

UTAS Future Energy Workforce Workshop

Internal background paper, June 3 2020

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This background paper provides

- 1) An overview of the energy sector in Tasmania and a brief synopsis of the investment and future employment outlook based on publicly available sources
- 2) Snapshot of energy sector employment and occupation mix in the Tasmanian energy sector in 2019 based on ABS data.
- 3) Project-specific analysis of future employment needs
 - Project Marinus
 - Hydro Tasmania's BoN
 - New generation projects
 - Hydrogen
 - On island low emissions opportunities
- 4) Estimates of future state-wide energy sector employment opportunities

Scope and limitations

- This preliminary analysis is based on a combination of ABS employment data and public reports on and reporting of future energy projects.
- The primary focus of this analysis is on *direct* employment although data on energy-related indirect employment is provided where available. However, energy projects are capital rather than labour intensive and the main employment dividend will be in indirect employment and associated community dividends.
- Public analysis of the specific mix of occupations and skills and the location of employment is limited and will be a focus of future work.

Key points

- Direct employment in energy generation, transmission and distribution has increased by 59% in recent years to 1930 FTE reflecting new renewable projects.
- Direct employment in the sector is dominated by skilled occupations (50%>AQF 7) and 70% of these positions are located in Hobart (although most construction-related will be in regional Tasmania)
- Under a high investment scenario direct construction employment in the sector will increase by **4,383 jobs** over the following decade a further **17,193** indirect jobs being created
- The policy and investment outlook in the national energy sector remains uncertain although increased investment in renewable generation, transmission and cognate industries in Tasmania appears likely.

1. The Tasmanian energy sector: The investment and employment opportunity

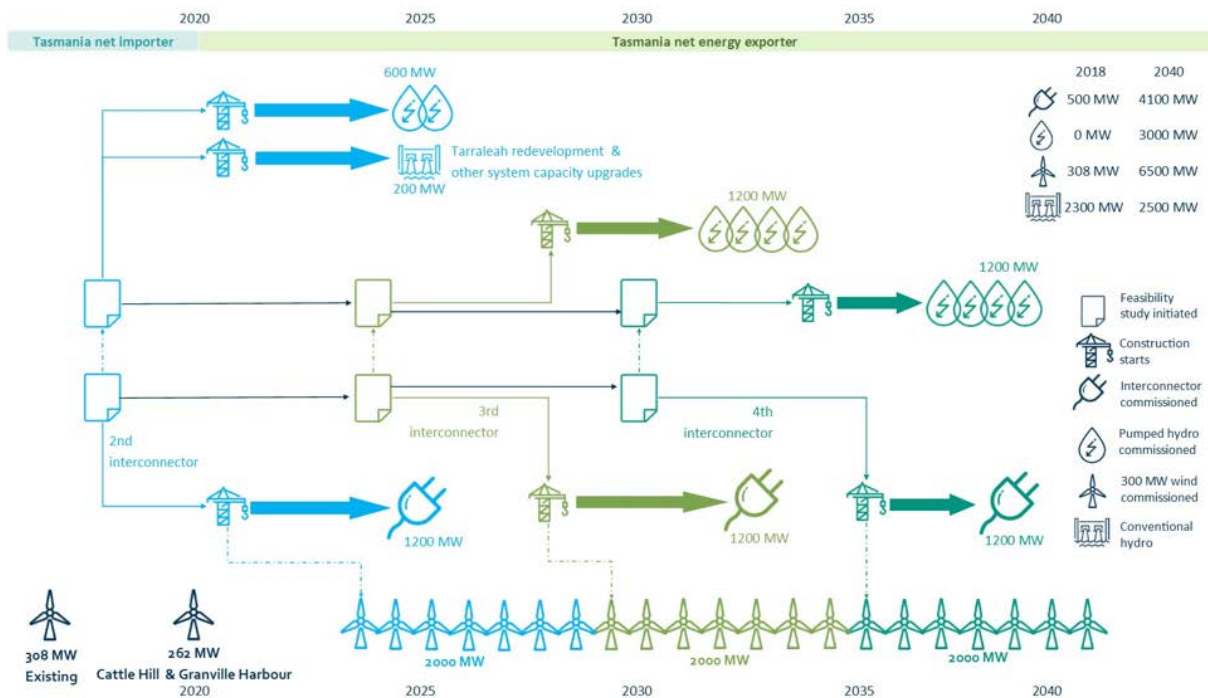
Tasmania has been a pioneer in the generation of renewable energy for over 125 years. More recently, hydro power has been supplemented by wind generation such that Tasmania now produces almost a quarter of Australia's total renewable electricity and became the first state in Australia to achieve zero net emissions in 2016.

Tasmania's renewable energy expertise and resources have the potential to make a major contribution to national emissions reduction targets through the supply of clean energy to the National Energy Market (NEM). Specifically, our capacity to supply reliable, cost effective renewable energy will underpin the expansion of wind and solar generation across the NEM.

On island, our renewable energy resources will provide a foundation for Tasmania's transition to a new zero emissions economy and will foster innovation and investment across a wide range of low emissions technologies and industries.

In order to realise Tasmania's ambition of building on its reputation as a global leader in renewable energy technologies strategies have been developed to promote the expansion of renewable generation in Tasmania and transmission to the NEM and, in the case of certified green hydrogen, export to East Asia and beyond.

A future Tasmanian investment pathway



The recently released *Draft Tasmanian Renewable Energy Action Plan* sets a target of doubling of renewable energy production in Tasmania through the generation of an additional 10,500 GWh of clean energy per annum by 2040. This energy could be exported to the NEM via the proposed Marinus Link and/or used in the production of green hydrogen or other uses across the Tasmanian economy. Having established additional demand for clean energy through Marinus or other means, investment in new renewable generation including pumped and optimised hydro, wind and solar will follow.

While the policy and investment outlook remains uncertain, given Tasmania's expertise and renewable energy resources, increased and sustained investment and employment in the sector is extremely likely. Indeed, under a 'high investment' scenario investment in the sector could reach \$7 billion over the next decade creating 4,300 direct construction jobs and a further 17,000 indirect jobs.

In order to fully capitalise on Tasmania's renewable energy potential, we need to ensure that we can meet both the direct skills needs of the industry as well as the indirect job opportunities in the wider communities. Not only will a strategic approach to workforce planning help ensure that more Tasmanians and their communities benefit from investment in renewable energy generation and transmission, providing relevant training and employment opportunities will also enhance community support for the Industry.

The Draft Tasmanian Renewable Energy Action Plan 2020



2. Current direct employment in the Tasmanian energy sector

- Direct employment in electricity generation, transmission and distribution sector in Tasmania in 2018 was approximately 1930 FTE (15th largest in Tas by 2 digit industry code)
- 78% of direct employment requires AQF Cert 4 qualifications of higher
- 69% of employment was based in greater Hobart
- Employment has grown by 59% since 2015 but, in the absence of new investment is forecast to decline over the next decade
- Net direct employment demand is forecast to decline by 426 FTE over the next decade in the absence of new investment

Employment

Employment outlook, by industry

Region

Tasmania
South East

Hobart
West and North West

Launceston and North East

1-digit industry code
(Scroll down)

Select all
 Electricity, Gas, Water and Waste Services

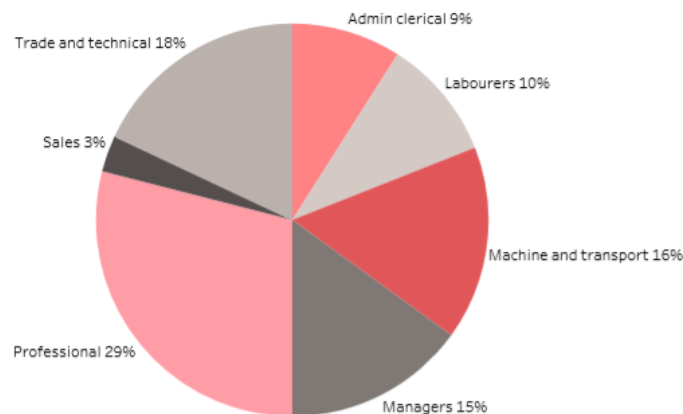
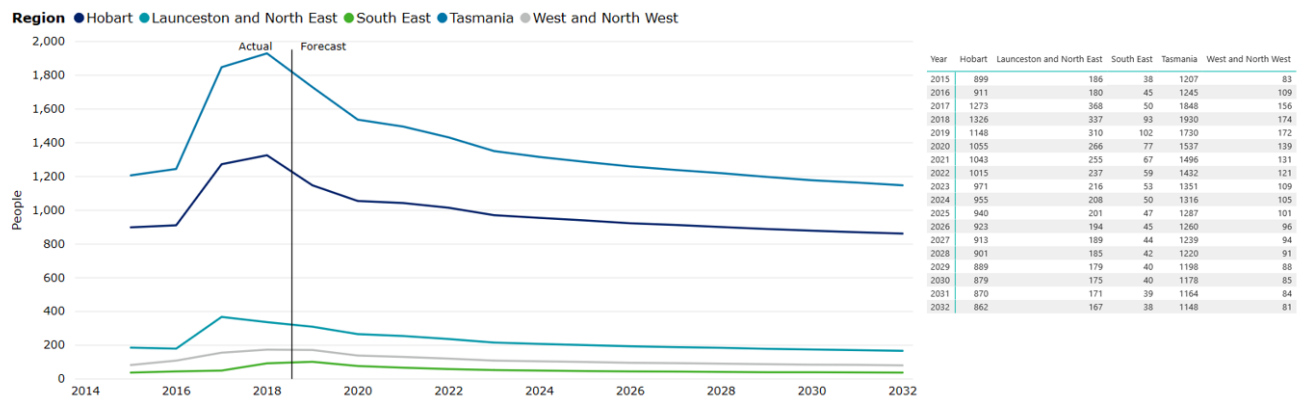
2-digit industry code
(Scroll down)

Select all
 Electricity Supply

3-digit industry code
(Scroll down)

Domestic Appliance Manufacturing
 Educational Support Services
 Electrical and Electronic Goods Retailing
 Electrical Equipment Manufacturing
 Electricity Distribution
 Electricity Generation
 Electricity Transmission
 Employment Services

Employment, by industry



Occupations in Tasmanian Energy Sector, 2019

3. Project-specific Analysis of Future Employment Needs

This section reports anticipated employment from proposed renewable energy projects. The assumption is that all of the listed project will proceed so it should be regarded as a high investment/employment scenario. The data has been obtained from public reports but has not been verified. Where not otherwise provided, indirect employment has been calculated using a standard multiplier.

The geography of employment. There is little public data on the likely location of future employment although we can reasonably assume that the majority of construction related work and associated indirect employment will be on the North West and West Coast with a hydrogen production facility likely to be located at Bell Bay. Given the prevalence of automation and use of technology the majority of operational employment is likely to be based in Hobart.

Occupational needs and skills demand. There is little public analysis of the precise occupational mix and skills needs associated future energy investment although we understand that this analysis is being undertaken by industry and government and will be a focus of the recently established energy and construction workforce development committee. EY published a preliminary overview of likely occupational demand and skills needs in the Tasmanian renewable energy sector.¹

| Occupation demand during construction | Occupation demand during operation |
|---------------------------------------|--------------------------------------|
| Civil engineering and construction | Electricity systems engineers |
| Professional and scientific services | ITC professionals |
| Construction management services | Mangers and finance specialise |
| Technical and trade services | Professional and scientific services |
| Admin and clerical workers | Maintenance trades and specialists |
| Labourers and drivers | Technical and trade services |

3.1 Project Marinus

Marinus Link is a proposed 1500MW undersea electricity connection to link Tasmania and Victoria, as part of Australia's future electricity grid. Many regard Marinus as the 'key' piece of transmission infrastructure which will unlock the next wave of investment in renewable generation in Tasmania. In November 2019, EY analysed the employment potential of the Marinus Link.

The analysis distinguishes between construction and operational employment

Construction is expected to commence in 2023 and conclude in 2027/28. The peak construction period is expected to span from 2025 to 2027. During this period, Marinus Link is expected to **support 283 direct and 1,109 indirect "job years"*** in Tasmania, then decline to 141 direct and 555 indirect jobs in 2028.

* All job figures in the report are in "job years". 'A "job year" represents one full time job supported for a full year - for instance, 1,000 job years may be 500 jobs sustained over 2 years, or 100 jobs over jobs sustained over 10 years' (EY/TN Report , Nov 2019, p 16).

Direct and indirect value added profile (job years supported)

| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 |
|----------|------|------|------|------|------|-------|-------|-------|------|
| Direct | 33 | 33 | 33 | 33 | 141 | 283 | 283 | 283 | 141 |
| Indirect | 130 | 130 | 130 | 130 | 555 | 1,109 | 1,109 | 1,109 | 555 |

Direct jobs in the construction phase include those *physically* involved in the building and installation process such as electricians, plumbers, engineers, welders, builders, metal workers, carpenters and support workers.

Indirect jobs are in Heavy and Civil Engineering Construction, and to a lesser extent in Rental, Hiring and Real-estate Services, Construction Services, Professional, Scientific and Technical Services, Manufacturing, Financial and Insurance Services, among other things such as Warehousing, Administration, Accommodation, Car Hire, and Food Services.

The **operational** phase is expected to commence in 2027/28 through to 2050. During this period, Marinus is expected to **support a peak of 152 direct and 342 indirect jobs** in Tasmania. Direct and indirect jobs are expected to increase over time.

Direct and indirect value added profile (job years)

| | 2020 to 2024 | 2025 to 2029 | 2030 to 2034 | 2035 to 2039 | 2040 to 2044 | 2045 to 2050 |
|----------|--------------|--------------|--------------|--------------|--------------|--------------|
| Direct | - | 40 | 127 | 127 | 127 | 152 |
| Indirect | - | 91 | 285 | 285 | 285 | 342 |

Direct jobs are in Electricity Distribution and Construction Services only.

Indirect jobs mirror the job profile as above (more Rental, Hiring and Real-estate Services jobs compared to fewer Food Services).

The EY analysis suggests that '*core jobs* in the operational phase include safety and incident support staff, operational and maintenance manager, plumbers, welders and other maintenance staff, corporate and financial staff, asset managers'. It does not assign these jobs direct and indirect categories.

Construction and Operational (Maritime) special category. 'Given Marinus Link's unique status as a maritime project, professionals with experience in dealing in ocean-based environments are required throughout both the construction and operating phase. *Core jobs* include, maritime safety staff, maritime preservation advisors, maritime construction and engineering specialists, maritime logistic and transportation specialists'.

3.2 Battery-of-the-Nation (pumped hydro)

Battery-of-the-Nation (BoN) largely involves the construction and operation of three pumped hydro storage facilities. Cethana, Lake Rowellan and (near)Tribute Power Station have been identified as possible sites. In conjunction with the Marinus interconnector the BoN projects would be able to provide ‘firming’ capacity and ‘deep storage’ for the NEM. The Tasmanian Government, through *Hydro Tasmania*, has committed up to \$30 million to develop one of these sites.²

Construction of the three facilities is expected to take place during the 2020s. Hydro Tasmania has explained that 'up to 300 people could be employed on each pumped hydro energy storage construction project...over the life of the construction period, which, on average, is estimated to be 3 - 4 years per site'. The analysis below assumes the 3 BoN projects will be delivered sequentially over a decade. Core jobs have been identified as 'Design, Engineering, Project management, Civil construction, Trade skills – electrical, mechanical, Transport'.

Operational employment estimates haven't been published publicly to the best of our knowledge however we would assume that the proportion of ongoing operational roles would be similar to project Marinus and we therefore estimate that the three BoN projects would support approximately **400 ongoing positions** beyond 2030.

| Battery of the national employment | |
|---|-----------------------------------|
| Direct construction Jobs | 300 per project in the 2020s |
| Indirect jobs during construction | 1170 approx in the 2020 9,718 p29 |
| Ongoing Operational Jobs | 400 in the 2030s+ |

3.3 New generation projects

The EY analysis also provided an estimate of 'induced investment' (solar, wind and pumped hydro projects) that may come online as a result of Marinus - see pages 23-30.³

New Generation Projects (wind and solar)

New Generation Projects are proposed wind and solar projects in Tasmania. The data below is largely drawn from proponent's websites as opposed to verified sources.

| Wind Farm | Location | Capacity MW | Jobs | Jobs Discussion |
|--------------------------|-----------------|--------------------|--------------------------------------|--|
| <i>Granville Harbour</i> | West Coast | 112 | 200 construction 10 permanent | 'the wind farm is expected to create around 200 temporary jobs during construction and 10 permanent jobs . During the construction period there will also be flow-on benefits for the local economy, particularly the nearby town of Zeehan and its local businesses' ⁴ |

| | | | | |
|--------------------------------------|---------------|-------|---|--|
| <i>Cattle Hill</i> | Great lakes | 148.5 | approx 200 construction 10 permanent | Expressions of Interest recruitment process in train ⁵ |
| <i>Jim's Plains / Robbins Island</i> | Circular Head | 1000 | 400 peak construction 65 operational | 'These projects will create employment opportunities, with up to 400 people needed during the peak of construction . At full development, an operational workforce of up to 65 people will be needed.' Locally sourced goods and services during the construction and operational phases, which may include: 'Accommodation and catering, Engineering, Construction materials and equipment, Local labour, Earthworks services, Fencing and landscaping'. ⁶ |
| <i>Whaleback Ridge</i> | Zeehan | 1500 | 2000 construction 50 permanent | 'create 2000 construction and 50 permanent jobs '. ⁷ |

| Solar Farm | Location | Capacity MW | Jobs | Jobs Discussion |
|--------------------|-------------|-------------|------|--|
| <i>Wesley Vale</i> | Wesley Vale | 12.5 | | Both solar projects have been proposed by Epuron - a renewable energy company. Both development proposals explain: 'The solar farm will benefit the local economy, creating a significant number of jobs during construction and the potential for additional jobs during operation and through the flow-on effects generated by the provision of accommodation, food, fuel groceries and associated needs throughout the life of the project.' ⁸ |
| <i>Georgetown</i> | George town | 5 | | |

The Ernst&Young /TasNetworks report presents a matrix of potential employment opportunities generated by 'induced investment' (solar, wind and pumped hydro projects) that may come online as a result of Marinus - see pages 23-30.

4. Renewable Hydrogen

In November 2019, the Tasmanian Government released its Draft Renewable Hydrogen Action Plan (HAP).⁹ The Plan articulated the Government's vision and a suite of actions to develop a renewable hydrogen industry in Tasmania. In terms of the jobs involved, the Plan asserts: 'Our Plan...will benefit Tasmanians through job creation and economic growth, particularly in regional areas'.

Renewable hydrogen is in the early stages of development. Therefore, estimates of the direct and indirect employment dividends of large scale hydrogen projects are speculative.

The Draft Plan repeatedly relies on Australia-wide job opportunities in the hydrogen industry modelled by ACIL-Allen:

'Analysis undertaken by ACIL-Allen indicates that under relatively conservative estimates, the economic benefits of Australia's potential hydrogen industry could reach approximately \$0.5 billion by 2025, \$1.6 billion by 2030, and \$4.3 billion by 2040, with additional employment of approximately 800 new jobs by 2025, 2800 jobs by 2030, and 7100 jobs by 2040'.¹⁰

Applying this national modelling to the local context the HAP argues:

*'A renewable hydrogen production facility in the range of around 10 to 100 MW could be a viable first-stage commercial scale facility at the Bell Bay Advanced Manufacturing Zone... (as ACIL-Allen shows) A 100-megawatt renewable hydrogen production facility would contribute an estimated **120 ongoing regional jobs**...while a 1000-megawatt facility, which could be feasible by 2030, would contribute an estimated **1200 regional jobs**.*

We understand that proponents have expressed interest in developing a 1000 MW facility at Bell Bay which would be operational by 2030. We therefore estimate that up to 1000 direct or 4000 indirect jobs during construction.

Energy Sector Employment Outlook – High growth/investment scenario

| | | |
|---|---|-------------------------|
| Marinus | Construction jobs | 283 |
| | Indirect jobs during construction | 1,103 |
| | Ongoing operational jobs | 69 |
| BoN | Construction Jobs | 300 (av. over 10 years) |
| | Indirect jobs during construction | 1,170 |
| | Ongoing operation jobs | 400 |
| New Gen. Renewables | Construction Jobs | 2800 [†] |
| | Indirect jobs during construction | 10,920 |
| | Operation operational jobs | 125 |
| Renewable Hydrogen | Construction Jobs | 1000 |
| | Indirect jobs during construction | 4000 |
| | Operation operational jobs | 1200 |
| Total Energy Sector Jobs | Construction Jobs (late 2020s) | 4,383 |
| | Indirect jobs during construction | 17,193 |
| | Ongoing operational jobs | 1,794 |
| EY Energy Sector Employment Analysis | Construction Jobs (job years) | 11, 707 |
| | Actual construction jobs (assuming 3 year employment) | 3,902 |
| | Operational jobs (job years) | 5,652 |
| | Actual operation jobs over 25 years | 226 |

[†] These employment figures are dominated by the proposed 1500 MWh whaleback ridge project

5. On Island Low Emissions Opportunities

Investment in the next generation of renewable energy generation and transmission in Tasmania has the potential to create thousands of skilled jobs. However, the renewable energy sector isn't labour intensive, especially in the operational phase. Perhaps the most significant long term employment opportunities associated with the TRAP will be created by Tasmania's broader transition to a climate-positive (below net zero) emissions economy. In order to make renewable energy work for the Tasmanian community and maximise investment and employment Tasmania will have to develop innovative, diverse and commercially sustainable uses for expanding renewable energy supply across these sectors:

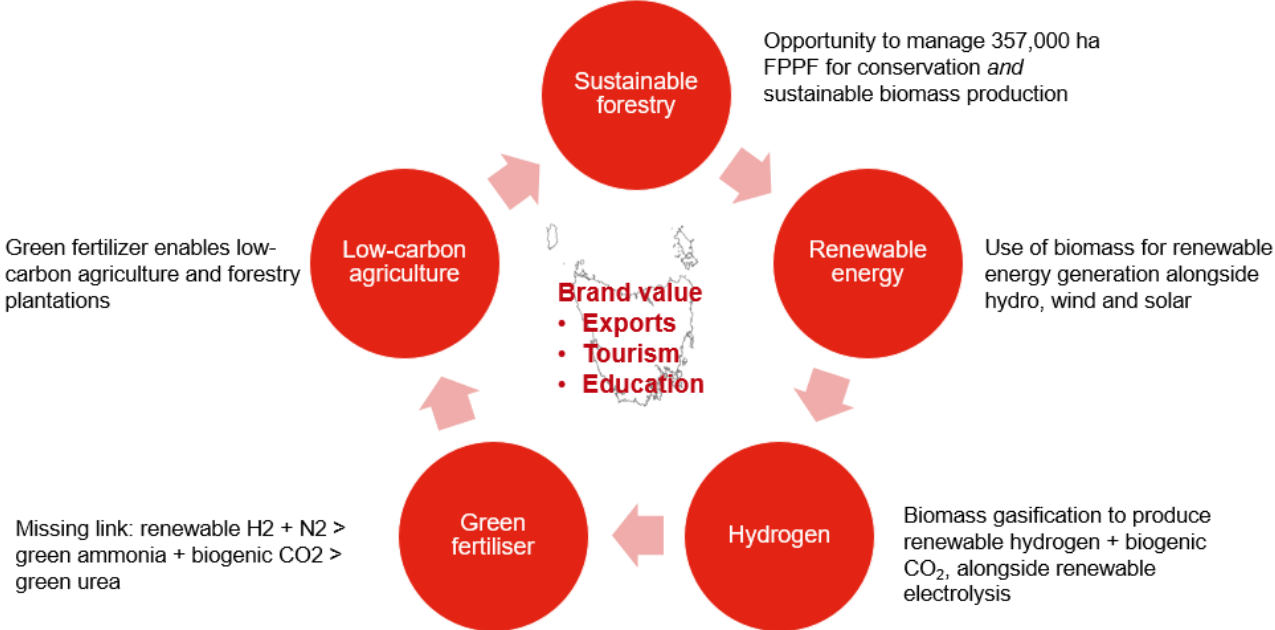
- **Transport** emissions have proven stubbornly consistent over time. Developing low emissions mass-transport networks presents significant opportunities for training and re-training future-focused high-tech mechanics, IT systems engineers, and metal and construction workers for example. Using new renewable energy sources for powering mass-transport networks is critical for emission reduction but would also enhance brand Tasmania.
- **Heavy industry** emissions could be tackled through innovations including on-island carbon offsets to cancel out fugitive emissions from industrial processes, which required University-trained technical experts. Perhaps most importantly Tasmania, as a globally competitive supplier of renewable energy, could become a hub for advanced manufacturing. As Ross Garnaut has argued, renewable energy is harder to transport than fossil fuels resulting in more manufacturing and energy intensive production being located near renewable energy suppliers such as Tasmania.
- **Agriculture** is the third significant emitter in Tasmania. University has a role to play supporting the increasingly diversified jobs and skills with specialist training in this sector. For instance, technical expertise in developing and implementing low-carbon-high-yield food production systems will become increasingly desirable as economics decarbonise.
- **Green hydrogen** production has the potential to not only form a key part of Tasmania's industrial future but should be used for export as well as for a range of domestic applications such as in:

Agriculture: Green hydrogen can be used to produce ammonia and low carbon fertiliser which would create a new industry while reducing emissions in our all-important and expanding agricultural sector.

Transport: The Tasmanian Government has explained that it is 'looking at opportunities across government to increase hydrogen uptake including rolling out hydrogen buses, fleet vehicles, ferries and barges'.¹¹

Heavy industry: The Tasmanian Government has 'identified Bell Bay and Burnie as Hydrogen Hubs and the Tasmanian and Australian government will work together to see how we can leverage existing resources and infrastructure to produce green hydrogen in these locations'.

Sustainable forestry, renewables, hydrogen and agriculture – all interconnected and supporting Tasmania’s brand



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6. Making a contribution beyond Tasmania

This brief analysis has focused on on-island employment opportunities which result from Tasmania's renewable energy strategy. However, given our reputation, track record and expertise in renewable systems research, design and development there is an excellent opportunity to export our training, skills and services to the world as part of the global transition to a low carbon economy. There is potential to attract interstate and international students to distinctive degrees and courses which focus on renewable energy systems and technology while there is potential for our graduates and other Tasmanians who have gained professional experience in the sector to work globally. Finally, as Entura have demonstrated, there is potential to export our renewable energy knowledge and expertise well beyond Tasmania's shores.

References

¹ The Economic Contribution of Marinus and Supporting Transmission, *Ernst&Young (TasNetworks)*, Report, 20 November 2019.

² Battery of the Nation Investment and Employment Opportunity, *Hydro Tasmania*, July 2018.

³ The Economic Contribution of Marinus and Supporting Transmission, *Ernst&Young (TasNetworks)*, Report, 20 November 2019.

⁴ Granville Harbour Windfarm, Company website, FAQs.

⁵ Cattle Hill Wind Farm, Company website.

⁶ Jim's Plain and Robbins Island Renewable Energy Parks, Company website - UPC, FAQs.

⁷ Bill Shorten, Labor Back West Coast Renewable Energy Surge, *The Advocate*, 2 May 2019.

⁸ See Company website - Epuron - for these documents.

⁹ Tasmanian Renewable Hydrogen Action Plan, Draft, Department of State Growth, November 2019.

¹⁰ *Opportunities for Australia from Hydrogen Exports*, in Tasmanian Renewable Hydrogen Action Plan, Draft, Department of State Growth, November 2019.

¹¹ Guy Barnett and Michael Ferguson, 'Re-issued: Becoming the Nation's Renewable Hydrogen Industry Epicentre', *Joint Media Release*, 19 May 2020.