1. Headline Summary of Findings

Purpose of the Report

i. Regeneris Consulting and the Welsh Economy Research Unit at Cardiff Business School were appointed by the Welsh Government to undertake an assessment of the potential economic contribution of marine energy to Wales. The report examines the economic benefits for Wales from future development of the sector using three illustrative timeline scenarios:

- **Scenario 1:** A 30MW wave installation and a 30MW tidal stream installation;
- **Scenario 2**: 300MW in marine energy capacity (two 30MW wave installations and eight 30MW tidal stream installations, reflecting the relatively advanced state of tidal energy);
- **Scenario 3:** 1GW of marine energy capacity (250MW of wave and 750MW of tidal energy).

ii. For each scenario we consider the impacts arising from direct employment and expenditure, indirect expenditure via supply chain goods and services sourced within Wales and induced expenditure by employees supported through direct and indirect effects. There is considerable uncertainty on the timing of these scenarios. As an indication, there is potential for Scenario 1 to be achieved in the next 3-4 years, scenario 2 in ten years and scenario 3 in the next two decades.

iii. The assessment has been informed by a review of existing economic impact and supply chain literature and consultations with project and device developers, policy and strategy leads in Welsh Government, and other industry experts and stakeholders.

Development of the Industry to Date

iv. In Wales, there are currently a total of four pre-commercial (demonstration) projects proposed off the Pembrokeshire coast and there are plans for the first full-scale tidal turbine array in Welsh waters by 2016.

v. Given the current sectoral strengths of the Welsh economy, our analysis suggests that device manufacture may be concentrated outside of Wales, in other parts of the UK (Scotland in particular) and Europe. The greatest opportunities for the Welsh economy could be in terms of balance of plant manufacturing, and in supporting elements of installation, local assembly of imported products and maintenance. However, given the nascent nature of the marine energy sector, there is scope to capture elements of higher value device manufacture with carefully targeted SME support.

Potential Economic Benefits for Wales

vi. It should be noted that the realisation of the economic benefits outlined below is heavily dependent on continued capital and revenue support from Government and the ability of the industry to drive down costs through innovation. Moreover, given the early stage of the industry there are a range of uncertainties on the economic impact its development may have for Wales, centring particularly around the timing of development, the balance between wave and tidal, the rate at which costs fall over time, and the ability of the Welsh supply chain to benefit from the opportunities coming forward.

Economic Impact Results: Development and Installation

vii. We estimate that gross capital expenditure associated with tidal installations is currently around an average of £4.2m per MW and £5m for wave energy. After accounting for expenditure that leaks out of Wales (largely on specialised services and the manufacture of devices), we estimate the likely level of spend retained in Wales from tidal to be around two thirds and a half for wave.

viii. After accounting for indirect and induced multiplier effects and cost-savings due to learning and scale effects (for the time periods in which the different scenarios might be realised), our estimate of the cumulative impact on Welsh GVA of our three Scenarios is as follows:

- Scenario 1 of development has the potential to support over £70m of GVA across Wales, with this including on- and off-site economic activity (based on total investment in Wales of the order of £150m in 2013 prices).
- Scenario 2 delivers just over £300m of GVA for Wales, with the economic impact per megawatt declining somewhat (from £1.2m in Scenario 1 to £1m) as cost reductions come further into play (based on total investment in Wales of over £500m in 2013 prices).
- The final, very substantial roll out of 1GW in wave and tidal (Scenario 3) delivers £840m of GVA impact on Wales (based on total investment in Wales of the order of £1.5bn in 2013 prices).

ix. Turning to employment effects, for Scenario 1, we estimate a total of around 2,000 person-years of employment associated with development and installation. This rises to 8,500 person-years in Scenario 2 and for the large 1GW installation of Scenario 3 almost 24,000 person-years. It is important to note that the employment arising in Scenario 3 could be supported over a 10-20 year period, depending upon the time it takes to roll out this capacity. To put this into context, this compares to around 4,500 person years that would be generated for 1 GW of gas fired power station capacity.[1]

Economic Impact Results: Operational Phase

x. We estimate a gross operational cost currently of £165,000 per MW for tidal stream and £175,000 for wave, albeit with considerable uncertainty over these estimates. Unsurprisingly, the operations-related impacts of marine energy installations are more moderate than those estimated for development/installation (although they accrue in every year of operation):

- In Scenario 1, with 60MW in operation, we estimate a total of £2m in GVA and 50 FTE jobs per annum would be supported across Wales throughout the period of generation.
- For Scenario 2 the 300MW of capacity would support £7.8m in GVA and 180 jobs per annum across Wales.
- Economic impacts increase with the scale of installation. For the 1GW Scenario 3, we estimate that £20m of GVA and 440 FTE jobs per annum are supported across Wales through generation activities.
- We estimate that regional operational spend per MW will, by Scenario 3, be under a third of its current estimated level for tidal stream, and around 50% its current level for wave. Hence, whilst each MW of capacity in Scenario 1 supports 0.83 FTE jobs in Wales, by Scenario 3 each MW is supporting 0.44 FTE jobs.

[1] See Cardiff University and Regeneris Consulting (2013) *Employment effects associated with regional electricity generation*. Note that the major driver of the large economic impacts from wave and tidal compared to other technologies is the cost of development and installation. As novel technologies, wave and tidal are more expensive to install and hence tend to support greater economic impacts.

Recommendations

xi. The report sets out a series of high level recommendations. These focus on:

- Communicating the nature of the opportunity Wales presents to developers;
- An investment focus on one or two marine hubs which will provide a focus on testing commercial scale devices;
- Targeted supply chain development, possibly underpinned by further supply side analysis;
- The provision of commercial development and growth finance for SMEs in the sector and the associated supply chain;
- Integration of these actions with existing area-based initiatives with an energy focus; and
- The development of an investment strategy which enables Welsh Government and project sponsors to access ERDF and other suitable resources to enable the delivery of these actions.