TASmania

The Perfect Location for The Renewable Hydrogen Revolution
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MINISTERIAL FOREWORD

As the world increasingly looks to decarbonise, Tasmania offers the perfect environment for industry and investors looking to be at the forefront of the rapidly emerging hydrogen industry.

Over 100 years of sustained investment in renewable energy infrastructure and technology has placed Tasmania as a leader in renewable energy supply, knowledge and expertise. Now, Tasmania is on track to be the first state in Australia to be self-sufficient in renewable power generation by 2022.

This abundance of renewable energy sets Tasmania apart and offers investors a truly unique proposition; the ability to produce low cost hydrogen through competitively-priced renewable energy generated by high capacity wind power firmed by reliable hydropower.

The Tasmanian Government is highly supportive of seeing a hydrogen based industry flourish within the state both for export and domestic application and this vision has been articulated in the Tasmanian Renewable Hydrogen Action Plan.

This plan sets out the Government’s goals and actions to position Tasmania as a leader in the large-scale production of renewable hydrogen with the aim to see the export of renewable hydrogen commence by 2025 and be a significant global producer and exporter of renewable hydrogen by 2030.

Large-scale hydrogen production is very achievable in our state. Tasmania has a track record of supporting and sustaining energy intensive major industry with its renewable energy and established industrial precincts.

This includes Tasmania’s renowned Bell Bay Advanced Manufacturing Zone with its flat accessible land, access to water, rail and electricity infrastructure and plentiful renewable energy, as well as adjacent deep water major port, ‘ticks the right boxes’ for the establishment of hydrogen production facilities.

Tasmania has the required credentials to support the emerging hydrogen industry. Our University of Tasmania is currently leading the $329 million Blue Economy Cooperative Research Centre. This centre is the largest-ever of its type and will include a focus on renewable energy and hydrogen in marine and aquaculture industries.

We invite you to engage with our Government and to form long-term strategic relationships to advance this extraordinary opportunity. We encourage you to leverage our unique proposition and to invest here to deliver renewable hydrogen from Tasmania – Australia’s renewable state.

Hon Guy Barnett MP
Minister for Energy

Hon Michael Ferguson MP
Minister for State Growth
KEY PROPOSITION

Australia’s Chief Scientist, Dr. Alan Finkel has identified a huge market opportunity for Australia to supply the world with renewable hydrogen (ie hydrogen produced utilising renewable energy). Factors such as an abundance of renewable energy; proximity to committed markets in Asia supported by well-established trading relationships, and the ability for Australia to leverage expertise and infrastructure to develop hydrogen export supply chains, places Australia in a globally unique position.

Indeed, a number of independent reports have validated Australia’s potential in the global marketplace. For example, the World Energy Council’s International Aspects of a Power-to-X Roadmap classifies Australia as a ‘giant’ which has the potential to become a key player due to its disproportionately vast renewable resources potential.

Like natural gas, Australia could be the world leader in the production and export of renewable hydrogen. ACIL Allen estimates that capitalising on this growing demand could, by 2040, result in hydrogen exports of over 1.3 million tonnes and worth around $5.7 billion.¹

Tasmania is by far the best placed of all Australian states and territories to capitalise on this growing demand and support the development of hydrogen production and export industries due to its unique combination of factors:

• the highest renewable penetration in Australia (already over 95 per cent) that is readily expandable
• an energy system firmed by a huge proportion of dispatchable hydropower
• the largest fresh water storage capacity of any Australian state; and
• the existing and available infrastructure needed for shovel-ready projects to proceed.

The result of this combination is that the cost of hydrogen production can be minimised through competitively-priced renewable energy from high capacity wind and supported by hydropower supply.

Tasmania is in an extraordinary position. A large-scale cost-competitive renewable (or ‘green’) hydrogen production industry could be initiated today and with numerous opportunities to leverage this market position to form long-term strategic relationships.

TASMANIA’S RENEWABLE HYDROGEN CREDENTIALS

Tasmania is exceptionally well placed to develop a competitive large-scale renewable hydrogen industry to meet international demand by using its abundant and high-quality renewable energy and water resources.

One of Tasmania’s key advantages is provided through the combination of wind power with significant capacity firming hydropower, which could provide high capacity factor production of renewable hydrogen.

This is confirmed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), an independent Australian federal government agency responsible for scientific research, which notes in its National Hydrogen Roadmap, “The primary consideration for hydrogen production via electrolysis is access to low cost and low emissions electricity…Tasmania is a somewhat unique locality as it offers the potential to combine a high grade wind resource with hydro–electric generation which would lead to a high capacity factor.”

Japan and Korea as well as other markets have indicated their intentions to import substantial quantities of hydrogen produced from clean sources to help them meet emission reduction targets. The hydrogen may be produced using fossil fuels with carbon capture and storage (CCS) or from renewable energy (‘renewable hydrogen’).

However, Tasmania’s engagement with industry to–date has indicated an expressed preference for hydrogen produced from renewable energy sources.

Tasmania’s extraordinary set of advantages for producing renewable hydrogen includes:

- **Low cost.** Preliminary analysis by Tasmanian Government owned generator, Hydro Tasmania (HydroTas), indicates Tasmania can produce renewable hydrogen at around 10–15 per cent less than other Australian power grids and 20–30 per cent less than from dedicated off–grid renewables.

- **Low risk.** International partners can rely on hydrogen supply from Tasmania due to a high level of energy security. Tasmania is stable in terms of geopolitical and other major risks.

- **Potential for high electrolyser utilisation.** Wind and solar energy firmed by hydropower could provide a reliable supply of renewable energy at all times of the day.

- **100 per cent renewable integrated system.** Tasmania currently has a very high renewable energy contribution (over 95 per cent) and will be the first state in Australia to be 100 per cent self–sufficient in renewable power generation – on target for 2022. This provides strong credentials for the provision of renewable hydrogen from an integrated power system and the immediate potential for large scale production.

- **Strong transport infrastructure options and established industrial precincts.** Tasmania has existing and expandable port infrastructure already with strong transmission infrastructure, abundant fresh water resources and a range of established industrial precincts containing development sites with flat available land. Tasmania and Australia are comparably near to Japan and Korea, both of which are actively developing opportunities and partnerships to deliver clean hydrogen.

- **Options for expansion of supply.** Expansion of Tasmania’s renewable energy generation through development of further interconnection with mainland Australia and the Battery of the Nation project will provide more options for supply. This includes almost 9GW of potential feasible new wind locations, all with world class wind resources driven by the Roaring Forties (latitude) weather pattern as well as scope for multi gigawatts of pumped hydro capacity by 2040.

- **Skilled workforce.** Access to a highly skilled and innovative workforce supporting Tasmania’s extensive established renewable energy and major industries, and world–class educational and research institutions including the Blue Economy Cooperative Research Centre.

- **Tasmanian brand of origin.** Tasmania’s ‘clean, green’ brand is likely to add further value to renewable hydrogen produced in the state.

- **A supportive Government.** The Tasmanian Government along with the Australian Government are highly supportive of developing the hydrogen economy. The Tasmanian Government has recently released its Tasmanian Renewable Hydrogen Action Plan detailing its plans to be a leader in large–scale renewable hydrogen production and a significant global supplier of renewable hydrogen by 2030 to meet export and domestic demand.

It is also noted that the Tasmanian Government owns Hydro Tasmania (generation) and TasNetworks (transmission and distribution networks) which can provide support to proponents looking to produce hydrogen within the State.
**LOW COST**

Tasmania has a range of options that could be used to support renewable hydrogen production. Notable benefits can be derived from using energy directly from the grid to achieve high capacity factors.

Hydro Tasmania has undertaken research into the potential cost that hydrogen could be produced in Tasmania by 2030. Based on preliminary analysis, the lowest cost of production is likely to be achieved between an 80 per cent and 90 per cent capacity factor. At even higher capacity factors electricity would be consumed at high price periods which would affect the total cost of electricity and result in substantially increased production costs.

The analysis indicates that renewable hydrogen could be produced from the grid in Tasmania at around 10–15 per cent lower cost than other Australian power grids (at average emissions intensity) and 20 per cent to 30 per cent less than from dedicated off-grid renewables.

**FIGURE 1. PRELIMINARY ANALYSIS BY HYDRO TASMANIA ON COST OF HYDROGEN PRODUCTION IN 2030.**

3 Hydro Tasmania November 2019. Tasmania’s green hydrogen opportunity. Tasmania’s unique advantage as a ‘green hydrogen’ development zone.
LOW RISK

Affordable, reliable and secure energy is one of the key foundations of a successful modern economy. Importing energy from an international partner is a decision that needs to be made carefully – particularly with respect to the full complement of risks.

Geopolitically and economically Tasmania, as with the rest of Australia, should be considered stable and low risk. This is very attractive when dealing with energy security.

HIGH CAPACITY RENEWABLE ENERGY

While solar Photovoltaic (PV) systems and wind are now the cheapest sources of new electricity, the relatively low capacity factor available for production (25 per cent to 50 per cent) has a significant impact on economics.

Tasmania is unique in Australia in that it has a large existing hydro generation system that is capable of providing renewable firming to new low cost wind generation in a region that will become a net exporter of renewable energy. This provides a major advantage to the economics of renewable hydrogen production as it is possible to produce in Tasmania from grid supply at high plant utilisation.

A much higher capacity, achieved through hydropower firming, allows the fixed costs of the production facility’s plant and equipment to be spread across more hours of operation, resulting in a lower cost per kilogram of hydrogen.

PRODUCTION AT LARGE SCALE

A 100MW renewable hydrogen production facility is estimated to produce around 14 000 tonnes of renewable hydrogen per year as either pure hydrogen or embedded within derivatives such as liquid hydrogen, ammonia or methanol and could easily be accommodated within the Tasmanian context. Future expansion to a 1 000MW facility would produce an estimated 140 000 tonnes, representing just 11 per cent of the 1.3 million tonnes export potential by 2040 predicted by ACIL Allen and around eight per cent of Japan’s import target by 2030.

In addition to its substantial existing renewable energy generation, Tasmania has the potential to add significant new renewable energy infrastructure to support renewable hydrogen production.

Already there is over 1 000 MW of additional wind development currently considered as being in their planning phases within Tasmania and over 2 000 MW of other wind projects currently being investigated. Analysis under the Battery of the Nation initiative demonstrates that multi–gigawatt new wind development is feasible with scope for substantial pumped–hydro capacity by 2040.
ESTABLISHED INDUSTRIAL PRECINCTS WITH STRONG INFRASTRUCTURE

Tasmania has a number of sites well suited to hydrogen production development. In particular the Bell Bay Advanced Manufacturing Zone is ideally suited to accommodate large-scale production. Other potential sites which would suit production for domestic usage include industrial precincts linked to ports in the north west of the state and at industrial precincts located at Brighton in the state’s south and Westbury in the state’s north.

The National Hydrogen Strategy highlights the importance of Australia developing hydrogen industrial hubs to develop the industry, with the objective of hubs that can most efficiently leverage existing infrastructure, that have access to sufficient energy and water, and that have the potential to aggregate demand for export and/or for domestic uses.

Concentrating hydrogen related activities around industrial hubs should provide the required economies of scale to viably produce and deliver hydrogen to end users.

The Bell Bay Advanced Manufacturing Zone meets all the requirements and is ideally placed to become a hydrogen industrial hub, utilising Tasmanian renewable energy for large-scale renewable hydrogen production and storage, particularly for export but also for domestic application.

Further details regarding this zone and its suitability for hydrogen production are highlighted in the section ‘Bell Bay Advanced Manufacturing Zone and deep water port – a ready location for hydrogen production.’
EXPANSION OF SUPPLY – BATTERY OF THE NATION AND PROJECT MARINUS

In response to identified and forecast electricity demand across Australia, work is currently underway in Tasmania on a number of capacity building projects.

This includes:

- Project Marinus, a business case assessment of a second Bass Strait interconnector being undertaken by TasNetworks
- Battery of the Nation project, undertaken by Hydro Tasmania
- other opportunities identified through the Australian Energy Market Operator’s Integrated System Plan (ISP) to fill the gap that the retirement of ageing coal–fired power stations on the Australian mainland will create.

The Battery of the Nation initiative is about investigating and developing a pathway of future opportunities for Tasmania to make a much greater contribution to the transformation of the National Energy Market (NEM).

This includes new dispatchable capacity from a combination of hydropower system expansion including pumped hydro, new wind and more transmission and interconnection.

Significantly, Tasmania is well placed to dramatically increase its renewable energy supply. Hydro Tasmania’s recently completed pre–feasibility study, jointly funded with the Australian Renewable Energy Agency (ARENA), has identified a strong portfolio of cost–competitive future pumped hydro opportunities, with a combined capacity of 3 400 MW. Work is well advanced on a full feasibility assessment of the top three identified pumped hydro opportunities: Lake Cethana and Lake Rowallan in the north west and near Tribute Power Station on the West Coast.

The Battery of the Nation initiative has also identified that some 8 700 MW of feasible potential new wind locations could be developed in the state, because of world class wind resources driven by the Roaring Forties (latitude) weather pattern.

Project Marinus is investigating how further interconnection between Tasmania and mainland Australia might form a key part of Australia’s future electricity and communication grid. Investigations into Project Marinus have identified that up to 1 500 MW of additional interconnection from Tasmania to Victoria across Bass Strait by the mid–2020s may be feasible, unlocking more low–cost, reliable and clean Tasmanian renewable energy for the benefit of the nation.

The development of a large–scale renewable hydrogen industry is complementary to Battery of the Nation and Project Marinus, providing additional diversification and reflecting the underlying strength of Tasmania’s existing and expandable renewable energy resources.
‘GUARANTEE OF ORIGIN’ CONSIDERATIONS

Discussions are occurring at an international level regarding an accepted worldwide ‘guarantee of origin’ standard for hydrogen.

It is considered very unlikely that emissions free attributes will be transferred simply through power purchase agreements from producers of (variable) renewable energy noting that to achieve economic plant utilisation it will be necessary to procure firming which would need to be sourced from predominantly fossil fuels in most regions.

In order to achieve green certification for hydrogen, purchase of a guarantee of origin, carbon offset or carbon credits to cover the emissions intensity from the grid may be required. This will add additional cost to the production of hydrogen (or ammonia etc) to achieve the ‘green’ status from a power system with emissions.

For example, Australian Carbon Credit Units (ACCUs) are trading at around $15–16 per tonne in October 2019 while emissions intensity factors vary between regions with an average across the NEM of around 0.725 T CO2/MWh.

As Tasmania becomes self–sufficient in renewable energy it is likely that it will be able to produce hydrogen without additional costs associated with carbon abatement in order to achieve green status.

POLICY SUPPORT

The Tasmanian Government is highly supportive of developing renewable hydrogen and derivatives (such as ‘green’ ammonia, liquid organic hydrogen carriers or other derivatives) with this support demonstrated through its Tasmanian Renewable Hydrogen Action Plan. The plan highlights that renewable hydrogen presents a tremendous opportunity for Tasmania to lead an emerging market for low and zero emissions energy, by producing hydrogen for industrial application and export from clean, competitively priced renewable sources of energy.

The plan has the goal of Tasmania becoming a significant global producer and exporter of renewable hydrogen by 2030. It is also intended that locally produced renewable hydrogen will comprise a significant portion of the energy used in Tasmania.

TASMANIA – AUSTRALIA’S RENEWABLE STATE

Tasmania is Australia’s leader in renewable energy and offers an especially compelling location for investors looking to establish facilities for the production and export of renewable hydrogen.

The latest Clean Energy Australia report released by the Clean Energy Council of Australia highlights that Tasmania is the most significantly advanced state in terms of renewable energy penetration (over 95 per cent). The next closest is South Australia and Victoria at 53 per cent and 20.6 per cent renewable penetration respectively. Last year, Tasmania generated 11 584 GWh of renewable energy, the highest of any Australian state or territory and representing 24 per cent of Australia’s total renewable energy generation.

Tasmania’s existing electricity supply is dominated by hydropower, consisting of 30 hydropower stations. Total installed electricity generating capacity on mainland Tasmania is 2 975 MW, comprising 2 283 MW of hydro–electric generation, 386 MW of thermal generation and 308 MW of wind generation. There are also a growing number of generators embedded in the distribution network, with small scale solar photovoltaic generation providing approximately one per cent of Tasmania’s electricity.

Wind power is making an increasingly important contribution, with total installed capacity to increase to 564MW, once construction of the Cattle Hill and Granville Harbour wind farms are complete (expected 2020–21).

Tasmania has been a forerunner in the development of renewable energy generation, with over 100 years of continued investment in renewable energy infrastructure and technology. These years of experience have helped Tasmania to develop an unmatched level of renewable energy skill and expertise among our engineers and technicians.

Tasmania benefits from having a significant water resource (27 per cent of the nation’s total freshwater reserve capacity with just one per cent of Australia’s land area), and a significant wind resource with the state being perfectly situated to capture the prevailing westerly winds from the Roaring Forties.

With Tasmania’s hydro system not being capacity constrained, the state is in the enviable position of having a consistent, reliable supply of renewable energy that already meets the vast majority of the state’s energy demands.

Additionally, Tasmania has the lowest per capita greenhouse gas emissions of any Australian state or territory. Our latest figures show that Tasmania has reduced its emissions by 95 per cent from 1990 levels. Tasmania also benefits from its capacity to import and export electricity via the Basslink interconnector, with Tasmania’s renewable energy supply making an important contribution to meeting peak demand levels interstate.
A SKILLED, COMPETENT AND ADAPTABLE WORKFORCE

Tasmania boasts a diverse and highly skilled workforce that has a proven track record in meeting the needs of industry, with particular strengths in advanced manufacturing and renewables. Many of these workers received their training through Tasmania’s world-class educational and training institutions, including the University of Tasmania and TasTAFE, which offer courses tailored to meet the needs of major Tasmanian industries.

Tasmania’s labour force totals around 265,000 people with manufacturing one of Tasmania’s most significant employment sectors, ranking in the top seven industries by employment in the state.

Investors seeking to establish a hydrogen production facility in Tasmania would benefit from Tasmania’s well-regarded employee loyalty and staff retention record. Research undertaken by the National Institute of Labour Studies highlights that Tasmania’s retention rate per employee in the private sector of 6.08 years is higher than any other state in Australia with the national average being 4.85 years.

Tasmania also has a sizeable Fly-In Fly-Out (FIFO) workforce which resides in Tasmania yet travels to mainland Australia to work. Given the opportunity of being able to both reside and work in the state, workers within this group could be attracted to utilise their skills in a hydrogen production facility. Most recent data indicates that there are over 4,000 FIFO technicians, trade workers, and machinery operators etc. as well as approximately 2,000 FIFO labourers based in Tasmania.

The workforce also benefits from the strong education culture that is fostered by Tasmanian educational facilities. The University of Tasmania is consistently ranked in the top 10 research universities in Australia and within the top two per cent of universities worldwide, and has four campuses, offering graduate and post graduate qualifications. Indeed, the university is currently expanding its campus offering in northern Tasmania with a $330 million investment in new facilities near the Launceston CBD.

The Australian Maritime College (AMC) is Australia’s national centre for maritime education, training and research, and has campuses in Launceston and Beauty Point. It was one of the seven founding members, representing five continents of the world, of the International Association of Maritime Universities (IAMU). The AMC offers vocational certificates, graduate and post graduate qualifications via specialist teaching, learning and world-leading research facilities in maritime and maritime related fields.
Tasmania is also home to TasTAFE, one of Australia’s 10 largest Registered Training Organisations (RTOs). TasTAFE provides vocational education and training ensuring the state’s workforce is equipped with vocation ready skills and that employers are supported to lift the productivity of their workforces through skills development.

The capacity of Tasmania’s workforce will soon receive a further boost, through the $17 million ‘Energising Tasmania’ initiative which will provide training in priority areas to further increase Tasmania’s skilled workforce capacity, in readiness for major energy developments in Tasmania including Project Marinus, Battery of the Nation and hydrogen industry development.

Tasmania can supply a skilled workforce to proponents looking to establish hydrogen production facilities in the state as well as working in conjunction with our training organisations to continue a strong pipeline of apprentices, graduates and skilled tradespeople. It is anticipated that a significant proportion of staff would be able to be sourced domestically. In the event that staff are required to be recruited from outside the state, then we are confident that Tasmania’s desirability as a place to work, live and raise a family will continue to attract the required workforce.

Demonstrating this notion, Tasmania is experiencing strong population growth with its current annual population growth rate at more than the decade–average growth rate.

Tasmania is increasingly attracting global attention for the work and lifestyle options it can offer; its geography and culture, as well as its very close proximity and easy access to mainland Australia.
RESEARCH AND DEVELOPMENT CAPABILITY

Tasmanian businesses and educational institutions have a proven history of innovation, particularly in regard to the research, development and delivery of renewable energy–based solutions to overcome technical challenges and provide environmental and economic benefits.

As noted, the University of Tasmania is consistently ranked in the top 10 research universities in Australia and within the top two per cent of universities worldwide. It is currently leading Australia’s largest–ever Cooperative Research Centre (CRC), the $329 million Blue Economy CRC, bringing together expertise in aquaculture, marine renewable energy and offshore engineering. The 10–year collaboration will involve 45 national and international partners from industry, research and government and will support a research community of 50 PhD students and 50 post doctoral research fellows.

Investigation into renewable energy systems to support offshore aquaculture will be a key research area for the CRC, with a focus on renewable hydrogen which is expected to play a critical role in storing, transforming and distributing renewable based energy in the offshore marine environment. Research areas will also include the use of hydrogen as a fuel for powering offshore vessels and the supply of oxygen for aquaculture as a co–product of hydrogen production by electrolysis.

This research will be crucial to establishing commercial pathways to transition away from fossil fuels, such as diesel, toward renewable hydrogen–based systems to support offshore aquaculture.

The potential for offshore renewable hydrogen production for export will also be investigated, recognising the beneficial synergies this could provide through scale and access to additional markets in contributing to the costs of offshore infrastructure.

The University of Tasmania has also established the Future Energy collaborative research group with a vision for Tasmania to be an internationally recognised experimental hub for energy. The group brings together diverse disciplines including engineering, economics, law, marine science, social science and humanities to research and develop options for future energy provision in Tasmania. Research into renewable hydrogen production and use is an emerging key research theme for the Future Energy group.

The Australian Maritime College holds a unique position as Australia’s national maritime centre with the most advanced maritime research facilities in the Southern Hemisphere. This creates an exceptional environment for facilitating research in diverse areas such as maritime renewable energy, naval architecture, fluid dynamics, offshore engineering, human centred design, and sustainable ports. Opportunities for research and collaboration may include areas such as maritime transportation and storage, as well as powering maritime fleets via renewable hydrogen or hydrogen derivatives.
BELL BAY ADVANCED MANUFACTURING ZONE AND DEEP WATER PORT – A READY LOCATION FOR HYDROGEN PRODUCTION

The Bell Bay Advanced Manufacturing Zone (BBAMZ) is Tasmania’s premier industrial zone and has the established infrastructure, capacity and ease of access to transport options to support the production of hydrogen and its derivatives.

Of the many exceptional attributes of the BBAMZ, is the presence and sheer ease of accessibility to the adjacent deep-water port. This ideal pairing of the zone and major port offers a unique advantage to those looking to establish and operate hydrogen production facilities from the BBAMZ.

The BBAMZ is located approximately five kilometres from George Town in northern Tasmania. It consists of two distinct areas: the light industrial subdivision and the heavy industrial subdivision as well additional tracts of industrial land surrounding these subdivisions.

The BBAMZ benefits from being strategically located at the mouth of the Tamar River just 45 kilometres from Tasmania’s second largest city, Launceston and 192 nautical miles from Melbourne (Port Phillip). The BBAMZ is Tasmania’s largest heavy-industrial area, covering approximately 28 square kilometres and is recognised as a regionally significant precinct.

Bell Bay has a long established and proud heritage of meeting the needs of multi-national and local businesses alike. Multi-national operators such as the Rio Tinto owned Bell Bay Aluminium have a significant presence within the BBAMZ and benefit from the unique features on offer. It is noteworthy that Bell Bay was originally chosen as the location for the aluminium smelter because of the available hydroelectric power and deep water facilities.

With approximately 30 businesses operating in the BBAMZ, a range of significant industrial and advanced manufacturing activities currently occur including resource processing, fuel storage, plastics manufacturing, timber processing, steel fabrication and parts manufacturing.

Reflective of these heavy and light industrial activities, the BBAMZ provides the perfect location for those seeking to produce hydrogen and to leverage Tasmania’s world renowned ‘clean and green’ reputation of producing quality, premium products for export to national and international markets.

The Bell Bay region is considered an infrastructure gateway for Tasmania with a number of key infrastructure services and assets connecting Tasmania to mainland Australia via the region. This includes the Tasmanian gas pipeline and the Basslink interconnector which connects to the George Town substation, the largest substation in Tasmania. The presence of this level of key infrastructure in proximity to the BBAMZ combined with ease of connectivity to main transport networks, further supports the proven credentials of the BBAMZ to accommodate major industry.

George Town is the local economic centre and is close to the BBAMZ. It offers a range of accommodation, dining options, housing, shopping, banking, medical facilities, schools and the commercial services one would expect from a local centre. Also, of note is the township’s proximity (less than one hours’ drive) to the world acclaimed Barnbougle Dunes and Lost Farm golf courses.
Barnbougle Dunes is rated the number four course in Australia by Australian Golf Digest and the number 11 course in the world by US Golf Digest in 2018. Lost Farm is rated the number six course in Australia by Australian Golf Digest and the number 26 course in the world by US Golf Digest in 2018. Both courses are a ‘must play’.

Just 40 minutes’ drive from BBAMZ is Tasmania’s second largest city and the region’s mercantile centre, Launceston. The city and the north east region accommodates almost 30 per cent of Tasmania’s businesses and over one quarter of Tasmania’s population.
KEY FEATURES OF THE BELL BAY ADVANCED MANUFACTURING ZONE

PORT
The Port of Bell Bay is an ideally situated deep water industrial port. A natural safe harbour with the huge advantage of being close to large flat industrial land opportunities, without the urban encroachment issues confronting many other ports.

Operated by TasPorts a Tasmanian state-owned company, the Port of Bell Bay is a major port for domestic and international bulk goods as well as container services. With over 4.2 million tonnes per annum of freight handled, the port provides all-weather access, and significant infrastructure, and skilled staff capable of handling bulk and container freight movements. The port is accessible and navigable, with draft of up to 11.5 metres.

The port currently handles freight such as fuel, metals, timber, timber products, and food products. Full port services are provided including pilotage, towage, fuel, provisioning, stevedoring, quarantine and maintenance.

The port is ideally situated less than 200 nautical miles from the Port of Melbourne, Australasia’s largest maritime hub for containerised, automotive and general cargo, and provides an important linkage to Australia’s extensive rail network.

The port features extensive lay down areas both portside and waterside. A range of level secure landside areas along with a variety of on-site buildings are available for lease by arrangement with TasPorts.

The port is well suited to assisting with the transportation of hydrogen. For example, berth four has ample capacity to welcome new vessels currently providing for berthing of tanker vessels with a depth alongside the berth of 12.0 metres at Lowest Astronomical Tide.

There are existing above ground oil pipelines connected to a tank farm located 33 metres elevation above manifolds. Fuel pipeline bunkering exists and with further investment into a new parallel pipeline, the port can support shipping liquefied hydrogen or liquid ammonia.

ELECTRICITY
The BBAMZ has available capacity at the nearby George Town substation to service the biggest commercial electrolyser currently deployed with minimal upgrades needed. As the BBAMZ has provided consistent, reliable renewable energy to some of the most energy intensive industries in Australia, it presents as the perfect location to establish hydrogen production. For facilities at large scale this may require further augmentation to the network but the infrastructure is there to make this efficient.

The George Town substation is the largest load centre in Tasmania and options exist for supply at 22kV, 110kV, or 220kV.

Identified approximate available capacity⁶ from the George Town substation is as follows:

- 31 MW at 22 kV (50 MVA supply transformer firm capacity to 19 MW MD)
- 263 MW at 110 kV (400 MVA network transformer firm capacity to 137 MW MD)
- 273 MW at 220 kV (1244 MVA transmission circuit @ 90% non-firm capacity to 470 MW MD and 500 MW Basslink export).

⁶ Approximate available capacity is based on 2018 calendar year loads and a number of common assumptions including, no contribution from the Tamar Valley Power Station, continuous (transformer) and summer 25°C (transmission circuit) ratings used and unity power factor. These are approximate figures only, calculated at a particular point in time.
WATER
Tasmania is blessed with abundant water with heavy rainfall a particular feature of the state's western region. It is worth highlighting that while Tasmania represents only 0.9 per cent of Australia's land area, the state has approximately 27 per cent of the nation's total freshwater reserve capacity. The BBAMZ is well serviced with raw (untreated) and reticulated treated water supply with pipe size running into the precinct ranging from 100mm – 450mm in diameter. Given potable water is becoming an increasingly valuable resource, there are numerous identified opportunities for utilisation of greywater that could be repurposed for the production of hydrogen. In addition, there is sufficient renewable energy to power a decent sized desalination plant should a proponent wish to explore this avenue.

The George Town Waste Water Treatment Plant is located in the BBAMZ and services George Town. Subject to the relevant approvals, this treatment plant is accessible for the disposal of waste water for businesses in the BBAMZ.

WORKFORCE
The BBAMZ has been operating as an industrial zone for over 65 years. Since its inception it continues to support significant heavy and light industry including Rio Tinto's Bell Bay Aluminium as well as Kymera, Timberlink and a range of other businesses. The region has provided a highly skilled and adaptive labour force to support the BBAMZ and its businesses for many years. Indeed, the aluminium smelter is the first and longest running aluminium smelter in the Southern Hemisphere, which is a testament to this innovative workforce's ability to underpin the BBAMZ's industries and enable them to be sustainable and thrive through various global economic cycles.

Bell Bay and the wider northern Tasmanian region have a stable and skilled workforce with around 90 000 of working age. As previously noted, manufacturing (including processing) is one of Tasmania's most significant employers ranking in the top seven industry sectors in the State.

From a northern Tasmania perspective, the concentration of the workforce is even more significant for the manufacturing industry and ranks in the top four of all industry sectors. For the local George Town municipality, it is the top–ranking industry sector by employment.

The heavy industry and manufacturing centric workforce that exists within Bell Bay, George Town and the wider northern Tasmania region, ranges from administrators to professionals, technicians to tradespeople, labourers to apprentices. The BBAMZ is serviced by a range of local and regional employees. Other key industries for the region include intensive agriculture, construction and forestry, and the workforce is well versed in these areas. Commuting to the area is very easy due to the efficient road network and lack of traffic congestion in Tasmania.
PLANNING AND ZONING

The BBAMZ provides extensive portions of flat and accessible land with sufficient buffers from residential areas. The size of land allotments varies considerably with parcels ranging from less than one hectare to well in excess of 100 hectares. Land ownership consists of a variety of government, private enterprise and private owners.

Subject to negotiation with the relevant land owners, a range of tenure options are possible including ownership or leasing. Hydro Tasmania is also investigating the potential of its decommissioned Bell Bay thermal power station to be redeveloped for hydrogen production and export. This site is a particularly attractive location consisting of almost 13 hectares having access to the water via its own jetty facilities.

The Bell Bay Advanced Manufacturing Zone benefits from primarily five different planning zonings: general industrial, light industrial, rural resource, utilities as well as port and marine zone. Each zoning has a number of permitted uses under the planning scheme. Further to the permitted uses, there are also a number of discretionary uses allowed for under the planning scheme.

While the complexity of development applications varies, the Tasmanian system compares very favourably with the other Australian states. Statutory approval periods are 28 days for permitted developments and 42 days for discretionary developments with actual processing times consistently reported to be well within these limits. Most recent data indicates that the average time across the state for processing permitted applications was 13.6 days and for discretionary applications it was 34.4 days.
GAS
The Tasmanian gas pipeline supplies natural gas to Tasmania with the main pipeline running adjacent to the nearby East Tamar Highway. The Tasmanian gas pipeline has the capacity to transport 129 TJ/day of natural gas to Tasmania. The gas network route extends to provide a natural gas option to businesses in both the light industrial and heavy industrial areas. Any prospective client could access the high–pressure transmission pipeline and the low–pressure distribution pipeline which is reticulated through the industrial zones.

Tasmania has a relatively new state wide natural gas distribution network, constructed from High Density Polyethylene (HDPE) which does not suffer the potential pipe embrittlement and leakage issues associated with high hydrogen blends in older gas distribution networks constructed from steel. Therefore, the existing natural gas network has the potential to store a high proportion of hydrogen (blended with natural gas).

OTHER ZONE ATTRIBUTES – ROAD, AIR, RAIL, COMMUNICATIONS
Road – The BBAMZ is well connected via a network of roads to all Tasmanian cities and major ports. The zone is adjacent to the East Tamar Highway which caters for heavy transport vehicles including B doubles and links Bell Bay to Tasmania’s second largest city, Launceston (35 minutes) and National Highway 1.

Air – approximately 60 kilometres from Bell Bay (around 50 minutes driving time), Launceston Airport provides air freight services and direct passenger air links to Australia’s three major population centres, Melbourne (60 minutes), Sydney (105 minutes) and Brisbane (2 hours, 40 mins).

The airport is the principal tourism and airfreight gateway for northern Tasmania, handling almost 1.4 million passengers. More than 20 000 regular passenger transport movements occur per year at the airport. Airlines flying in and out of Launceston Airport include Jetstar, Virgin Australia, QantasLink and Sharp Airlines.

Recent growth and investment has propelled the airport into the top 12 airports in Australia in terms of passengers. For three consecutive years (2015–2017) the Australian Airports Association named Launceston Airport ‘Major Airport of the Year’ in recognition of its transformational improvements. In addition, Launceston Airport, along with partner airport Melbourne Airport (both owned by Australia Pacific Airports Corporation), were recognised for commitment to sustainability in the 2019 Global Real Estate Sustainability Benchmark (GRESB) Infrastructure Assessment. The two airports jointly took out the Asset Sector Leader status for Airport Companies in the Transport division and were awarded the highest score awarded to any airport worldwide.
The George Town Aerodrome, a local airport, provides services for the George Town municipality. The George Town Aerodrome is located approximately seven kilometres from the BBAMZ.

**Rail** – TasRail, a state owned rail company, operates safe, reliable and competitive freight rail and logistics services state wide with rail going through the BBAMZ. With 611 kilometres of operational lines, the network is a narrow-gauge single rail line providing access to a significant proportion of Tasmania’s cities and major towns.

The BBAMZ also benefits from the recently developed intermodal facility, the George Town Freight Terminal, which is in the heart of the BBAMZ. This well-designed facility offers multi-modal options, secure intermodal and bulk storage and direct connections to major ports and freight terminals located within Tasmania.

**Communications** – Tasmania was the first state in Australia to benefit from connection to the national broadband network (NBN). This super-fast broadband technology provides Tasmania with the speed and integrity of digital technology demanded by business and industry in the 21st century. NBN fixed line services are available in the Bell Bay Advanced Manufacturing Zone. The Bell Bay area also benefits from very good mobile phone coverage with the availability of 4G Telstra coverage.

### FLIGHT TIMES TO MAJOR CENTRES

<table>
<thead>
<tr>
<th>City</th>
<th>State</th>
<th>Approximate flight time</th>
<th>No. of stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melbourne</td>
<td>Victoria</td>
<td>60 minutes</td>
<td>Direct</td>
</tr>
<tr>
<td>Sydney</td>
<td>New South Wales</td>
<td>1 hours, 45 minutes</td>
<td>Direct</td>
</tr>
<tr>
<td>Brisbane</td>
<td>Queensland</td>
<td>2 hours, 40 minutes</td>
<td>Direct</td>
</tr>
<tr>
<td>Canberra</td>
<td>Australian Capital Territory</td>
<td>2 hours, 5 minutes</td>
<td>1 stop</td>
</tr>
<tr>
<td>Adelaide</td>
<td>South Australia</td>
<td>2 hours, 25 minutes</td>
<td>1 stop</td>
</tr>
<tr>
<td>Perth</td>
<td>Western Australia</td>
<td>5 hours, 15 minutes</td>
<td>1 stop</td>
</tr>
<tr>
<td>Darwin</td>
<td>Northern Territory</td>
<td>5 hours, 30 minutes</td>
<td>1 stop</td>
</tr>
</tbody>
</table>
OVERVIEW OF TASMANIA

Tasmania is the island state of Australia. It lies 240 kilometres south of the Australian mainland and has a distance from north to south of 296 kilometres and 315 kilometres from east to west. At 42° south, Tasmania has a mild and temperate maritime climate and hosts a population of just over 520 000. It is just a short flight from the major international cities of Melbourne (60 minutes) and Sydney (105 minutes).

Tasmania has spectacular natural attributes including laying claim to some of the cleanest air in the world – Cape Grim was identified by the Australian Government’s Scientific and Research Organisation as having the cleanest air on Earth.

One of Tasmania’s most significant natural resource advantages is its water, with the state having nearly 27 per cent of Australia’s total freshwater reserve capacity. This advantage is magnified given Tasmania is also one of the few places in the world where bottled rainwater has the required purity to be approved for human consumption by the Health Departments of the United States of America, European Union, Australia and Japan.

Tasmania is home to a diverse range of industries demonstrating the state’s capacity and capability in assisting businesses thrive. Industries include advanced manufacturing, renewable energy, education, agriculture, aquaculture, food processing, tourism, mining, resource processing, transport and logistics, to name a few.

Tasmania offers a number of advantages to investors in the hydrogen industry including:

• Tasmania’s industrial land costs and office accommodation costs are some of the most affordable in Australia
• Staff costs are very competitive, with Tasmania enjoying some of the lowest total labour costs in the country
• Tasmania has industry renowned staff retention rates and workforce relations records
• Tasmania has one of the lowest business taxation ratios in Australia
• Tasmania has transparent planning procedures, an independent and transparent environmental regulatory regime and low sovereign risk
• Tasmania is a safe island benefiting from its geographical location
• Tasmania’s climate is stable – there is a lack of extreme weather events and relative freedom from other natural disasters.
FURTHER INFORMATION

The Office of the Coordinator–General is the first point of contact for any business looking to establish in Tasmania. Our specialist team works with potential investors to provide tailored, confidential assistance.

The Office does this by:

- providing information on Tasmania’s industry capabilities and strengths, specific business opportunities, investment regulations and government assistance
- assisting investors to identify and select the best Tasmanian site for their business
- facilitating visits to Tasmania, assisting with itineraries and arranging appropriate meetings
- providing introductions to local industry, government departments and potential joint venture partners
- assisting access to export markets.
CONTACT DETAILS

For any additional information regarding hydrogen related investment opportunities within Tasmania or the Bell Bay Advanced Manufacturing Zone, please contact:

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