



Emerging Renewables Program

Carnegie Wave Energy Limited - The Perth Wave Energy Project (PWEP) Milestone Report No: 5

Funding Agreement details	
Recipient Company Name:	Carnegie Wave Energy Limited
Project Title:	The Perth Wave Energy Project (PWEP)
Contract Number:	2494
Funding Agreement Period:	Commencement date ó 30 April 2012 End date ó 31 January 2016
Contact Details:	
Primary Contact Name:	Aidan Flynn
Contact Telephone Number:	s47F
Contact Email:	aflynn@carnegiewave.com

Milestone Summary	
Current Milestone No.:	5
Expected Completion Date:	31 December 2014
Actual Completion Date:	31 December 2014

Budget Summary			
Total ARENA Funding:	\$12,095,380	Total Project Cost:	\$31,362,968
ARENA Funding paid to date:	s47G(1)(a)	Total Project Cost to date:	s47G(1)(a)

<i>ARENA use only</i>	
Report Due Date:	
Report Received Date:	
Received By:	

Milestone No. 5 – Activities to be completed for this milestone (as set out in Schedule 2, item 3):	Completed? Please indicate against each item.
D5.1 Provision to the Commonwealth of Power Generation System and Connection procurement documentation	Yes <input checked="" type="checkbox"/> See photos included in this report and selection of documents attached.
D5.2 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for the procurement of Power Generation Systems and Connection components	Yes <input checked="" type="checkbox"/> See invoices accompanying Carnegie's Milestone 5 Payment Claim.
D5.3 Provision to the Commonwealth of Power Generation System and Connection delivery documentation including final acceptance of the design for fabrication (detailed design and specification), fabrication and procurement, procurement of equipment and certification of materials for fabrication, manufacture and fabrication of sub-components, inspection of sub-components, assembly and factory acceptance testing, packaging, shipping and local delivery.	Yes <input checked="" type="checkbox"/> See photos included in this report and attached selection of documents to represent the huge range of documentation for the onshore plant. The attached documents include the specifications for onshore plant and process control system, motor control center drawings approved for construction, factory acceptance testing of transformer, hydraulic motor test sheets, and generator delivery.
D5.4 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for the delivery of Power Generation System and Connection components.	Yes <input checked="" type="checkbox"/> See invoices accompanying Carnegie's Milestone 5 Payment Claim.
D5.5 Provision to the Commonwealth of Power Generation System and Connection installation documentation. Prior to delivery of equipment and materials to site the site will be prepared and made ready for construction and installation to commence. Once delivered the power generation system and connection equipment and materials will be assembled and installed at the Project site in accordance with the system architecture and construction methods. The power generation system and connection installation will be confirmed via system integration, function and integrity tests, inspection log sheets and dimensional checks.	Yes <input checked="" type="checkbox"/> See photos included in this report and the attached certificate of construction compliance.
D6.6 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for the installation of Power Generation System and Connection components.	Yes <input checked="" type="checkbox"/> See invoices accompanying Carnegie's Milestone 5 Payment Claim.

1. Report on Milestone Activities

- 1.1. Please provide a report, referencing the activities listed above and any relevant attachments, on the activities undertaken to achieve the milestone. The report should include, but not be limited to:
- a description and analysis of the technical progress of the Project, including the status of each installed component and the testing outcomes of each component (where relevant);
 - evidence (including, where possible, pictorial evidence) that the activities within the Milestone have been achieved;
 - any major issues or developments which have arisen in the course of achieving the Milestone and the effect they will have on the Project.

The Project has achieved significant progress during this Milestone with the manufacture and installation of the Power Generation System and Grid Connection (Onshore Plant).

For this Milestone, Carnegie built the Onshore Plant at Carnegie's onshore site on Garden Island, Western Australia. The first phase of this included the initial site and building works and the installation of the cable between the Onshore Plant and the grid connection point at the Department of Defence's Helicopter Support Facility (see photos below).



Construction of Onshore Plant Building



Cable Installation to Grid Connection Point

Carnegie also worked with its suppliers to design, manufacture, test and deliver of all the components for the Onshore Plant in this Milestone. While ABB was the main contractor for the Onshore Plant, this also included work with a number of other key suppliers. The onshore plant components include the onshore hydraulic skid (with onshore accumulators), hydraulic motors, generators, valves, process control system, transformer and more.

In addition to completing factory acceptance testing of components, Carnegie completed an exhaustive program of onshore component and integration tests. As an innovative demonstration project (and the first time Carnegie built a CETO onshore plant), Carnegie believes this testing was a prudent way to reduce risk, improve system performance and provide valuable learning for future projects.



Delivery of Onshore Hydraulic Skid to Onshore Plant Building



Factory Acceptance Testing of Transformer



Onshore Plant Assembly and Testing



Panoramic of Onshore Plant During Testing



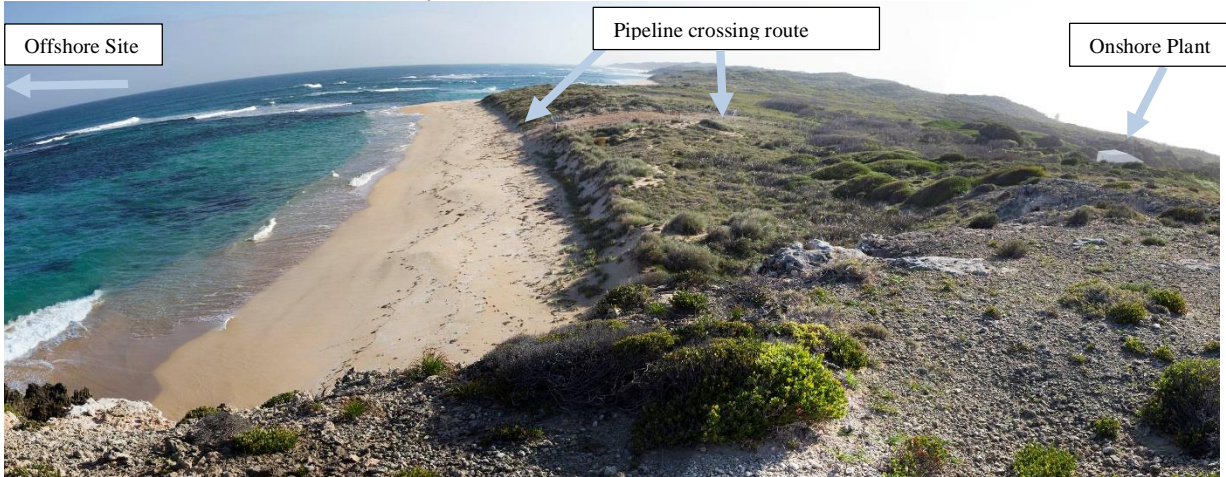
Plant Operator monitoring operational CETO system in Site Office

Although it is not part of the ARENA funded Project, Carnegie also built a containerised desalination pilot plant (DPP) in parallel with the Onshore Plant. The DPP is located next to the main Onshore Plant building and is operated as part of the whole system so Carnegie can produce both power and desalinated water from the Perth Project.

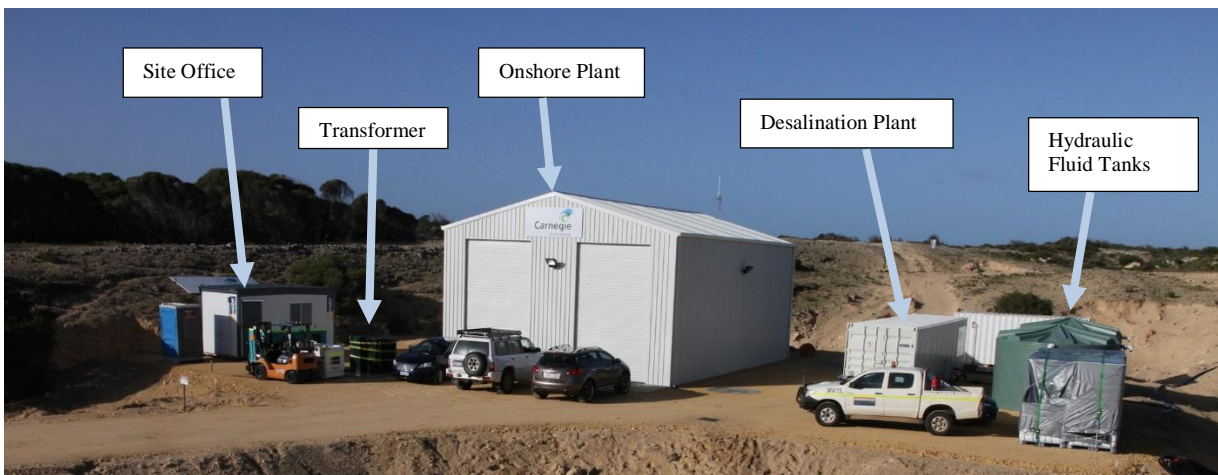


Containerised Desalination Plant

The two images below show the Garden Island Site and Onshore Plant Site with key elements labelled in order to better understand the site layout.



Garden Island Site



Onshore Plant Site

1.2. Please indicate and describe any actual or planned:

- delays for achieving future milestones, including the overall project impact for delays.
- changes to the project plan
- changes to key personnel or subcontractors (*as listed in Schedule 1, pts 7,8 & 9 of the Agreement*)
- changes to insurance policies relevant to the project
- changes in IP arrangements (*Clause 12 in the Agreement*)
- reviews of the project/technology.

There has been a small delay to completion of Milestone 7 (CETO Units), Milestone 8 (Commissioning) and Milestone 9 (Practical Completion) due to moving back the deployment date for CETO Units 2 and 3. This has been discussed with ARENA and will be outlined in separate request for variation. This does not affect the Operational Milestones or the Project End Date.

2. Regulatory and Environmental Approval

2.1. Please detail any significant environmental achievements or issues that are currently impacting on the project or that have occurred during the Milestone period.

N/A

2.2. Please complete the list below for approvals currently applied for and received (i.e. associated with this or future milestones)

Date applied	Description of Approval	Related Milestones	Approval Reference & Authority	Approval Date
29/11/12	Offshore seabed licence	2	WA Department of Regional Development and Lands (DRDL)	29/11/12
9/12/10	Native Title Clearance	2	WA Department of Regional Development and Lands (DRDL)	28/05/12
19/04/10	Defence licence	2	Australian Department of Defence	13/07/12
19/04/10	Defence power supply agreement	2	Australian Department of Defence	13/07/12
19/04/10	Defence grid connection agreement	2	Australian Department of Defence	13/07/12
28/09/12	<i>Environmental Protection Act 1986</i> Approval	2	WA Environmental Protection Authority (EPA)	10/12/12

18/10/12	Defence ECC	2	Australian Department of Defence	28/11/12
30/08/12	Maritime Safety Approval	2	WA Department of Transport (DoT)	30/08/12
14/12/12	Offshore Planning Approval	2	WA Joint Development Assessment Panel (JDAP)	08/02/13
9/12/10	Offshore Lease and Easement	2	WA Department of Regional Development and Lands (DRDL)	31/07/13

2.3. Detail any approvals that are yet to be applied for associated with a future milestone, and any progress to achieving these.

All environmental, maritime safety and planning approvals received.

3. Knowledge Sharing, Project Dissemination and Media

3.1. Please provide a comprehensive summary of any knowledge sharing activities completed during the reporting period

Knowledge Sharing and Community consultation is managed through a Community Consultation Plan which details key stakeholders, key messages, and communication mechanisms and records all interactions (see section 4 and Attachment C - Carnegie M5 - PWEF Community Consultation Report).

Carnegie continues working with Knowledge Sharing partners on a number of ongoing and upcoming projects.

3.2. List any public statements or announcements made by the Recipient or any project participant about the ERP project during the milestone reporting period.

Public Announcements since the last Milestone Report (for Milestone 4):

Subject/Description	Audience (newspaper/conference)	Date of release	Date Copy sent to ARENA
140505 Environmental Interactions of Marine Renewables (EIMR-II) Conference Presentation	ASX Release	05/05/2014	N/A
140523 All Energy Aberdeen Presentation	ASX Release	23/05/2014	N/A
140630 Perth Wave Energy Project Update - Perth Wave Energy Project nears commissioning and operation phase - Good progress on assembly and pre-installation testing activities - Final	ASX Release	30/06/2014	

commissioning after winter in optimum deployment conditions			
140723 Carnegie's Perth Project key to CSIRO and ARENA project - CSIRO secures \$1.3m ARENA funding for a national wave resource modelling, mapping and impact assessment - Novel research to be applied to Carnegie's Perth Wave Energy Project	ASX Release	23/07/14	Discussed with ARENA (Fiona McKenna)
140731 Quarterly Report, 30th June 2014 - Assembly and onshore testing phase ahead of post-winter commissioning - Desalination Plant commissioning commenced - Closing quarterly cash balance of \$14.9m - New \$11m grant from ARENA to support the CETO 6 Project - Awarded a berth at WaveHub in the UK for a subsequent CETO 6 Project.	ASX Release	31/07/14	N/A
140910 Perth Wave Energy Project Update - Onshore plant construction and power generation equipment installation complete - Offshore preparations complete in advance of CETO unit deployment and Project commissioning - Onshore integration testing of CETO units nearing completion - Process Control System implementation nearing completion	ASX Release	10/09/14	Draft sent to ARENA on 08/09/14
140926 2014 CWE Annual Report	ASX Release	26/09/14	N/A
141015 CWE Roadshow Presentation	ASX Release	15/10/14	N/A
141022 Quarterly Report, 30 September 2014 - Commencement of the deployment phase for the Perth Project - ARENA funded CSIRO Project to study Perth Project - Commenced Control Systems Project with University of Adelaide - Joined WavePod Project with Bosch Rexroth, Aquamarine and ESB - Former Japanese Prime Minister visit to Carnegie's Wave Research Facility - Received first ARENA grant funding payment for the CETO 6 Project - Received \$670,000 in two quarterly Higginsville royalty payments - Selected as a finalist in the Australian Technologies Competition	ASX Release	22/10/14	N/A

<p>141125 CETO 5 Operational, 25th November 2014</p> <p>- First CETO 5 unit now installed and operating - Initial operational period in line with expectations - Second CETO 5 unit installation and grid connection to follow</p>	ASX Release	25/11/14	Draft sent to ARENA on 23/11/14
<p>141201 Carnegie Receives Two Innovation Awards, 1st December 2014</p> <p>- Pinnacle award for Innovation Excellence from Australian Institute of Management WA - Australian Water Association award for Program Innovation to Carnegie and MAK Water - Initial CETO 5 operation continues in line with expectations. Second CETO 5 unit installation and grid connection to follow in coming weeks</p>	ASX Release	01/12/14	N/A
<p>141216 Perth Project Update, 16th December 2014</p> <p>- First CETO 5 Unit clocks up 700 operating hours - CETO Unit and Pod #2 ready for deployment - Western Power grid connection approvals now in place</p>	ASX Release	16/12/14	Draft sent to ARENA on 15/11/14

3.3. List site visits undertaken directly related to the demonstration aspect of the ERP project (ie academics /state authorities/etc)

List of Visitors (company or institution)	Summary of visit (i.e. activities/technology demonstrated)	Date of visit
s47F	LEED Representative visit to BAE Systems & Garden Island	June 20, 2014

3.4. Provide comment on any other dissemination activity undertaken or planned during the period.

<p>Garden Island is an active Defence base and therefore access is strictly controlled by the Department of Defence. Site visits to Garden Island have been limited to essential CWE personnel and accompanied contractors. As the project onshore site is currently under construction, visits are not being undertaken to demonstrate the project yet.</p> <p>A representatives of LEED visited the site to take a look at the Project progress.</p> <p>Details of other dissemination activities are captured under Carnegie's community consultation update (see Attachment C "Carnegie M5 - PWEF Community Consultation Report").</p>
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4. Community Consultation

4.1. Please provide an update of community consultations undertaken under the Community Consultation Plan, and any significant issues that have arisen during these consultations.

See Attachment C "Carnegie M5 - PWEF Community Consultation Report"

No significant issues have been raised during consultations.

5. Risk Management

- 5.1. Please provide comment on any changes to the Risk Management Plan during the milestone. E.g. Have any additional risks been identified? Have any risk ratings changed?

As detailed in the Risk Management Plan, Carnegie continuously updates the Risk Management Register as the Project proceeds and existing risk are mitigated and new risks are identified. During the past months, Carnegie has identified and managed a number of new installation and operation risks as expected.

6. Project Expenditure and Budget

- 6.1. Please complete the highlighted columns in the Budget and Expenditure tables at **Attachment A**.

Completed

- 6.2. Please provide where appropriate financial comments in relation to:
- Other government financial assistance
 - Current milestone
 - Next milestone
 - Overall expenditure to date against budget
 - Change in future budget projection

s47G(1)(a)

7. List of Attachments to the report

- 7.1. Please identify any relevant information that is attached to this report, such as photographs, independent certification certificates etc. Documentary evidence that is required for the Milestone/Payment Criteria should be included in this list.

Attachment	Description
	Carnegie Milestone 5 - Invoice and Supporting Information
A	Budget and Expenditure
B	Carnegie Milestone 5 ó CWE Supplier Invoices
C	Carnegie Milestone 5 - PWEF Community Consultation Report
D	Carnegie Milestone 5 ó Onshore Plant Specification
E	Carnegie Milestone 5 ó Process Control Specification
F	Carnegie Milestone 5 ó Certificate of Construction Compliance
G	Carnegie Milestone 5 ó Transformer FAT Certificate
H	Carnegie Milestone 5 ó Generator Delivery
I	Carnegie Milestone 5 ó Hydraulic Motor Test Sheets

J	Carnegie Milestone 5 ó Motor Control Center Drawings Approved for Construction
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Certification

I, Michael Ottaviano being a person duly authorised by the Recipient hereby certify that:

- the Milestone described at section 1.1 above has been completed by 31/12/2014
- the information provided above is accurate, complete and not misleading;
- the eligible expenditure listed above in section 5 is understood by the Recipient to include only expenditure eligible for the Funding in accordance with the Eligible Expenditure Guidelines set out in Appendix A of the Emerging Renewables Program Information Guide;
- the Community Consultation Plan is up to date and being implemented;
- the Risk Management Plan is up to date and being implemented
- I am aware of the Recipient's obligations under the ERP funding Agreement, including the need to keep the Department informed of any circumstances that may impact on the objectives, completion or outcomes of the agreed project;
- the Recipient remains compliant with terms and conditions under the ERP funding Agreement, including (if relevant) with the National Code of Practice for the Construction Industry; and
- that all representations and warranties contained in clause 4.2 of the ERP Funding Agreement can be restated by the Recipient as true and correct and not misleading at the due date for this progress payment.



Signed

Date: 20 January 2015



Emerging Renewables Program

Carnegie Wave Energy Limited - The Perth Wave Energy Project (PWEF) Milestone Report No: 7

Funding Agreement details	
Recipient Company Name:	Carnegie Wave Energy Limited
Project Title:	The Perth Wave Energy Project (PWEF)
Contract Number:	2494
Funding Agreement Period:	Commencement date – 30 April 2012 End date – 31 January 2016
Contact Details:	
Primary Contact Name:	Aidan Flynn
Contact Telephone Number:	s47F
Contact Email:	aflynn@carnegiewave.com

Milestone Summary	
Current Milestone No.:	7
Expected Completion Date:	30 April 2015
Actual Completion Date:	7 March 2015

Budget Summary			
Total ARENA Funding:	\$13,095,380 s47G(1)(a)	Total Project Cost:	s47G(1)(a)
ARENA Funding paid to date:	s47G(1)(a)	Total Project Cost to date:	s47G(1)(a)

ARENA use only	
Report Due Date:	
Report Received Date:	
Received By:	

Milestone No. 7 – Activities to be completed for this milestone (as set out in Schedule 2, item 3):	Completed? Please indicate against each item.
D7.1 Provision to the Commonwealth of CETO Unit (Buoyant Actuators, Connectors, Tethers, Pumps, Attachments, Valves and Foundation Connectors) procurement documentation	Yes – See photos included in this report and selection of documents and invoices attached.
D7.2 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for the supply of CETO unit components.	Yes – See invoices accompanying Carnegie’s Milestone 7 Payment Claim (Attachment A and B).
D7.3 Provision to the Commonwealth of CETO Unit (Buoyant Actuators, Connectors, Tethers, Pumps, Attachments, Valves and Foundation Connectors) delivery documentation including manufacturer’s drawings, certification of materials for manufacture, inspection of sub-components, assembly and factory acceptance testing, packaging, shipping and local delivery.	Yes – See photos included in this report and attached selection of documents to represent the huge range of documentation for the CETO Units. The attached document includes FAT reports for the hydraulic pump and dampener, tether and foundation connector and one of the BA tests (piping inspection) (Attachment C).
D7.4 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for the delivery of CETO Units components.	Yes – See invoices accompanying Carnegie’s Milestone 7 Payment Claim.
D7.5 Provision to the Commonwealth of CETO Unit (Buoyant Actuators, Connectors, Tethers, Pumps, Attachments, Valves and Foundation Connectors) installation documentation. Once delivered the CETO unit components will be assembled in preparation for installation at the local staging point in preparation for mobilisation to the installation site. Once on site the CETO units will be lowered to the seabed to enable mechanical, hydraulic, control and instrumentation connections to be secured. Connections will be confirmed via video inspection, log sheets and control system communication checks.	Yes – See photos included in this report and attached documents which include Unit Launching Plan and checklist and Unit Installation plan and checklist, both of which were updated post the deployment of Unit #1 (Attachment D and E). Also refer to the PWEP Construction and Installation Report (Attachment F).
D7.6 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for the installation of CETO Units components.	Yes – See invoices accompanying Carnegie’s Milestone 7 Payment Claim.

<p>D7.7 Provision to the Commonwealth of a report against the Construction Plan, as detailed in Milestone 2, D2.7 satisfactory to the Commonwealth.</p>	<p>Yes – See attached PWEF Construction and Installation Report (Attachment F)</p>
<p>D7.8 Provision to ARENA of a completed Decommissioning Plan prepared in accordance with clause 4.11 including planned decommissioning and crisis management decommissioning, and itemised costs for completion of decommissioning activities.</p>	<p>Yes – see attached Decommissioning Plan (Attachment G). For itemised costs for completion of decommissioning activities, refer to Attachment H.</p>
<p>D7.9 Provision to ARENA of an updated Knowledge Sharing Plan satisfactory to ARENA in accordance with the template provided by ARENA.</p>	<p>Yes – see attached Knowledge Sharing Plan (Attachment I)</p>

1. Report on Milestone Activities

- 1.1. Please provide a report, referencing the activities listed above and any relevant attachments, on the activities undertaken to achieve the milestone. The report should include, but not be limited to:
- a description and analysis of the technical progress of the Project, including the status of each installed component and the testing outcomes of each component (where relevant);
 - evidence (including, where possible, pictorial evidence) that the activities within the Milestone have been achieved;
 - any major issues or developments which have arisen in the course of achieving the Milestone and the effect they will have on the Project.

The Project has achieved significant progress during this Milestone with the manufacture, construction and deployment of the CETO Units.

From mid-2013, Carnegie began placing orders for the construction of the major project elements for the Perth Wave Energy Project (PWEF) relating to the CETO Units. These elements include:

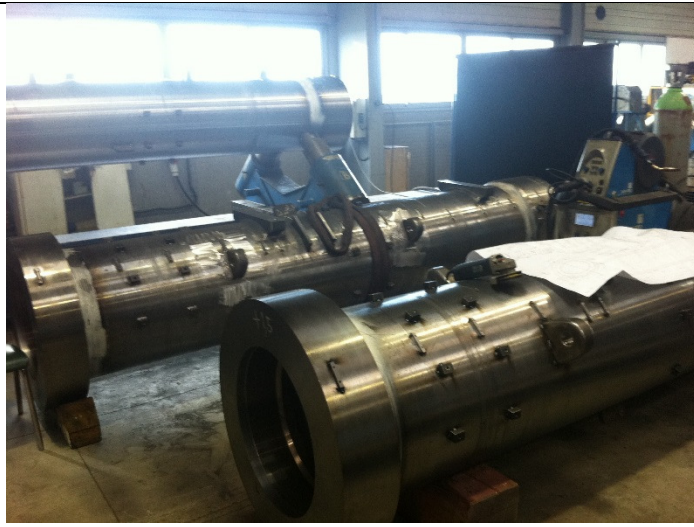
- CETO Unit Pumps from Douce-Hydro
- CETO Buoyant Actuators from Strategic Marine
- Tethers and Unit Attachment and Foundation Connectors from Subsea Riser Products Ltd
- CETO Unit energy relief system from Tensa Equipment Pty Ltd
- Hydraulic Accumulators from Parker Hannifin Australia Pty Ltd
- Valves from Severn-Glocon Australia Pty Ltd

The photos below show the manufacture and construction of these elements:

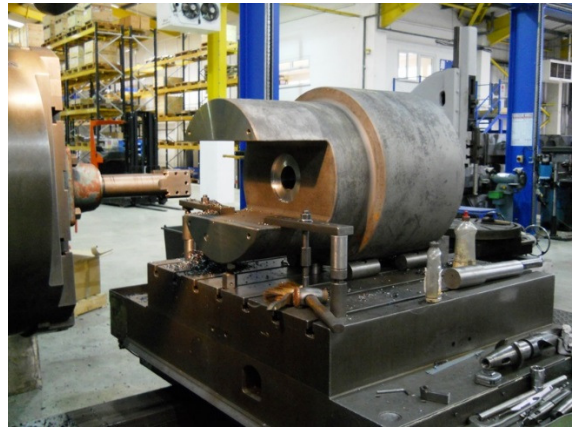
Buoyant Actuators under construction



Pumps under construction



Foundation Connectors and Tethers under Construction



In early 2014, Carnegie Wave Energy and its suppliers completed Factory Acceptance Testing (FAT) on the CETO Unit components including the Buoyant Actuator, Hydraulic Damper, BA Connector, Tether, Pump Connector, Pump and Foundation Connector.

See photos below showing the CETO Unit FAT being undertaken.

Buoyant Actuator



Hydraulic Damper



ONE VECTOR Hydraulic Dampers
 101 PROCEDURE

tensa TENZA EQUIPMENT Pty Ltd Tel: +61 8 9480 4000
 101 Bay Street Perth WA 6000 Australia Fax: +61 8 9480 4001
 email: sales@tenzaequipment.com.au
 web: www.tenzaequipment.com.au

JOB: 130103-001

CERTIFICATE OF FACTORY ACCEPTANCE TEST

ITEM	TEST	SIGNED	REMARKS
1	FD Cylinder full bore hydraulic pressure tested to 1.5 times maximum design pressure of 215 bar (2628 psi) for 30 minutes with no internal and external fluid leakage being observed. The test is fully recorded in this test.	[Signature]	
2	FD Cylinder external and end cap pressure test to 2.00 bar for 30 minutes with no internal and external fluid leakage being observed. Full bore pressure = 273.2 bar	[Signature]	
3	FD Cylinder full bore side hydraulic pressure tested to a maximum of 68 bar (987 psi) for 30 minutes with no internal and external fluid leakage being observed. (FD-seals done together with step 2 above)	[Signature]	
4	FD Cylinder Head was extended and retracted manually	[Signature]	
5	Stroke direction was tested and functioned correctly	[Signature]	
Pass on Load Test			
6	Dr-R Cylinder underwent a pull test with internal pressure of 21 MPa (3045 PSI) - equivalent to a pulling force of 537.4 tonnes. Stroke = 3 minutes	[Signature]	
7	No deformation observed after the test time.	[Signature]	

Equipment: Carnegie Wave Energy DRETS-Hydraulic Damper
 Equipment Serial No: 026-0002 DRETS-0001-15012
 Test Date: 14/02/2014 LOCATION: DOCK HYDRO UNIT 2A P

TENZA Equipment Pty Ltd: Duice-Hydro: [Signature]
 Name: OREGG Hill-Pur Name: O. Buckle
 Date: 14/02/2014 Date: 14/02/2014
 Carnegie Wave Energy: Third Party: (if applicable)
 Name: [Signature] Name: [Signature]
 Date: 14/02/2014 Date: [Signature]

528-410-001-001 - Carnegie Hydraulic Damper F&O procedure

BA Connector



Tether and Pump Connector



Pump





Foundation Connector

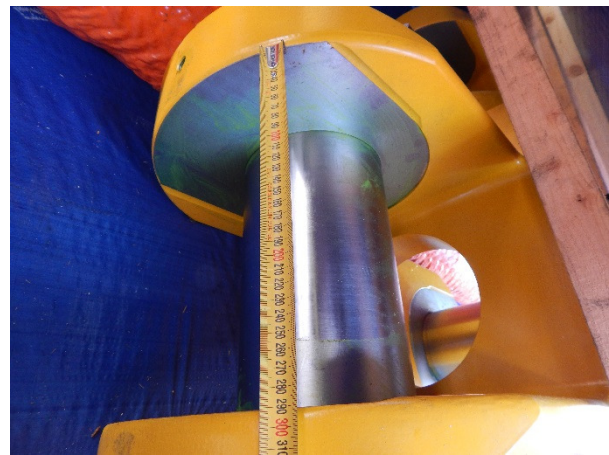


Following on from FAT, Carnegie received delivery of the CETO Unit Components including the Buoyant Actuator, Hydraulic Damper, Tether and Connectors, Pump and Foundation Connector in March 2014, as evidence by the attached photos showing the components in Western Australia. The key equipment was delivered to the final pre-deployment location at BAE Systems in Henderson, WA, where the Buoyant Actuators were fitted out with instrumentation and energy relief systems prior to assembly to the balance of the CETO unit components (i.e. tethers, pumps, attachments and foundation connectors).

Buoyant Actuator and Hydraulic Damper



Tether and Connectors



Pump and Foundation Connector (with Pump Attached)



Pre-deployment site integration testing at BAE Systems, Henderson



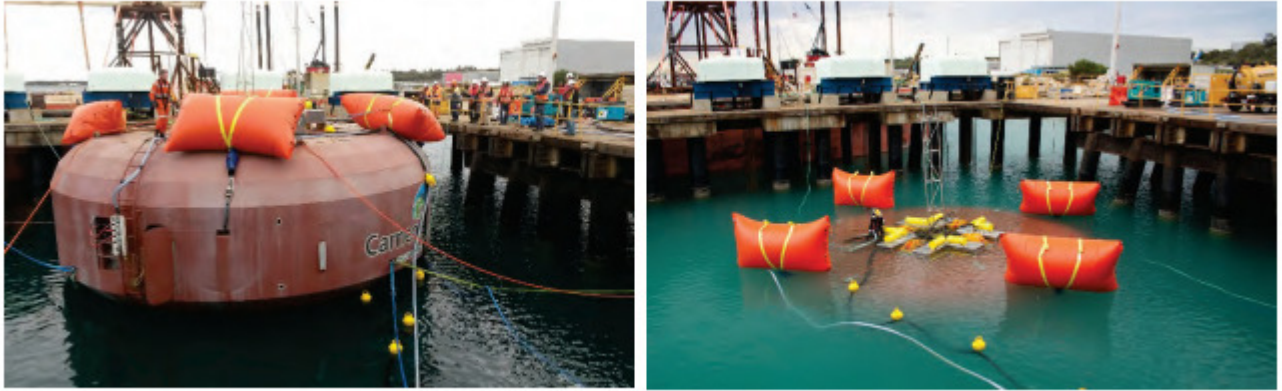
Pump integration testing at BAE Systems, Henderson



By September 2014, Carnegie had made significant progress on the assembly and testing stage of the PWEF in advance of the Project's final commissioning and operation phase. Progress at this point had included the completion of the offshore preparations in advance of the deployment of the CETO unit, completion of construction of the onshore plant including installation of all power generation and conditioning equipment on Garden Island and nearing completion of the testing of the CETO units.

Carnegie went through a rigorous program of integration testing of the CETO units in advance of offshore installation and commissioning. This testing program was designed to test and verify that individual components meet specification, component interfaces conform and component subsystems are integrated and tested. This allowed Carnegie the opportunity to identify and remedy problems before deploying the CETO units offshore. The time spent on integration testing provided significant benefit to the Perth Project as well

as valuable input into the design of future CETO projects. The testing program included testing of the buoyant actuators, pumps, connectors, onshore and offshore pods, hoses, instrumentation and control system.



In-ocean testing of the CETO Unit 1 Buoyant Actuator

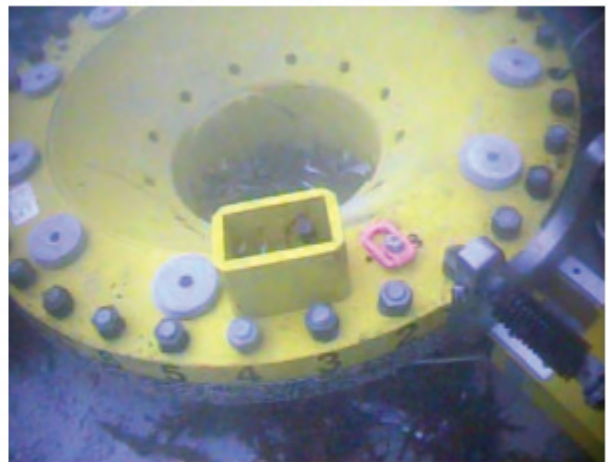


Onshore integration testing of the Pump, Hoses and Foundation Connector



Subsea pods undergoing onshore testing at Carnegie's Fremantle test facility

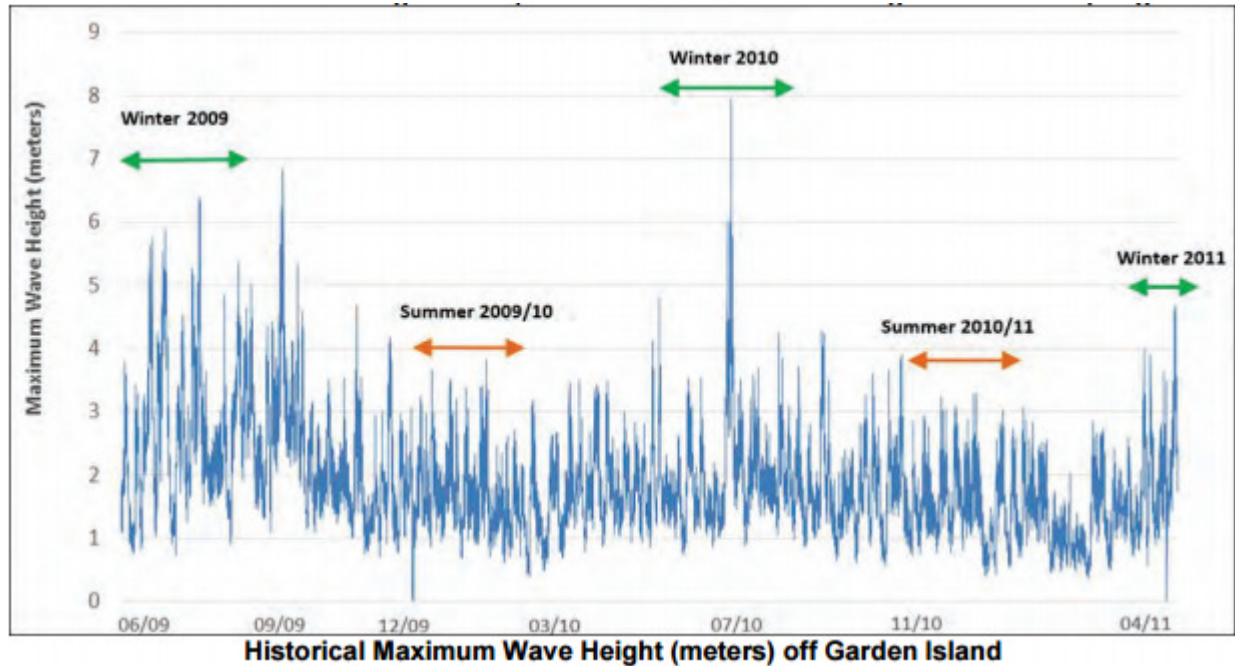
Carnegie also completed a number of final offshore preparations ahead of the deployment of the CETO units. These activities included the installation of the lower foundation connector which connects the CETO unit to the offshore foundation previously installed, as well as the offshore mudmat which will provide the base for the subsea hydraulic pod that helps regulate the flow from the CETO unit through the pipeline to the onshore plant. The short interconnection pipelines that connect the subsea pods to the rest of the pipeline system were also installed in preparation for the deployment of the CETO units and subsea pods.



Installation of a Foundation Connector (left) and in place on an offshore foundation (right)

In planning for the offshore activities, weather windows (a period of wind and wave conditions that allows a planned marine operation to be performed safely and effectively) are a critical consideration in planning any offshore activities but particularly for a demonstration project like the Perth Project, and especially for the installation of the first CETO 5 unit. For initial Unit deployments, both the period of installation, as well the initial operational period required a low to moderate sea state to minimise the risk of component or system damage, and to maximise the ability to intervene should it be required. The vessels being used and components being deployed were typically susceptible to the maximum wave height during installation. Historical maximum wave height off Garden Island (in 2009 – 2011) can be seen in the graph below. As would be expected, it shows that the maximum wave height is higher in the winter months than in the summer months and highlights that avoiding the winter months is the lowest risk approach to the planning of offshore

construction and installation activities. During September 2014, the Perth Project site saw a maximum wave heights in excess of 5m. While this is within the normal operational range for a CETO unit, it was well beyond the conditions required by the vessels involved in the installation activities. Evidence from Carnegie's recent offshore installation preparations however demonstrated that the incidents of suitable weather windows were beginning to improve and would continue through the rest of Spring.



By November 2014, Carnegie had conducted the assembly and integration testing required, including a tow test of a unit (see photo below), and successfully installed the first CETO Unit off Garden Island, Western Australia.

The CETO 5 unit was successfully installed on the first attempt, with sea state conditions experienced during the initial operation period ranging up to maximum wave heights s47G(1)(a) .

CETO Unit #1



CETO Unit #1 Tow Test





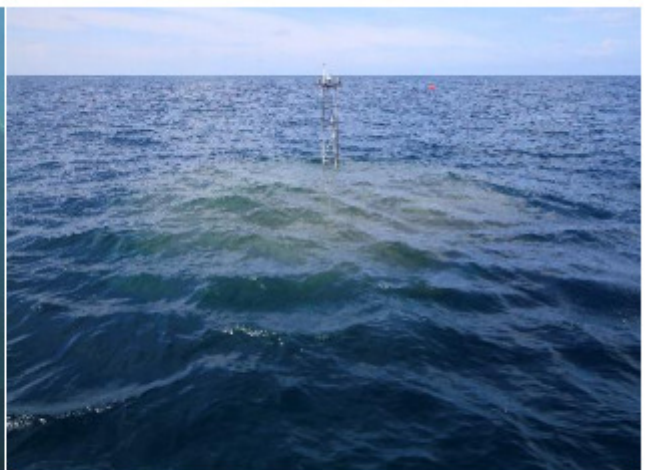
CETO 5 unit being towed to site



CETO 5 unit during installation at the Perth Project site



Installation of the CETO 5 unit into the offshore foundation



Operating CETO 5 Unit #1 at the Perth Project site



The first CETO 5 Unit in operation at the Perth Project site off Garden Island, WA



Offshore installation of Pod #2 mudmats and lower foundation connector #2

The second Unit was installed in January 2015, with sea state conditions experienced during the initial operational period including waves up to 3.5m in height. Following deployment, the Unit was operating in line with expectations alongside the first CETO 5 unit, installed in November last year.



The second CETO 5 unit being installed off Garden Island, Western Australia

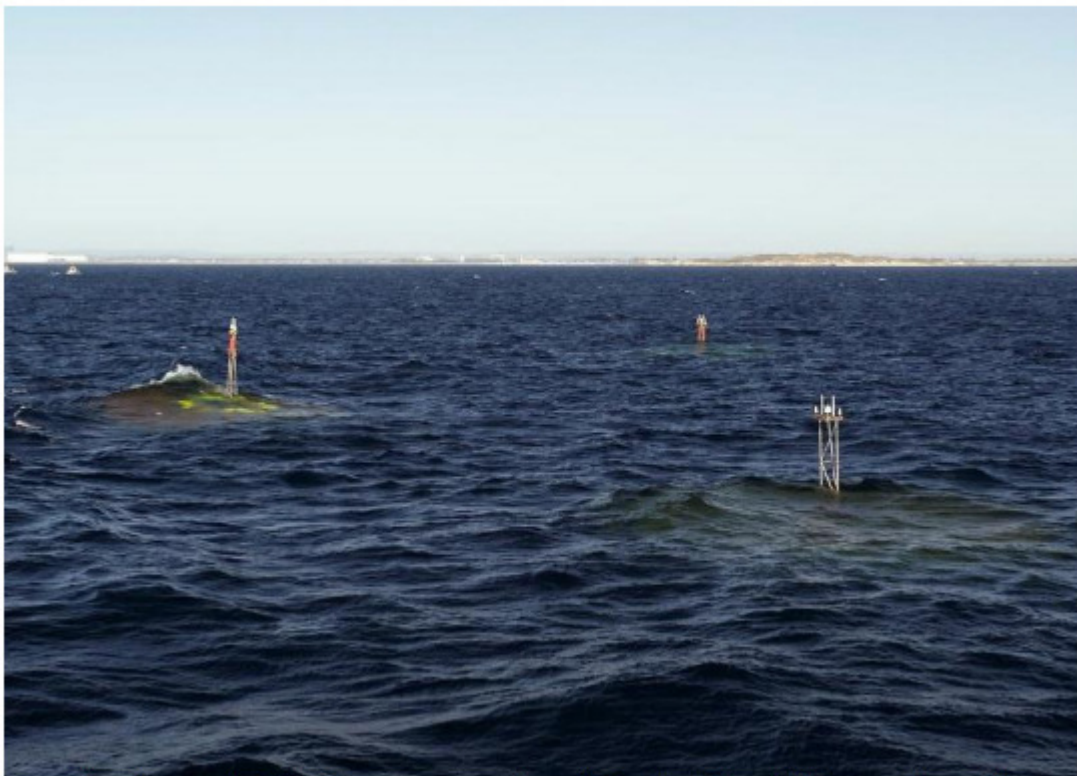


CETO Units 1 and 2 [circled]

The third Unit was successfully installed in March 2015. At the point of installation of the third Unit, the first CETO 5 unit had been operating for over 2,700 hours, with the second CETO 5 unit completing 1,200 operational hours. During the 4,000 operational hours the units experienced a range of sea states, including waves up to 4m in height.



CETO 5 Unit #3 being lowered into the water on the floating dock at the Australian Marine Complex, Henderson, WA



The three unit CETO 5 array operating off Garden Island, Western Australia

The planned retrieval and onshore inspection of one of the two existing CETO 5 units at the same time as the deployment of the third was deferred to allow an initial period of time where all 3 units could operate together. This deferral decision was made due to the continued positive operations of the first two CETO 5 units.

1.2. Please indicate and describe any actual or planned:

- delays for achieving future milestones, including the overall project impact for delays.
- changes to the project plan
- changes to key personnel or subcontractors (*as listed in Schedule 1, pts 7,8 & 9 of the Agreement*)
- changes to insurance policies relevant to the project
- changes in IP arrangements (*Clause 12 in the Agreement*)
- reviews of the project/technology.

As noted in previous milestones, there has been a small delay to completion of Milestone 7 (CETO Units), Milestone 8 (Commissioning) and Milestone 9 (Practical Completion) due to moving back the deployment date for CETO Units 2 and 3. This has been discussed with ARENA and was outlined in separate request for variation. This does not affect the Operational Milestones or the Project End Date.

2. Regulatory and Environmental Approval

2.1. Please detail any significant environmental achievements or issues that are currently impacting on the project or that have occurred during the Milestone period.

N/A

2.2. Please complete the list below for approvals currently applied for and received (i.e. associated with this or future milestones)

Date applied	Description of Approval	Related Milestones	Approval Reference & Authority	Approval Date
29/11/12	Offshore seabed licence	2	WA Department of Regional Development and Lands (DRDL)	29/11/12
9/12/10	Native Title Clearance	2	WA Department of Regional Development and Lands (DRDL)	28/05/12
19/04/10	Defence licence	2	Australian Department of Defence	13/07/12
19/04/10	Defence power supply agreement	2	Australian Department of Defence	13/07/12
19/04/10	Defence grid connection agreement	2	Australian Department of Defence	13/07/12
28/09/12	<i>Environmental Protection Act 1986 Approval</i>	2	WA Environmental Protection Authority (EPA)	10/12/12

18/10/12	Defence ECC	2	Australian Department of Defence	28/11/12
30/08/12	Maritime Safety Approval	2	WA Department of Transport (DoT)	30/08/12
14/12/12	Offshore Planning Approval	2	WA Joint Development Assessment Panel (JDAP)	08/02/13
9/12/10	Offshore Lease and Easement	2	WA Department of Regional Development and Lands (DRDL)	31/07/13

2.3. Detail any approvals that are yet to be applied for associated with a future milestone, and any progress to achieving these.

All environmental, maritime safety and planning approvals received.

3. Knowledge Sharing, Project Dissemination and Media

3.1. Please provide a comprehensive summary of any knowledge sharing activities completed during the reporting period

Knowledge Sharing and Community consultation is managed through a Community Consultation Plan which details key stakeholders, key messages, and communication mechanisms and records all interactions (see section 4, Attachment J “Carnegie M7 - PWEF Community Consultation Report” and Attachment I “Knowledge Sharing Plan”).

Carnegie continues working with Knowledge Sharing partners on a number of ongoing and upcoming projects.

3.2. List any public statements or announcements made by the Recipient or any project participant about the ERP project during the milestone reporting period.

Public Announcements since the last Milestone Report (for Milestone 5):

Subject/Description	Audience (newspaper/conference)	Date of release	Date Copy sent to ARENA
Carnegie's Perth Project key to CSIRO and ARENA Project	ASX Release	23/07/2014	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/asx-announcements-2014/item/download/404_6e6c030456a5a250e8d16f017cef5240.html)
Australian Research Council Linkage Project Awarded	ASX Release	25/07/2014	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/asx-announcements-2014/item/download/456_82b880cf976454401004cb01ad06eabe.html)
Perth Wave Energy Project Update	ASX Release	10/09/2014	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/asx-announcements-2014/item/download/419_771f09b3feed1519eec8d683ebd3450c.html)
CWE Roadshow Presentation	ASX Release	15/10/2014	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/asx-announcements-2014/item/download/423_cef5a7bf0ea77b3b24ffbbcd09c114f.html)
CETO 5 Operational	ASX Release	26/11/2014	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/asx-announcements-2014/item/download/431_c09852808a6ffcf1c80c9cff4d23ce90.html)
Perth Project Update	ASX Release	16/12/2014	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/asx-announcements-2014/item/download/436_44450d52652726276e82ab8a080d0a9a.html)
Perth Project Onshore Plant Complete	ASX Release	21/01/2015	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/item/download/451_3c10d6110627d1d604e0a356dd17a978.html)
Second CETO 5 Unit Installed & Operating	ASX Release	27/01/2015	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/item/download/452_19cc0e26bc50caf5d3a725bb498aa94e.html)
Perth Project Grid Connected	ASX Release	18/02/2015	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/item/download/465_2b5f99ac7d4aa93ba4495ff33d2794ec.html)
Final CETO 5 Unit Installed and Operating	ASX Release	12/03/2015	N/A – available online (http://www.carnegiewave.com/investors/asx-announcements/item/download/480_3ba50150a1119014f2631b665ed20da0.html)

3.3. List site visits undertaken directly related to the demonstration aspect of the ERP project (ie academics /state authorities/etc)

List of Visitors (company or institution)	Summary of visit (i.e. activities/technology demonstrated)	Date of visit
The PWEP launch took place in February with the Hon Ian Macfarlane MP, Australian Minister for Industry and Science, Captain Angela Bond, Commanding Officer of HMAS Stirling, WA Senator Chris Back, the Hon Phil Edman, member for WA South Metropolitan Region, and other key project stakeholders, including representatives from Project funding bodies; ARENA and LEED.	Perth Project Grid Connected	18 Feb 2015

3.4. Provide comment on any other dissemination activity undertaken or planned during the period.

Garden Island is an active Defence base and therefore access is strictly controlled by the Department of Defence. Site visits to Garden Island have been limited to essential CWE personnel and accompanied contractors. As the project onshore site is currently under construction, visits are not being undertaken to demonstrate the project yet.

The PWEP launch took place in February with the Hon Ian Macfarlane MP, Australian Minister for Industry and Science, Captain Angela Bond, Commanding Officer of HMAS Stirling, WA Senator Chris Back, the Hon Phil Edman, member for WA South Metropolitan Region, and other key project stakeholders, including representatives from Project funding bodies; ARENA and LEED.

Details of other dissemination activities are captured under Carnegie’s community consultation update (see Attachment J “Carnegie M7 - PWEP Community Consultation Report”).

4. Community Consultation

4.1. Please provide an update of community consultations undertaken under the Community Consultation Plan, and any significant issues that have arisen during these consultations.

See Attachment J “Carnegie M7 - PWEP Community Consultation Report”

No significant issues have been raised during consultations.

5. Risk Management

5.1. Please provide comment on any changes to the Risk Management Plan during the milestone. E.g. Have any additional risks been identified? Have any risk ratings changed?

As detailed in the Risk Management Plan, Carnegie continuously updates the Risk Management Register as the Project proceeds and existing risks are mitigated and new risks are identified. Over the period of this milestone the following risks were added to the risk register:

s47G(1)(a)

Over the period of this milestone the following risks ratings changed:

s47G(1)(a)

6. Project Expenditure and Budget

- 6.1. Please complete the highlighted columns in the Budget and Expenditure tables at **Attachment K**.

Completed

- 6.2. Please provide where appropriate financial comments in relation to:
- Other government financial assistance
 - Current milestone
 - Next milestone
 - Overall expenditure to date against budget
 - Change in future budget projection

s47G(1)(a)

7. List of Attachments to the report

- 7.1. Please identify any relevant information that is attached to this report, such as photographs, independent certification certificates etc. Documentary evidence that is required for the Milestone/Payment Criteria should be included in this list.

Attachment	Description
A	Carnegie Milestone 7 - Invoice and Supporting Information
B	Carnegie Milestone 7 - Supplier Invoices
C	CETO Unit Selected FATs
D	Works Procedure Unit Launching
E	Works Procedure Unit Installation
F	PWEP Construction and Installation Report
G	PWEP Decommissioning Management Plan
H	PWEP Decommissioning Cost Estimate
I	PWEP Knowledge Sharing Plan
J	Carnegie Milestone 7 - PWEP Community Consultation Report
K	Budget and Expenditure

Certification

I, Michael Ottaviano being a person duly authorised by the Recipient hereby certify that:

- the Milestone described at section 1.1 above has been completed by 07/03/2015
- the information provided above is accurate, complete and not misleading;
- the eligible expenditure listed above in section 5 is understood by the Recipient to include only expenditure eligible for the Funding in accordance with the Eligible Expenditure Guidelines set out in Appendix A of the Emerging Renewables Program Information Guide;
- the Community Consultation Plan is up to date and being implemented;
- the Risk Management Plan is up to date and being implemented

- I am aware of the Recipient's obligations under the ERP funding Agreement, including the need to keep the Department informed of any circumstances that may impact on the objectives, completion or outcomes of the agreed project;
- the Recipient remains compliant with terms and conditions under the ERP funding Agreement, including (if relevant) with the National Code of Practice for the Construction Industry; and
- that all representations and warranties contained in clause 4.2 of the ERP Funding Agreement can be restated by the Recipient as true and correct and not misleading at the due date for this progress payment.

S47F

Signed . . .

Date: 29 April 2015



Emerging Renewables Program

Carnegie Wave Energy Limited - The Perth Wave Energy Project (PWEP) Milestone Report No: 8

Funding Agreement details	
Recipient Company Name:	Carnegie Wave Energy Limited
Project Title:	The Perth Wave Energy Project (PWEP)
Contract Number:	2494
Funding Agreement Period:	Commencement date – 30 April 2012 End date – 31 January 2016
Contact Details:	
Primary Contact Name:	Aidan Flynn
Contact Telephone Number:	s47F
Contact Email:	a-flynn@carnegiwave.com

Milestone Summary	
Current Milestone No.:	8
Expected Completion Date:	30 April 2015
Actual Completion Date:	7 March 2015

Budget Summary			
Total ARENA Funding:	\$13,095,380 including s47G(1)(a)	Total Project Cost:	s47G(1)(a)
ARENA Funding paid to date:	s47G(1)(a)	Total Project Cost to date:	s47G(1)(a)

ARENA use only	
Report Due Date:	
Report Received Date:	
Received By:	

Milestone No. 8 – Activities to be completed for this milestone (as set out in Schedule 2, item 3):	Completed? Please indicate against each item.
<p>D8.1 Provision to the Commonwealth of Commissioning documentation for: CETO Units; Pipeline System; Instrumentation and Control System; and Power Generation System and Grid Connection. Commissioning will be confirmed via sub-system tests to confirm appropriate sub-system and integrated-system function, commissioning log sheets and compilation of a punch-list identifying key items to be closed out to meet practical completion.</p>	<p>Yes – See photos included in this report, and selection of documents including deployment logs, offshore inspection works schedule, example of CETO power optimisation, and technical operations meeting minutes post installation of all units (attached in Attachment B).</p> <p>Please note that example Pre-Commissioning documents such as Factory Acceptance Test Certificates were included with the Milestone 7 report.</p>
<p>D8.2 Provision of a Commissioning Report against the Commissioning Plan, as detailed in Milestone 2, D2.8 to the satisfaction of the Commonwealth.</p>	<p>Yes – See Attachment C for the Commissioning Report</p>
<p>D9.1 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for Commissioning.</p> <p>(Note: Although this is a technically a deliverable for Milestone 9, this seems like it might have been a mistake in the agreement and should be a deliverable under this milestone).</p>	<p>Yes – See invoices accompanying Carnegie’s Milestone 8 Payment Claim (Attachment A)</p>

1. Report on Milestone Activities

- 1.1. Please provide a report, referencing the activities listed above and any relevant attachments, on the activities undertaken to achieve the milestone. The report should include, but not be limited to:
- a description and analysis of the technical progress of the Project, including the status of each installed component and the testing outcomes of each component (where relevant);
 - evidence (including, where possible, pictorial evidence) that the activities within the Milestone have been achieved;
 - any major issues or developments which have arisen in the course of achieving the Milestone and the effect they will have on the Project.

The Project has achieved significant progress during this Milestone with the commissioning of the complete system architecture, following the installation of all elements of the wave energy facility including CETO units, pipeline system, onshore power generation system and connections.

This Milestone relates to the period from 1 November 2014 to 7 March 2015, when the final CETO unit was installed.

Prior to the installation of the first CETO unit, Carnegie worked through a rigorous program of onshore testing of the CETO units in advance of offshore installation and commissioning. This onshore testing program was designed to test and verify that individual components meet specification, component subsystems integrated and tested and to identify and remedy any problems before deploying the CETO units offshore. The testing and preparation also extended offshore to tow tests of the CETO unit and function testing of the deployment system at the site in the days ahead of unit installation and commissioning. This process has been detailed in the Milestone 7 report.

The first CETO 5 unit was installed and commenced operating in November 2014, which marked the completion of a critical phase in Carnegie's evolution and culmination of 3 years of design, financing, development and construction.



CETO 5 unit during installation at the Perth Project site

Following on from the installation of the first unit, there was a period of analysis and assessment of the operational unit to ensure that Carnegie has full confidence in the power quality and system control being achieved prior to connection to the Western Power grid (Western Power own and operate the electricity network in Perth). Until that point the hydraulic energy delivered ashore was measured and run through a bypass valve and a load bank at the onshore power station site at HMAS Stirling on Garden Island.

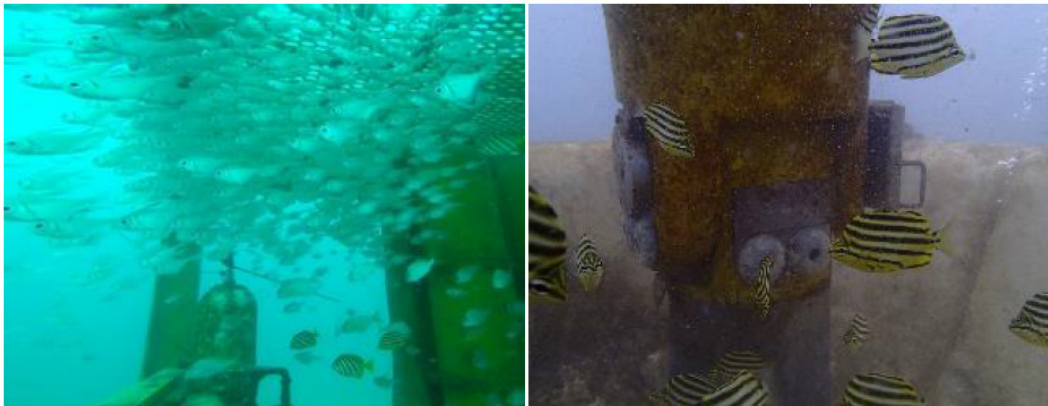


Operating CETO 5 Unit #1 at the Perth Project site



Installation of the CETO 5 unit into the offshore foundation

Prior to the installation of the second unit, the first CETO unit was allowed to operate for approximately 700 hours, experiencing a range of sea states including waves up to 3.8m in height. This successful initial commissioning period resulted in approval to connect to the grid from Western Power.



The first CETO 5 Unit in operation at the Perth Project site off Garden Island, WA

The second unit was successfully installed in one day on 19 January 2015. At this point, the first CETO 5 unit had been operating for over 1,700 hours.



CETO Unit 2 prepared for deployment quayside along CETO Unit 3 (L), Carnegie operations team member controlling position of Buoyant Actuator from deployment barge (R)

On 18 February the Perth Wave Energy Project was formally opened by the Federal Minister for Industry and Science, the Hon Ian Macfarlane, and commenced exporting electricity into the WA power grid whereby the Project became the first grid connected CETO wave power plant and the only wave power plant anywhere in the world operating multiple wave units.



Federal Minister for Industry & Science, the Hon Ian Macfarlane MP and Carnegie CEO, Dr Michael Ottaviano observing the generators spinning on the world's first grid connected wave energy array power plant

The third and final CETO unit was installed successfully on 7 March 2015. At this point the first unit had been operating for over 2,700 hours and the second unit had completed 1,200 operational hours. During the 4,000 operational hours the units had experienced a range of sea states including waves up to 4m in height.



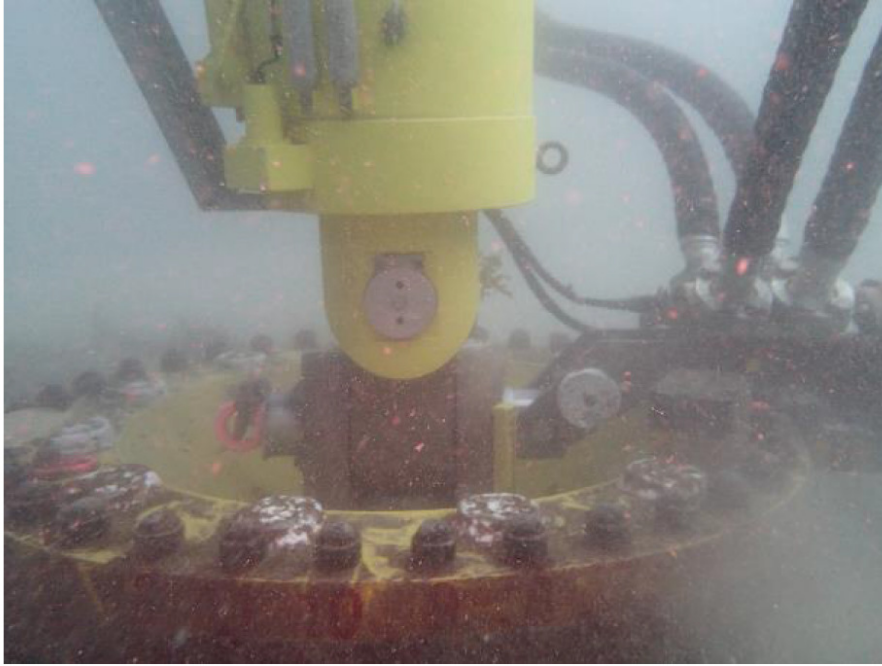
Vision from Remote Operated Vehicle (ROV) camera subsea on deployment vessel



The three unit CETO 5 array operating off Garden Island, Western Australia

The planned retrieval and onshore inspection of one of the two existing CETO 5 units at the same time as the deployment of the third was deferred at this point to allow an initial period of time where all 3 units could operate together. This deferral decision was made due to the continued positive operations of the first two CETO 5 units. The retrieval of one of the first two CETO 5 units is still a planned activity to be completed in May 2015, subject to suitable weather conditions.

During this period of installation and initial operations, offshore commissioning including regular offshore inspections – through diving and remotely operated vehicles (ROVs) – as well as onshore activities such as the maintenance of plant and equipment and monitoring of working fluid cleanliness.



Inspection of CETO Unit foundation, off Garden Island, Western Australia

During this offshore commissioning phase, the PWEF team conducted regular monitoring of the data being transmitted from each of the units as well as onshore monitoring.

1.2. Please indicate and describe any actual or planned:

- delays for achieving future milestones, including the overall project impact for delays.
- changes to the project plan
- changes to key personnel or subcontractors (*as listed in Schedule 1, pts 7,8 & 9 of the Agreement*)
- changes to insurance policies relevant to the project
- changes in IP arrangements (*Clause 12 in the Agreement*)
- reviews of the project/technology.

As noted in previous milestones, there has been a small delay to completion of Milestone 8 (Commissioning) and Milestone 9 (Practical Completion) due to moving back the deployment date for CETO Units 2 and 3. This has been discussed with ARENA and was outlined in separate request for variation. This does not affect the Operational Milestones or the Project End Date.

As noted above, the decision to retrieve one of the CETO units for onshore inspection was deferred to allow an initial period of time where all 3 units could operate together. The retrieval of one of the first two CETO 5 units is still a planned activity to be completed in May 2015, subject to suitable weather conditions. This delay in retrieval date does not affect the Operational Milestones or the Project End Date.

2. Regulatory and Environmental Approval

2.1. Please detail any significant environmental achievements or issues that are currently impacting on the project or that have occurred during the Milestone period.

N/A

2.2. Please complete the list below for approvals currently applied for and received (i.e. associated with this or future milestones)

Date applied	Description of Approval	Related Milestones	Approval Reference & Authority	Approval Date
29/11/12	Offshore seabed licence	2	WA Department of Regional Development and Lands (DRDL)	29/11/12
9/12/10	Native Title Clearance	2	WA Department of Regional Development and Lands (DRDL)	28/05/12
19/04/10	Defence licence	2	Australian Department of Defence	13/07/12
19/04/10	Defence power supply agreement	2	Australian Department of Defence	13/07/12
19/04/10	Defence grid connection agreement	2	Australian Department of Defence	13/07/12
28/09/12	<i>Environmental Protection Act 1986</i> Approval	2	WA Environmental Protection Authority (EPA)	10/12/12
18/10/12	Defence ECC	2	Australian Department of Defence	28/11/12
30/08/12	Maritime Safety Approval	2	WA Department of Transport (DoT)	30/08/12
14/12/12	Offshore Planning Approval	2	WA Joint Development Assessment Panel (JDAP)	08/02/13
9/12/10	Offshore Lease and Easement	2	WA Department of Regional Development and Lands (DRDL)	31/07/13

2.3. Detail any approvals that are yet to be applied for associated with a future milestone, and any progress to achieving these.

All environmental, maritime safety and planning approvals received.

3. Knowledge Sharing, Project Dissemination and Media

3.1. Please provide a comprehensive summary of any knowledge sharing activities completed during the reporting period

Knowledge Sharing and Community consultation is managed through a Knowledge Sharing Plan and a Community Consultation Plan which details key stakeholders, key messages, and communication mechanisms and records all interactions (see section 4. The latest PWEPC Community Consultation Report and Knowledge Sharing Plan was submitted with Milestone 7 which covers the same time period as this Milestone, so has not been duplicated for this report.

Carnegie continues working with Knowledge Sharing partners on a number of ongoing and upcoming projects.

3.2. List any public statements or announcements made by the Recipient or any project participant about the ERP project during the milestone reporting period.

Public Announcements since the last Milestone Report (for Milestone 7):

Subject/Description	Audience (newspaper/conference)	Date of release	Date Copy sent to ARENA
N/A – as per Milestone 7 report			

3.3. List site visits undertaken directly related to the demonstration aspect of the ERP project (ie academics /state authorities/etc)

List of Visitors (company or institution)	Summary of visit (i.e. activities/technology demonstrated)	Date of visit
N/A – as per Milestone 7 report		

3.4. Provide comment on any other dissemination activity undertaken or planned during the period.

N/A – as per Milestone 7

Details of dissemination activities are captured under Carnegie’s community consultation update (refer to the PWEPC Community Consultation Report as submitted with Milestone 7).

4. Community Consultation

4.1. Please provide an update of community consultations undertaken under the Community Consultation Plan, and any significant issues that have arisen during these consultations.

Refer to the PWEPC Community Consultation Report as submitted with Milestone 7.

No significant issues have been raised during consultations.

5. Risk Management

5.1. Please provide comment on any changes to the Risk Management Plan during the milestone. E.g. Have any additional risks been identified? Have any risk ratings changed?

N/A – as per Milestone 7 report

6. Project Expenditure and Budget

- 6.1. Please complete the highlighted columns in the Budget and Expenditure tables at **Attachment D**.

Completed

- 6.2. Please provide where appropriate financial comments in relation to:
- Other government financial assistance
 - Current milestone
 - Next milestone
 - Overall expenditure to date against budget
 - Change in future budget projection

s47G(1)(a)

7. List of Attachments to the report

- 7.1. Please identify any relevant information that is attached to this report, such as photographs, independent certification certificates etc. Documentary evidence that is required for the Milestone/Payment Criteria should be included in this list.

Attachment	Description
A	Carnegie Milestone 8 - Invoice and Supporting Information A1. Invoice A2. Invoice Supporting Info A3. Invoice Detailed Supporting Info A4. Supplier Invoices
B	Carnegie Milestone 8 – Offshore Commissioning Documents B1. Offshore Works Schedule (Inspection schedule and records) B2. Deployment Log Unit 1 B3. Deployment Log Unit 2 B4. Deployment Log Unit 3 B5. Technical Operations Meeting Minutes (27 March 2015, post unit 3 installation) B6. Record of Test Power Optimisation
C	Carnegie Milestone 8 - PWEF Commissioning Report
D	Budget and Expenditure

Certification

I, Michael Ottaviano being a person duly authorised by the Recipient hereby certify that:

- the Milestone described at section 1.1 above has been completed by 07/03/2015
- the information provided above is accurate, complete and not misleading;
- the eligible expenditure listed above in section 5 is understood by the Recipient to include only expenditure eligible for the Funding in accordance with the Eligible Expenditure Guidelines set out in Appendix A of the Emerging Renewables Program Information Guide;
- the Community Consultation Plan is up to date and being implemented;

- the Risk Management Plan is up to date and being implemented
- I am aware of the Recipient's obligations under the ERP funding Agreement, including the need to keep the Department informed of any circumstances that may impact on the objectives, completion or outcomes of the agreed project;
- the Recipient remains compliant with terms and conditions under the ERP funding Agreement, including (if relevant) with the National Code of Practice for the Construction Industry; and
- that all representations and warranties contained in clause 4.2 of the ERP Funding Agreement can be restated by the Recipient as true and correct and not misleading at the due date for this progress payment.

s47F

Signed

Date: 06 May 2015



Emerging Renewables Program

Carnegie Wave Energy Limited - The Perth Wave Energy Project (PWEP) Milestone Report No: 9

Funding Agreement details	
Recipient Company Name:	Carnegie Wave Energy Limited
Project Title:	The Perth Wave Energy Project (PWEP)
Contract Number:	2494
Funding Agreement Period:	Commencement date – 30 April 2012 End date – 31 January 2016
Contact Details:	
Primary Contact Name:	Aidan Flynn
Contact Telephone Number:	s47F
Contact Email:	aflynn@carnegiewave.com

Milestone Summary	
Current Milestone No.:	9
Expected Completion Date:	30 April 2015
Actual Completion Date:	31 March 2015

Budget Summary			
Total ARENA Funding:	\$13,095,380 including s47G(1)(a)	Total Project Cost:	s47G(1)(a)
ARENA Funding paid to date:	s47G(1)(a)	Total Project Cost to date:	s47G(1)(a)

ARENA use only	
Report Due Date:	
Report Received Date:	
Received By:	

Milestone No. 9 – Activities to be completed for this milestone (as set out in Schedule 2, item 3):	Completed? Please indicate against each item.
<p>D9.1 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for Commissioning.</p> <p>(Note: Although this is a technically a deliverable for Milestone 9, this seems like it might have been a mistake in the agreement and should be a deliverable under Milestone 8).</p>	<p>This was submitted with the Milestone 8 report.</p>
<p>D9.2 Provision to the Commonwealth of Practical Completion documentation for: CETO Units; Pipeline System; Instrumentation and Control System; and Power Generation System and Grid Connection. Close out of key punch-list items.</p>	<p>Yes – See this document and Attachment B for documents including Daily Operator Reports.</p>
<p>D9.3 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for Practical Completion.</p>	<p>Yes – See invoices accompanying Carnegie’s Milestone 9 Payment Claim (Attachment A).</p>

1. Report on Milestone Activities

- 1.1. Please provide a report, referencing the activities listed above and any relevant attachments, on the activities undertaken to achieve the milestone. The report should include, but not be limited to:
- a description and analysis of the technical progress of the Project, including the status of each installed component and the testing outcomes of each component (where relevant);
 - evidence (including, where possible, pictorial evidence) that the activities within the Milestone have been achieved;
 - any major issues or developments which have arisen in the course of achieving the Milestone and the effect they will have on the Project.

The Project has achieved significant progress during this Milestone with the practical completion of the complete system architecture, following the installation and offshore commissioning of all elements of the wave energy facility including CETO units, pipeline system, onshore power generation system and connections.

This Milestone relates to the period from 8 March 2014 to 31 March 2015, following the point at which the final CETO unit was installed.

Milestone 9, Practical Completion, covers the initial stage of plant operation and optimisation. During Practical Completion, Carnegie resolved issues identified during commissioning, began operating the plant and worked to resolve the inevitable technical problems that can emerge from innovative projects such as PWEF. For instance, during this milestone, s47G(1)(a)



Carnegie employee working on onshore bypass valve (left), Hydraulic motor inspection (right)



Completed onshore plant

The PWEP project is now fully operational with all Units being deployed, electricity generation and the first Unit deployed since November 2014. Most of the major technical issues encountered post deployment have been resolved or are about to be and integration testing activities are completed.

By the end of March 2015, the CETO Units had been operating in the ocean for the following cumulative time period:

- Unit 1: 4,097 hours
- Unit 2: 1,802 hours
- Unit 3: 569 hours

During this period the units experienced a range of sea states, including waves up to 4m in height.

Additionally, following connection to the grid in February, an initial period of grid commissioning, data collection and analysis has been completed and provided to the grid owner, Western Power, and as at the end of April 2015, the Perth Project has now been deemed to comply with Western Power Technical Rules. This allows power generation and export to the grid to proceed.

Following the installation of the units, and in particular once the third and final unit had been installed, Carnegie is now able to operate, experiment and monitor a grid connected array of CETO wave energy devices.

In order to effectively operate, experiment and monitor the plant, Carnegie has equipped the CETO units and the balance of plant with approximately 500 sensors. This allows data such as pressure, flow, displacement, power, load, position and the like to be recorded and transmitted.

Following the offshore commissioning of the units, practical completion of the installation of the units was deemed to be complete once all units had been demonstrated to operate successfully in an array with generation of power. On 19 March 2015, 24 hours of continuous generation was reached. The practical completion date of 31 March 2015 has been assumed however to enable an additional period of operations and generation as generation has not been constant, depending on wave activity as well as operation of the CETO Units and systems.

s47G(1)(a)

s47G(1)(a)

This data is also used by the Process Control System and the Plant Operators to control the units and system response to optimise the overall performance of the plant. Following on from practical completion of the installation and commissioning process, this power optimisation process is now underway for the Perth Project, and will be ongoing throughout the operational phase.

1.2. Please indicate and describe any actual or planned:

- delays for achieving future milestones, including the overall project impact for delays.
- changes to the project plan
- changes to key personnel or subcontractors (*as listed in Schedule 1, pts 7,8 & 9 of the Agreement*)
- changes to insurance policies relevant to the project
- changes in IP arrangements (*Clause 12 in the Agreement*)
- reviews of the project/technology.

As noted in previous milestones, there has been a small delay to completion of Milestone 9 (Practical Completion) due to moving back the deployment date for CETO Units 2 and 3. This has been discussed with ARENA and was outlined in separate request for variation. This does not affect the Operational Milestones or the Project End Date.

As noted in the Milestone 8 report, the decision to retrieve one of the CETO units for onshore inspection was deferred to allow an initial period of time where all 3 units could operate together. The retrieval of one of the first two CETO 5 units is still a planned activity to be completed in May 2015, subject to suitable weather conditions. This delay in retrieval date does not affect the Operational Milestones or the Project End Date.

2. Regulatory and Environmental Approval

2.1. Please detail any significant environmental achievements or issues that are currently impacting on the project or that have occurred during the Milestone period.

N/A

2.2. Please complete the list below for approvals currently applied for and received (i.e. associated with this or future milestones)

Date applied	Description of Approval	Related Milestones	Approval Reference & Authority	Approval Date
29/11/12	Offshore seabed licence	2	WA Department of Regional Development and Lands (DRDL)	29/11/12
9/12/10	Native Title Clearance	2	WA Department of Regional Development and Lands (DRDL)	28/05/12
19/04/10	Defence licence	2	Australian Department of Defence	13/07/12
19/04/10	Defence power supply agreement	2	Australian Department of Defence	13/07/12
19/04/10	Defence grid connection agreement	2	Australian Department of Defence	13/07/12
28/09/12	<i>Environmental Protection Act 1986</i> Approval	2	WA Environmental Protection Authority (EPA)	10/12/12
18/10/12	Defence ECC	2	Australian Department of Defence	28/11/12
30/08/12	Maritime Safety Approval	2	WA Department of Transport (DoT)	30/08/12
14/12/12	Offshore Planning Approval	2	WA Joint Development Assessment Panel (JDAP)	08/02/13
9/12/10	Offshore Lease and Easement	2	WA Department of Regional Development and Lands (DRDL)	31/07/13

2.3. Detail any approvals that are yet to be applied for associated with a future milestone, and any progress to achieving these.

All environmental, maritime safety and planning approvals received.

3. Knowledge Sharing, Project Dissemination and Media

3.1. Please provide a comprehensive summary of any knowledge sharing activities completed during the reporting period

Knowledge Sharing and Community consultation is managed through a Knowledge Sharing Plan & Community Consultation Plan which details key stakeholders, key messages, and communication mechanisms and records all interactions (see section 4. The latest PWEPC Community Consultation Report and Knowledge Sharing Plan was submitted with Milestone 7 which covers the same time period as this Milestone, so has not been duplicated for this report.

Carnegie continues working with Knowledge Sharing partners on a number of ongoing and upcoming projects.

3.2. List any public statements or announcements made by the Recipient or any project participant about the ERP project during the milestone reporting period.

Public Announcements since the last Milestone Report (for Milestone 7):

Subject/Description	Audience (newspaper/ conference)	Date of release	Date Copy sent to ARENA
N/A – as per Milestone 7 report			

3.3. List site visits undertaken directly related to the demonstration aspect of the ERP project (ie academics /state authorities/etc)

List of Visitors (company or institution)	Summary of visit (i.e. activities/technology demonstrated)	Date of visit
N/A – as per Milestone 7 report		

3.4. Provide comment on any other dissemination activity undertaken or planned during the period.

N/A – as per Milestone 7
 Details of dissemination activities are captured under Carnegie’s community consultation update (refer to the PWEPC Community Consultation Report as submitted with Milestone 7).

4. Community Consultation

4.1. Please provide an update of community consultations undertaken under the Community Consultation Plan, and any significant issues that have arisen during these consultations.

Refer to the PWEPC Community Consultation Report as submitted with Milestone 7.
 No significant issues have been raised during consultations.

5. Risk Management

5.1. Please provide comment on any changes to the Risk Management Plan during the milestone. E.g. Have any additional risks been identified? Have any risk ratings changed?

N/A – as per Milestone 7 report

6. Project Expenditure and Budget

6.1. Please complete the highlighted columns in the Budget and Expenditure tables at **Attachment C**.

Completed

6.2. Please provide where appropriate financial comments in relation to:

- Other government financial assistance
- Current milestone
- Next milestone
- Overall expenditure to date against budget
- Change in future budget projection

s47G(1)(a)

7. List of Attachments to the report

7.1. Please identify any relevant information that is attached to this report, such as photographs, independent certification certificates etc. Documentary evidence that is required for the Milestone/Payment Criteria should be included in this list.

Attachment	Description
A	Carnegie Milestone 8 - Invoice and Supporting Information A1. Invoice A2. Invoice Supporting Info A3. Invoice Detailed Supporting Info A4. Supplier Invoices
	Carnegie Milestone 8 - Supplier Invoices
B	Carnegie Milestone 8 – Practical Completion Documents B1. Operator Report 19 March 2015 24 hrs generation B2. Operator Report 31 March 2015 (end of Milestone period)
C	Budget and Expenditure

Certification

I, Michael Ottaviano being a person duly authorised by the Recipient hereby certify that:

- the Milestone described at section 1.1 above has been completed by 31/03/2015
- the information provided above is accurate, complete and not misleading;
- the eligible expenditure listed above in section 5 is understood by the Recipient to include only expenditure eligible for the Funding in accordance with the Eligible Expenditure Guidelines set out in Appendix A of the Emerging Renewables Program Information Guide;
- the Community Consultation Plan is up to date and being implemented;
- the Risk Management Plan is up to date and being implemented
- I am aware of the Recipient's obligations under the ERP funding Agreement, including the need to keep the Department informed of any circumstances that may impact on the objectives, completion or outcomes of the agreed project;
- the Recipient remains compliant with terms and conditions under the ERP funding Agreement, including (if relevant) with the National Code of Practice for the Construction Industry; and
- that all representations and warranties contained in clause 4.2 of the ERP Funding Agreement can be restated by the Recipient as true and correct and not misleading at the due date for this progress payment.

A grey rectangular box containing the text 's47F' in a large, bold, black font, used to redact the signature.

Signed

Date: 06 May 2015



**CARNEGIE WAVE ENERGY LIMITED – The Perth Wave Energy Project
(PWEP) (Contract 2494)**
FINAL MILESTONE REPORT (Milestone 10)

Funding Agreement Details

Recipient Name	Carnegie Wave Energy Limited
Project Commencement Date	30 April 2012
Project Completion Date	30 March 2016
Project Partners/ Participants/ Sub-contractors	
Primary Contact Name	Aidan Flynn
Contact Telephone Number	s47F
Contact Email	aflynn@carnegiwave.com

Milestone Summary

Milestone Number	10	
Milestone Payment	s47G(1)(a)	
Report Dates	s47G(1)(a)	Reporting period:
Comments if report is late		

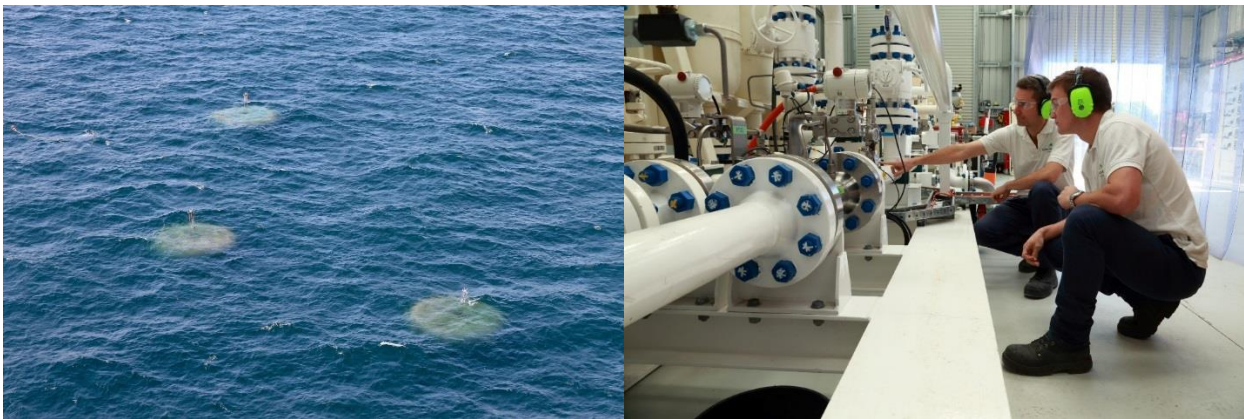
Budget Summary

Total ARENA Funding	\$13,095,381 (ex. GST)
ARENA Funding Paid to Date	s47G(1)(a) (ex. GST)
Total Project Budget	\$31,364,000 (ex. GST)
Total Project Cost to Date	s47G(1)(a) (ex. GST)

Technical Delivery of Milestone

1. Provide a technical report of the milestone activities.

The Perth Wave Energy Project (PWEF or the Project) comprised the design, construction, deployment and operational performance evaluation of a pilot scale, grid-connected wave energy array at Garden Island, Western Australia. In Milestone 10, the final Project milestone, Carnegie successfully completed over 12 months of operations; this included the day to day operation of the plant, routine inspections, maintenance, performance monitoring, retrieval, redeployment and inspection of the CETO Units and finally the completion of in-depth performance assessment and model validation studies.



CETO Units Operating (left) and Plant Operators Inspecting Onshore Plant Hydraulics (right)



Plant Operators and Operator's Plant Control Interface

At this small scale, the Project was never intended as a stand-alone economic investment rather its aim was the successful engineering, operation and grid compliant power sales demonstration. The Project was therefore designed and operated as a demonstration Project, not a commercial project. As such, Carnegie intentionally operated the Project in order to maximise system and technology learning and not for example to optimise energy extraction or electrical generation. The Project was operational for 13 months; it began operating when the first unit was installed in November 2014 and ceased operations when the final unit was retrieved in December 2015. The project completed a total of over 14,000 cumulative operating hours which remains a world record in the global wave energy industry.

The Project was designed to centralise and automate Plant operating functions and to minimise Plant operators. Therefore, operation of the Plant largely consisted of operating the Process Control System (PCS) which is the main interface for operating and monitoring the plant other than the

physical controls on the equipment. Plant Operators worked in shifts to monitor the system. During the operational phase of the Project, Carnegie conducted operational testing to find the optimum differential pressure value that would maximise the power produced in each wave state. This optimisation process was an important part of Carnegie's technology development and learning and one that will be repeated for the CETO 6 Project; however, it means that for most times the system was intentionally operated in a sub-optimal control state . either under or over damped . and only rarely at the optimal differential pressure setting. This is the opposite of what would have been the situation should the objective of the project been to maximise power extraction and output.

Carnegie conducted a performance assessment of the Project which was based upon respected industry standards for performance assessment of wave energy converters. The refined power assessment examines the optimised performance in order to reflect the performance of the device when operating in optimum conditions. s47G(1)(a)

In addition to better understanding and validating the performance of the CETO 5 technology, one of the other goals of the PWEF was to validate the accuracy of the model developed to estimate the power produced and the loads applied to the system. s47G(1)(a)

Further detail is provided in the attached PWEF Operations and Performance Report.

Technical delivery (Table 1)

Milestone (x) activity / deliverable <i>Activities to be completed for this milestone (as set out in Schedule 2 of the funding agreement)</i>	Completed / Not completed (comment)
D10.1 Provision to the Commonwealth of 12 Month Operation documentation for the Project, including an Operational Testing Report against the Operational Testing Plan detailed in Milestone 2, D2.9 to the satisfaction of the Commonwealth. During the operation of the wave energy facility power generating performance data, system integrity check sheets, maintenance and inspection logs and statutory compliance will be monitored and reported at periodic intervals.	Completed ó Successfully completed over 12 months of PWEF operations <u>Evidence</u> PWEF Operations and Performance Report Sample of the daily plant operators report
D10.2 Provision to the Commonwealth of evidence of Eligible Expenditure disbursed for 12 Months Operations.	Completed ó See eligible expenditure detailed in the Invoice and supporting information <u>Evidence</u> Invoice and Supporting Information
D10.3 Provision to the Commonwealth of an update on Technology Readiness Level at the end of the Project. Technology Readiness	Completed - Carnegie has completed a Technology Readiness Assessment on CETO 5 following the completion of PWEF.

Level to be certified against a measure index agreed by the Commonwealth	<u>Evidence</u> Post PWEF CETO 5 Technology Readiness Level Assessment Report
D10.4 Provision to ARENA of a completed feasibility study to assess the practical and economic feasibility of an expanded commercial wave energy facility off Garden Island. The study will include (but is not limited to): CETO performance (gained through PWEF) against wave climate, revenue potential, detailed capital and operation and maintenance costs, levelised cost of energy (LCOE) projections and available funding mechanisms given the prevailing economic climate and de-risking of the CETO technology through delivery of PWEF.	Completed ó Carnegie's progress with the CETO 6 Project, an expansion of the Garden Island site using the next generation of CETO technology which is funded by ARENA and is currently in the design phase, reflects the significant progress that has been made beyond the completion of a simple feasibility study considered in this deliverable. In addition, Carnegie recently completed a report to ARENA with regards to the PWEF Performance and the CETO 6 LCOE target. <u>Evidence</u> PWEF Performance and CETO 6 LCOE Target Report

2. Comment on achievement of each of the project outcomes listed in Schedule 2	
Project Outcomes <i>List project outcomes as set out in the funding agreement.</i>	Achieved / Not achieved <i>(provide comment on how it has been achieved / why it hasn't been achieved)</i>
1. Design, construct and commission a pilot scale, grid-connected CETO wave energy project off Garden Island, Western Australia;	Achieved ó PWEF designed, constructed and commissioned a grid-connected CETO wave energy array off Garden Island.
2. Demonstrate and evaluate the operational performance for the PWEF for at least 12 months, including maintenance, grid connection, and progression to technology readiness level of stage 4 as per the Guidelines for the Development & Testing of Wave Energy Systems published under the International Energy Agency Ocean Energy Systems Implementing Agreement;	Achieved ó PWEF was operated for 13 months (November 2014 ó December 2015) Achieved TRL readiness level of stage 4 as per the Guidelines for the Development & Testing of Wave Energy Systems published under the International Energy Agency Ocean Energy Systems Implementing Agreement. See Post PWEF CETO 5 Technology Readiness Level Assessment Report.
3. Improve coordination and collaboration between the research community, government and the ocean energy industry through knowledge sharing activities and to support developing	Achieved ó See Community Consultation Report for activities undertaken during this Milestone period. A PWEF Knowledge Sharing Report will be completed and submitted to ARENA as part of the final project reporting.

nationally consistent regulatory regimes; and	
4. Build the capacity and skills of the ocean energy industry in Australia for deployment of pilot scale ocean energy projects.	<p>Achieved ó Increased Carnegie team from approximately 20 at the start of the Project to almost 50 at the end of the Project.</p> <p>The Project increased Australian suppliers and contractors exposure to the ocean energy industry and built new capacity and skills to enable these organisations to help deliver future ocean energy projects. For instance, TAMS (the offshore installation contractor) significantly increased their capacity and skills to deal with the deployment of ocean energy projects.</p>

3. Provide details of any published patents that have arisen out of or been contributed to by the project.
Carnegie holds a portfolio of CETO patents and trademarks that were already held before the commencement of PWEF.

Knowledge Sharing

4. Provide details of any knowledge sharing activities, including published reports, promotional material, media publicity or other documentation relevant to the project.
<p>See Community Consultation Report covering the Milestone 10 period.</p> <p>A full Project Knowledge Sharing Report is being prepared and will be submitted with the final Project reporting.</p>

Financial Reporting

5. Provide a statement of the Grant Funds, Recipient Contributions (cash) and Other Contributions (cash) received and spent.
See Attached: Carnegie M10 Budget and Expenditure Table

6. Provide detail on how the project has/has not been completed in line with the Budget.
s47G(1)(a)

Particularly given that this was a demonstration Project which designed, manufactured, installed and operated the first grid-connected CETO array, the increased project costs are not unreasonable. The Project was a successful demonstration of the CETO technology which delivered significant benefit to the development of the technology as well as to Carnegie's ability to deliver and fund future projects.

7. List of Attachments to the report

- Invoice and Supporting Information
- Supplier Invoices
- Carnegie M10 Budget and Expenditure Table
- PWEP Account Statement
- LEED M10 Account Statement
- PWEP Operations and Performance Report
- PWEP M10 Community Consultation Report
- Post PWEP CETO 5 Technology Readiness Level Assessment Report
- PWEP Performance and CETO 6 LCOE Target Report

Certification

I, Aidan Flynn..... being a person duly authorised by the Recipient hereby certify that:

- the milestone described above has been completed by 30/3/2016.
- the information provided above is accurate, complete and not misleading.
- I am aware of the Recipient's obligations under the Funding Agreement, including the need to keep ARENA informed of any circumstances that may impact on the objectives, completion or outcomes of the agreed project.

S47F

Signed..... Date 31/3/2016