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Prifysgol Abertawe

SELKIE

Invitation to Quote

Q1S

Services of a Tidal Energy Developer Company

Deadline extended to 30 April 2020

Tionól Réigiúnach an Deiscirt
Southern Regional Assembly

Cláir Chistí Eorpacha Struchtúrtha agus Infheistíochta na hÉireann 2014–2020
Cómhaoinithe ag Rialtas na hÉireann agus ag an Aontas Eorpach

UNDEB EWROPEAIDD
EUROPEAN UNION

Llywodraeth Cymru
Welsh Government

Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund

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The Contractor shall provide Goods in accordance with the Specification (which may be varied from time to time in a manner to be agreed by both parties) set out in this document and the Terms and Conditions. See below link:

https://www.swansea.ac.uk/finance/procurement/informationforsuppliers/

2. Immediately prior to the commencement of this Contract the Contractor and the designated officer will agree objectives based on the Specification.
3. The Goods will normally be delivered at the University's Premises at Singleton Park and Bay Campuses
4. The Contractor will work with and report to the designated officer to this Contract.
5. The Goods will be provided to the University as appropriate for the performance of the Contract.

THE SPECIFICATION

INTRODUCTION

The waves and tides around Ireland and Wales could provide significant low carbon energy. Local companies that build devices to harness this natural resource are already creating jobs and exporting around the world. However, a barrier to development is lack of funding for R&D and pilot demonstration at sea. Another barrier is a lack of common procedures and components (seabed anchors for example), with many technology companies repeating activity in slightly different ways.

Therefore, the aims of the Selkie project are:
1. Establish a cross-border network of Ocean Energy SMEs and supply chain companies;
2. Conduct industry-academic collaborative R&D projects;
3. Transfer R&D knowledge to wave and tidal industry/SME stakeholders, thereby advancing the technology sector as whole;
4. Assist Irish and Welsh SMEs to progress along the path to commercialisation.

Selkie will achieve these aims by developing shared multi-use engineering tools, templates, standards and models, which can be used across the sector in both Wales and Ireland. The key technology tools are: Techno-economic models, Foundations and Mooring Design, Physical and Numerical Array Modelling, Sensor Optimisation and Data Analysis and Operations and Maintenance and logistics models.

Selkie will test and validate the technology tools on two pilot demo technologies: one wave and one tidal technology. The pilot testing will advance the knowledge for Wales and Ireland SMEs in general, using a structured development path for testing and improvement of ocean energy devices in terms of their reliability, survivability, operability, stability and commercial viability. Selkie has received funding from the European Union's European Regional Development Fund through the Ireland Wales Cooperation programme. https://irelandwales.eu/

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SELKIE OPERATION BACKGROUND

Selkie is coordinated by the Irish academic partner beneficiary, MaREI research centre at University College Cork (UCC). Swansea University (SU) are the other academic partner beneficiary. The operation is focused on marine renewable energy, which sits within the Ireland Wales 2014-2020 Programme focus area of Marine and Environmental Sciences, and involves close collaboration between research institutes and SMEs based in both Ireland and Wales. These include University College Cork (MaREI Centre), Swansea University, GDG Ltd, DP Energy Ireland Ltd, Pembrokeshire Coastal Forum CiC and Menter Môn Cyf.

POLICY CONTEXT

The European Regional Development Fund (ERDF) is part of a suite of European Structural Funds provided to the UK Government and Devolved Administrations, which includes the Welsh Government. The primary aim is to strengthen the economy and bring about a fairer society in alignment with the Europe 2020 strategic approach to smart, sustainable and inclusive growth. The rationale underpinning programme objectives are set out in the UK Partnership Agreement, which sets out the relevant thematic objectives and investment priorities for the ESI funds in Wales. The Selkie operation is funded under and is fully aligned to the overall vision of the Ireland Wales 2014-2020 Programme.

SELKIE OBJECTIVES

Objective 1 - The operation will demonstrate the benefit of cross-border collaboration and show that it is essential to the development of the Marine Renewable Energy (MRE) industry.

Objective 2 - Selkie will design and create a range of the most common services required by the MRE sector responding to the programme regional needs e.g. developing models, testing models, sensors, monitoring of installation and operations etc. for use by MRE industry sector. These services will be demonstrated in the form of R&D projects that are mutually beneficial to Ireland and Wales as well as demonstrated in the form of 2 ocean energy Pilot projects, assisting the partner beneficiaries and case studies involved to progress along TRL path to commercialisation.

Objective 3 – Selkie will solve one of the critical barriers facing MRE: lack of confidence in data and results. Following data acquisition, Selkie will subcontract most of the data-handing to expert 3rd party experts in the field for data validation.

SELKIE TECHNOLOGY TOOLS

Selkie will develop shared multi-use technology tools, templates, standards and models, in key shared technology areas through applied research work streams, that can be used across the sectors and partner beneficiaries in both Wales and Ireland (in line with TP Ocean's1 Strategic Research Agenda for R&I). These templates and models will be made open access post-project. The key technology tools are described below:

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1. Techno-economic models. (University College Cork (UCC) Led) Collaboration between Swansea University and these tools will link the Ireland/Wales Geographical Information Systems (GIS) to a techno-economic model. This will enable the assessment of MRE sites in relation to resource, optimum technology, cable routes, logistics, grid connection etc. UCC who have experience in both GIS and techno-economic development along with their use for cost optimisation.

2. Foundations and Mooring Design. There are no specific design codes for MRE and methodologies taken from the Oil & Gas Industry are generally used. However, these are not suited to MRE and do not provide optimum designs. In Selkie, foundation and mooring work will be led by the beneficiary GDG Ltd who have already taken innovative approaches to developing design methods for the MRE industry.

3. Physical and Numerical Array Modelling. (Swansea University Led) These are methods normally used by the MRE industry to advance technology designs as accurate modelling can considerably de-risk an open sea deployment as well as reduce costs. Selkie focuses on research in wave and tidal energy modelling and array interaction and correlation using a modified BEM-CFD Computational Fluid Dynamics Technique. Led by SU:

4. Sensor Optimisation and Data Analysis. (Swansea University Led) Evaluation and monitoring of pilot designs through sophisticated sensors are critical for understanding and learning purposes, as well as guiding new improved designs. Sensor design and demonstration in the pilot projects form an important part of Selkie.

5. Operations and Maintenance (O&M) and logistics models. (University College Cork Led) It has been demonstrated within the offshore wind industry that significant cost savings can be achieved from efficient and optimised installation and O&M strategies. The Selkie project will develop a suite of bespoke models for the MRE sector to optimise logistics and O&M processes, building upon the knowledge developed within the offshore wind industry but incorporating solutions for the additional challenges that are specific to MRE.

SELKIE REQUIREMENT

SELKIE at Swansea University seeks quotes for the services of a Tidal Energy Developer company. There are 9 work packages in total, the successful company may be required to contribute input to any of the 9 work packages. The requirement is to validate these five tools as described above for tidal energy devices.

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TECHNICAL

The technical requirements for the services of a Tidal Energy Developer company are as follows:

1. Mandatory Requirements - you must meet all criteria in this section
   1.1. Confirmation of previous experience of deployment of tidal technology at sea and possession of meaningful data from this deployment.
   1.2. Confirmation of active development of a tidal array deployment site including evidence of ownership of the site and investment in site development and consenting
   1.3. Confirmation of economic activity that brings a benefit to the Ireland/Wales programme area. This can be technology development, demonstration, project development, location of company staff or any combination of the above.

2. Work package 4: GIS Techno – economic model and pilot applications
   2.1 Confirmation of availability and capability for consultation in designing of the GIS-TE model tool
   2.2 Confirmation of ability to test and validate the model to enable the techno economic analysis of their device to be completed. This task will involve interaction with pilot project managers, to decide on scope of case study and agree on data requirements. Once the modelling is completed the output may dictate aspects of the pilot projects and feedback after deployment may be used to tune the model for future applications

3. Work package 5: Foundation and mooring model and pilot application
   3.1. Confirmation of availability and capability for consultation in designing of the Foundation and mooring design model - Software tool
   3.2. Confirmation of ability to test and validate the model
   3.3. Ability to participate in a test of the moorings / tidal device applicants with foundations in a realistic environment (In the case of a floating system where a mooring system is required, tank testing and numerical modelling will be carried out. The tank testing will involve: design and build of physical scaled models of anchors and moorings. The designs will need to be tested in the Lir ocean tank and Deep ocean tank. This work will facilitate the verification of the foundation/mooring design which will be used for the pilot project which in turn will validate the process and allow a more general rollout of the methodology)

4. Work package 6 Physical and Numerical Modelling and Pilot applications
   4.1. The project team are developing a CFD tool that is an extended blade element disk turbine representation inside the OpenFoam open source software code. The project will use this tool to explore micro-siting of projects and array layout optimization for the

tidal development site identified in paragraph 1.2 above. Confirmation of availability and capability for consultation in designing of the array modelling and interaction tool

5. Work package 7: Sensor Optimization, data analysis and Pilot applications
   5.1. A sensor system to be developed is the use of drone measurement of surface currents. Confirmation of availability and capability for consultation in specification of requirements for such a system
   5.2. Confirmation of participation in decision making for a suitable drone trial location
   5.3. A sensor system to be developed is the use of a converging beam ADCP for turbulence measurement. Confirmation of availability and capability for consultation in specification of requirements for such a system
   5.4. Confirmation of ability to participate in an overall assessment on the completion of the pilot, with input from other stakeholders, to determine the overall feasibility of the methods and sensors developed and its general application to the wider industry

6. Work Package 8: Installation, Operations, Maintenance & Logistics models and pilot applications
   6.1. Confirmation of availability and capability for consultation in designing of the Operations and Maintenance expert tool
   6.2. Applicant will be required to test and validate the model. The tools will first be applied to plan and optimize the installation and O&M strategies and subsequently real data can be input that will help refine and improve the model. The models will then be used to consider how installation and O&M strategies would change for different scales of array development for these technologies.

7. Data Access - As a pilot company within the SELKIE project, the consortium requires access to your data to validate the models developed within the project – in accordance with the Terms and Conditions documents, link provided in the section 1, above, and we suggest you review such terms . These models will be published by the consortium, and the publication will include example validation taken from your data sets. For each data item supplied by you, please indicate (in the table below) the current situation regarding your data already published and the terms on which you are willing to share the data with us.

   7.1. Selkie require all bidders to provide information on the extent to which they are willing to share the data they currently have access to for each of the categories described in the table (**COLUMN A**)
   7.2. Selkie also requires all bidders to provide information on the extent to which they are willing to share the data that will arise from this contract, should they be successful, for each of the categories described in the table (**COLUMN B**)
   7.3. The companies that are willing to provide wider access to a larger range of more relevant data will score higher than those that provide limited access and / or limited data sets.

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Please use the reference keys below to categorise the data you hold.

0. The data does not exist, or we are unwilling to provide access.

1. Data can be provided to the consortium under confidentiality conditions but cannot be published or distributed further.

2. Summary data can be published in normalised form in papers and reports, and is subject to our review of the draft document.

3. Processed data can be published (including values and units) in papers and reports, and is subject to our review of the draft document.

4. Raw data can be published and uploaded to data repositories under open access conditions. Processed data can be published (including values and units) in papers and reports.

a. If you are willing to share with us data that you hold, but do not have IP rights to (a third party has shared it with you under licence) then indicate this with the appropriate number (1-4) above followed by a secondary "a" and provide details of the data owner.

7.4. Please complete the table as per the above instructions –please note the data item requirements are examples and you will be required to provide details on as many relevant examples as per the list in each section as possible.

Data Item Requirement Examples	**COLUMN A** **Previously published data access category (0-4)**	**COLUMN B** **Proposed data - as a result of this contract access category (0-4)**	**Comments/ further details**
GIS Techno-economic model - *The GIS-TE tool will contain site relevant data for both Ireland and Wales in order to facilitate the strategic decision-making on optimum sites for specifically defined technologies. Functionality will include GIS layers (constraints and restrictions, proximity to infrastructure, environmental and technical data, etc.), Outputs – LCOE/NPV, Decision facility – location rank*			
Power Curve, CapEx, OpEx, WACC, Project discount rate, Expected life of the system, Decommissioning cost and Desired site characteristics for deployment (proximity to grid, seabed character, desired depth, etc.)			
Foundation and Mooring model - *An improved software tool for the design of mooring systems for wave and tidal technology*			

Details of Geophysical Surveys, Details of ROV Surveys, Details of Intrusive Geotechnical Surveys (boreholes, grabs, VCs, sampling, lab testing, CPTs, etc.), Continuous Current Profile data, Wave Data, Wave, Current misalignment data			
Numerical Modelling - *This tool will be used to provide a CFD model of the wake interaction of your turbine array. Data for the site and turbines can be from the same location, or existing turbines data applied to a future site. Approximately 2km x 2km of seabed will be included within the array model.*			
Site Bathymetry (approx. 2km x 2km at 10m grid), Turbine locations, Outputs from a coastal scale model to provide velocity and turbulence boundary conditions, ADCP data (or report) from bottom mounted device (to characterise velocity and turbulence through the water column) ADCP transect data, or equivalent spatial velocity and turbulence information,			
On/Near device velocity measurements and locations relative to turbines, Wake structure (from site measurements or scale tank testing),			
Defeatured CAD surface data for nacelle and substructure, Details of blade foil section, chord and twist, Lift and drag coefficients for blade profile, Performance curves: power-velocity, power-rpm, Cp-TSR, Thrust-RPM, Ct-TSR etc, Pitch control abilities / strategies			
Drone measurement of surface currents - *A feasibility study will be undertaken to establish the quality of velocity measurements from drone video. This will be undertaken at a nearshore tidal site.*			
Environmental scoping information to enable site risk assessment, Details of potential launch/observation locations and suggested survey region, Past ADCP current measurements to characterise site prior to experiments			
Converging beam ADCP - *Selkie will design, prototype and trial a converging beam ADCP (at an accessible location). The tidal pilot will assist in device specification and provision of comparative data.*			

ADCP raw beam data (4 beams or greater, 2Hz or faster), Wave data (preferably simultaneous with ADCP and co-located)			
Installation, Operations, Maintenance and Logistic models - *In order to reduce the LCoE for marine renewables it is important to optimise operations in all parts of the life cycle.*			
<u>Site data</u> For wave energy converter you will need c. 10 years of site data with c. an hourly resolution of the significant wave height Hm0 and peak wave period Tp to make a site scatter diagram. For tidal energy converter you will also need current velocities in m/s			
<u>Installation logistics</u> 1. Device description including rating, overall size, weight and materials, list of components, electrical infrastructure, moorings and anchors etc. 2. Array details including spacing etc. 3. Proposed installation strategy of each element i.e. device, moorings and anchors, electrical infrastructure and substation. This includes per element: a. Expected installation duration; b. Required vessels, equipment and technicians per operation; c. Weather restrictions per operation e.g. maximum significant wave height or current speed etc. d. Costs including CAPEX costs for devices and balance of plant as well as the associated cost of vessels, equipment, technicians etc. required for installation.			
<u>O&M logistics</u> 1. Power production: device power matrix or curve as relevant (i.e.			

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depending on wave or tidal converter) 2. Description of required preventive planned maintenance (PM) including which components included in PM and per component: a. Frequency of PM; b. Description of operation required; c. Estimated duration; d. Required vessels, equipment and technicians per operation; e. Weather restrictions per operation e.g. maximum significant wave height or current speed etc.			
<u>Description of required corrected maintenance (CM) including:</u> a. List of components to be considered for CM. b. Different CM categories e.g. minor or major maintenance or replacement etc. c. Estimated failure rate per component and maintenance category. d. Description of operation required for each CM; e. Estimated duration; f. Required vessels, equipment and technicians per operation; g. Weather restrictions per operation e.g. maximum significant wave height or current speed etc.			
Costs for vessels, technicians, equipment and consumables as well as replacement parts related to PM and CM.			

8. <u>Previous experience: please provide at least two references as detailed in the table below</u>

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Please provide a record of a project/purchase involving a similar service carried out within the last five years.	
Organisation Name, Address & Postcode:	[Insert Response]
Project/Purchase Date(s):	[Insert Response]
Project/Purchase Value and Quantity:	[Insert Response]
Details of Service Supplied:	[Insert Response]
Please provide a record of a project/purchase involving a similar service carried out within the last five years.	
Organisation Name, Address & Postcode:	[Insert Response]
Project/Purchase Date(s):	[Insert Response]
Project/Purchase Value and Quantity:	[Insert Response]
Details of Service Supplied:	[Insert Response]

PRICE

The indicative budget for this service including insurances and all associated costs is €20,833 (exc VAT). This is not a definitive maximum or minimum and may be subject to slight change to meet system specifications.

1. The budget is €20,833 (ex VAT), including all expenses.

2. Confirmation of acceptance of Swansea University's Terms and Conditions as provided.

3. Please note payment shall only be made upon satisfactory completion of each stage as agreed with the Principal Investigator

AWARD CRITERIA

Quotes that clearly meet requirements 1.1 to 1.3 will be evaluated on the basis of the most economically advantageous submission using the following award criteria;

a) Demonstrated understanding of the requirements as set out in the specification (scored out of 20)
b) Range and depth of previous relevant experience (scored out of 25)
c) Range and depth of data access (scored out of 25)
d) Quality of the quote proposal and methodology (scored out of 25)
e) Cost (scored out of 30)

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QUOTE PROCEDURE

The deadline for receipt of quotes is **12pm on 30th April 2020**. Quotes received after this date will not be considered.

Quotes should be submitted by e-mail to Angharad Marshall-Smith at; **a.marshall-smith@swansea.ac.uk**. Please complete the data access table from section 7, the previous experience table from section 8, any further supporting information to demonstrate your understanding of the requirement along with your quoted total price

CONFLICT OF INTEREST

Swansea University has a number of collaborators in the Higher Education sector; several large industrial companies; and also public funders. The firm must disclose interests associated with any Swansea University Partners (including Swansea University) and indicate that it would be able to act independently of any outside influence, as well as provide assurance that any conflicts of interests would be declared and cleared.

SWANSEA UNIVERSITY POLICIES

The Contractor must comply with the following University policies:

- Sustainability Policy

http://www.swansea.ac.uk/sustainability/

- Welsh Language Scheme

http://www.swansea.ac.uk/the-university/welsh-language-policy/

- Swansea University Code of Safe Practice for Contractors

https://www.swansea.ac.uk/about-us/safety-and-security/health-and-safety/policies-and-procedures/premises-safety/