



Goldfields Voluntary Regional Organisation of Councils (GVROC)

2022 RENEWABLE ENERGY PROJECTS AUDIT

Final Report

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Executive Summary



In line with Australia's and global efforts towards achieving net zero greenhouse gas emissions by 2050, the Western Australian Climate Policy has introduced a plan aimed at developing climate-resilient communities and transitioning to a prosperous low-carbon future. As part of this initiative, the Goldfields Voluntary Regional Organisation of Councils (GVROC), a partnership of nine Local Government Authorities (LGAs), was selected to participate in a pilot project that is funded by the WA Climate Policy. One of the goals of this pilot is to collaborate and identify the most effective solutions to reduce greenhouse gas emissions and increase investment in renewable energy in the Goldfields-Esperance (GE) region.

The objective of this work is to provide insights into the state of renewable energy projects in the Goldfields-Esperance region and recommend actions to catalyse further investments in renewable energy. This report seeks to deliver the following:

- Examine past and present renewable energy projects in the Goldfields-Esperance region since 2013, when a similar audit was undertaken.
- Offer insights into the current energy market landscape and trends in WA while also identifying potential renewable energy initiatives in the Goldfields-Esperance region.
- Gather input from key stakeholders to determine the primary challenges and opportunities that exist in investing in renewable energy in this area.
- Provide actionable recommendations to encourage and accelerate further investment in renewable energy projects in the Goldfields-Esperance region.
- Serve to inform Government, industry and communities as the region seeks to move toward a sustainable, low carbon energy future.

Audit of renewable energy projects

The 2013 Audit of Renewable Energy Projects, commissioned by Regional Development Australia, Goldfields-Esperance (RDAGE)¹ found 13 operational and 10 proposed renewable energy projects in the GE region. The total capacity of these projects was 12,144 kW. In the 2022 status update conducted by 100% Renewables, only 8 of these projects were found to still be in operation. These projects are based in Esperance, Hopetoun, Kalgoorlie-Boulder and Ravensthorpe and are operated by utilities, mines and the City of Kalgoorlie-Boulder. They use wind, solar PV, solar thermal and geothermal

¹ Audit of Renewable Energy Projects in the Goldfields Esperance Region

technologies. The total capacity of the 2013 projects found to be operational in 2022 is approximately 8,900 kW.

Between 2013 and 2022, the region experienced growth in renewable energy implementation. In 2022, 100% Renewables identified 35 operational projects in the region with a total capacity of 78,300 kW. This represents around 545% growth in renewable energy capacity since 2013. Most of this renewable energy generation comes from solar PV and wind turbines (Figure 1).

The operators of these renewable energy projects include mining companies, utilities and Local Governments.

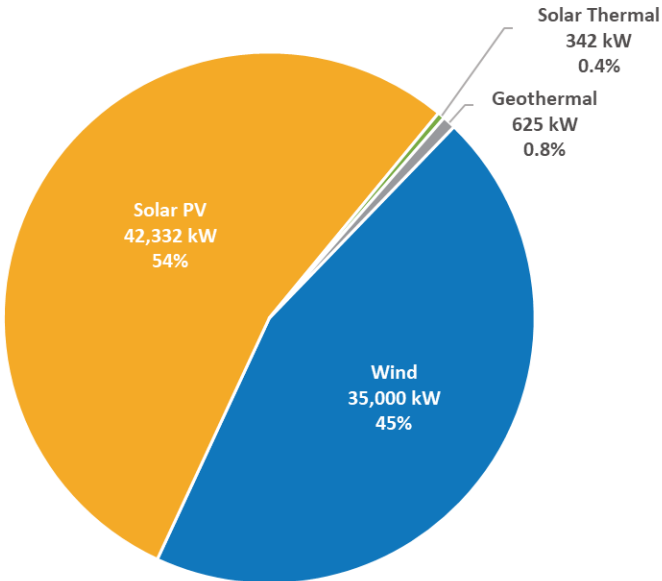


FIGURE 1: BREAKDOWN OF RENEWABLE ENERGY PROJECTS BASED ON CAPACITY (MW) PER TECHNOLOGY TYPE

Mining companies

The mining sector is the primary driver of economic output in the region, contributing \$22.2 billion (67.8%) to the total output, with \$7.546 billion generated in Kalgoorlie-Boulder alone. However, the mining industry is also the leading emitter of greenhouse gases (GHG) in the region. Despite this, the mining sector plays a vital role in implementing renewable energy technologies and achieving significant investment in sustainable energy infrastructure. The continued growth of renewable energy in the mining industry offers the most viable solution for reaching the target of net-zero emissions by 2050 or earlier.

Some of the largest generators in the mining sector include Gold Fields, BHP, Mitsui and Co, Tellus Holdings and AngloGold Ashanti. Based on operating, in-construction and planned renewable energy projects, these companies plan to develop some 289 MW of hybrid solar PV and wind systems as shown in Table 1.

TABLE 1: EXAMPLES OF RENEWABLE ENERGY CAPACITY GENERATED BY MINING COMPANIES

Resource company	Total renewable energy capacity	Technology
Gold Fields	143,500 kW	solar + wind
BHP	114,100 kW	solar + wind
Mitsui and Co	30,000 kW	solar
Tellus Holdings	1,400 kW	solar
AngloGold Ashanti	40kW	solar thermal

Utilities

Utilities also play an essential role in reducing GHG emissions in the region by facilitating grid decarbonisation and by implementing renewable energy microgrids in remote areas which are not connected to the South West Interconnected System (SWIS).

Geographically, the majority of the GVROC Region sits outside the boundaries of the SWIS which supplies electricity to the majority of South Western Australia. However, the majority of the population in the GE region is serviced by the SWIS (Western Power), with the SWIS network providing electricity to the population centres and surrounds of Coolgardie, Kalgoorlie-Boulder, Kambalda and Ravensthorpe.

Horizon Power is the main utility supplying renewable energy in the GE region. Horizon Power already operates a Central Solar Farm and wind turbines in Esperance with 13 MW capacity, utility grade Standalone Power Systems (SPS) in remote communities with delivered capacity of 1.5 MW (at the time of this research), and other solar PV projects at various locations in the region. The total renewable energy capacity developed by Horizon Power is estimated at 15.2 MW. The WA Government has allocated \$45.8 million for Horizon Power to roll out 150 SPS' in regional WA over the next 3 years and the GE region is part of this plan.

Local Government areas

LGAs are mainly focused on reducing emissions from their own operations which includes installing solar panels on council facilities and implementing energy efficiency. As an example, the City of Kalgoorlie-Bolder installed 1 MW of renewables on their Oasis recreation centre, utilising solar PV, solar thermal and geothermal (in progress) technologies.

Other activities include supporting important renewable energy projects in their regions and partnering with Horizon Power on innovative projects that include wind, solar and battery storage. One example is the Esperance Integrated Power Solution renewables hub which brings together solar and wind power, to generate up to 46% of Esperance's electricity from a new integrated energy solution.

Potential for renewables in Goldfields-Esperance region

The Goldfields-Esperance region has vast potential for renewable energy. Based on a parallel Emissions Baseline Study² on community and corporate emissions in the GE region, the total energy supply requirements for the region have been estimated to be around 14.4 PJ. This demand is currently supplied from various non-renewable energy sources, including electricity from the grid (the non-renewable component), LPG, natural gas, diesel and kerosene. Based on our research of the number of operational renewable energy projects, the region currently generates around 677,000 GJ of renewable energy annually. This represents around 5% of the total energy supplied to the region.

In terms of power, approximately 1,790 MW of supply from renewable energy sources could potentially enable the region to be powered with zero emissions generation (Figure 2) which would help the region to reach net zero emissions.

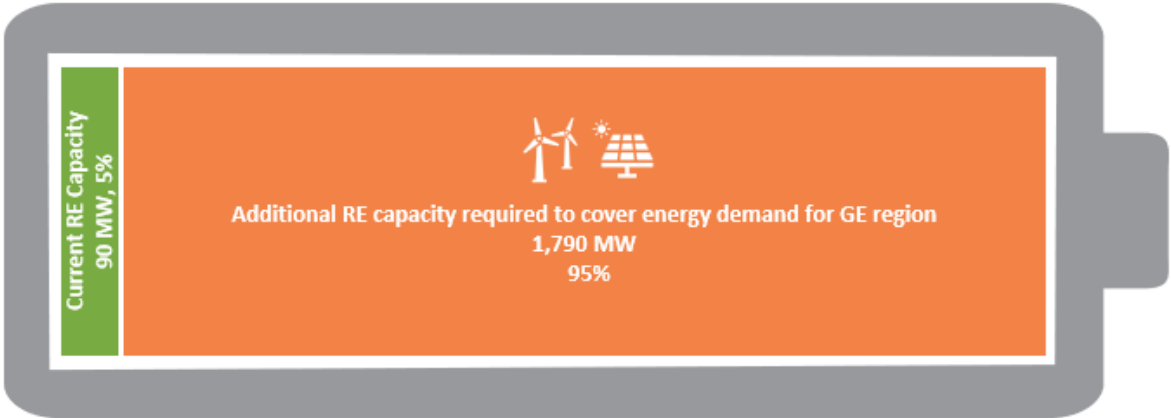


FIGURE 2: MODELLED RENEWABLE ENERGY (RE) CAPACITY REQUIREMENT FOR THE GOLDFIELDS ESPERANCE (GE) REGION

Separate analysis of mining sector energy demand, and future demand where all fleet energy use is electrified, suggests that mining energy use may be double the figure shown above, and as such renewable energy may supply less than is indicated here (as a fraction of demand), highlighting that these figures are indicative at this time.

For remote mining operations in particular, it is challenging to develop renewables to meet more than 50-60% of energy demand. Solutions that coordinated policy, funding, infrastructure development and collaboration could target include building microgrids to power remote communities, commercial and industrial sites, encompassing interconnected resources like solar panels, wind turbines and energy storage to supply green electricity in areas that operate independently from the grid. Additional technologies that could be deployed include geothermal, biomass and hydro power.

However, the biggest potential for renewable energy development in the region may be for export-focused industries of the future, including proposed mega-projects like the Western Green Energy Hub (WGEH) at Eucla and Fortescue Future Industries' South East Western Australia Green Hydrogen hub at Esperance. The Eucla proposal is at planning and feasibility stage and is forecast to have capacity of up to 50 GW generated upstream by wind and solar. This project aims to manufacture 3.5 million

² Net Zero Emissions Baseline Study in Goldfields Esperance Region, Ironbark Sustainability 2023

tonnes per year (MTPA) of green hydrogen, for use in power generation, shipping fuel, minerals processing, and manufacturing³. The State Government has indicated that both projects have the potential to provide green hydrogen to the GE region.

The region has attracted considerable attention from global players in the hydrogen industry, who are expressing keen interest in investing. The WA Government is also making significant investments in green hydrogen hubs. Although there are several green hydrogen projects in progress, the current primary focus is on exporting hydrogen rather than meeting local energy demand.

Initiatives of Western Australia's Government

It is expected the WA Government's 2022 announcement that it will close the Collie and Muja coal-fired power plants by 2030 will reduce Government emissions on the SWIS by 80%. An estimated \$3.8 billion will be invested in new green power infrastructure in the SWIS, including wind generation and storage, to ensure emissions reduction, continued stability and affordability.

These actions indicate that climate initiatives are a priority for the WA Government and provides a signal that WA is open for investment in renewable energy generation. Energy Policy WA (EPWA) plays an active role in setting the framework for the electricity market in the SWIS and electricity systems elsewhere in WA. There are number of initiatives that support the State net zero by 2050 target⁴.

Western Power is a key provider of energy in the Goldfields region and Distributed Energy Resources (DER) are changing rapidly, which is both a challenge and an opportunity for the WA Government⁵. One of the initiatives already underway, is the WA Government's announcement to deliver 1,000 Standalone Power Systems in WA over the next five years, with \$45.8 million allocated to Horizon Power to deliver 150 SPS in the region by 2025 to replace diesel power generation.

EPWA is facilitating a fast-tracked assessment of the demand for electricity on the SWIS (SWISDA) which will help to determine the size, location and timing of investment into transmission infrastructure which will support the needs and decarbonisation ambitions of the industry.

There are many other initiatives that the WA Government is undertaking to boost renewable energy in the GE region, including potentially introducing penalties for high carbon emission electricity generation technologies in the SWIS electricity market⁶, installing Virtual Power Plant technologies, and providing financial support for communities to switch from gas to electricity.

Key challenges in implementing renewable energy

The Goldfields-Esperance region has an ideal environment for implementing renewable energy, with an abundance of sunshine, wind and land. However, there are many challenges that need to be overcome to boost the renewable energy market. Based on our stakeholder interviews, these are the key challenges that have been identified:

³ Sourced from <https://intercontinentalenergy.com/western-green-energy-hub>

⁴ Sourced from [Energy Transformation Strategy \(www.wa.gov.au\)](http://www.wa.gov.au)

⁵ Distributed Energy Resources Roadmap

⁶ Sourced from [Out-of-Session Meeting Papers.pdf \(www.wa.gov.au\)](#)

- **Lack of land availability** – this is one of the biggest challenges, due to existing pastoral, mining, and native title land rights.
- **Connectivity and energy security** – the SWIS and Horizon Power grids need to be updated to accommodate new technologies (such as community rooftop solar) and improve system strength.
- **Remoteness and isolated areas** – lack of infrastructure, supply chain issues, and facilities hinders bringing renewable energy into these areas.
- **Current lack of Government policies** – policies are still being developed by Energy Policy WA and more should be released in 2023 that LGAs can then action and reference at a local level.
- **Development approvals** – these are part of mining approvals and LGAs have very limited visibility over what developments are in place in the region.
- **Lack of trust in renewable energy** - there is still a belief that diesel and gas are more reliable sources and renewable energy infrastructure is more expensive and cost prohibitive for smaller mining operations and lower socio-economic demographics (rooftop solar and electric vehicles). Providers of some technology are often start-ups who have no proven track record and don't offer follow-up service.
- **Lack of community incentives and limited hosting capacity** – across most of the GE region there is a lack of capacity in the grids. Installing renewable energy technology is expensive and many of the Government incentives don't apply to regional and remote communities (particularly remote aboriginal communities like Warburton).
- **Existing Power Purchase Agreements** – existing agreements can be for 10 to 20 years. Gas supply is also considered a reliable and cheap energy source in WA and transitioning away from gas infrastructure is costly and currently makes no economic sense for some towns (such as Leonora) and mines in the region.
- **Lack of labour and housing** – the entire GE region already has a labour shortage and housing crisis, and the issue is heightened in the more remote goldfields mining towns. Attracting people to the region to build and manage renewable energy infrastructure is a significant and on-going challenge.

Recommendations

Based on the current structure of energy supply, and current developments and challenges experienced by many stakeholders, the strategy for implementing more renewable energy in the GE region could include the following activities:

- **LGAs to develop net zero strategies**
 - To support the State's net zero by 2050 target, LGAs should focus on decarbonisation of their operations and work with the community to find solutions for reducing their emissions
 - These strategies should be developed in collaboration with utilities and the WA Government
- **Energy supplied from green hydrogen generation**
 - Energy generated from the proposed Western Green Energy Hub project (WGEH) and the Fortescue Future Industries' South East Western Australia Green Hydrogen hub, could supply green energy for the region. To capture this opportunity, will require engagement and coordination between the project proponents, Traditional Owners, State and Local Governments, investors, utilities and communities.

- While much of the product is planned for export, LGAs can play an important advocacy role to ensure that the region benefits from this supply and provide required support and local approvals for the projects.
- **Land availability**
 - Identify available land for building renewable energy projects in the region in collaboration with relevant State Government Departments.
 - Assist the State Government in developing a full land audit report across the whole GE region that depicts the zoning and occupancy of land and its suitability for renewable energy projects.
 - Plan for and enable Renewable Energy hubs and corridors that will support infrastructure developments (such as port access for wind turbine importation and road and rail transfers).
- **LGAs role in advocacy and lobbying**
 - Lobbying State and Federal Governments to provide funding and support for renewable energy provision to local communities from future renewable energy projects.
 - Develop new policies to ensure renewable energy outcomes for local communities that assist in transitioning to meet the Government policy of net-zero emissions by 2050.
 - Further investigate and lobby for opportunities for bioenergy generation through shared waste management solutions in the region.
 - GVROC to support and advocate for biofuel trials using mining and agricultural waste that can bring economic and reduced emission opportunities by replacing diesel powered energy in the region.
- **Lead collaborations between communities, utilities, mining companies and farmers**
 - Assist utility providers (especially Horizon Power) with development of the path to net zero for LGAs.
 - Advocate to State Government for the opportunity for communities to obtain Public Private Agreements with utility providers for renewable energy supply.
 - Advocate to State and Federal Governments for LGAs to have more involvement in planning mines – particularly relating to renewable energy developments.
 - Advocate and lobby State and Federal Governments for more funding to support regional and remote communities to transition to renewable energy. Particularly Goldfields remote aboriginal communities.
- **Coordination of renewable energy projects implementation**
 - Assist with the coordination to implement renewable energy infrastructure in the region, with all levels of Government, utility providers, businesses, industry, universities, training providers and local communities.
- **Infrastructure development**
 - Facilitate shared infrastructure opportunities across multiple LGAs to bring Renewable Energy infrastructure to remote areas.
 - Work with WALGA to coordinate with other regional LGAs the collective buying power of multiple organizations, which could result in more favourable renewable energy infrastructure development prices and deals. The organisation may also have access to grants and funding programs that LGAs can tap into, which can help to offset costs and support sustainable renewable energy initiatives.

Conclusion

The mining sector and large initiatives like Western Green Energy Hub (WGEH) in Dundas and FFI South East WA Green Hydrogen Hub (FFI SEWA) in Esperance have the greatest potential for leading the decarbonisation journey in the GE region. Mining companies can adopt renewable energy technologies to enhance sustainability, reduce costs, cut carbon emissions, and strengthen their social license to operate. Collaboration between the Government, utilities, and local communities is crucial to fully realise these opportunities. State and Local Governments can offer incentives and policies that encourage sustainable energy practices in mining operations. Utilities can offer competitive pricing for renewable energy sources and develop innovative solutions for energy storage. By working together, stakeholders can transition the mining industry to sustainable energy and contribute to a net-zero emissions future, delivering both environmental benefits and economic growth.



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