

AUSTRALIAN OCEAN ENERGY GROUP

08 September 2020

The Hon Guy Barnett MP
Minister for Energy
Tasmania, Australia

Australian Ocean Energy Group response to Tasmanian Renewable Energy Action Plan 2020

Introduction

The Australian Ocean Energy Group (AOEG) is an industry cluster that unites businesses, research, academia, government and the Investment community to create an innovation ecosystem of ocean energy stakeholders. Our Tasmanian members include:

- CSIRO, Ocean Science Office located in Hobart.
- The University of Tasmania, Australian Maritime College (AMC) located in Launceston.
- Keith Calvert; former senior executive in the Federal Department of Industry, Innovation and Science's main SME support programs to industry. Keith resides in Launceston.

AOEG's programme engagement in Tasmania includes:

- AOEG member, Wave Swell Energy, King Island integrated wave energy demonstration project in collaboration with Hydro Tasmania. To learn more about their King Island project, click [here](#).
- AOEG member, MAKO Tidal Turbine technology demonstration in Tamar River in association with AMC and AMC-Search. To learn more about their demonstration activities, click [here](#).
- Formal member of the Blue Economy CRC. AOEG's engagement is in support of BE-CRC's objective to develop ocean energy as means to support successful transition of Tasmania's salmon aquaculture sector from inshore to offshore. To learn more about their offshore energy systems research program, click [here](#).

Given AOEG's connection and active engagement with Tasmania, we appreciate the opportunity to contribute input to Tasmania's Renewable Energy Action Plan. In summary, our recommendations are the following:

- Ensure ocean energy is included in the proposed Plan to help Tasmania achieve its goal as a global renewable energy powerhouse.
- Incorporate ocean energy into the Action 1.5 - Renewable Energy Centre of Excellence.

Comments on Proposed Tasmanian Renewable Energy Action Plan

AOEG applauds Tasmania's proactive efforts to establish an achievable renewable energy target that enables Tasmania to capitalise on its immense natural renewable energy assets in order to achieve strong economic growth. The development, adoption and implementation of an action plan will help assure the necessary alignment, collaborations and resources necessary to attain the target. For these reasons, AOEG supports the overarching Renewable Energy Action Plan.

However, while AOEG generally supports the Plan, we are concerned about the lack of inclusion of one of Tasmania's most abundant, powerful and perpetual sources of renewable energy -- ocean energy. Given the absence of ocean energy in the current draft Plan, AOEG provides the recommendations below.

Recommendations

Recommendation #1. We believe ocean energy worthy of public support and inclusion in the Action Plan based on the massive wave and tidal resources in the State combined with a diversity of market opportunities that could lead to significant economic contributions to Tasmania.

- **Ocean Energy resources are Tasmania's most abundant source of renewable energy.**

Ocean energy refers to the massive energy which can be harnessed from ocean waves, tides, currents, and ocean temperature differentials. The natural movement of water within oceans creates a vast resource from which energy can be extracted and transformed into electricity and other useful purposes. The key advantages of ocean energy are consistency and predictability. This energy potential and benefits are multiplied when partnered with other major renewable sources, such as offshore wind, floating solar, battery storage or supporting additional energy production such as hydrogen.

Tasmania's wave and tidal resources are enormous. Based on research led by the University of Tasmania's Australian Maritime College (AMC)¹, Banks Strait tidal energy resource alone has a total annual estimate of approximately 350 MW (3 TWh/yr; flux of 1650 W/m², over a 10 km wide channel, 25 m deep). This provides a significant resource for either off-grid application to Flinders Island or to the NEM via mainland Tasmania. This single location is indicative of the extensive tidal resource throughout Tasmania.

Tasmania's wave resource is equally impressive! The wave energy resource off Tasmania's West Coast has one of the highest yearly wave energy density resources in the world at approximately 80-100kW/m along Tasmania's West Coast. The State's East Coast wave resource is estimated at approximately 10-50KW/m. In an annual projection, the wave energy estimate for Tasmania's West Coast alone is approximately 131,400GWh, while the Tasmanian annual demand for energy is approximately 10,000GWh. Harnessing just 10% of Tasmania's West Coast wave energy resource could deliver all of Tasmania's energy demand (approx. 13,000GWh per year)².

- **Jobs and economic growth.**

As the ocean energy sector matures throughout the life of the Renewable Energy Action Plan, a wide range of unique market opportunities will be established, leading to corresponding jobs and additional economic benefits to Tasmania. The following are a variety of markets to develop.

- ***Remote communities and/or coastal based industries.*** Integrated ocean Energy microgrids have the potential to reduce the transportation, storage and consumption of diesel as a source of energy supply for off-grid or end of grid coastal communities.

¹ Australian Tidal Energy Project, [AUSTEn](#), is a \$5.85 million, three-year project to map Australia's tidal energy resource in detail and assess its economic feasibility. The project is led by the Australian Maritime College, University of Tasmania.

² Data from ARENA-supported Wave Energy Resource Atlas. <http://www.nationalmap.gov.au/renewables>. Mark Hemer, CSIRO Oceans and Atmosphere, 19 August 2020.

Integrated ocean energy systems can also provide additional complementary and ancillary benefits, such as providing electricity for specialised operations, such as desalination, waste-water treatment or niche power supply for coastal-based industrial operations. The addition of ocean renewable systems to produce green hydrogen could be a significant contributor to helping Tasmania achieve its production and export goals for hydrogen.

- ***Aquaculture/sustainable food production.*** The Blue Economy CRC's program to power offshore aquaculture operations includes the integration of ocean energy as a critical source of energy. In order for near-shore aquaculture systems to successfully move offshore while maintaining economically viable operations, they will require reliable perpetual supply of electricity without an electricity cable from shore.

Electricity produced from renewable ocean energy technologies, along with other sources of renewable energy, is the key to the future success of an economically viable offshore aquaculture operations.

- ***Offshore communications.*** An expansive network of underwater communications infrastructure plays a critical role in global data transmission, such as submarine cables. Ocean energy could provide necessary electricity to power sensors attached to submarine cables that could provide climate change monitoring and/or early disaster warning systems.
- ***Offshore data centres.*** The explosion of cloud computing and internet-based content has created significant growth and evolution in the build-out of server centres. These servers have a tremendous electricity demand. As the costs and reliability of ocean energy technologies continue to improve, they have the potential to provide local, renewable power to shoreside centres or sea-based data centres where cooling loads can be reduced.
- ***Coastal monitoring, safety and navigation.*** An extensive amount of ocean-based equipment is located at sea to support everything from weather forecasting, navigation aids, wide area search and protection and many other scientific, government and operational support needs. Every piece of equipment requires energy to support data transmission and other communication and operational requirements. Ocean energy can serve as the source of electricity.
- ***Ports and harbour infrastructure.*** Certain wave and tidal technologies are being designed to operate in shallow waters and which may be attached to existing infrastructure, such as piers, docks, pilings, etc. These technologies have the potential to provide supplemental electricity to power niche operations at ports, harbours and/or marinas, such as lighting, sensors or electricity to ships. The structures also have the ability to act as a form of coastal protection, reducing the impact on the coastline of extreme weather events. In some cases, multiple units can be placed in such a way as to act as a harbour breakwater in their own right.
- ***National security and defence.*** Effective national defence requires surveillance at both on land at sea. Renewable ocean energy has the potential to provide perpetual energy at sea for a variety of defence applications.

Examples of these applications include establishing virtual borders where devices with active and passive target detection would be able to identify and deter coastal encroachment from targets such as submarines and unmanned underwater vehicles. Ocean energy could also provide energy to power critical communications such as potential threats via satellite communications or provide operational surface vessel tracking capabilities to prevent attacks.

- **Marine transportation.** Similar to providing energy to storage systems, ocean energy could provide energy to charging stations for electric boats, especially in off-grid locations.

Given the above range of potential markets for ocean energy, it is important to acknowledge that a 'one-size-fits-all' wave or tidal device is unlikely to serve these various market applications. Instead, diverse types of tidal and wave technologies are in development to effectively align with varying applications. In addition to the direct economic benefit of the generation and sale of electricity within each market sector, additional economic benefits will occur from the diversification of the supply chain (e.g., new skills, manufacturing needs, shoreside infrastructure, etc.) and the communities where these markets are implemented.

Recommendation #2: Incorporate ocean energy into the Action 1.5 - Renewable Energy Hub Centre of Excellence.

A key objective of the Tasmanian Renewable Energy Action Plan is to investigate establishment of a Renewable Energy Centre of Excellence creating an integrated industry, government and academic Centre. There are three key reasons why renewable ocean energy should be included in the feasibility analysis for the Centre.

1. Given AOEG's established participation in the Blue Economy CRC Offshore Renewable Energy Systems Program, it is a natural connection to include ocean energy, especially to research and demonstrate the production of low-cost, clean energy through integration of ocean energy with other renewable sources, such as offshore wind, floating solar, hydrogen production, etc.
2. Recommendation #1 above identified a variety of unique market opportunities for ocean energy that could generate significant economic benefits if a commitment to Tasmania's ocean energy sector is realised. The Renewable Energy Centre of Excellence could play a crucial role in helping generate a market-pull from these opportunities. It would accomplish this through demonstration of energy systems aligned with the different markets. Demonstration of such systems could occur through physical establishment of an operating integrated renewable energy microgrid to showcase how various forms of renewable energy can deliver energy solutions to end-users, such as ocean energy combined with solar, battery storage, hydrogen production and offshore wind.
3. An economically viable industry sector requires well-trained, skilled workforce. The proposed Centre of Excellence provides an excellent opportunity to serve as place for skill development specific to integrated renewable ocean energy systems.

The economic benefits could be fully realised if training and skills development extends to building supply chain and focusing on creating energy resilient communities.

About the Australian Ocean Energy Group

The Australian Ocean Energy Group (AOEG) is an Industry-led cluster established to accelerate innovation of ocean energy in Australia as a commercial, low carbon energy source, suitable for multiple industrial and community applications. The growth of this sector will support energy independence, decarbonisation and job creation, both domestically and internationally.

By virtue of being an industry cluster, AOEG operates as a collaborative group of stakeholders. Our members span from research institutions to technology and project developers, as well as a range of service and equipment suppliers and end-user segments. *A list of members is provided as Attachment A.*

“Co-opetition”³ is a key value of AOEG. Traditional competitors, such as wave and tidal technology development companies, are working together to innovate new market strategies for commercial development. This cooperative approach returns significant benefits at regional, national, and international levels.

In addition to a national presence, AOEG operates in the international stage as well. The organisation is an active member of two international bodies which enable the transfer of overseas technical knowledge applied to Australian setting. AOEG is alternate delegate to CSIRO in representing Australia on the IEA-Ocean Energy Systems (OES), an international ocean energy technology collaboration with 26 member countries.

In addition, AOEG is a representative to the new *EL-066 Marine Energy – Wave, Tidal and other Water Current Converters*, which enables Australia to become a full member of the International Electrotechnical Commission for Marine Energy Standards – Technical Committee 114.

Thank you for accepting our submission. Please do not hesitate to contact us should you require any clarification.

Yours sincerely,

Stephanie Thornton



Stephanie Thornton,
Cluster Manager

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Sydney, Australia

www.oceanenergygroup.org.au



Enclosed/ Attachment A – AOEG Consortium Members as of 01 September 2020

Enclosed/Attachment B – Letters of support from AOEG members: BMT Commercial, Keith Calvert, Tom Denniss, Wave Swell Energy and UTAS/AMC.

Enclosed/Attachment C – Links for Additional Facts and Information About Ocean Energy

³ Co-opetition definition: collaboration between business competitors in the hope of mutually beneficial results.

ATTACHMENT A

AUSTRALIAN OCEAN ENERGY GROUP (AOEG) CONSORTIUM MEMBERS *as of 01 September 2020*

Company or Membership	Representatives	Organisation Type
Aquatera Asia	Gareth Davies, Managing Director & Ian Hutchison, Chief Operating Officer	Environmental services and products specialising in the ocean energy sector
Atratus Renewable Consulting	Simon Troman, Principal	Consulting Firm
BMT Commercial Australia Pty Ltd	Chris Shearer, Senior Mechanical Engineer and David Rissik, Head of Business Development & Climate Change Adaptation	International design, engineering, science and risk management consultancy.
Bombora Wave Energy	Sam Leighton, CEO	Australian wave energy technology developer
Carnegie Clean Energy	Jonathan Fievez, CEO & Brighid Jay, Business Development Manager	Wave energy technology developer
Climate-KIC Australia	Chris Lee, CEO	Climate change knowledge innovation community (NGO)
CSIRO, Ocean Science Programme	Mark Hemer	Commonwealth Government
Hargreaves International	Kylie Hargreaves, Principal	Consultant - government and policy specialist.
Individual	Dan Etherington	Agricultural economist
Individual	Darren Powell	Managing Director, CoAxe Engine Company

Company or Membership	Representatives	Organisation Type
Individual	Forbes Peter	Former naval electrical engineering officer providing support for Australia's fleet of Submarines
Individual	Greg Butler	Ocean energy supporter
Individual	Keith Calvert	Former executive with the Federal Department of Industry, Innovation and Science's SME support programs.
ENGINE Inc.	Fanny Sauvignon, Program Manager	Wave energy technology developer
MAKO Tidal Turbines	Douglas Hunt, Managing Director	Tidal technology development company
National Energy Resources Australia (NERA)	Francis Norman	Commonwealth Growth Centre
SABELLA SAS	Jean Christophe ALLO, Commercial Director and Marlene Moutel, Business Development Engineer	Tidal technology developer
Wave Energy Research Centre (WERC)	Wiebke Ebeling, Manager	State-supported ocean energy technology research centre
Wave Swell Energy	Tom Denniss, CEO	Wave energy technology developer
Wolfe and Co Solutions	Mike Straughton, Director	Consultant
University of Adelaide, School of Mechanical Engineering	Ben Cazzolato, Professor and Boyin Ding	University

Company or Membership	Representatives	Organisation Type
University of New South Wales (UNSW), Water Research Laboratory	Francois Flocard, Principal Engineer	University
University of Queensland, School of Civil Engineering	Remo Cossu, Senior Lecturer	University
University of Tasmania, Australian Maritime College	Jean-Roch Nader, Lecturer/Research Fellow	University
University of Western Australia, Offshore Foundation Systems	Christophe Gaudin, Professor and Deputy Director	University

ATTACHMENT B

Letters of support from the following AOEG members are included below:

- BMT Commercial
- Keith Calvert
- Wave Swell Energy
- UTAS/AMC



BMT Commercial Australia Pty Ltd
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Our Ref: : L.405005.001.BMTSupportLetter.docx

27 August 2020

Minister for Energy
Tasmania, Australia

Attention: The Hon Guy Barnett MP

To Whom It May Concern,

RE: LETTER IN SUPPORT OF AUSTRALIAN OCEAN ENERGY GROUP (AOEG) RESPONSE TO TASMANIAN RENEWABLE ENERGY ACTION PLAN 2020

BMT are a leading international design, engineering, science and risk management consultancy with a reputation for engineering excellence. With around 1,500 professionals located in 47 offices in the Americas, Asia, Australia and Europe, we draw upon a wide range of experience and expertise to provide high-quality, high-value products and services.

BMT have strong connections into the Tasmanian economy across a broad range of fields including:

- Key industry participant of the Launceston-based Blue Economy CRC,
- Strong relationships with the University of Tasmania and the Australian Maritime College,
- The Australian Renewable Energy Agency's (ARENA's) technical expert in wave energy including our role in the Wave Swell Energy – King Island project,
- Flood impact assessments across Tasmania,
- Technical experts for insurance related investigations in Tasmania,

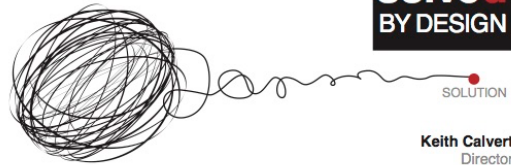
BMT endorse AOEG's submission to "The Draft Tasmanian Government Renewable Energy Action Plan 2020" including AOEG's recommendations.

BMT supports the draft Renewable Energy Action Plan and applaud Tasmania's proactive efforts to establish an achievable renewable energy target.

Yours Faithfully
BMT

Chris Shearer
Senior Mechanical Engineer

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3 September 2020
The Honourable Guy Barnett MP
Minister for Energy
Level 5, 4 Salamanca Place
HOBART TASMANIA 7000

Dear Minister Barnett,

I commend you and your Department for the development of the **Tasmanian Renewable Energy Plan 2020** at a truly exciting time for the sector.

I am writing to express my support for the Australian Ocean Energy Group's (AOEG) response to the plan. As a member of AOEG, I am increasingly seeing Australian Ocean Energy technologies becoming a competitive option in areas like remote, off-grid or fringe of grid coastal communities, Aquaculture and renewable hydrogen production. These are all highly relevant potential applications for Ocean Energy in Tasmania, together with others identified in AOEG's submission.

The manufacturing of the Waveswell UniWave200 technology at Kings Wharf in Launceston and imminent commissioning in Grassy Harbour, King Island is an exciting development and validates the potential for Ocean Energy to be a realistic player in the Tasmanian Renewable Energy sector.

Given the Island State's tremendous Ocean Energy resources, it is entirely logical that Ocean Energy should be included in the Tasmanian Renewable Energy Plan 2020, and as such I fully support both the recommendations made in AOEG's submission.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Keith Calvert', with a stylized flourish at the end.

Keith Calvert



WSE Operations Pty Ltd

ACN 607 418 922

50 Camberwell Road, Hawthorn East, VIC, 3123

www.waveswellenergy.com.au

Subject: Letter of Support to AOEG in regard to the Tasmanian Renewable Action Plan

Dear Stephanie Thornton,

On behalf of Wave Swell Energy Ltd (WSE), please accept this Letter of Support in regard to the Tasmanian Renewable Action Plan.

WSE is an innovative Australian renewable energy technology development company, founded in October 2016. The company has developed a cost-effective means to convert the energy in ocean waves into electricity.

WSE is currently developing a world first project utilising its unique unidirectional Oscillating Water Column (OWC) technology at King Island, Tasmania. Much of the pre-development research related to the King Island project has been conducted in collaboration with the University of Tasmania's Australian Maritime College at its Launceston campus. The King Island project is expected to be operational early in 2021.

The unit build is 90% complete. The project commenced at the Southern Marine Shiplift in September 2019 at Launceston. Since February 2020, construction of the super structure of the unit, which houses the turbine/generator, is being assembled at Bell Bay Port. This is a major undertaking involving many stakeholders including in excess of 30 Tasmanian based groups who are involved with the project. We are very grateful for the collaborative involvement, access to specialised skillsets, and the quality of work achieved.

The WSE technology has several applications in addition to conventional energy generation. These applications include the displacement of diesel-based electricity generation in remote island locations, the production of hydrogen, the production of desalinated water, and acting as a form of protection against coastal erosion. The WSE technology is expected to ultimately play an important role in Australia and the world's efforts to combat climate change.

WSE strongly supports the development of ocean energy solutions for the decarbonisation of electricity generation. While wave energy holds great promise in many parts of the world, Tasmanian waters, in particular, exhibit a great resource in terms of wave energy density – one that WSE has a keen interest in exploiting via projects subsequent to that at King Island.

WSE endorses AOEG's efforts to effectively accelerate the uptake of ocean energy in Australia, including in Tasmania. The ocean energy sector has the potential to materially benefit Tasmania in terms of energy independence, decarbonisation of the electricity sector, and job creation.

Kind regards,

A handwritten signature in black ink that reads "Tom Dennis". The signature is fluid and cursive, with the first name "Tom" being larger and more prominent than the last name "Dennis".

Dr Tom Dennis
Executive Chair

Dr Jean-Roch Nader

Lead – Marine Renewable Energy Research Precinct

Lecturer | Research Fellow - Ocean Energy

National Centre for Maritime Engineering & Hydrodynamics

Australian Maritime College | University of Tasmania

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31/08/2020

To the Department of State Growth, Tasmanian Government,

As the Lead of the Marine Renewable Energy Research Precinct at the Australian Maritime College (AMC), University of Tasmania (Utas) and active member of the Australian Ocean Energy Group (AOEG), I fully support AOEG's response to the Tasmanian Renewable Energy Action Plan 2020.

Indeed, Tasmania is home to one the best ocean energy resource in the world and has the capacity and opportunity of becoming a worldwide leader in its development. The applicability of ocean energy is broad. Systems can be deployed in large arrays or farm and feed the grid with highly predictable electricity and/or be directly linked to the production of renewable hydrogen. Smaller units can be applied to off-grid applications such as Waveswell's wave energy convertor in King Island. Furthermore, different systems can also be easily applied to cover the energy requirement for offshore aquaculture (such as the plan presenting in the Blue Economy CRC) and other coastal and offshore infrastructures (communication, monitoring, data centres, port and harbours, defence, marine transportation, etc.).

In my experience, while testing one of Mako Turbine tidal stream turbine in the Tamar river, is that we had a remarkable positive response and support from the community wanting us to power the Auld Kirk West Tamar Presbyterian Church straight away!

I fully support AOEG's recommendation for asking to include a commitment in accelerating the development of Tasmania's renewable ocean energy sector and to include Ocean Energy in the Renewable Energy Hub Centre of Excellence. Not only will the development of the sector lead to economic benefit and continue to elevate the Tasmanian Brand but UTas and AMC has the ability to develop in-house training to develop some of the key skills necessary for this transformation.

Please do not hesitate to contact me if you would like to discuss further.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'JR Nader', written in a cursive style.

Dr. Jean-Roch Nader

ATTACHMENT C

Links for Additional Facts and Information About Ocean Energy

- **Australian Ocean Energy video:** see video on home page; <https://oceanenergygroup.org.au/>
- **What is ocean energy?** <https://www.oceanenergy-europe.eu/ocean-energy/>
- **Data sources for ocean energy:**
 - **Australian Tidal Energy Project, [AUSTEn](#),** is a \$5.85 million, three-year project to map Australia's tidal energy resource in detail and assess its economic feasibility. The project is led by the Australian Maritime College, University of Tasmania.
 - Wave energy data from ARENA-supported **Wave Energy Resource Atlas.** <http://www.nationalmap.gov.au/renewables>.
- **Additional Government submissions associated with Australia's ocean energy industry (below) can be found on AOEG's website:** <https://oceanenergygroup.org.au/news-events/>
 - Submission by AOEG to the Department of Agriculture, Water and the Environment regarding the Offshore Clean Energy Infrastructure Regulatory Framework.
 - Submission by AOEG to the Department of Industry, Science, Energy and Resources, in its call for input to the draft national Technology Investment Roadmap.
 - Pre-budget submission by National Energy Resources Australia (NERA) to the Department of Treasury.
- **International Ocean Energy:**
 - Australia is a member country of the International Energy Agency (IEA), **Ocean Energy Systems:** <https://www.ocean-energy-systems.org/>. The OES Vision for International Deployment of Ocean Energy estimated a global potential to develop 748 GW of ocean energy by 2050. Deployment of ocean energy can provide significant benefits in terms of jobs and investments. The global carbon savings achieved through the deployment of ocean energy could also be substantial. By 2050 this level of ocean energy deployment could save up to 5.2 billion tonnes of CO₂.
 - European Marine Energy Test Centre – global demonstration centre for ocean energy technologies: <http://www.emec.org.uk/>