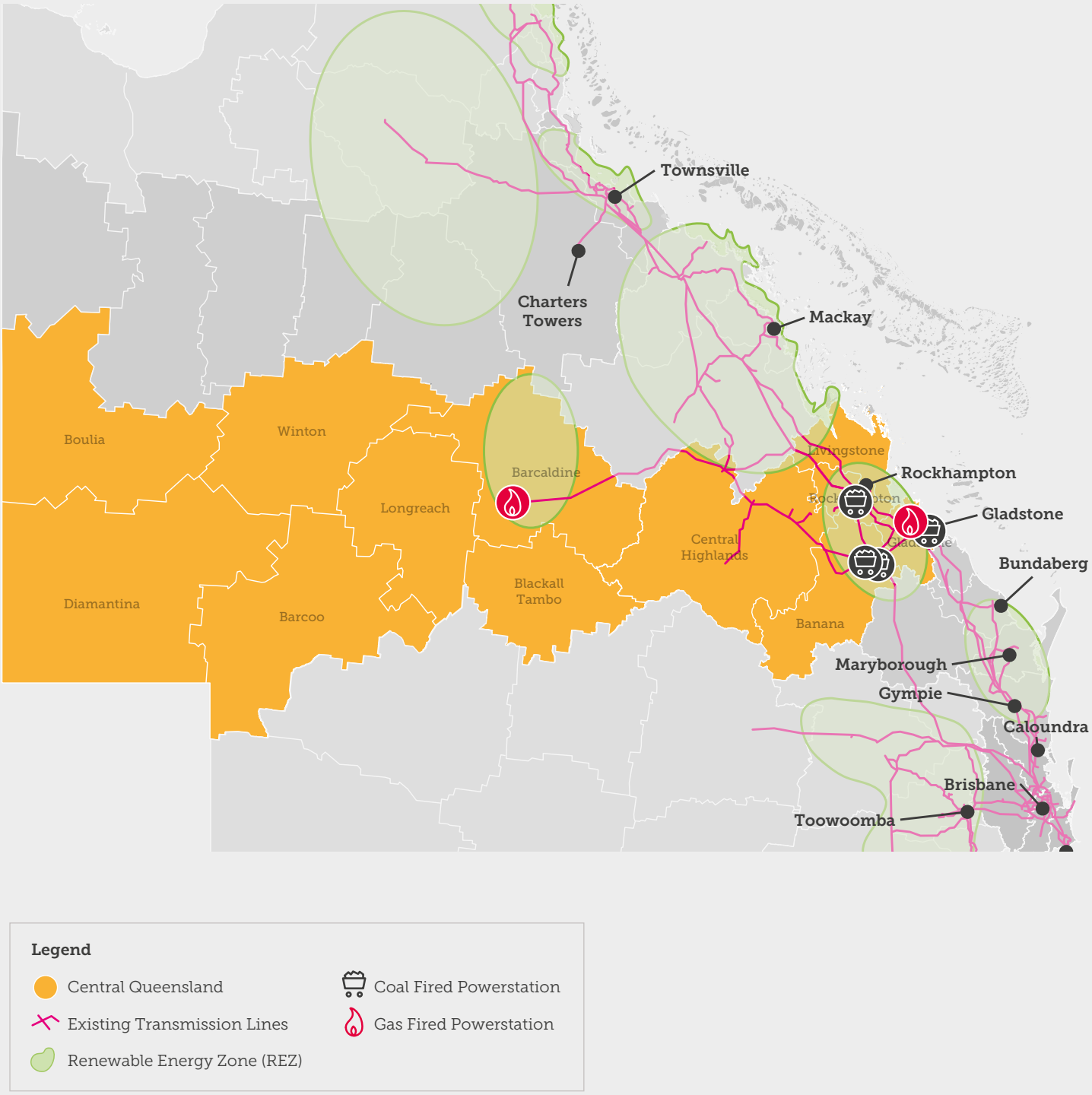

Figure 4: Central Queensland, as defined by the State Development Department. This includes the councils of Barcaldine, Barcoo, Blackall-Tambo, Boulia, Banana, Central Highlands, Diamantina, Gladstone, Livingstone, Longreach, Rockhampton, Woorabinda, and Winton.

BOX 1: RENEWABLE ENERGY INDUSTRIAL PRECINCTS (REIPs)

Central Queensland already has a transmission system with good connectivity and will soon have a Renewable Energy Zone (see Figure 4 above). Beyond Zero Emissions and World Wide Fund for Nature (2020) have introduced the concept of Renewable Energy Industrial Precincts (REIPs) to help drive the planning and implementation of Australia's energy and industrial transformation. A REIP has been proposed for Central Queensland, centred in Gladstone, which could see a variety of new industries as well as the decarbonisation of existing industries, as outlined on page 15.

REIPs support a cluster of manufacturers powered by 100% renewable energy and can be located within Renewable Energy Zones (REZs) or connected to renewable energy generation through high voltage transmission lines. REIPs also have access to clean heat and renewable hydrogen production and infrastructure.

What do REIPs deliver?

REIPs (1) ensure low priced, reliable renewable energy (<$50/MWh); (2) provide critical infrastructure and skilled workers and training; and (3) streamline approval and planning processes as well as financial incentives. This means, REIPs will:

- Attract businesses and investors, support local industries, secure existing jobs and create new ones.
- Lower power bills and costs for all via access to infrastructure and energy (electricity and heat) shared across multiple large energy users.
- Provide access to a skilled workforce, trained in the development and operation of efficient, zero emission industrial processes.
- Create opportunities to commercialise new technologies and solutions onshore, by attracting start-ups to co-locate with established industry players.
- Increase the likelihood for energy intensive manufacturers to remain in Australia.
- Act as hubs for the development of innovative zero emissions and circular economy technologies and solutions that Australia can sell to the world.

What type of industries will be attracted to these precincts?

- Energy intensive businesses, such as aluminium smelting, steel and other metals processing; hydrogen production; chemicals production (for example ammonia or caustic soda); recycling and data centres.
- Existing manufacturers (such as smelters) as well as attracting additional ones.
- Companies making clean technologies such as wind turbines; batteries; electric vehicle chargers; electric buses; and mining equipment.

Where could these precincts be located?

REIPs will be located in regional Australia in existing industrial areas with supporting infrastructure such as transport connections (port, rail and road), brownfield land (ready for development) and technically-skilled workforce. In addition to Gladstone, potential locations include: Townsville, QLD; Hunter Valley, NSW; Port Kembla, NSW; Latrobe Valley, VIC; Portland, VIC; Collie, WA; Bell Bay, TAS; Kwinana, WA; and; Whyalla, SA.

2. Central Queensland's industry of the past

Central Queensland is a major source of the state's energy supplies and its exports of fossil fuel, including thermal and coking coal. While the region's jobs and economy have historically been driven by the fossil fuel industry, research highlights the imperative for Queensland to grasp the opportunities of decarbonisation and that continuing with a 'business as usual' approach could drastically reduce growth and jobs.

If South Korea, China and the G7 follow the European Union in introducing Carbon Border Adjustment Mechanisms - tariffs on emissions intensive products - Queensland could lose more than 50,000 jobs and more than $10 billion in Gross State Product (Hutley 2021). Coal exports will begin declining this decade, with Australia's traditional key export markets—Japan, South Korea and Taiwan—all shifting away from relying on expensive imported thermal coal in the long term. At the same time, previously flagged key growth markets for Australian coal exporters – such as Vietnam, Pakistan, Bangladesh and the Philippines – have all significantly reduced imported coal's role in their long-term power planning (Institute for Energy Economics and Financial Analysis, 2022).

Tackling the climate crisis means a rapid global shift from fossil fuels to clean energy. It is crucial that communities grasp the opportunities of decarbonisation.

POWER STATIONS

There are six power stations in Central Queensland, including half of the state's eight coal-fired power stations. Its largest power station, at Gladstone, generates almost half of Queensland's electricity (Trade and Investment Queensland, 2022). Gladstone power station is currently scheduled for closure in 2035, with the region's other power stations scheduled for closure in 2028 (Callide B) and 2046 (Stanwell). However, given national and global emissions reduction goals, the plummeting costs of cheaper renewables, and the unreliability of ageing coal-fired power stations (which led to the Callide C power station fire in 2021), it's reasonable to expect these closure dates will be brought forward.

COAL MINES

As well as large coal-fired generation infrastructure, Central Queensland is home to many coking and thermal coal mines. At Gladstone Port, coking and thermal coal are exported in a roughly 65/35 per cent split. The Centre for Policy Development (2022) found that Banana and Central Highlands Local Government Areas would be two of the three most exposed to international decarbonisation due to a reduction in demand for fossil fuel exports.

Figure 5: Undoubtedly, the extraction and burning of coal enabled the prosperity of regional economies like Gladstone (pictured Gladstone Power Station) in the past. However, the consumption of fossil fuels is worsening global warming with severe, ongoing climate impacts for Queensland such as heatwaves, bushfires, and intense rainfall. To avoid the worst impacts, 95 per cent of Australia's coal reserves must stay in the ground by 2050 (Welsby et al. 2021).

GLADSTONE STATE DEVELOPMENT AREA

At the economic and industrial heart of Central Queensland lies Gladstone and the Gladstone State Development Area (SDA). The SDA is adjacent to the port of Gladstone, which is Queensland's largest multi-commodity port, the fifth largest multi-commodity port in Australia and the world's fourth largest coal exporting terminal. Major exports from the port include coal and Liquefied Natural Gas (LNG), along with bauxite, alumina, aluminium, cement and (GPC 2022). All but coal and LNG can be effectively decarbonised and some already are, as the case studies below highlight. The area has connections to major rail networks and Australia's national highway, and is home to:

- Rio Tinto's alumina refinery;
- Orica's chemical manufacturing complex;
- Cleanaway's waste management and recycling facility;
- Cement Australia;
- Queensland Energy Resources (QER);
- Australia Pacific LNG;
- Santos Gladstone LNG;
- Queensland Curtis LNG; and
- Southern Oil's northern oil refinery (SC Lennon and Associates 2021).

In addition to the major renewable energy generation pipeline in the area, there are a large number of projects underway in future industries such as renewable hydrogen, green metals, green chemical manufacturing, and associated services (see next section).

Figure 6: Import and export infrastructure like the Port of Gladstone is critical as Gladstone, the country and the world undergo an energy transition from fossil fuels to renewable energy. Craig Haymes, CEO of the Gladstone Ports Corporation (GPC) expects GPC to be Australia's leading hydrogen export location. In the past two years, GPC has moved more than one million cubic metres of material to develop the Renewables Hub Precinct (Infrastructure Magazine 2022).

3. Central Queensland's industry of the future

Central Queensland's future is bright, with thousands of job opportunities and the potential to unlock billions of dollars in new capital investment in renewables and clean industry. At the same time, major industry players, such as Rio Tinto, are already putting forward proposals that will see major new investments and industry workers upskilled as they look to power their projects with renewable energy. A number of analyses have also identified further opportunities for Renewable Energy Industrial Precincts, including renewable hydrogen and resource recovery.

The market for clean exports, including green metals, green chemicals, and renewable hydrogen has the potential to grow enormously over the coming decades as countries worldwide strive to meet their emissions reduction commitments. For Australia, the total revenue and jobs from these new industries could far exceed those that we have seen from fossil fuels in the past (Accenture 2021). Nowhere is better placed to ride this new wave of opportunity than Central Queensland.

Figures 7 and 8: Women leading the way in imagining and creating a different future for Central Queensland and its people. Left to right Dr Amanda Cahill, CEO of Next Economy, which works with communities, governments and industry to build regional economies that are climate safe, regenerative and socially just; and Leanne Martin, Acting Principal at Gladstone State High School.

CASE STUDIES: ECONOMIC TRANSFORMATION IN ACTION

Transformation is already underway in Central Queensland. As well as the major renewable energy generation pipeline in the area, there are a large number of projects underway in industries such as renewable hydrogen, green metals, green chemical manufacturing, and associated services. Below we have presented a selection of case studies: electricity generation, circular economy, renewable hydrogen, renewable ammonia and ammonia derived chemicals, and High Purity Alumina (HPA).

CASE STUDY

GREEN CHEMICALS

The Hydrogen Utility (H2U) and Orica - green hydrogen and ammonia production, Gladstone

The Hydrogen Utility (H2U), an Australian-based developer of hydrogen infrastructure, is proposing a large-scale chemical complex at Gladstone, Queensland, for the production of renewable hydrogen and ammonia. In April 2022, a strategic partnership agreement between Orica and H2U to support initiation of the first phase of the proposed project was announced.

The proposed development would be constructed in stages to integrate up to 3 gigawatts (GW) in electrolyser capacity for hydrogen production and up to 5,000 tonnes per day in ammonia production capacity. It is expected that the proposed facility would be supplied solely by renewables-based energy from new-build solar and wind resources in the Queensland region of the National Electricity Market.

The master plan study is expected to take approximately six months with front-end engineering and development approval activities scheduled to commence in the latter part of 2022.

research.csiro.au/hyresource/h2-hub-gladstone

RENEWABLE ENERGY PROJECTS

While the region has not seen the same rapid installation of renewable energy projects as other parts of Australia, as of May 2022 there have been more than 5.6 gigawatts of projects announced, including three battery projects, five wind projects and nineteen solar projects (AEMO 2022). This would see the region's renewable generation capacity increase by almost 20 times. This pipeline of projects could also create more than 1,200 manufacturing jobs, about 6,000 jobs in construction and development, and 1,500 in ongoing operations and maintenance.[1] That's just the beginning. For example, Central West Energy, a partnership between Renewable Energy Systems and Energy Estate (see case study below) have suggested 5,450 or more jobs could be created through their investment in the Fitzroy River REZ. This is only one of eight REZs that have been identified in Queensland (Climate Council 2020).

Figure 9: To reach 75 per cent emissions reduction by 2030 and net zero shortly after, Australia needs a 100 per cent renewable energy supply by 2030 (Climate Council 2022). The projects planned for the Gladstone region will be crucial to ensuring a reliable, affordable and flexible energy supply into the future (Climate Council 2022).

1. Calculated using Rutovitz, J., Briggs, C., Dominish, E., Nagrath, K. (2020) *Renewable Energy Employment in Australia: Methodology*. Prepared for the Clean Energy Council by the Institute for Sustainable Futures, University of Technology Sydney. Assumes 1 year of manufacturing and 3 years of construction and development.

CASE STUDY

RENEWABLE ENERGY GENERATION

Central Queensland Power (Energy Estate and Renewable Energy Systems) - various locations

> *"We envisage that the Central Queensland Power project will facilitate the transition of Central Queensland's power supply towards firmed renewable energy and, in doing so, secure the future for heavy industry in the region.*
>
> *"The Moah Creek Renewable Energy Project is the first part of this. We aim to create jobs, deliver low cost clean energy and support the competitiveness of the region's existing heavy industry."* - Vincent Dwyer, co-founder, Energy Estate

Central Queensland Power is a joint venture between Renewable Energy Systems (RES) and Energy Estate to accelerate the energy transition and decarbonisation of the heavy industry and communities in Central Queensland.

The partnership will create a staged rollout of wind, solar and storage projects over a ten or more year timeline. Central Queensland Power will invest more than $6.7 billion in capital expenditure and create 400+ jobs in development, 4500+ in construction and 550+ during operation.

A number of projects are being developed within the Fitzroy River Renewable Energy Zone, including:

- Moah Creek, 30km west of Rockhampton, will include up to 414 megawatts of wind power, 200 megawatts of solar and potential for battery storage.
- Projects at Iveragh, South East of Gladstone, and Mount Rainbow, between Gladstone and Biloela.

www.centralqueenslandpower.com.au

Aldoga Solar Farm - Acciona Energia, Aldoga

> *"Central Queensland has enormous opportunities for renewable energy to create new jobs in the region and can supercharge the area's economic growth. The highly skilled workforce already in the area and the designated Renewable Energy Zone make Central Queensland a desirable place to invest and do business.*
>
> *"ACCIONA Energia has made a strategic long-term commitment to the future of Central Queensland. When we invest in a project we commit for the long-term and strive to integrate ourselves within the community and give back to those that support us."* - Brett Wickham, Managing Director, ACCIONA Energia

The $500 million Aldoga Solar Farm project will generate enough clean energy to power the equivalent of 220,000 homes annually. The project will have a peak workforce of 350 people, with ten on-going full time roles after construction and a Community Benefits Scheme to support local community groups.

ACCIONA Energia signed a 'Statement of Cooperation' with the Queensland Government to create opportunities and invest in Central Queensland in 2022, which included an agreement for lease with Economic Development Queensland for land within the Gladstone State Development Area to construct and operate Aldoga Solar Farm for a period of 30 years.

www.acciona.com.au/projects/aldoga-solar-farm

JOBS AND INVESTMENT

A large number of recent analyses have demonstrated the number of jobs and economic value that could be created by a move towards new clean industries in the region, and Queensland more generally.[2] Each study uses a somewhat different boundary for Central Queensland, as well as different methods of calculation, which makes it difficult to quantify the exact number of jobs for the area. However, what is clear is that the region has many existing advantages that will result in thousands of new job opportunities for those who live there.

For example, **ACIL Allen** modelling (2021) commissioned by Beyond Zero Emissions, indicates the potential for the Central Queensland REIP to unlock new capital investment of $7.8 billion in the region; generate an additional $2 billion in revenue per year by 2032; and create 10,719 new and ongoing local jobs in new manufacturing and service industries by 2032. All while protecting existing manufacturing jobs. Meanwhile, **Accenture** (2021) has suggested that there could be 13,000 jobs in Central Queensland - mainly in green metals mining and processing.

Figure 10: Fortescue Future Industry's (FFI) Green Energy Manufactuing centre (pictured) joins another five FFI Green Energy projects under development across the globe, including: Grand Inga Hydroelectric Project in the Democratic Republic of Congo, The Pampas Project for green hydrogen in Argentina, Southland green hydrogen project in New Zealand, The Bell Bay green hydrogen project in Tasmania, and the Pari Wabo development in hydropower and geothermal power in Papua New Guinea (FFI 2022)."

2. Accenture's Sunshot report; Climate Council's 10 Smart Solutions to Supercharge Queensland; Beyond Zero Emissions Million Jobs Plan; Alpha Beta's Clean Jobs Plan; Deloitte Access Economics' People Powering the Future; Climate Council's Leaders and Legends: thousands of clean jobs for Queenslanders.

CASE STUDY

GREEN METALS

Alpha High Purity Aluminium (HPA) - Gladstone

"The expectations of global manufacturers to decarbonise their operations is rapidly increasing. Alpha HPA produces the lowest emissions, high purity aluminium materials available in the market today which are critical ingredients in products like lithium ion batteries for EVs and e-mobility, as well as LED technology.

"Alpha HPA is about to start commercial production at our new industrial plant in Gladstone, with Stage 1 employing 34 locals. Our Stage 2 operation will employ a further 120 people reaching full-scale production by 2025. Our Stage 1 facility is contracted with CleanCo for 100% renewable energy and as part of that contract we intend to extend this to our large stage 2 facility once operational. At Alpha HPA we believe that to be part of the decarbonising solution it is imperative to minimise our emissions in doing so.

"Gladstone is the perfect place for our first commercial project — its industrial and manufacturing heritage, skilled workforce and large-scale renewable energy projects coming online provide great opportunities for industry. I'm excited to see this region and its top-notch people really lead the transition to the new, green economy." - Rob Williamson, Chief Operating Officer, Alpha HPA

Alpha HPA's Gladstone facility will be a platform to demonstrate new, greener opportunities in terms of product and process. The 10-hectare facility will be capable of producing 10,000 tonnes of HPA per year. The stage 2 project expects to create 120 full-time jobs in the operational phase and more than 300 jobs during construction.

Figure 11: Alpha HPA's Geoff Sheppard-Maintenance Team Leader; Rob Williamson-COO; Sidney Blake-Site Services Coordinator at their Gladstone site.

Figure 12: Alpha HPA's new industrial site at Gladstone. This facility will be one of the largest single HPA refineries in the world. The International Aluminium Institute (2022) predicts global aluminium demand will increase by almost 40 per cent by 2030. Alpha HPA's aluminium will be key to meeting this growing demand, while also supporting our journey to net zero.

The HPA First facility will be one of the largest single HPA refineries in the world. The unique Smart SX Technology is a highly selective scientific process that enables extraction of aluminium with pinpoint accuracy, and to generate a suite of Ultra High Purity aluminium products at a very low carbon footprint. Furthermore, 100% of its reagents are recycled into a saleable by-product, which puts us at an almost zero discharge facility.

alphahpa.com.au

RIO TINTO, LOOKING TO THE FUTURE

A proposal from Rio Tinto, one of the region's major employers, to meet the energy needs of its Boyne smelter, Yarwun alumina refinery and Queensland Alumina refinery through renewable energy would also require major further investment in firmed renewable generation in the region. The total requirement is 1,140 megawatts of reliable power to operate, which equates to at least 4,000 megawatts of quality wind or solar power with firming (Rio Tinto, 2022). This could mean a further 5,000 jobs in manufacturing, construction, and operations and maintenance.

Rio Tinto's proposal also shows us there are many opportunities for Central Queensland's skilled workforce to move into roles in new clean industries with some with some further on-the-job or formal upskilling. For example, drillers, miners, and shot firers currently employed in coal mines were found to have a 68 per cent skills match with Electrical Engineering Draftspersons and Technicians, and a 60 per cent match with Remote Sensing Technicians (Deloitte Access Economics, 2021).

Central Queensland could become home to battery, solar and wind projects that are generating more than 5.6 gigawatts of energy - more than the region's coal capacity - which could create almost 9,000 jobs.

Figure 13: Located in Gladstone, Rio Tinto's Queensland Alumina Limited is one of the world's largest alumina refineries. Aluminium production involves two key steps: alumina refining, to refine bauxite ore into alumina (aluminium oxide), and aluminium smelting, to convert alumina to pure aluminium - a process that's highly energy intensive. Powering aluminium supply chains by renewable energy - the cheapest form of energy - will be crucial in decarbonising the industry and reaching net zero.

CASE STUDY

RENEWABLE HYDROGEN

Fortescue Future Industries - Green Energy Manufacturing Centre, Gladstone

> *"Fortescue Future Industries (FFI) is excited to have commenced work on our Green Energy Manufacturing centre in Gladstone. Gladstone is the perfect place for us to establish this facility — it has a large port with excellent capacity, a skilled workforce, and an almost unlimited ability for industry to expand to the north and west of the town, all reasons why the location makes sense for us.*
>
> *"Australia has such an unequalled capacity to develop and export renewable energy, with abundant sunshine, wind and suitable land. Ultimately, our competitors are not other green industries — our competitors are fossil fuels. Renewables will become cheaper than fossil fuels and the second they do that, fossil fuels are gone and we're doing something better for people, better for the environment and we can demonstrate how to do it commercially."* - Cameron Smith, Head of Manufacturing, FFI

The Green Energy Manufacturing Centre (GEM) in Gladstone will be powered by renewable energy and become a major new pollution free green manufacturing hub. The GEM will help create hundreds of new direct and indirect jobs in regional Queensland.

Stage one is the A$114 million (US$83 million) electrolyser facility, which will be expanded as current demand indications crystalise. The GEM has several growth stages already planned into its factory footprint, which includes green manufacturing technology such as cables, batteries, wind turbines and solar panels. The electrolyser facility will have an initial capacity of two gigawatts per annum – more than doubling current global production, and enough to produce more than 200,000 tonnes of green hydrogen each year.

Figure 14: Cameron Smith, Head of Manufacturing, Fortescue Future Industries

The electrolyser facility will see Gladstone become a world leading hub for the manufacture of electrolysers which are vital to the production of green hydrogen – a zero-carbon fuel that will decarbonise hard-to-abate sectors such as heavy haulage, shipping, aviation, and industry. The first electrolysers manufactured at the facility in early 2023 are earmarked to be used in Queensland at FFI's proposed green hydrogen to ammonia project at Gibson Island.

The construction of the GEM will create more than 100 jobs during the construction phase, up to 50 permanent jobs and several hundred indirect jobs which will support the local supply chain.

The further stages of FFI's GEM will be delivered in specialist production lines according to the requirements of FFI and its customers, and could include the manufacture of wind turbines, high-voltage electric cabling, solar photovoltaic cells, modules and arrays, and associated renewable energy infrastructure.

ffi.com.au/technology/green-hydrogen

OPPORTUNITIES FOR REIPs

ACIL Allen suggests Gladstone could offer several advantages as a Renewable Energy Industrial Precinct (REIP) (see box 1):

- Excellent infrastructure, including world-class port facilities, and available industrial-zoned land for development;
- A skilled and technically capable workforce suited for manufacturing and resource processing;
- Diverse and established industry;
- Teaching and skills-training infrastructure;
- Strong local and state government support for development and transition;
- Excellent educational institutions including Central Queened University campus;
- Large industry load centre in close proximity to the new Renewable Energy Zones (REZs).

Beyond Zero Emissions (2022), an independent climate solutions think tank, has identified the following potential new activities in the Central Queensland REIP that could benefit from low-cost renewable energy sources including:

- Resource recovery/circular economy - turning waste into products;
- Renewable hydrogen — the production of hydrogen through electrolysis, powered by renewables;
- Renewable ammonia — use of renewable hydrogen to produce ammonia and ammonia derived chemicals;
- High Purity Alumina (HPA) — high purity alumina for clean-tech applications such as batteries and LEDs;
- Production of wind turbines components, including blades and towers.

Figure 15: Australia has the highest uptake of solar globally with around 30 per cent of homes with solar PV installed. This will grow further as we undergo the clean energy transition and special consideration must be given to recycling and the end of life for products. The Solar Recovery Corporation in Gladstone is one organisation doing just this.

CASE STUDY

CIRCULAR ECONOMY

Solar Recovery Corporation (SRC) - solar panel material recovery, Biloela

> *Central Queensland is transitioning from fossil fuel dependency and driving the net zero 2050 plan with renewable infrastructure. Solar Recovery Corporation's proven technology recovers more than 99 per cent of the material from solar panels at the end of their life. The recovery of valuable resources reduces the need to further mine these materials, saving greenhouse gas emissions and reducing threats to our environment."* - Sam Agostino, Chief Operating Officer, Solar Recovery Corporation

Building a sustainable, net-zero emissions future depends on our ability to recover and reuse the finite resources required for solar panels and other renewable energy components. When compacted and crushed in landfill, used solar panels are toxic and harmful to human health. Solar Recovery Corporation will work closely with solar farm owners, local suppliers and government agencies to develop a circular economy that ensures these materials are recovered and reused.

When in full operation, the main facility will create 12 new jobs on site. The high-quality recovered materials are instantly ready for reuse in local manufacturing streams. Technology used by Solar Recovery Corporation has a proven operating history and has been used in Europe for around 12 years. It is able to recover more than 99 per cent of materials. In comparison, other technologies currently in the R&D phase are aiming for 80 per cent or higher (ARENA 2022).

Figure 16: Currently, Australia has no circular economy solution for end-of-life solar panels. The Solar Recovery Corporation is addressing this void, with established facilities in Bilolea and Townsville. SRC has identified further solar panel collection sites to be established in South East Queensland, New South Wales and Victoria - using the same model as their existing sites.

Solar Recovery Corporation's technology does not use pyrolysis (essentially burning), chemicals, crushing or thermal processes to recover materials. Instead, it is a combination of mechanical, electrical and vacuum processes to recover materials from PV panels. Each machine, roughly the size of a shipping container, can process 180,000 panels every year. From an average sized panel of 20 kg, 2.4kg of aluminium, 0.4kg of copper, 14kg of glass, 2.2kg of plastic, and 1kg of silicon are recovered, for which there are strong local markets.

www.srcorp.com.au

4. Policy recommendations

We have a once-in-a-generation opportunity to revitalise Central Queensland and invest in Central Queenslanders. There's no doubt that new, clean industries and opportunities are coming to Central Queensland. But this is only the beginning. Managing this transformation is a huge and complex task that requires a high level of leadership, vision, honesty, coordination, planning and financial investment that Australia hasn't seen in decades.

There's not just a need for further support from various levels of government, as well as coordination to ensure the transition occurs efficiently and effectively. This is also a question of what the community wants. Recent YouGov polling of the electorate of Flynn, which includes a large part of Central Queensland, found that fewer than 2 in 10 people believe their community is getting enough support to prepare for a future with less fossil fuels.

Very few people in the electorate of Flynn believe their community is getting enough support to prepare for a future with less fossil fuels.

Figure 17: Hugh Bridge and Carol Holden, Gladstone locals. Hugh highlighted a need for the government to disassociate with the fossil fuel industry and foresight to create the skilled workforce required for the energy transition. In Carol's words, "We don't have an actual detailed plan of how to go about it. We need a transition plan. We need a transition authority to do this. It just looks like a big black wall to a lot of people in Gladstone, as to what's going to happen when the coal mines shut? What are people going to do?"

Figure 18: Gladstone Regional Councillor Kahn Goodluck, Deputy Mayor. "As a region with a proud industrial heritage we need to ensure we plan and adapt for the changes that are coming in a rapidly decarbonising economy. We have some of the biggest industry players in the world, but we can't leave it to industry and business alone. We need government policies and investment that support success."

FEDERAL GOVERNMENT

The Federal Government has an important role to play in ensuring Central Queensland and all regions of Australia can tap into new opportunities as the world moves beyond fossil fuels. Climate Council's report *Power Up: Ten climate gamechangers* identifies the priority actions the Federal Government can take to accelerate Australia's energy and industrial transition, including:

- Helping boost energy storage through a mandated Renewable Energy Storage Target.
- Planning ahead for coal closures by creating a National Transition Authority. By 2024, the Authority should set closure dates for Australia's remaining coal-fired power stations and develop transition plans.
- Overhauling the Safeguard Mechanism to drive real emissions reductions from Australia's largest industrial emitters.
- Ending public funding for fossil fuels, and developing a comprehensive climate and energy investment plan.

The Federal Government should also work closely with the Queensland Government to support the rollout of new transmission infrastructure needed to connect the state's renewable energy zones and, importantly, up-skilling Queenslanders for jobs in new, clean industries.

Power Up: Ten climate gamechangers.

QUEENSLAND GOVERNMENT

Through its 10-year energy plan, the Queensland Government can send a clear signal to clean industries and inventors that the sunshine state is open for new business.

Alongside leadership from the Federal Government, new policy measures and funding will be required at the state level to realise the opportunities for Central Queensland. These include:

- Committing to powering Queensland's current and future electricity needs entirely with renewable energy by 2030. This will require the building of at least an additional 6GW of renewable generating capacity and 1GW of storage by 2025.
- Planning for Queensland's future clean export and manufacturing industries by identifying, developing and funding a Renewable Energy Industrial Precincts program.
- In cooperation with a National Transition Authority, funding a regional transition authority that can provide locally-specific support to workers and communities and help manage the impact of coal closures.
- Ensuring the meaningful engagement of First Nations communities, and that the benefits of Queensland's transformation flow to local communities.

Figure 19: *"In 10 years' time I'd love to see the Gladstone region growing in population, size and opportunity. I think there's a lot of wonderful small businesses here that don't get the support they could if we had more job opportunities to bring others to this regional area. For a regional town we have a fantastic community, a fantastic council that's doing a lot to work on our infrastructure and learning, and it shows wonderful possibilities."* - Katie Windsor, Year 12 Student at Gladstone State High School.

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The Climate Council acknowledges the Traditional Custodians of the lands on which we live, meet and work. We wish to pay our respects to Elders past, present and emerging and recognise the continuous connection of Aboriginal and Torres Strait Islander peoples to Country.

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