

Marine Energy White Paper



A discussion document from the
Aotearoa Wave and Tidal Energy Association

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Marine energy – the production of electricity or other forms of energy from the oceans – encompasses a range of activities, from established methods of drawing power from tides and waves, through to research on the utilization of gradients in heat and salt. And whilst there might appear to be a surplus of energy at present in NZ, it is dangerous to view supply as static while facing the certainty of retirement of existing supply, and the increased likelihood of dry summers resulting in low hydro generation. **One thing is clear then: New Zealand cannot succeed in the long term on business as usual in terms of electricity supply.**

We also like to compare ourselves to Norway in terms of renewable energy. However, there are some key differences. Norway has as much as three years of hydro reserve supply; we have only a few months. This makes our electricity supply highly vulnerable. **Energy, especially renewable - is the key to long-term prosperity.**

As with wind, New Zealand is blessed with substantial natural marine resources. Roughly every 100 m of NZ's coastline dissipates a wave energy flux equivalent to 1 modern wind turbine. Although of course there is substantial day to day variability this energy supply is only modestly influenced by seasonal changes

(unlike many locations overseas). The total kinetic energy contained in the tides of Cook Strait is sufficient to supply two times New Zealand's present electricity requirements. The shape of our island nation means that modest tidal height range is accelerated to provide a disproportionately large amount of energy. The infrastructure would be mostly offshore and so there would be minimal aesthetic impact. Importantly, these resources are either predictable or forecastable to high degrees of confidence.

The UK is taking marine energy very seriously. It makes for useful viewing to visit places like Strangford in Northern Ireland and Stromness



Marine Current Turbines' 1.2 MW device at Strangford Lough in Northern Ireland.

in the Orkney Islands that are hot-spots in UK marine energy development. **The townships are invigorated by the development.** While not everyone amongst the local population might see the need for low-carbon energy, they all see the benefits of local investment, jobs - and actually being on the national map.

An important point is that **initiatives around marine energy are not solely focused on electricity generation.**

Maintaining the world's fourth largest maritime EEZ generates some vital synergies. A whole host of associated skills and industries contribute to development and

benefit from growth. One only needs to look at Americas Cup efforts to understand that downstream benefits will come in a diverse range of areas - carbon fibre technology, usage mapping, resource assessment, impact quantification and mitigation, tourism – the list goes on.

Connecting industry, research and the public in any such endeavour is a complex challenge. A recent visit by an AWATEA co-chair to the Norwegian research organisation SINTEF provided clear examples of what a nation needs to do to truly connect with, and manage, its marine resources. Their research programmes reach out to industry in meaningful ways, and as a consequence industry is trusting of, and interested in, what research can offer. Meanwhile, researchers have a better idea of the immediate and long-term goals of industry. They train people with highly relevant marine skills and have places for them to work.

There is no doubt that it has been a tough few years for renewable energy and “future renewables” even more so. The Marine Energy Deployment Fund, while stimulating attempts to practically harness the resource, was perhaps too forward-looking. Paradoxically it has also been a very successful time for New Zealand marine energy in other ways including funding of basic research as the transition from research to industry. In this context AWATEA is promoting a number of ideas with short and long-term perspectives.

A focal point for these ideas is the proposed Marine Energy Centre for the Cook Strait

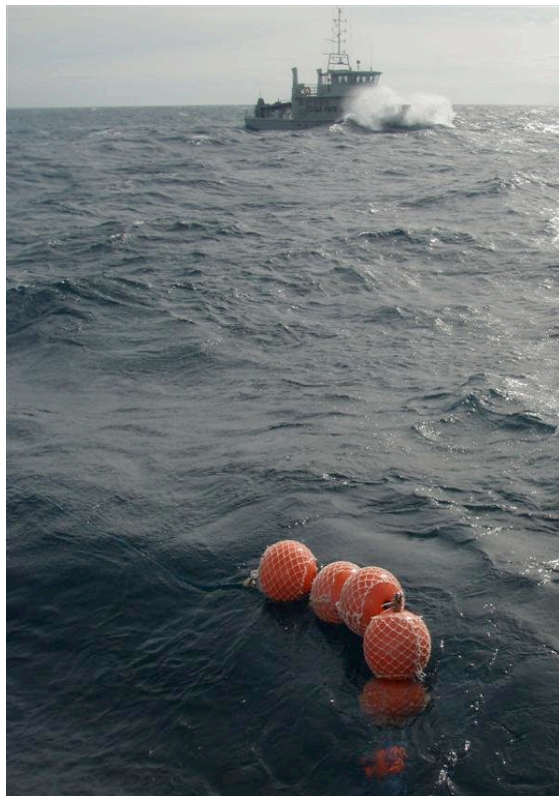
region. This facility would connect with the world-leading EMEC in Orkney and provide a critical mass for the development of a local industry able to take up the best of international development and build on that with our own world-class skills and resources.

A demonstration project as part of this will be a way to show-case local skills and industry and connect with researchers and users. Then, in order to consolidate this nascent industry into something that is viable for the century to come – the renewable

energy century - we need to make good on initiatives like building the intellectual capacity through a combined marine technology education facility/department/school, investing in associated maritime infrastructure (i.e. a dedicated vessel) to handle the requirements and not keep us beholden to outside schedules, and developing the appropriate grid connection regimes to integrate such energy sources. The other skills that come with it that generate niche markets or add-ons to a global business and especially

the Pacific nations where energy is usually very expensive. These nations understand implicitly the importance of low CO₂ resources.

In many ways the timing is perfect for the nascent industry to play an important role for the nation in meeting the growing challenges of the new century.



Deploying a mooring in Cook Strait



Marine Energy Accelerator Wish List



New Zealand Marine Energy Centre

- Provide a focal point for industry, utilities, researchers and the public
- Capability development hothouse
- Critical mass for international profile

A Demonstration Project

- act as show-case of skills
- inclusive to demonstrate these skills and foster intra-industry R&D links
- improved public profile as a future alternative supply

Ocean Engineering Academia

- The lack of this given NZ's maritime EEZ is astounding.
- A clear signal that NZ intends to make the most of its natural resources in a responsible way.
- Home-grown skills and people.
- A CoRE would be one way within the present framework to start this critical mass.
- Investment in the future.

AWATEA's Long Term Vision: Marine Energy Futures

We foresee a time when our maritime marine energy resources, along with the impacts of implementation, are understood, quantified and predictable. This provides a basis for investment in a range of technologies, primarily developed offshore but with niche local contributions. These contributions come via an increased academic and high-value industry sector development. The technology can then be deployed and maintained using local industry and infrastructure in a way that suits our environmental values, in order to provide low social-impact clean energy – a fundamental requirement of society for the next century and beyond. This would support our stewardship of one of the world's largest maritime EEZs.

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