SCHEDULE 7 – PROPOSAL
Albany Wave Energy Project:
Carnegie Clean Energy's Project Proposal for
Department of Primary Industries and Regional
Development
# Executive Summary

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Executive Summary

Funding Request

Carnegie Clean Energy Ltd (ASX: CCE) (Carnegie) is pleased to submit its vision for its $65m Albany Wave Energy Project (AWEP) (the Project) to the Department of Regional Development. Carnegie is requesting $16m of grant funding from the Department of Primary Industries and Regional Development (State) to deliver this world first, innovative wave energy project in Western Australia.

Carnegie is uniquely positioned to deliver on the support of the State's funding and unlock significant local opportunities for the following reasons:

- Carnegie is the most advanced wave energy company in the world and the best equipped technically. Through its Perth Wave Energy Project off Garden Island, Carnegie is the only wave energy company globally to have successfully delivered an array of large scale wave energy generators in open ocean and operated for 12 months. Over the past 10 years of development, Carnegie's experienced team has designed, deployed and operated more than 10 wave energy prototypes at its Fremantle and Garden Island wave energy sites. Carnegie's Western Australian based team of approximately 100 staff make it the largest wave energy developer in the world and the largest renewable energy company in Western Australia.

- Carnegie is the most financially capable wave energy company in the world. Carnegie is the only wave energy company to have consistently raised private sector capital alongside Government funding to support the development of its wave energy technology. In total Carnegie has raised more than $140 million in private sector equity and debt and Government grants.

- Carnegie has deep knowledge of the Albany wave energy resource and site. Over the past decade, Carnegie has spent approximately $2 million on studies, surveys and designs for the region, including site assessment, wave resource mapping, licensing and site design. Carnegie originally received a site license for its proposed Albany wave farm, offshore from Torbay and Sandpatch in 2008. This licence was renewed earlier in 2017 and is exclusive to Carnegie for the AWEP.

- Carnegie is motivated to assist other wave energy companies to also progress development so that a wave energy industry can emerge to the benefit of all. To this end, Carnegie has worked in particular with local Western Australian developers, to best incorporate their needs into the AWEP and both have supplied support letters to this effect in our proposal.

- Carnegie is the only wave company able to commence immediately in October 2017 on the Project development and to deploy in such an energetic, offshore location in 2019. Carnegie's work on the site extends back 10 years. It most recently shipped its wave measurement buoy to Albany in June 2017 ready for immediate deployment.

- The Project would create significant value for the region in terms of shared knowledge and common user infrastructure that would then be utilised by other industry developers and by the associated Research Centre which will be able to use the site and Project as a platform to perform applied research to support the growth of this emerging industry. After a year of operations, Carnegie intends to remove its initial CETO Unit and work with the State to open the site to other developers. As part of its broader commercialisation strategy, Carnegie will leverage this Project to then develop a commercial large-scale array of CETO Units.

- University of Western Australia (UWA) is expected to be the lead research partner for the Research Centre. Carnegie and UWA have a strong history of working together with current collaborative research activities alone measuring in excess of $5m and engaging approximately 20 researchers. Carnegie will be able to leverage this existing relationship and enable the Research Centre to gain maximum learnings from this Project. Through
collaboration with offshore renewable industry partners such as Carnegie, this research will in turn help to advance development of this emerging industry, creating new knowledge and skills in Western Australia.

- Carnegie's demonstrated history of collaborative research as demonstrated by a current R&D portfolio worth over $11m with local and international universities and research organizations including UWA, Curtin, Murdoch, Adelaide, Swinburne and Tasmania in Australia and Scottish, German, French and Irish universities and research organizations globally.
- Carnegie's strong international industry connections and ability to bring international industrial expertise to Western Australia including from within the wave and marine energy industries witnessed by existing collaborations with support letters from Atlantis Tidal, NEMOS and CorPower and major global utilities as evidenced by Carnegie's licencing deal with French power giant EDF and the letter of support provide by major Italian utility Enel Green Power.
- Carnegie is the original proponent of the State Government's Albany Wave Energy Project and Research Centre. Carnegie's deep history in wave energy development in Western Australia, including its development work at Albany, led it to identify the AWEP as a significant opportunity for Western Australia to take a leadership position in the commercialisation of wave energy globally. Additionally, Carnegie originated the concept of Research Centre to be develop in parallel to best leverage the benefits of a globally unique wave energy project like the AWEP.
- Strong existing relationships with key stakeholders including Synergy and Western Power, including a previous secondment of a Western Power planning engineer to the CETO team, the City of Albany and the Great Southern Development Commission.

Benefits

- The State's funding for the Project is expected to leverage $49m in additional federal and private funding and investment that would flow into the Western Australian economy and would help Carnegie make significant progress towards commercialisation, ultimately creating domestic and export opportunities. Subsequent expansion stages would unlock of further local investments.
- In addition to delivering an innovative wave energy project, this funding will be utilised to build common user infrastructure in the form of subsea cables, foundations, onshore grid connection and the like, that will be made available to the wave energy industry at the completion of the AWEP and will significantly enhance the development of this emerging industry in Western Australia. Carnegie is committed to ensuring that the wider industry, research and government stakeholders, including the associated Research Centre, gain maximum benefit from this Project's infrastructure.
- The successful delivery of the AWEP, will help to unlock the subsequent expansion to a 20MW Project and then beyond to 100MW. A local wave energy industry could generate indirect and induced jobs in Albany and WA.
- Demonstrate a stable, consistent and reliable source of "24/7" renewable energy in the WA electricity grid, and increasing the level of renewable energy supplied to Albany, securing the future of Albany as a renewable energy city.
- Put Western Australia at the forefront of new renewable technology with Albany acting as a knowledge hub and a global centre for wave energy research and development.

- Unlock Carnegie's existing sites at Fremantle and Garden Island for other marine energy developers, technology providers and researchers. Carnegie's commitment to this proposal is demonstrated by its provision of its existing Fremantle and Garden Island offshore wave energy sites available to the Research Centre and other wave energy developers so they can become a living laboratory and other aspiring wave energy developers can leverage the multi-million dollar investments made by Carnegie in these sites.
1. Introduction to Project

The Albany Wave Energy Project (the Project) will design, build and operate a CETO wave energy unit off the coast of Albany in Carnegie's Licence Area (Figure 1). In addition to building a CETO Unit, the Project will deliver valuable infrastructure and knowledge that will provide significant benefits to the region, and the developing offshore renewable energy industry and research community.

Figure 1 - Carnegie's Albany Site Licence Area

The consistency of the swell off the southern coastline of Australia means wave energy has a major role to play as our energy mix transitions to one dominated by renewables. Wave data studies conducted over the past 10 years have indicated that the Albany site in particular offers significant energy potential; the south coast wave energy density around Albany is approximately 57 kW/m\(^1\) compared with approximately 20 kW/m typically seen in Europe. Albany has one of the most consistent wave energy resources in the world, experiencing greater than 1m swell 100% of the time. The integration of this 24/7 wave resource with the regions existing infrastructure, including the existing wind farm, will demonstrate a stable, consistent and reliable source of renewable energy into the Western Australian electricity grid, providing a significant contribution towards realising the vision of Albany as a renewable city.

1.1. The Project

The Project will design, build and operate a 1.5MW CETO 6 Unit off Albany which will be connected to the local grid. The Project infrastructure will consist primarily of:

- Onshore: A control room in the town of Albany suitable for multiple plant operators (common user)
- Onshore: A onshore substation with grid connection (common user)
- Export electrical cable and subsea junction connecting the onshore and offshore sites (common user)
- Offshore: Pile foundations (common user)
- Offshore: 1.5MW CETO 6 Unit

\(^1\) Data measured as specific DoT wave buoy location
1.2. CETO Technology

Carnegie's CETO technology has been honed over the past 15 years leading technological advancements in the wave energy industry. The CETO technology has been adapted to suit the demanding wave climate that exists in WA and has undergone several phases of testing to further the development of a commercial wave industry.

1.3. Location

Carnegie has invested over a decade of work into selecting sites to develop the CETO technology. Western Australia has excellent wave resources and Carnegie identified Garden Island and Albany as key sites from an early stage of the CETO development. In regards to the proposed Albany site, Carnegie has secured offshore and onshore licenses from the State Government and has previously commissioned a [redacted] and [redacted] to assess the environmental constraints (See Figure 1). The significant investment in the Albany location demonstrate the maturity of the CETO development and the readiness of the Carnegie team to construct the Project.

Based on these years of site development work, Carnegie selected an offshore site within Torbay off the coast of Albany. The proposed deployment location is located in 30 m water depth just offshore of the existing wind farm. The exact coordinates of the CETO Unit deployment will be determined based upon the upcoming site development work, including bathymetry, metocean and geophysical survey.

![Figure 2 - Likely location of CETO 6, offshore Torbay](image)

1.4. Timings

The Project Stages are based on Carnegie's Technical Approach as discussed in Section 3.3. Carnegie's approach to development of the CETO 6 technology for this Project is consistent with typical concept design and detailed design phases for engineering and construction projects, and with the approaches previously undertaken by Carnegie in PWEIP. This will consist of the following stages:

- Concept Design (already completed)
ALBANY WAVE ENERGY PROJECT PROPOSAL

- Detailed Design
- Procurement, Manufacture, Construction and Deployment
- Commissioning
- Operations

As soon as the funding is awarded, Carnegie is ready to formally commence the Detailed Design Phase and progress the required Albany site development activities. Carnegie would complete the detailed design and begin ordering long lead items in [redacted]. The cable and foundations would be installed during the Full CETO system commissioning is expected in late 2019.

The Project will operate for a minimum of 12 months. This will allow for the demonstration of the Project in a full cycle of weather conditions and is sufficient time to ensure learnings to be input into future commercial CETO projects and R&D activities. At the end of the operational year, the balance of infrastructure available for future users. Carnegie then intends to develop a larger Project at the Albany site whilst making the common user infrastructure developed in the AWEP available to the Research Centre and other developers.

1.5. Project Cost

The Project budget has been extensively developed based on estimates and knowledge gained during the PWEP, years of CETO 6 design work and in-depth engagement with Carnegie's supply chain to understand costs for a single unit demonstration at Albany as well as long term cost reduction potential. A high-level Project budget can be seen in Table 1.

<table>
<thead>
<tr>
<th>Expenditure</th>
<th>Total Expenditure</th>
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<tr>
<td>Design &amp; Development</td>
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<td>CAPEX</td>
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<tr>
<td>Operations, Maintenance &amp; Decommissioning</td>
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<tr>
<td>Payroll &amp; Administrative</td>
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</tr>
<tr>
<td><strong>Total Expenditure</strong></td>
<td><strong>$ 65,447,683.37</strong></td>
</tr>
</tbody>
</table>
2. Carnegie Clean Energy

Carnegie Clean Energy Limited is an Australian, ASX-listed (ASX: CCE) (Carnegie) wave energy, solar energy and battery storage project developer. Carnegie is the 100% owner and developer of the CETO Wave Energy Technology intellectual property and is also 100% owner of leading Australian battery/solar microgrid Engineering Procurement and Construction (EPC) company Energy Made Clean (EMC). EMC specialises in the delivery of mixed renewable energy microgrid projects to islands and remote and fringe of grid communities. Carnegie is the only company in the world to offer a combination of wave, solar, wind, battery storage and desalination via microgrids which are ideally suited to islands, off grid communities and fringe of grid locations. Within Australia, Carnegie delivers its solar energy and battery storage projects via a joint venture between Energy Made Clean and multinational property and infrastructure company Lendlease (ASX: LLC).

As an ASX listed company, Carnegie has over 10,000 Australian shareholders, including over 3,500 shareholders in Western Australia.

Over $140m has been invested to fund the development of the proprietary CETO wave energy technology that converts ocean swell into zero-emission renewable power and desalinated freshwater. Carnegie employs a combination of rapid prototyping, computational simulation, wave tank testing and, in-ocean testing in developing CETO.

2.1. Carnegie Team

Carnegie Clean Energy has a strong multidisciplinary team of over 100 employees based in Western Australia. Carnegie employs a CETO wave energy team based in Belmont, Fremantle and North Fremantle, WA that span a wide skill base including hydrodynamics, mechanics, hydraulics, electrical, intellectual property, offshore engineering and operations, project planning, finance, environmental planning and stakeholder consultation. In addition, Carnegie is also the 100% owner of Energy Made Clean which has a team of engineers, project managers, electricians and more whose expertise can also be drawn upon to deliver this Project.
Carnegie has a highly experienced international Board of Directors consisting of Mike Fitzpatrick (Hastings Funds Management, Rio Tinto), Jeffrey Harding (Pacific Hydro, Ceramic Fuel Cells), Kieran O'Brien (Former MD Irish electricity grid and World Energy Council Secretary), John Leggate (VantagePoint Capital Partners, BP), Grant Mooney (Chairman) and Michael Ottaviano (MD & CEO), who combined, have delivered and overseen projects measured in the multiple-billions of dollars across renewables, oil and gas, offshore energy, power generation and transmission and mineral resources (Table 2).
Table 2 – Carnegie Board Members

From left to right: John Leggate, Kieran O'Brien, John Davidson, Michael Ottaviano, Grant Mooney, Jeff Harding, Michael Fitzpatrick

Jeff Harding – Chairman, BEng, MSC

Mr Harding is recognised as one of Australia’s leading alternative energy practitioners and has been a key driver in expanding the renewables market in Australia, South America and Europe since the wind mid-90’s. From 1995 to 2005 Mr Harding was Managing Director of Pacific Hydro Limited, Australia’s largest renewable energy developer with wind and hydro energy projects in Australia, Asia and Chile. During his tenure, Mr Harding oversaw the International expansion of the business with growth in market capitalisation from AU$5 million to over AU$750 million and an increase in profit after tax each year from 1996 to 2005, when Pacific Hydro was sold to IFM Renewable Energy. Mr Harding was also previously the Vice President of the Australian Business Council for Sustainable Development.

Dr Ottaviano joined Carnegie in January 2006 and was made Managing Director in March 2007. Dr Ottaviano oversaw the acquisition of the CETO wave power intellectual property in 2009 and focusing of the company’s efforts onto its commercialisation. During his time as Managing Director, Dr Ottaviano has led the development of CETO Wave Energy Technology from Proof of Concept, Pilot Plant and Commercial Demonstration stages and has been responsible for raising over $140m in equity, grants and debt. More recently he has steered the companies expanded focus into the solar/battery microgrid market.

Dr Ottaviano has previously worked in research and development and consulted in technology and innovation management. He has advised companies on new product development, intellectual property and technology commercialisation across various industries and ranging from start-ups to large multi-nationals. He is a former Board Member of the Clean Energy Council, Australia’s clean energy peak industry group, and a member of the Australian Government’s Energy White Paper Consultative Committee. He is also a non-executive director of ASX listed hearing technology start-up, Nuheara Limited. Dr Ottaviano has a Bachelor of Engineering, a Masters of Science and a Doctorate in Business Administration.

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Grant Mooney – Non-Executive Director/Joint Company Secretary, B.Bus, CA

Mr Mooney is the principal of Perth-based corporate advisory firm Mooney & Partners, specialising in corporate compliance administration to public companies. Mr Mooney has gained extensive experience in the areas of corporate and project management since commencing Mooney & Partners in 1999.

His experience extends to advice on capital raisings, mergers and acquisitions and corporate governance. Currently, Mr Mooney serves as a Director to several ASX listed companies across a variety of industries including technology and resources. He is a Director of Nuheara Limited, appointed 14 October 2008, Barra Resources Limited, appointed 29 November 2002, Carbine Resources Limited, appointed 16 January 2012 and Talga Resources Limited, appointed 20 February 2014. He was a Director of Nuheara Limited from 1 May 2007 to 4 June 2016 and Carbine Resources Limited from 18 January 2012 to 2 September 2014. Mr Mooney is also a member of the Institute of Chartered Accountants in Australia.

John Leggate – Non-Executive Director, CBE, FREng

John Leggate is a highly-experienced oil and gas and venture capital industry executive. He worked for over 27 years for BP. His key leadership roles were as President of the Azerbaijan International Oil Co, BP’s Group Chief Information Officer and Group Vice President of BP’s Global Supply Chain.

At BP Mr Leggate was closely involved in the development of corporate policy on technology foresight, and corporate venturing during the dotcom era. He has spent 20 years in the exploration and production business; running various projects, construction, commissioning and production operations with a focus on the North Sea and the Caspian Region.

Mr Leggate’s early career was spent in marine consultancy at Yarrows Admiralty Research in Glasgow and after that, he was engaged in the design and construction of coal, oil and nuclear power stations with South of Scotland Electricity Board (now Scottish Power). Mr Leggate has served as a Director on the Main Board and Audit Committee of London AIM listed Parkmead Boston-based Group and Ogin, a Boston-based wind turbine company. He has also served on the UK DTI Far Eastern Trade Advisory Board for four years and was an advisor to the US House Science Committee on the potential threat from cyber security on critical national infrastructure and global trade.

Mr Leggate was awarded the CBE in recognition of his outstanding contribution and leadership to the international digital technology agenda. Mr Leggate is a graduate of Glasgow University and is a Fellow of the Royal Academy of Engineering.

Mike Fitzpatrick – Non-Executive Director, B.Eng (Hons), BA (Hons)

Mr Fitzpatrick has over 37 years in the financial services sector. He is Chairmain of Pacific Current Group (formerly Treasury Group Limited), an incubator of fund management companies, and also Chairman of the Australian Football League. He also holds a number of other non-executive directorships, including Infrastructure Capital Group, Carnegie Wave Energy Limited and Latam Autos Limited.

In 1994 Mr Fitzpatrick founded Hastings Funds Management Ltd (‘Hastings’), the pioneering infrastructure asset management company where he was Managing Director until he sold his interest in 2005. Hastings was then one of the largest managers of infrastructure and alternative assets in Australia (including infrastructure, high yield debt, private equity and timberland) managing investments of approximately A$3.8 billion. Mr Fitzpatrick was a director of a number of Hastings’ managed investments, including Pacific Hydro Limited, GlobalRenewables Limited, Utilities of Australia, Australian Infrastructure Fund and Australia Development Group Pty Ltd (the holding company of Perth Airport). Prior to establishing Hastings, Mr Fitzpatrick was a director of CS First Boston. He also previously held positions with Merrill Lynch and First Boston in New York, the Victorian Treasury and Telecom Australia.

Mr Fitzpatrick is a former chairman of Victorian Funds Management Corporation, and the Australian Sports Commission, a former director of Rio Tinto Limited and Rio Tinto plc, a former member of the Melbourne Park Tennis Centre Trust, a former director of the Carlton Football Club and a former director of the Walter & Eliza Hall Institute of Medical Research.

Mr Fitzpatrick has a Bachelor of Engineering with Honours from the University of Western Australia and a Bachelor of Arts with Honours from Oxford University where he was the 1975 Rhodes Scholar from Western Australia.
John Davidson – Executive Director

John Davidson is an Executive Director of Carnegie Clean Energy Limited and founder and Managing Director of Energy Made Clean, a leading Perth-based renewable energy company providing off-grid power and utility-scale solutions. EMC was recently acquired by Carnegie Clean Energy (ASX: CCE). Mr Davidson is a highly-regarded corporate and business executive with more than 30 years' experience leading major strategic business initiatives and business transformation in a diverse range of industries, particularly the renewable energy and technology sectors.

From its inception in 2002, Mr Davidson has spent the last 15 years building EMC into one of the country's leading solar and battery storage innovators. Growing in strength through a number of acquisitions, including Solar Sales, Clear Energy and Aussie Solar, Mr Davidson has developed a unique business model that offers an end to end renewable energy solution in-house, dedicated to research and development, custom design, construction, operation, maintenance and monitoring. Most recently, EMC’s has expanded its reach and project opportunities through a number of strategic partnerships, including an initial 3-year joint venture with Lendlease Services to leverage off the construction giants Australia wide footprint; a joint venture with aboriginal mining contractors Eastern Guruma to develop renewable energy solutions in the Kimberley; and a memorandum of understanding with mining company TNG and Japan's Sumitomo Electric Industries to collaborate on the development and growth of Australia's emerging Vanadium Redox Flow Battery (VRF) market.

As founder of EMC, Mr Davidson will be instrumental in establishing Carnegie as the leading Australian renewable energy microgrid project delivery company. His international business experience and connections will also further enhance the company's global opportunities in the microgrid and wave energy technologies.

Mr Davidson also serves as Non-Executive Director on the board of mining company TNG, following the signing of a MoU between EMC and TNG in late 2016.

Carnegie also has a strong Senior Management and Technical team with considerable international and local experience in the development and commercialisation of technology across a range of research and development, technical, power utility and commercial-based industries.

Carnegie's staff are dedicated to the development of the CETO technology, the successful delivery of this Project, and are driven to see the technology succeed in Australia.

2.2. Technical Ability

For over 10 years, Carnegie has developed the CETO wave technology from a concept through computation simulation, wave tank testing and small scale in-ocean operational testing, large-scale in-ocean operational testing completed off Garden Island to the Perth Wave Energy Project (PWE), the first grid connected and water mains connected CETO array.

During this time, Carnegie has developed a world-class competency in advancing new marine energy technological concepts, developing and testing these concepts initially virtually, through advanced computational analysis systems, and then via real in-sea prototyping to validate the predicted performance. Through work carried out at its private onshore/offshore Fremantle Wave Energy Research Facility, Carnegie has demonstrated the benefits of accelerated design development techniques and has built a core team of business, engineering and scientific personnel to direct and manage the development and commercialisation of CETO. Carnegie operated the only dedicated wave pilot facility in the Southern Hemisphere and holds wave energy seabed licences across Australia and internationally.

In the course of researching and developing the CETO technology, Carnegie has developed unique knowledge and capabilities that make it best positioned to commercialise CETO. For example, Carnegie has developed a unique in-house hydrodynamic and hydraulic modelling capability supported by its own dedicated, in ocean, wave energy test facility at Fremantle, Western Australia). Instead of using a facility such as European Marine Energy Centre (EMEC) in Scotland, Carnegie has built its own flexible Australian based testing facilities which allow for rigorous testing and accelerated design developments. As part of Carnegie’s contribution to and ongoing relationship with the newly created Research Centre, Carnegie would facilitate access to these facilities for other industry partners.
Carnegie has also developed its technical ability through the process of developing the Garden Island site where it designed, built and operated two CETO demonstration projects off Garden Island, WA. Carnegie would also facilitate access to this facility for other industry partners as part of its ongoing collaboration with the Research Centre.

These projects, discussed in more detail in section 3, encompassed significant technological advances for CETO as well as progressing Carnegie’s technical understanding and ability to deliver wave energy projects including how to navigate the challenges of the offshore environment for installation, operations and maintenance.
2.3. Corporate Ability

With a highly-experienced Board of Directors and Senior Management, Carnegie has the necessary skills and proven track record to make this unique Project a reality. In addition, Carnegie has extensive wave energy project experience through developing the Garden Island site for the CETO 3 Project and the Perth Wave Energy Project including securing the necessary financing, approvals, permits as well as designing, testing, installing, operating and maintaining the CETO technology.

Carnegie has an experienced in-house team that manages site assessment and development as well as project development. This includes projects already successfully delivered such as the deployment of the pilot scale CETO prototypes in North Fremantle, the in-ocean operational test of the commercial scale CETO unit at Garden Island as well as the successful delivery of the Perth Wave Energy Project at Garden Island.

Carnegie is a publicly listed company with a proven track record of solvency and demonstrated history of raising the necessary capital for the development of CETO technology, primarily through private placements and share purchase plans. To date, Carnegie has raised over $140 million through public and private channels. As such, Carnegie intend to contribute over half of the project cost through cash in hand and private equity and debt financing (see Table 3 – Project Funding Sources).

Table 3 – Project Funding Sources

<table>
<thead>
<tr>
<th>Project Funding</th>
<th>Amount</th>
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<tr>
<td>Carnegie Cash on Hand, Equity &amp; Debt</td>
<td>$37.8m</td>
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<tr>
<td>ARENA CETO 6 Grant</td>
<td>$11.7m</td>
</tr>
<tr>
<td>WA State Funding</td>
<td>$16.0m</td>
</tr>
<tr>
<td>Total</td>
<td>$65.5m</td>
</tr>
</tbody>
</table>

Carnegie is the best positioned of any party to own, fund and successfully deliver the Project for a range of corporate, commercial, financial, technical and other reasons including but not limited to:

- Carnegie is the most advanced wave energy company in the world and the best equipped. Through its Perth Wave Energy Project off Garden Island, Carnegie is the only wave energy company globally to have successfully delivered an array of large scale wave energy generators in open ocean and operated for 12 months. Over the past 10 years of development, Carnegie’s experienced team has designed, deployed and operated more than 10 wave energy prototypes at its Fremantle and Garden Island wave energy sites. Carnegie’s Western Australian based team of approximately 100 staff make it the largest wave energy developer in the world and the largest renewable energy company in Western Australia.

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- Carnegie is motivated to assist other wave energy companies to also progress development so that a wave energy industry can emerge to the benefit of all. To this end, Carnegie has worked in particular with local Western Australian developers, **[redacted]** to best incorporate their needs into the AWEP and both have supplied support letters to this effect in our proposal.

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- Carnegie's demonstrated history of collaborative research as demonstrated by a current R&D portfolio worth over $11m with local and international universities and research organizations including UWA, Curtin, Murdoch, Adelaide, Swinburne and Tasmania in Australia and Scottish, German, French and Irish universities and research organizations globally.

- Carnegie's strong international industry connections and ability to bring international industrial expertise to Western Australia including from within the wave and marine energy industries witnessed by existing collaborations with support letters from Atlantis Tidal, NEMOS and CorPower and major global utilities as evidenced by Carnegie's licencing deal with French power giant EDF and the letter of support provide by major Italian utility Enel Green Power.

- Carnegie is the original proponent of the State Government's Albany Wave Energy Project and Research Centre. Carnegie's deep history in wave energy development in Western Australia, including its development work at Albany, led it to identify the AWEP as a significant opportunity for Western Australia to take a leadership position in the commercialisation of wave energy globally. Additionally, Carnegie originated the concept of Research Centre to be develop in parallel to best leverage the benefits of a globally unique wave energy project like the AWEP.

- Strong existing relationships with key stakeholders including Synergy and Western Power, including a previous secondment of a Western Power planning engineer to the CETO team, the City of Albany and the Great Southern Development Commission.

Carnegie is fully committed to the development and progression of the wave energy industry and fully supports the State in believing that the establishment of a Wave Energy Project and a Research Centre is the best way to progress the industry.

Carnegie has full board approval for the ongoing development of the CETO technology and participation in the this tender. Moreover, the board have expressed their support for the construction of a Wave Energy Project in Albany.
2.4. Project Governance

Carnegie is exceptionally well positioned to manage and govern the Project given its experience in successfully delivering large scale wave energy projects in Australia, in addition to the broader company experience in delivering other world-leading renewable energy projects.

To deliver the Project, Carnegie will leverage the knowledge and experience of its ASX Board of Directors and Executive Management team to provide governance for the Project. Carnegie is led by an experienced board of directors and executive management with a proven track record in the governance and disciplined delivery of complex projects internationally.

Building on the experience and learnings from the PWE, effective project governance will be achieved through a structured framework applicable throughout the full life of the Project, commencing at concept development and evolving through to commissioning and operation of the Project.
3. CETO Technology

3.1. CETO Technology Development

Named after a Greek sea goddess, CETO has demonstrated the potential to revolutionise renewable power and water production globally. CETO harnesses the enormous untapped renewable energy present in our ocean’s waves and converts it into two of the most valuable commodities underpinning the sustainable growth of the planet; zero-emission electricity and zero-emission desalinated water.

Initial development of the CETO wave energy technology began in 1999 with desktop research and design. Following on from detailed design and analysis, work on the development of the CETO technology platform commenced in 2003 with construction of the first prototype unit starting at the end of the same year (Figure 8). The CETO I prototype proved the concept of generating zero-emission power and freshwater from the ocean waves in 2006. Between 2006 and 2008, CETO II prototypes were developed and tested in the waters of Carnegie’s Fremantle Wave Energy Research Facility, providing new commercial design concepts.

During this time, a unique and powerful in-house capability, harnessing modern computational power and hydrodynamic analysis techniques, was developed which allowed numerous CETO designs to be tested in a virtual wave environment before data collection from in-sea trials validated these designs. This capability has been continually improved upon by Carnegie and results in both substantially cheaper and faster design development, as well as allowing a wider variety of ideas to be tested than would be otherwise possible.

In 2011, the CETO 3 Unit was tested at Carnegie’s PWEP site at Garden Island. In 2014, Carnegie’s CETO 6 design was deployed and operated at the PWEP Garden Island site. The PWEP was the first multi-unit grid connected and water mains connected wave energy converter array in the world and also the first wave energy project to produce both power and potable water. The array operated over 12 months for a cumulative 14,000 hours setting a world record for a grid-connected wave energy system.

**Demonstration Projects**

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Scale models &amp; wave tank testing</td>
</tr>
<tr>
<td>2003</td>
<td>Prototype producing zero-emission power and desalinated water</td>
</tr>
<tr>
<td>2006</td>
<td>Multiple prototype units generating power</td>
</tr>
<tr>
<td>2009</td>
<td>Large scale Unit demonstration in full depth ocean site</td>
</tr>
<tr>
<td>2011</td>
<td>Demonstration scale array, first grid connected project</td>
</tr>
<tr>
<td>2015</td>
<td>Pre-Commercial demonstration of CETO Production Unit</td>
</tr>
<tr>
<td>2020</td>
<td>Commercial Rollout</td>
</tr>
</tbody>
</table>

*Figure 8 – CETO Development Pathway*
Through the process of delivering the Commercial Unit Demonstration and the Perth Wave Energy Project, Carnegie has gained significant and unique experience in delivering a commercial scale wave energy unit that provided valuable lessons learned that will benefit this Project, including in the following areas:

- **Project Management** – i.e. work breakdown structures, PRINCE2 in practice
- **Procurement Strategies** – i.e. offshore construction contract safeguards
- **Risk Management and Risk Allocation** – i.e. appropriate spares philosophy
- **Practical application of Systems Engineering** – i.e. importance of requirements and interface management
- **Assembly and Site Integration Testing** – i.e. test documentation needs, on-site OH&S management
- **Offshore Installation** – i.e. design for installation, diver induced constraints,
- **Offshore Operations & Maintenance** – i.e. necessary procedural detail

These lessons are typically learned only in large scale deployment projects. Carnegie has conducted two such campaigns and the majority of the staff have been through at least one of those. The entire senior management have been through both.

Figure 9 - CETO 3 Commercial Unit Demonstration Project
3.2. CETO 6 Technology

The Project will design, build and operate a 1.5MW CETO 6 Unit off Albany which will be connected to the local grid. The Project infrastructure will consist primarily of:

<table>
<thead>
<tr>
<th>Project infrastructure</th>
<th>Common User Infrastructure</th>
<th>CETO-specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore Infrastructure</td>
<td>A control room in the town of Albany suitable for multiple plant operators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A small onshore substation with grid connection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Onshore electrical cable connecting offshore subsea junction with onshore substation</td>
<td></td>
</tr>
<tr>
<td>Offshore Infrastructure</td>
<td>Pile foundations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subsea junction box</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Offshore cable connecting subsea junction box to CETO Unit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.5MW CETO 6 Unit</td>
<td></td>
</tr>
</tbody>
</table>

The CETO 6 Unit has a prime mover known as the Buoyant Actuator (BA); which is the body that captures the wave energy and convert it into motion. This motion actuates the Power Take Off (PTO) located in the BA and connected to the Mooring System. The Mooring System secures the Unit on the sea bed through Foundations. The electricity generation is performed within the PTO and
exported back to the onshore substation using subsea electrical cables. The multiple moorings allow the capture of energy from all motions produced by the waves, offering a twofold increase in power production compared to a single moored device.

Figure 11 – CETO 6 multi-moored configuration

The CETO 6 Unit for this Project has been developed with a focus on increased power output, increased market applicability, lower capital costs and reduced maintenance costs, particularly for sites where the array is located far from shore or in deeper water. This new generation of the CETO technology will provide a step change in CETO development by demonstrating subsea generation and transmission of electrical power to shore via cables and further increasing the power capacity per CETO Unit which in turn decreases the cost of generation. This Unit provides a significant improvement in yield and CETO's long term levelised cost of energy (LCOE).

Figure 12 – Innovative Power Take-Off in CETO 6
The design of the CETO 6 Unit for this Project builds upon the extensive experience gained in previous CETO generations, draws on the experience gained through delivering PWEP, wave tank testing (see Figure 13), advanced hydrodynamic modelling and will incorporate some innovative designs that will decrease costs and increase market opportunities for CETO in the long term. Carnegie has been undertaking CETO 6 design work internally and with expert partners from industry and the research community with the aim of minimising cost and maximising yield in order to ensure that the technology is progressing towards a commercially competitive LCOE.

![Wave Tank Testing of CETO 6](image)

**Figure 13 – Wave Tank Testing of CETO 6**

### 3.3. Technical Approach

Carnegie’s approach to development of the CETO 6 technology for this Project is consistent with typical concept design and detailed design phases for engineering and construction projects, and with the approaches previously undertaken by Carnegie in PWEP. Detailed design is carried out for each element according to the technical certainty as well as the risk to budget and schedule.

All processes at Carnegie are defined in KPMs (Key Process Maps) which describe the important steps involved in performing some of the company key activities. These covers Project management, design and development activities as well as operations.

Best practice of Systems Engineering (SE) are also followed throughout the design and are detailed in a Systems Engineering Management Plan. This plan was developed for CETO 3, with support from [supporter name], and has been improved through subsequent projects.
The project will involve the five main stages described below:

- Concept Design (already completed)
- Detailed Design
- Procurement and Manufacture
- Construction, Deployment and Commissioning
- Operations
The Concept Design for the CETO 6 AWEP unit was completed at the end of June 2017. Carnegie has now formally started the detailed design for the Albany project. Detailed design is due for completion at the end of 2019. As described in section 4, Carnegie has already made significant progress since detailed design started and progress will continue with the Wave Sensor deployment at Torbay, the Geophysical and Geotechnical surveys, Environmental survey and various testing campaigns. Major onshore testing campaigns will be performed during detailed design to minimise risk to the project during deployment and operational phases. Detailed design will also allow Carnegie to refine its procurement strategy for the various components of the CETO system with long lead items expected to be ordered by the end of 2019.

During the procurement and manufacture phase common user infrastructure will be installed. This includes the Onshore plant, export cable and Foundations. This phase requires the reception of all Unit components, their assembly and the site integration testing. The system will then be operated for a duration of 12 months allowing the Unit to experience a large range of environmental conditions, collecting invaluable data for the future project and exporting electricity into the grid. After the 12 months of operation, the Unit will be decommissioned leaving in place common user infrastructure for other wave energy technology developers.

3.4. Intellectual Property

Carnegie Clean Energy Limited (CCE) is the inventor, developer and 100% owner of the CETO wave energy technology. Carnegie owns 100% of the CETO Intellectual Property (IP) and does not need to purchase, licence or create any other background IP to complete the Project.

Carnegie actively invests in the management and maintenance of its intellectual property (IP) portfolio and views the creation and protection of IP as a core competency. It employs a full-time Research and Intellectual Property Co-ordinator who is responsible for executing Carnegie's IP strategy as well as the capture, documentation, protection and maintenance of the CETO IP.
4. Common User Infrastructure and Knowledge

4.1. Site Data & Knowledge

Carnegie will work closely with the Research Centre throughout the Project to ensure the maximum value for the Research Centre, the wave energy industry and the broader offshore renewable energy industry.

Carnegie will share all non-proprietary data and results gathered through the Project activities. Additionally, a significant amount of data exists that has been collected for the site over the last ten years and would be available immediately. Examples of the types of knowledge that could be shared include:

- Geophysical surveys (for example bathymetric, side-scan sonar, grab samples, airborne LIDAR)
- Metocean studies (includes extreme event analysis, annual occurrences and persistence analysis for offshore works)
- Wave sensor data
- Grid connection studies with Western Power
- Onshore Geotechnical Survey
- Offshore Geotechnical Survey
- Environmental & Planning Approvals
- Environmental surveys
- Information on local infrastructure required for the installation, operation and maintenance of an offshore renewable energy device
- Community consultation learnings and associated actions
- Optimum towing route and associated weather constraints from onshore staging area to deployment site.
- Design data associated with common user infrastructure

4.2. Grid Connection

Carnegie will work with Western Power to connect the Project to the grid in Albany (SWIS). The most likely grid connection point will be at the Albany wind farm. Carnegie has held discussions with Synergy who owns the Albany and Grasmere wind farms and the associated 22 kV express feeders back to the Albany substation.

The Project will deliver a physical grid connection point that will provide a lasting legacy for future users, although future users will also be subject to Western Power's grid connection requirements.

Carnegie already has a strong relationship with Western Power, developed over a number of years and specifically related to the connection of the Perth Wave Energy Project (PWE) to the SWIS in 2014. PWE is the only wave energy project ever connected to the SWIS and created a great deal of learning for both Western Power and Carnegie, and resulted in Carnegie becoming intimately familiar with the network operator's grid connection requirements, and how best to collaborate with Western Power in an open and ongoing basis as the design progresses.
As a result of this Project therefore, there will be significant additional common user value created through the process of connecting the Albany Wave Energy Project to the grid. Carnegie’s collaborative relationship with Western Power will enable the network operator to be much more knowledgeable about wave energy and more comfortable with connecting future innovative wave energy projects at the site.

4.3. Onshore Plant & Control System

The Project will design and build a kiosk style substation onshore which will house the following:

Carnegie intends to make the Onshore Plant adaptable to future wave energy developer needs. Taps in the transformer to provide for different voltages and standard SCADA equipment could be incorporated subject to further analysis.

Figure 16 – Example of onshore substation
4.4. Subsea Export Cable

The nearshore location of the Unit will require much of the cable route installation operations to occur in the surf zone. The size and duration of wave events in this area will make trenching operations difficult. Horizontal Directional Drilling (HDD) is therefore the preferred option for this site. The 2km cable route would be drilled from the top of the cliffs and exit the seabed in the vicinity of the CETO Unit. The required length and diameter are within industry capability.

In order to complete the HDD design, a geotechnical survey will need to be performed to determine the soil condition. Synergy has provided Carnegie with the geotechnical survey performed for the wind farm, which will fast track the design of the HDD. Below is a sectional view of the proposed HDD.

Figure 17 – Proposed HDD Profile

Figure 18 – Design of the Cross Section of the Export Cable
4.5. Subsea Junction

An inline connector will be used to join the export cable to the WEC's dynamic umbilical cable. The connector can be easily disconnected from the CETO Unit, blanked and laid back on the seafloor, protecting it from the subsea environment. The connector can be recovered and connected to another device as long as the same connector is used, allowing for an easy connection.

4.6. Offshore Foundations

During concept design Carnegie engaged leading marine services company [redacted] to complete the design of the foundations for the CETO 6. [redacted] design work demonstrated that large piles drilled and grouted into the seabed offer the most economic and reliable solution of subsea foundations for CETO. This conclusion is consistent with Carnegie's experience during previous projects. Drilled and grouted large piles were used for the foundations of the CETO 5 technology during PWEP and for the CETO 3 project. Carnegie gained considerable commercial and technical experience through this process and is now in an excellent position to manage this type of offshore activities that will be required for AWEP.

Figure 20 – Jack Up Barge during PWEP foundation installation.
Foundation design work will progress during detailed design phase and Carnegie will continue to optimise the foundation design and its installation methodology. It will leverage on subsea industry expertise but also on its unique collaboration with UWA and its Centre for Offshore Foundation Systems.
5. Project Site Development

As detailed below, Carnegie has made significant progress already in developing the Project site, including understanding the potential wave resource, environmental considerations, preliminary assessment of approvals required, securing an offshore license and engaging with local stakeholders including UWA.

5.1. Site Location

5.1.1. Offshore Site:

The Southern coast of Australia has some of the best wave energy resources in the world due to the proximity to the circumpolar Southern Ocean and the West Wind Drift. A 2011 CSIRO report indicated that the total wave energy crossing the 25 metre depth isobath between Geraldton and the Southern Tip of Tasmania is over 1300TWh/ year, which is about five times the total electricity requirements of Australia. Wave data studies conducted over the past 10 years have indicated that the Albany site in particular offers significant energy potential; the south coast wave energy density around Albany is approximately 57kW/m² compared with typically approximately 20kW/m in Europe.

Because of Albany's impressive wave energy resource, Carnegie has long considered Albany to be one of the best sites to develop a commercial wave energy project. Several years ago, as part of Carnegie's ongoing site development efforts, Carnegie secured offshore and onshore licenses from the State Government and commissioned ___ to complete a feasibility study and ___ study to assess the environmental constraints (Section 0) of the Albany wave energy site. This helps Carnegie better understand the site and its specific challenges and opportunities.

Figure 22 - GHD wave resource assessment of Torbay

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Data measured as specific DoT wave buoy location
Based on these years of site development work, Carnegie selected an offshore site within Torbay off the coast of Albany. The proposed deployment location is located in 30 m water depth just offshore of the existing wind farm (Figure 23). The exact coordinates of the CETO Unit deployment will be determined based upon the upcoming site development work, including bathymetry, metocean and geophysical survey.

Figure 23 - Likely location of CETO 6, offshore Torbay

5.1.2. Offshore Site Licence

Carnegie currently holds a Licence to Occupy Crown Land, granted by the WA Department of Lands under Section 91 of the Land Administration Act 1997, for the area shown in Figure 24. Carnegie has held a licence over the site since 2008. This current licence is exclusive for the purposes of wave energy, but non-exclusive for other sea users. Therefore, no other wave energy projects can obtain rights to this site during the term of Carnegie’s licence.
5.1.3. Onshore Site and Tenure

The Project will have a small onshore footprint for a kiosk style substation. The onshore footprint would be located at Sand Patch Reserve, near the Albany wind farm. Sand Patch is a Crown Reserve (13773) with management delegated to the City of Albany. As a Crown Reserve, the site must be used for its designated purpose. In 2009, as part of Carnegie’s site development efforts, Carnegie successfully applied to update the purpose of the land to include wave energy. As a result, the current purpose of the Reserve is “Conservation, Recreation, Water Supply and Wind and Wave Energy Power Generation.” The City of Albany has the power to lease Sand Patch Reserve for any term not exceeding 30 years subject to the consent of the Minister for Lands. Carnegie held a licence over Sand Patch Reserve for the Albany Wave Project, which can be renewed with the City of Albany.

5.2. Environment & Approvals

5.2.1. Legislative Framework
5.2.2. Commonwealth Legislation
5.2.3. Principle Western Australian Legislation
5.2.4. Other State Legislation

5.3. Community Consultation

Carnegie will develop a Project specific Community Consultation Plan which will provide a strategic approach and a detailed engagement plan, with clear objectives, activities and process evaluation, specific to the Project. It will build on previous work Carnegie has undertaken for the CETO 3 commercial-scale unit testing and PWEP array.

The Community Consultation Plan identifies a fair and transparent engagement and feedback process for stakeholder consultation and will integrate the social/community component in line with key planning phases and Project milestones. The Community Consultation Plan will also identify all key stakeholders groups across Minister and Cabinet, Government Agencies (Federal, State and Local), Industry, Community, Customers and Suppliers.

Figure 26 - Examples of Carnegie Community Consultation (Fremantle Ports Maritime Day (left) and Rockingham Shopping Centre (right))
It is important to recognise that the Community Consultation Plan is a live document that will be reviewed and updated on an ongoing basis in response to material changes as a form of adaptive management.

Community consultation, including key stakeholder engagement, will be an essential component going forward with this Project, and be undertaken in a similar way as Carnegie’s previous projects, with key stakeholders including:

- WA Department of Primary Industries and Regional Development, encompassing Fisheries and Regional Development
- WA Department of Planning, Lands and Heritage, encompassing the former departments of Planning, Lands, the State Heritage Office and the land and heritage functions of the Department of Aboriginal Affairs
- WA Department of Transport
- WA Department of Water and Environmental Regulation
- WA Environmental Protection Authority,
- WA Conservation and Parks Commission
- WA Biodiversity, Conservation and Attractions, WA Department of Mines, Industry Regulation and Safety
- Australian Government Department of the Environment and Energy
- Australian Fisheries Management Authority
- Australian Maritime Safety Authority
- Australian Government Department of Industry, Innovation and Science
- Heritage Council of WA
- National Native Title Tribunal
5.4. Consultation with Future Infrastructure Users and Research Centre

Carnegie is in a unique position to be able to manage and govern this Project given its significant experience in delivering offshore wave energy site development, design, installation, operations and maintenance in Western Australia. The infrastructure will be designed and delivered by Carnegie to suit the needs of this initial phase of the Albany Wave Energy Project, the deployment of a single CETO unit.

When making key design decisions regarding the Common User Infrastructure, Carnegie will consider input from industry and will seek to build infrastructure that has optionality for future users where technically and economically feasible.
5.4.3. Research Centre

Carnegie will have a very close collaborative relationship with the Research Centre, and UWA as the lead research partner, throughout the life of the Project to ensure that all parties are realising the maximum benefit from the Project.

Carnegie will contribute the Research Centre through the provision of knowledge such as site characteristics as well as facilitating access to Carnegie’s Rous Head and Garden Island site as well as facilitating future access to the Albany site. Carnegie will also seek to support knowledge development of the Research Centre members by working to allow members to use the Albany site and infrastructure as a living laboratory. Further details on Carnegie’s links to the Research Centre can be found in Section 11.

5.5. Site Characteristics and Environmental Values

5.5.1. General Overview
5.5.2. Terrestrial Environment

Protected Sites, Communities, Flora and Fauna
5.5.3. Marine Environment

Bathymetry and Seabed Features

Benthic Assemblages and Fauna
5.5.4. Social and Economic Environment

Industry and Commerce

5.5.4.1. Recreation and Tourism

5.5.5. Further Studies and Surveys
5.5.6. Potential for Significant Impacts

5.6. Approvals Timeframes
6. Project Schedule & Milestones

The Project Stages are based on Carnegie's Technical Approach as discussed in Section 3.3. Carnegie's approach to development of the CETO 6 technology for this Project is consistent with typical concept design and detailed design phases for engineering and construction projects, and with the approaches previously undertaken by Carnegie in PWEP. This will consist of the following stages:

- Concept Design (already completed)
- Detailed Design
- Procurement, Manufacture, Construction and Deployment
- Commissioning
- Operations

As soon as the funding is awarded, Carnegie is ready to formally commence the Detailed Design Phase (including wave tank testing and other onshore testing) and progress the required Albany site development activities. Carnegie would complete the detailed design and begin ordering long lead items in Q4 2019. The cable and foundations would be installed in Q1 2020, with the CETO Unit installed during the early summer weather window 2019. Full system commissioning is expected at the end of 2019. The Project would then be operated for a period of 12 months. At the end of the operational year, Carnegie would remove the CETO Unit and leave the balance of infrastructure available for future users. At a high level, the Project schedule can be seen in Figure 28.

![Figure 28 - High Level Project Schedule](image)

Carnegie has completed the Concept Design for the CETO 6 multi-moored configuration (which built upon the detailed design completed for the CETO 6 single tether configuration).

The Project will operate for a minimum of 12 months. This will allow for the demonstration of the Project in a full cycle of weather conditions and is sufficient time to ensure learnings to be input into future commercial CETO projects and R&D activities, as well as for the Research Centre and broader wave industry to gain maximum benefit from this demonstration project.

On the basis of the agreement commencement date of October 2017, Carnegie proposes the following set of Project Milestones.
Table 4 – Project Milestones

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>C6M Concept Design</td>
<td></td>
</tr>
<tr>
<td>Albany Design Optimisation</td>
<td></td>
</tr>
<tr>
<td>Site Development</td>
<td></td>
</tr>
<tr>
<td>Detailed Design &amp; Approvals</td>
<td></td>
</tr>
<tr>
<td>Procurement - Order Long Lead Items</td>
<td></td>
</tr>
<tr>
<td>Export Cable Construction</td>
<td></td>
</tr>
<tr>
<td>Procurement - Progress Payments</td>
<td></td>
</tr>
<tr>
<td>Foundation Procurement &amp; Installation</td>
<td></td>
</tr>
<tr>
<td>Factory Acceptance Testing, Components Delivered, Assembly &amp; Integration Testing</td>
<td></td>
</tr>
<tr>
<td>CETO Installation &amp; Commissioning</td>
<td></td>
</tr>
<tr>
<td>12 Months Operations &amp; Monitoring</td>
<td></td>
</tr>
</tbody>
</table>
7. Project Budget & Funding Sources

7.1. Project Budget

The Project budget has been developed based on supplier estimates and knowledge gained during the PWEP, years of CETO 6 design work and in-depth engagement with Carnegie’s supply chain to understand costs for a single unit demonstration at Albany as well as long-term cost reduction potential. The expected Project budget can be seen in Table 2.

At this stage of the Project a construction budget would typically be expected to have a cost resolution of +/- 30%. Due to the PWEP and CETO 6 design experience, and the experience gained through the delivery of the PWEP Carnegie feels that the traditional +/- 30% is conservative in this case. In some cases, multiple quotes have been received and the conservative option pricing has been used.

All costs have undergone probabilistic analysis through Monte Carlo and other risk models. This has ensured that the numbers are robust and therefore deliverable in the circumstances.

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Sub-Cost Category</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible Expenditure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design &amp; Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design &amp; Development Sub-total</td>
<td></td>
<td>$13,432,222.25</td>
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<tr>
<td>CAPEX</td>
<td></td>
<td></td>
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<td>CAPEX Sub-total</td>
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<td>Operations, Maintenance &amp; Decommissioning</td>
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<td>O&amp;M&amp;D Sub-total</td>
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<td>$2,450,000.00</td>
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<td>TOTAL Eligible Expenditure</td>
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<td>$55,447,683.37</td>
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<tr>
<td>Ineligible Expenditure</td>
<td>Payroll &amp; Administrative</td>
<td>$10,000,000.00</td>
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<tr>
<td>TOTAL Project Expenditure</td>
<td></td>
<td>$65,447,683.37</td>
</tr>
</tbody>
</table>
7.2. Project Finance

The Project will be financed by a combination of Carnegie cash on hand, Carnegie debt (from Commonwealth Bank), new Carnegie equity, Carnegie’s existing ARENA CETO 6 grant and the requested State funding.

Table 6 – Project Funding Sources

<table>
<thead>
<tr>
<th>Project Funding</th>
<th>Amount</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Cash on Hand, Equity &amp; Debt</td>
<td>$37.8m</td>
<td>58%</td>
</tr>
<tr>
<td>ARENA CETO 6 Grant</td>
<td>$11.7m</td>
<td>18%</td>
</tr>
<tr>
<td>WA State Funding</td>
<td>$16.0m</td>
<td>24%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$65.5m</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

7.2.1. WA State Funding

Carnegie’s requested contribution from the State is $16m (approximately 24% of total Project costs).

7.2.2. Commonwealth Bank Debt Facility

While CETO is not yet at the stage of full project finance debt, Carnegie has successfully attracted corporate debt into a CETO project and into Carnegie as a company. In November 2015, Carnegie and Commonwealth Bank completed Australia's first wave energy financing deal by a commercial bank. Commonwealth Bank of Australia (CBA) is providing a five-year $20 million loan facility as part of the financing required to deliver this next stage of CETO technology development and commercialisation.

This financing deal replaced the previous $20 million loan facility Carnegie had with the Australian’s Government’s Clean Energy Finance Corporation (CEFC). This is the Commonwealth Bank's first wave energy financing arrangement and builds on its commitments to assist in the transition to a low carbon economy by supporting businesses and technologies that reduce dependence on fossil fuels and mitigate the effects of climate change.

7.2.3. Carnegie Equity
7.2.4. ARENA Funding

Carnegie is currently in the process of varying its existing ARENA CETO 6 grant funding agreement so that the balance of funds ($11.7m) can be used for the Albany Wave Energy Project.

7.3. Reporting and Grant Payments

Carnegie is flexible in the reporting and grant payment structure with the Government and able to work with all key stakeholders to devise a workable solution. Through our experience, Carnegie would initially propose to structure the funding agreement in a way that provides sufficient progress reporting for the State (without creating excessive administrative burden for either party) as well as supporting the Project’s cashflow requirements. Accordingly, Carnegie would propose to provide quarterly progress reporting and grant payments based on forecast quarterly spend.

The quarterly Project progress reports would be complemented by more in-depth reporting provided when each of the Project Milestones are completed.

The State’s grant funding would be provided through quarterly in advance grant payments determined based on the Project’s forecast quarterly spend. Then, at the end of each quarter, all funds would be reconciled with actual expenditure and the next quarter’s payment would be determined based on the next quarter’s forecast spend (adjusted for the previous quarter’s actual spend). Carnegie has successfully delivered projects under this funding model such as Carnegie’s AusIndustry grant funding for the Perth Wave Energy Project’s Desalination Plant.
8. Project Benefits

8.1. Socio-economic Benefits

The Project will offer significant benefits to the local economy through direct, indirect (through employment generated in businesses that serve the project) and induced job creation (jobs created from income being spent in the broader economy). Beyond this Project, through the Project learnings and through providing common user infrastructure that supports the development of the wave energy industry, the locally situated world class wave resource means that there is significant potential for a major new industry in the region, bringing the opportunity for substantially greater job creation and economic growth.

Currently, Carnegie has approximately 100 direct employees in its Fremantle and Belmont offices. Of which, approximately 25 people are actively working on various aspects of the CETO development. These jobs will be maintained and secured, and expanded upon, should the Project go ahead in Australia (Figure 29). We further expect some indirect consultant work through our legal, commercial and broader support services to ensure delivery of the project.

Overall, the Project is expected to create an additional [redacted] full time equivalent (FTE) jobs during construction, in addition to an injection of more than [redacted] into the local economy. Developing this Project in Australia would also improve Australia's position in the international marine renewables industry and would contribute to the long-term creation and expansion of national marine industries, investments and jobs. It is worth noting that Carnegie has leveraged a great deal of additional local investment based on the ARENA and State Government grants for the Perth Wave Energy Project. The State's funding for the Albany Wave Energy Project would likewise leverage additional federal (ARENA) funds as well as additional private investment from Carnegie.

Figure 29 - Carnegie Employees and Contractors at work in Western Australia

Development of wave energy in Australia brings with it development of local supply chain with the capability to export expertise as the industry grows. In addition, at least [redacted] of the total project budget is expected to be spent within Australia through the local supply chain, including development and consenting, device fabrication, balance of plant manufacture and testing, installation and commissioning, and operation and maintenance. This Project also positions the CETO technology for subsequent further innovation to achieve cost competitiveness and large scale, high availability (24/7) renewable power supply for Australia and internationally.
WWF-Australia, in 2009, identified that building 1,500MW of wave energy power stations would create about 3,210 Australian jobs and generate enough clean electricity to power 1.2 million households. In preparation for this build up, Carnegie is developing a project pipeline across Australia, Europe, America and remote islands.

The Albany Wave Energy Project would also unlock the potential for a second stage, the development of a ca. 20W commercial wave energy array off Albany.

8.2. Energy Supply Benefits

This project would have substantial energy supply benefits including increased reliable and predictable renewable energy in Australia, embedded generation, local security of energy supply, reduced carbon emissions, and improvements in infrastructure.

Australia has significant potential for deployment of wave energy due to its vast, untapped wave energy resource, a strong offshore energy (oil and gas) industry and a coastal population with a demand for renewable energy. This provides a great opportunity for a large-scale deployment of CETO technology in Australia that would deliver cost competitive power over the long term. CSIRO (2009) outlines that utilising just 10% of Australia’s resource could meet 50% of Australia’s electricity demand. Wave energy is geographically well distributed, highly available, consistent and predictable as demonstrated in Figure 30. The wave resource is available in excess of 90% of the time for much of the southern Australian coastline (RPS MetOcean, 2009).

The Project will be a critical step forward towards wide scale deployment and cost competitiveness of wave energy and would contribute to making future wave energy projects financeable. Importantly, the renewable energy generated from waves will be at least 3 times more consistent and 3 times more predictable than that of wind (CSIRO, 2012).
Figure 30 Spatial distribution of time-averaged wave power on the Australian continental shelf (kW/m). The wave power at each location represents a time-average of the available 11-year time series from March 1997 to February 2008.

8.3. Wave Energy Industry Development Benefits

The implementation of a wave energy project at a commercial scale will demonstrate on a global level the advancement of the wave energy industry. Carnegie is best placed to accelerate this process having invested over $140m into the development of the CETO units to date.

The project proposed will highlight to the international renewable energy market that full scale commercial wave projects are commercial, economically viable and scalable. The advancement of the technology will place Australia at the forefront of the emerging technology, with Albany seen as the knowledge hub for the wave energy technology. The initial project will unlock the potential for larger scale commercial projects to be built around Australia. The success and timely delivery of the project will put Western Australia at the forefront of the renewable energy market, demonstrating on a global scale Australia’s commitment to supporting the long-term energy shift towards renewable generation.

Development of wave energy in Australia brings with it development of local supply chain with the capability to export expertise as the industry grows. Direct benefit will be recognised by upstream and downstream suppliers who will then have direct experience in the emerging, leading renewable technology. As the technology market expands, indirect benefits will be seen across the technology industry with investment, training and project involvement increasing.

8.4. Regional Development Benefits

The Albany Wave Energy Project would unlock the potential numerous local jobs. The RPS report highlights that construction and operational projects create positive economic “ripple” effects in
supporting sectors ranging from engineering to tourism, enabling the diversification and broadening of job opportunities in the region.

Recreation and tourism is a significant component of the local and regional economy and is considered a growth market. Similar to the Albany Wind Farm, Carnegie propose that the wave energy project becomes a visitor attraction to educate the public on the emerging technology. This not only would boost the tourism industry in Albany but would deliver indirect benefits through public understanding and support for the emerging technology.

The Project and associated Research Centre will attract national and international interest from innovators, financiers and governments. The Research Centre will attract local and international talent to Western Australia and deliver training and apprentice opportunities to develop a younger, skilled, local workforce. Additional, larger scale infrastructure players and financiers will look to invest directly into the area to cement their understanding of the emerging technology and develop relationships with the research and development teams.

Post the 12-month operational phase of the Project, Carnegie will leave a legacy of common user infrastructure to be made available to other wave energy developers to further expand the industry and market appeal. This will deliver long term benefits to the energy market with further technological advances made to further increase the profitability of the industry.

8.5. Building an Australian Wave Energy Industry

The development of common user infrastructure will also draw Australian and international developers to Albany and create a world class hub for offshore renewable energy research and development.

The Project will also enhance Australia’s reputation as a leader in the marine renewables industry internationally which will lead to value capture for the industry. For example, contractors on this Project will also gain unique and valuable experience of working in the marine renewables industry which will increase their competitive position in the expansion of the marine renewable industry worldwide.

Carnegie is active in the international marine energy community, in particular in UK, Ireland, France, Chile and North America, and will share knowledge from this Project at international conferences and events which will contribute to the development of the industry, as well as improving Australia’s standing in this international industry.

Carnegie often attends and presents at All-Energy in the UK and in Australia, International Conference on Ocean Energy (ICOE), Renewable UK Conferences, Global Marine Renewable Conference (US) and the European Wave and Tidal Energy Conference (EWTEC). This Project would be presented at these conferences and would raise the profile of the Australian industry and particularly the opportunities for international companies to bring their technologies to Western Australia to utilise the Albany Common User Infrastructure.
9. Risk Management

Risk management is an integral part of Carnegie's project management practice and project governance. A comprehensive Risk Management Plan is being developed for the Project, which presents the risk management philosophy adopted for delivery of the PWEP, including regular review and update, and identifies key risks and management and mitigation strategies. Some of the key high level risks identified include the ability to secure and adhere to the required permitting and approvals, health and safety risks associated with offshore construction and operation, budget and delivery risks and the performance and reliability of key technologies that form part of the project.

Carnegie now has a knowledge base derived from over 10 years' worth of technology and project development, including deployment and operation of commercial scale CETO units and the Perth Wave Energy Project. These provide direct and valuable experience of designing and developing CETO through the innovation cycle, whilst adapting to harsh oceanic conditions.

Carnegie continues to work with an ever evolving and maturing supply chain, chosen based on demonstrated capability and experience. Stakeholder consultation is seen as a critical part of project implementation and development, and Carnegie will continue to build on existing and well established relationships with key stakeholders to deliver the Project. Carnegie will hold all commercial insurance policies, act in accordance with the rules of the ASX and ASIC, and align the Project delivery and management model with Australia standards and codes of practice.

9.1. Risk Management Plan

There are a wide spectrum of risks that potentially impact the ability of CWE to achieve the Project objectives including; immature technologies, environmental and social impacts, key stakeholders, availability of resources, funding, operational costs, offshore operations and support and schedule. In order to mitigate these risks and to achieve the Project's objectives, it is important that a sound and effective risk management philosophy and process is introduced and adopted.

In combination with other aspects such as the management and engineering processes, risk management will enhance visibility into the project activities, strengthen decision making and facilitate delivery of the Project objectives. The Risk Management Plan (RMP) will form an integral part of the management of the Project and will require active and continuous updating throughout the Project lifecycle. As the Project progresses, the nature of the risks and the context and environment in which they will have to be managed, will change and therefore this risk management process will be reviewed and adapted on a regular basis.

In a broader context, the Risk Management Plan (RMP) is a subset of Carnegie’s existing Company Health Safety & Environmental Management policies, plans and procedures (Figure 31). Carnegie’s Occupational Health and Safety policy includes a commitment from management to be actively involved in the management and planning of Occupational Health and Safety by annually setting and continuously monitoring progress toward safety objectives and targets. This is achieved via an annual corporate strategy process where company objectives and target are agreed and set by senior management and the board of director. Monitoring of corporate objectives and targets is achieved via quarterly strategic reviews and monthly senior management meetings. The Occupational Health and Safety policy also includes a commitment to encourage all employees to be active in observing and recommending changes in the workplace to reduce exposure to any risks and hazards.
Risks are not limited to technical and performance aspects only and will be present within all disciplines, at all levels and throughout the life cycle of the project. It is therefore important to integrate the risk management philosophy and process across all AWEP work packages.

In support of the system engineering approach being adopted, risk management activities form a key aspect of evaluating Project design and delivery decisions.

The focus of the risk management process will be the identification and management of risks and their root causes. The aim will always be to reduce risk to eliminate risks where practicable or manageable levels to allow the achievement of Project objectives. This does not imply that the risk management profiles for the Project will be so risk averse that they will stifle innovation and lead to over-engineering of solutions. The risk management process as put forward in this document aims to achieve effective risk mitigation without stalling the creativity and innovation ("managed risk taking") required to deliver an innovative project.

Some common risk categories are environmental, cost, performance and schedule. In the case of the Project these aspects are tightly interwoven. In these cases, the risk mitigation plans and strategies will focus on obtaining a balance between these categories to ensure that the technology is viable, affordable, engineerable, deployable etc. Other risk categories include legal, social, organisational, safety, economic and all have to be considered to eventually arrive at the full risk picture.

AS/NZS ISO 31000:2009 - Risk management - Principles and guidelines defines the relationships between the risk management principles, framework and process (Figure 32), which forms the basis of the structure of the RMP.
9.2. Project Risk Register

As part of the Risk Management Plan, a risk register for the Project is being created. This is a live document that will evolve as the Project moves from concept design to detailed design, manufacturing and construction, installation and deployment, operations and through to the eventual decommissioning.

The risk register becomes more sophisticated and detailed throughout the Project as risks are identified and mitigation measures are put in place. The Planner/Scheduler of the Project will manage and continually update the risk register in collaboration with the Project Manager, Package Managers and other staff members.

Risks are identified in periodic risk review meetings as well as through the development and implementation of specific Project Plans such as the Construction Management Plan and Environmental Management Plans.

A preliminary risk register will be included in the Risk Management Plan, however, some key high level risks are identified below in Table 7,
10. Knowledge Sharing

As was the case with PWEP, there will be a great deal of valuable information from the Project that will be shared with stakeholders such as the government, universities, local site users, general public and the marine renewable energy industry both locally and internationally.

Carnegie believes that a systematic and strategic approach to stakeholder engagement and knowledge sharing is important in building sustainable and resilient relationships with stakeholders and disseminating information to contribute positively to the development of the marine renewable industry. Accordingly, the Albany Wave Energy Project will have its own Knowledge Sharing Plan and Community Consultation Plan such as the ones Carnegie maintained for the Perth Wave Energy Project to ensure that the maximum amount of non-proprietary data and results can be shared.

Carnegie already has a number of existing programs both within Australia and internationally to support technology development which will continue with this Project through the associated Research Centre. These programs are supported by and involve a number of research institutions including: CSIRO, University of Western Australia, Curtin University, University of Adelaide, University College Cork, University College Dublin and University of Edinburgh. Using these existing relationships, as well as new partnerships developed through this project and individual discussions with relevant developers and other partners, Carnegie will disseminate important learnings from the Project to aid in the development of the marine industry.

Carnegie utilises a range of mechanisms for engaging with stakeholders that relate to the development of the CETO technology as well as to specific Projects. These are directed by Carnegie’s internal communications plan which includes the requirements of ASX guidelines and rules, corporate objectives and project specific plans. The Project’s Knowledge Sharing Plan and Community Consultation Plan will work alongside the associated Research Centre to identify the best way to engage and share information with each of the many stakeholder groups in a timely and professional manner.

The Project’s Knowledge Sharing Plan and Community Consultation Plan will initially build on the work Carnegie undertook for the CETO 3 single unit testing and the Perth Wave Energy Project, which had many overlapping stakeholders with this Project. This means that Carnegie has already undertaken many years of consultation and information dissemination with key stakeholders and has developed strong relationships with interested parties which will ensure effective Project consultation and information dissemination. Whilst utilising its relevant experience, Carnegie will look to hone its knowledge sharing strategy by collaborating with the Research Centre.

10.1. Knowledge Sharing Plan

The Project provides a unique opportunity to share knowledge and information relating to technology and project development that can help improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia and globally. The Project will have a Knowledge Sharing Plan (KSP) that outlines how Carnegie proposes to disseminate knowledge and experiences gained through developing the Project.

The objective of knowledge sharing in relation to the Project is to further understand and test the wave energy resource and enable commercially financeable wave energy projects in Australia and to disseminate this knowledge to the ocean energy industry. Specifically, outcomes from knowledge sharing will:

- improve the Australian ocean energy sector’s knowledge and understanding of the opportunities associated with the development of wave energy projects;
- improve coordination and collaboration between the research community, government and the ocean energy industry through improved knowledge sharing activities; and
ALBANY WAVE ENERGY PROJECT PROPOSAL

- build the capacity and skills of the ocean energy industry in Australia for the long-term development and viability of the industry, which will assist Australia in transition towards a low carbon future.

The Knowledge Sharing Plan will provide a strategic approach and a detailed engagement plan with objectives, milestones and process evaluation with an aim to build better ongoing relationships and realise benefits for Carnegie and its stakeholders, including the government and the marine industry as a whole. This will be a live document that will be continually updated throughout the Project lifetime.

10.2. Use of Project Information

As a public company, Carnegie is required to release information subject to Australian Security Exchange (ASX) Guidelines for continual disclosure. ASX Guidelines require that Carnegie disclose information to the market that may have a material effect on the price or value of its securities. In addition, the Project would be subject to confidentiality provisions of the State Government, in addition to other Project partners including University of Western Australia and ARENA.

Information about the Project that can be released into the public arena includes:

- Basic Information: Carnegie's name and details, value and term of the grant, approval date, purpose of grant and location of the Project.
- Project Description for use in Ministerial statements, announcements, press releases and Annual Reports. This would include Project objectives, key activities and timeframes.
- Community consultation material
- Processed wave energy resource data. As an example, Carnegie currently makes some of its wave data available to the public online.
- Announcements regarding project milestones achieved, environmental monitoring results, performance (success and/or failure) and other important information will be released as ASX announcements (subject to ASX listed company requirements).
- Where relevant and agreed, case studies or similar documents

In line with Carnegie's strategic priority to protect its proprietary CETO Intellectual Property and commercial in confidence know how, certain details about the Project and its performance will be kept confidential. This includes but is not limited to:

- Detailed Project Engineering Design
- Detailed CETO Unit and Component Design
- Detailed Performance Data
- Detailed Resource Data
- Detailed Budgets and Costings
- System know-how

Carnegie will release certain confidential information to the State and ARENA to be treated as Commercial in Confidence. This Commercial in Confidence information will be provided in:

- Quarterly Progress Reports
- Detailed Milestone Reports

CONFIDENTIAL – COMMERCIAL IN CONFIDENCE
THIS DOCUMENT IS UNCONTROLLED WHEN PRINTED
10.3. Project Collaboration & Knowledge Sharing

The Project has involved and will continue to involve a number of important collaborations which are an important avenue for knowledge sharing and dissemination of key Project learnings. Carnegie has key collaborations with industry (including European energy giant EDF-EN who has a CETO technology licence agreement), academia, government and the finance community.

Carnegie’s national and international research projects currently consist of >$11,000,000 of R&D. Carnegie’s internal and external R&D focus is on reducing the long term LCOE of the CETO technology, while increasing the overall energy conversion efficiency. To help deliver this, Carnegie has a number of ongoing Research and Development collaborations with academic, industry and research organisations.

Carnegie is currently collaborating with the following companies and institutions. The breadth of this portfolio demonstrates Carnegie’s commitment to collaboration and relationships it brings to CORE.

Table 8 - Carnegie’s Collaborative Partners
10.3.1. Industry

Key industry players that have been, and continue to be, involved in the Project, including development of the CETO 6 technology to date, include but are not limited to:

Industrial partners are involved in a range of functions within the project including manufacturing components to Carnegie's specification, engineering design, independent review, and specialists aiding in the installation and retrieval.

10.3.2. Other Marine Energy Developers

As outlined in section 5.4, Carnegie will engage with other wave energy developers as part of this Project. When making key design decisions regarding the Common User Infrastructure, Carnegie will consider input from industry and will seek to build infrastructure that has optionality for future users where technically and economically feasible. Once the Project learnings become available, Carnegie will engage with other marine energy developers to disseminate learning regarding environmental impact and monitoring, regulation and approvals processes and other non-technical areas of mutual interest. This dissemination will occur through formal input into industry research and consultations, direct collaboration with other developers as well as from Carnegie giving presentations at academic conferences and industry meetings and events, such as those hosted by the International Energy Agency’s Ocean Energy Systems Implementing Agreement, Renewable UK and other industry associations.

10.3.3. Industry Associations

Carnegie will also engage with a range of stakeholders through the relevant Ocean Energy Industry Associations and related organisation around the world. This will allow Carnegie to reach other stakeholders interested in and engaged with the marine energy and offshore industry such as environmental specialists, the finance community, lawyers and many more.

Some of the key Industry Associations through which Carnegie will disseminate information include:

- World Energy Council
- The European Ocean Energy Association (EU-OEA)
- Renewable UK
- Regen SW (UK)
- Ocean Renewable Energy Group (OREG), Canada
- Clean Energy Council (Australia)
- Marine Renewable Industry Association (Ireland)
- Sustainable Energy Association of Australia (SEA)

10.3.4. Academia

Carnegie has a strong history of engaging with universities in Western Australia as well as leading international universities and will continue to encourage and enable collaborations with academic partners. Some of Carnegie's academic collaborators include:

- Commonwealth Scientific and Industrial Research Organisation (CSIRO) – wave resource modelling and assessment
- Curtin University (Centre for Marine Science and Technology) – underwater acoustics and impacts on cetaceans
- The University of Western Australia – offshore foundation options study
• University of Adelaide – novel control technologies
• Scottish Association for Marine Science – environmental aspects
• University of Edinburgh and FloWave – hydrodynamic wave tank testing
• University of Exeter and Dynamic Marine Component Test Facility – fatigue analysis
• Plymouth University – wave tank testing

In addition, Carnegie has sponsored a number of studentships in specific areas of interest to wave energy development.

Carnegie also collaborates with local Universities through the Researcher in Business grant placements (University of Western Australia and Curtin University).

Carnegie will share information from the Project with relevant marine energy academic and research organisations, subject to certain IP and confidentiality restrictions. The key ways in which Carnegie will engage academic/research stakeholders will be through conference presentations and papers at key events, provision of information into research programs and providing the opportunity for student projects and work experience to be undertaken with Carnegie.

In the academic marine renewable energy research field, the key conferences are International Conference and Exhibition on Ocean Energy (ICOE) and the European Wave and Tidal Energy Conference (EWTEC). Carnegie will engage academic stakeholders by submitting papers and giving presentations at these conferences that highlight the progress, performance and outcomes of the Project as well as informing international audiences about Australia’s efforts to support emerging renewable energy. This will not only serve to disseminate learning from the Project but will also increase the visibility of the Australian marine energy industry.

Carnegie will also explore the opportunities to host Student Projects (primarily at Masters and PhD levels) where a student can examine key issues surrounding the Project. This will be subject to appropriate student matching, non-disclosure agreements and publication agreements.

10.3.5. Government

Carnegie has worked with the WA Department of Regional Development and Lands (DRDL) to develop a process for the award of offshore tenure for wave energy. Carnegie extended this approach to South Australia, Victoria and New South Wales to secure further investigative licences for potential commercial wave energy projects. Carnegie has also worked extensively with the WA Department of Transport to develop an internationally consistent approach to maritime safety for wave energy.

Carnegie has also collaborated with the CSIRO on CETO-related research.

10.3.6. Finance

Carnegie has been listed on the ASX since 1993. Since 2007, Carnegie has raised over $100 million and has undertaken extensive knowledge sharing through public and private capital raising initiatives and through its continuous disclosure requirements under the ASX listing rules, ASIC rules and the Corporations law. Carnegie produces an annual report and quarterly reports published through the ASX and periodically releases information through regular ASX and press releases.

Carnegie also worked closely with the Clean Energy Finance Corporation (CEFC) to secure a $20m debt financing deal for this Project that was then refinanced by the Commonwealth Bank. As such, this will be an important and valuable knowledge sharing tool with the finance and energy communities.

The debt financing for this Project will provide the finance community with a better understanding of the emerging wave energy industry and should increase the likelihood of future financing opportunities for wave energy projects and other emerging renewable energy projects in Australia, a key hurdling block for the industry’s development. Moreover, large financial institutions such as
CEFC and Commonwealth Bank will demonstrate to global infrastructure players the bankability and economic viability of this industry, paving the way for future investment across Australia. Carnegie will maintain an open and ongoing dialogue with its financial partners to ensure success of the project and growth of the industry.
11. Carnegie and Project Links to the Research Centre

A key aspect in the election commitment of $19.5 million for the Albany wave energy project was to support the establishment of a Wave Energy Research Centre in Albany. Carnegie has a strong track record of working collaboratively with research institutions in WA and further afield. Uniquely, Carnegie can offer the Research Centre and supporting partners access to existing facilities at Fremantle and Garden Island.

11.1. Existing Carnegie – UWA Partnerships

Carnegie and UWA have a long working history, with both parties signing a research and collaboration agreement on the 20th of November 2013. As a result of the collaboration agreement between the two parties, there has been six different projects undertaken or still ongoing having a total value of over $5 million.

Carnegie and UWA are currently collaborating in the areas of foundation design, array design and placement as well as improving the understanding of the hydrodynamics of wave energy converters. This includes the recent award of funding under the MARINET2 funding where Carnegie and UWA are collaborating on a tank testing campaign to improve the design wave technique.

This ongoing collaboration has led to 4 conference papers being published for Australian and International Conferences on renewable energy, with journal papers planned for the completion of each of the projects.

As part of the ARENA R2 project, Carnegie and UWA plan on hosting the next iteration of the Australian Offshore Renewable Energy Symposium in Perth in the second half of 2018.

11.2. Carnegie’s Additional Contributions to the Research Centre

In addition to delivering the Albany Wave Energy Project, Carnegie would:

- Facilitate access to Carnegie’s Research & Testing Facilities for industry and research partners:
  - Rous Head – Onshore research facility & offshore nursery site
  - Garden Island – Intermediate demonstration site
  - Albany – Commercial site (to be developed by Carnegie through the Albany Wave Energy Project, with common user infrastructure made available to others after the operational phase of the Project)

- Provide access to Carnegie’s existing site data and knowledge.

- Environmental approvals process followed by Carnegie will cover most of the activities performed by future users of these sites.

- Provide access to all new non-proprietary site data and knowledge gathered for the Albany site.

- Bring Carnegie’s existing $11m portfolio of collaborative research projects and relationships.

- Carnegie and UWA will build on its existing research partnership.

- Leverage additional funding for the Research Centre.

- Draw other industry and research partners into the Research Centre.

- Work with the Centre to attract future infrastructure users and support knowledge transfer.

- Disseminate Research and Project outcomes and lessons learned at Australian and International conferences.
11.2.1. Ongoing Corporate Commitment

Carnegie's successful project in Albany and ongoing progression of the wave energy industry on a national and international scale will further confirm the importance of the knowledge hub in Albany and importance of the Research Centre. Carnegie firmly believe that the Research Centre will attract further corporate investment (both through research financing and physical expansion) with the success of the initial Project in Albany. Carnegie will actively support this through its extensive industry network, which will ensure that the Research Centre is fully funded post the initial 4 years by both private and public funds.

11.2.2. Staged Wave Energy Research & Testing Facilities

As part of the associated Research Centre, Carnegie will work with other industry and research partners to facilitate access to Carnegie's site portfolio. The Offshore Development & Testing Facilities would initial consist of the following three sites, Carnegie's Private Research Facility and Offshore Nursery Site at Rous Head, North Fremantle, the Garden Island Demonstration Site, and the Albany Commercial Site (upon completion of the CETO 6 Project). More details on those sites is provided below.

**Rous Head - Onshore Testing & Offshore Nursery Site**

The Rous Head site includes an onshore research facility dedicated to wave energy converters testing. This facility includes a mechanical and electrical workshop as well as various test rigs developed for previous versions of the CETO technology. An office space is also available for analysis and preparation of the tests performed at the facility.

The site also offers a shallow offshore testing area suitable for prototype and pilot scale testing. A subsea pipeline runs from the offshore testing area back to the onshore facility. Being sheltered the wave resource is small at this site and estimated to 3 kW/m. The offshore testing area is delimited by four cardinal markers and approvals are in place for wave energy development activities.
The Garden Island demonstration site is suitable for large scale demonstration projects. The onshore facilities in place includes the onshore power plant building, the desalinisation plant and the grid connection point. These are located on the southern tip of Garden Island.

The Offshore testing is located 3 km offshore of Garden Island is sheltered from large swell event by the five Fathom bank. The wave energy available there is about 8 kW/m. A subsea pipeline runs from the offshore testing area back to the onshore power plant. A total of four foundations located at various depths and rated to various loads are available in the offshore testing area. The site is fully characterised and bathymetry, metocean, geophysical, geotechnical, benthic habitat and sediments data is available.

Approvals are in place for the site, these includes Department of Lands, pipeline easement and offshore lease. Carnegie hold a license from the Department of Defence and a power and water supply agreement is in place.
Garden Island – Intermediate Wave Site

Figure 35 – Garden Island Testing Site

Albany – Commercial Site

The Albany site will be an open ocean site suitable for commercial projects. The infrastructure to be built onshore through the Albany Wave Energy Project includes a control room in the town of Albany suitable for multiple plant operators and a small onshore substation with grid connection.

The offshore deployment area in Torbay is highly energetic being directly exposed to the Southern Ocean conditions. The wave resource is about 57 kW/m. Three pile foundations will be installed and available for future projects. An export electrical cable and subsea junction will connect the onshore and offshore sites.

Carnegie will obtain all necessary approvals for the operation of wave energy converters during the Albany Wave Energy Project. A licence has already been signed with Department of Lands.

Carnegie has already started the work to fully characterise the site and the data obtained will be made available to other users. This include bathymetry, metocean, geophysical, geotechnical, benthic habitat, sediments data.
Albany – Commercial Wave Site

Carnegie strongly believes that providing access to this site portfolio will support the development of a strong offshore renewables industry, which is good for Australia, the wave energy industry and for Carnegie.

Other renewable energy developers who have struggled to navigate the challenges of securing a demonstration site will benefit from access to Carnegie’s site portfolio. Academic partners will also be able to use these sites for research projects, such as UWA’s ongoing coastal ocean processes research at Garden Island. Industry supply chain partners will also be able to access the sites to test components for the offshore renewable energy industry.

There is already clear support and interest in the ability to access Carnegie’s site from a range of partners as highlighted in the letters of support.
ATTACHMENT 1

Letters of Support

Carnegie
CLEAN ENERGY
ATTACHMENT 2
Draft IPP
ATTACHMENT 3
Addenda Signed
ADDENDUM TO REQUEST FOR PROPOSAL DOCUMENTS

REQUEST FOR PROPOSAL NO.: BUSI07170402
ADDENDUM NO.: 1
DATE OF ISSUE: 8 August 2017
NO. OF PAGES: 2 (inc this sheet)

IMPORTANT

Please acknowledge this addendum in your Proposal. Failure to acknowledge this addendum in your Proposal may constitute grounds for rejection of the Proposal.

Acknowledgment may be made if your Proposal has been submitted prior to receipt of this addendum. The acknowledgment must state whether the price contained in your sealed Proposal is to remain unchanged or by how much it is to be increased or decreased in value.

To: Tendering Services
Ground Floor, Optima Centre
16 Parkland Road
Osborne Park WA 6017
Phone: (08) 6551 2345
Email: tenderingservices@finance.wa.gov.au

We acknowledge receipt of ADDENDUM NO. 1 to the Request for Proposal Document(s) for: BUSI07170402

(please print)
Name of Company Carnegie Clean Energy Ltd
Person Tendering Aidan Flynn
Address 21 Barker Street, Belmont, Perth
(Postcode) 6104
Signature
Date 30/08/2017
Addendum Advice

1. Revised Lodgement Date

The deadline for lodgement of proposals has been extended by a period of two weeks, to Friday 1 September 2017.

2. Revised Key Dates

The following revised process and proposed dates will apply:

<table>
<thead>
<tr>
<th>STAGE</th>
<th>DATE/TIMEFRAME</th>
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<tbody>
<tr>
<td>Request for Proposal issued</td>
<td>w/c 28 July 2017</td>
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<tr>
<td>Deadline for receipt of Proposals</td>
<td>1 September 2017</td>
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<tr>
<td>Preferred Proponent(s) notified and Agreement negotiations begin</td>
<td>September 2017</td>
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<tr>
<td>Ministerial approval of a Request to Execute</td>
<td>September/October 2017</td>
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<tr>
<td>Finalise negotiations and sign Agreement committing to release of funds</td>
<td>October 2017 (following release of the State Budget)</td>
</tr>
<tr>
<td>Agreement commencement date</td>
<td>October 2017 – following inclusion of allocated funding in State Budget</td>
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END OF ADDENDUM
ADDITION TO REQUEST FOR PROPOSAL DOCUMENTS

REQUEST FOR PROPOSAL NO.: BUSI07170402

ADDENDUM NO.: 2

DATE OF ISSUE: 15 August 2017

NO. OF PAGES: 2 (inc this sheet)

IMPORTANT

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Acknowledgment may be made if your Proposal has been submitted prior to receipt of this addendum. The acknowledgment must state whether the price contained in your sealed Proposal is to remain unchanged or by how much it is to be increased or decreased in value.

To: Tendering Services
    Ground Floor, Optima Centre
    16 Parkland Road
    Osborne Park WA 6017

Phone: (08) 6551 2345
Email: tenderingservices@finance.wa.gov.au

We acknowledge receipt of ADDENDUM NO. 2 to the Request for Proposal Document(s) for: BUSI07170402

(please print)
Name of Company: Carnegie Clean Energy
Person Tendering: Aidan Flynn
Address: 21 Barker Street, Belmont, Perth

(Postcode) 6104
Signature
Date 30/ 08/ 2017
Addendum Advice

The Department of Primary Industries and Regional Development (the Department) has received enquiries regarding the Request for Proposal for the Wave Energy Technology Development Project. The Department provides the following answers to these questions which may be helpful in the preparation of a Proposal.

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
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<tr>
<td>1  Is there a defined location for the installation of the wave energy converter? Or if not is this only constrained by the requirement to connect with the Albany Wind Farm substation?</td>
<td>The requirement is that the Wave Energy Converter installation will be in the general Albany Area.</td>
</tr>
<tr>
<td>2  Is there any available bathymetry or wave climate data for this site you can share with applicants?</td>
<td>There is no specific data available from the Department.</td>
</tr>
<tr>
<td>3  Is there any technical data available for the defined substation (voltage levels, access points for connection, etc)? If not, are you able to identify exactly which substation will be used so this information can be sought from Western Power or Synergy?</td>
<td>The Department has had high level discussions with Western Power on the suitability of the project. At present there are no confirmed details regarding location or connection, which will be the responsibility of the successful Proponent. There is no technical data available from the Department.</td>
</tr>
<tr>
<td>4  Do you have an approximation of the budget dedicated to the Technology Development Project? i.e. the not including funding dedicated to the wave energy research centre and other items.</td>
<td>As per the RFP, funding of up to A$16 million has been made available for a proposal that is assessed as suitably meeting the criteria of the RFP.</td>
</tr>
<tr>
<td>5  Is there a desired level of power generation you are aiming to reach with this project?</td>
<td>No.</td>
</tr>
<tr>
<td>6  Are there any activities specifically precluded from funding? E.g. R&amp;D, administration, dissemination, etc.</td>
<td>No.</td>
</tr>
<tr>
<td>7  Are you considering awarding to multiple proponents to allow testing of multiple wave energy converter technologies simultaneously?</td>
<td>The Department will accept a consortium proposal. However, the Department will only enter into a single Agreement awarded to a single entity (or consortium) in relation to the Technology Development Project. Multiple Proponents will not be awarded on an individual basis.</td>
</tr>
<tr>
<td>8  Do you have an expectation of the format for the proposal or are we free to address the requirements as we see fit?</td>
<td>See the RFP for the requirements of the Proposal.</td>
</tr>
<tr>
<td>9  Is there a maximum cost share of the project that the department is willing to fund? The request for proposal mentions other funding without identifying to what extent.</td>
<td>As per the RFP, funding of up to A$16 million has been made available for a proposal that is assessed as suitably meeting the criteria of the RFP. It is anticipated that a suitable and viable proposal may require additional funding. The Department is aware that other Australian government agencies are involved in the funding of Wave Energy Projects. Availability of additional funding will be considered when evaluating the suitability and viability of Proposals.</td>
</tr>
</tbody>
</table>

END OF ADDENDUM
Dear Erin,

Re: Carnegie’s Responses to DPIRD’s Clarification Questions: Albany Wave Energy – Technology Development Project

Thank you for the opportunity to respond to the Department of Primary Industries and Regional Development’s (DPIRD) clarification questions regarding Carnegie’s proposal for the Albany Wave Energy Project. Please find our responses to the Department’s questions below.

We hope these clarifications and additional information help to evaluate our proposal. Please let us know if you require any further information.

Introduction

1. **Section 1.3 - Can CCE please confirm that any licences /permits pertaining to the common user infrastructure will be made available for the Wave Energy Test Centre post the 12 month operational period, notwithstanding any requirements CCE may have for a future larger project.**

Yes, Carnegie confirms that it will work with DPIRD and the Wave Energy Test Centre (or the entity created to own and manage the Test Centre) to ensure that relevant licences and permits for the common user infrastructure can be transferred to the Wave Energy Test Centre following the Project’s 12-month operational period.

Grid Connection
Section 7 Budget

3. Section 7.1 - The proposal states that the budget at this stage would have a resolution of +/- 30%. In the event that the project runs 30% over can CCE confirm a) that they will complete the project, and b) that CCE has sufficient private funding / financing arrangements to complete the project without having to resort to Shareholder capital raising.

We confirm that Carnegie will be solely responsible for any Project cost increases, not the State. If potential cost increases are identified during the design and site development phases of the Project, where possible Carnegie would work to refine the design to minimise any projected budget increases.

In addition, Carnegie’s procurement and legal teams will work with the Project team to develop a contracting strategy for the Project that will help mitigate risk of cost-overruns where appropriate.

Carnegie’s Board of Directors recognises that because this is an innovative technology demonstration project there is potential for Project costs to increase. However, through our in-
depth engagement with suppliers and by using conservative costings at the start (rather than the more aggressive/lower costings provided by some suppliers) we believe that the budget resolution is actually better than +/- 30% at this stage and should be delivered close to budget.

Carnegie will continue to be motivated to successfully deliver this Project as it will be the first demonstration of our commercial product, the CETO 6M unit. This Project is a key step in the company’s plans for future commercial expansion and as such, Carnegie is committed to delivering the Project.

4. Under section 7.1, please clarify what is meant by ineligible expenditure?

This simply means that Carnegie’s payroll and administrative costs of the Project ($10m) would not be reported in detail in each of the milestones. Each milestone grant claim would provide full details of all the eligible costs incurred during the milestone. Removing payroll and administrative expenditure from the eligible expenditure costs for the milestones (although they are costs incurred in delivering the Project) reduces administrative burden on both sides. This is how Carnegie and ARENA’s Funding Agreement and milestone grant claims currently deal with payroll and administrative costs.

5. Section 7.1 Please explain why the cost of the Power Take Off unit is so high.

The Power Take-Off (PTO) is the part of the CETO unit that takes the kinetic energy (the motion of the CETO unit in the ocean) and converts it into useable transportable electrical energy (electricity) to be exported back onshore. As such, it is the most complex and critical element of the technology.

The PTO to be built and deployed in the CETO 6M unit in Albany is an innovative new PTO that Carnegie has developed with a focus on increasing the CETO unit’s power output whilst reducing the long-term capital costs and maintenance costs for future commercial projects. Thus, whilst the costs for this first, one-off PTO are high for this Project, it provides the best opportunity to reduce CETO’s long term levelised cost of energy (LCOE). Significant cost reductions are forecast for future commercial projects once the technology has been demonstrated and economies of scale can be captured.

6. Section 7.2 Can Carnegie please confirm whether they have received funding or loans from the Clean Energy Finance Corporation. If so are there any conditions associated with the loans relative to the project?

Carnegie does not currently have any loans with the Clean Energy Finance Corporation (CEFC). Carnegie previously had a $20m loan facility with CEFC but it was refinanced with a new $20m debt facility with the Commonwealth Bank. The ability to get debt financing from a commercial bank was a significant and positive validation for Carnegie and the CETO wave energy technology. The switch to Commonwealth Bank was completed with the full support and consent of the Clean Energy Finance Corporation.
7. Section 7.3 The State would disburse the grant through to be agreed milestone payments. It is envisaged that these milestones would be similar to those agreed with ARENA. Please confirm that this is CCE’s understanding.

Carnegie is happy to agree to State milestone grant payments similar to ARENA’s model of milestone based funding. In the proposal, Carnegie had suggested quarterly progress reporting and grant payments as we interpreted portions of the provided draft Financial Assistance Agreement as suggesting this structure.

8. Section 7. The State is prepared to enter into a one off agreement to provide a fixed amount of financial assistance for a wave energy technology development project. Such payments will be made in accordance with yet to be agreed milestones to be reflected within a financial assistance agreement (FAA) to be executed by both parties. Please confirm that CCE understand that the State will accept no liability for any additional costs arising from the project and its development (whether foreseeable or unforeseeable, and notwithstanding any changes in scope).

This is fully acknowledged and understood. Carnegie confirms our understanding that the State will accept no liability for any additional costs arising from the Project.

Section 8 Local Content
9. Local Content – Are CCE planning to set up an office in Albany?

Yes, Carnegie plans to set up an office in Albany if awarded the grant.

Section 11 Collaboration
10. Section 11.2 - CCE state that they will facilitate access to Carnegie’s Research & Testing Facilities for industry and research partners - which is acknowledged as a very positive contribution to the development of Wave Energy Technology. Can CCE confirm that should such facilitation would be on a not for profit basis.

Yes, Carnegie confirms that we will facilitate access to our Research and Testing Facilities on a not for profit basis.

Yours sincerely,

Michael Ottaviano
Chief Executive Officer
Carnegie Clean Energy Limited