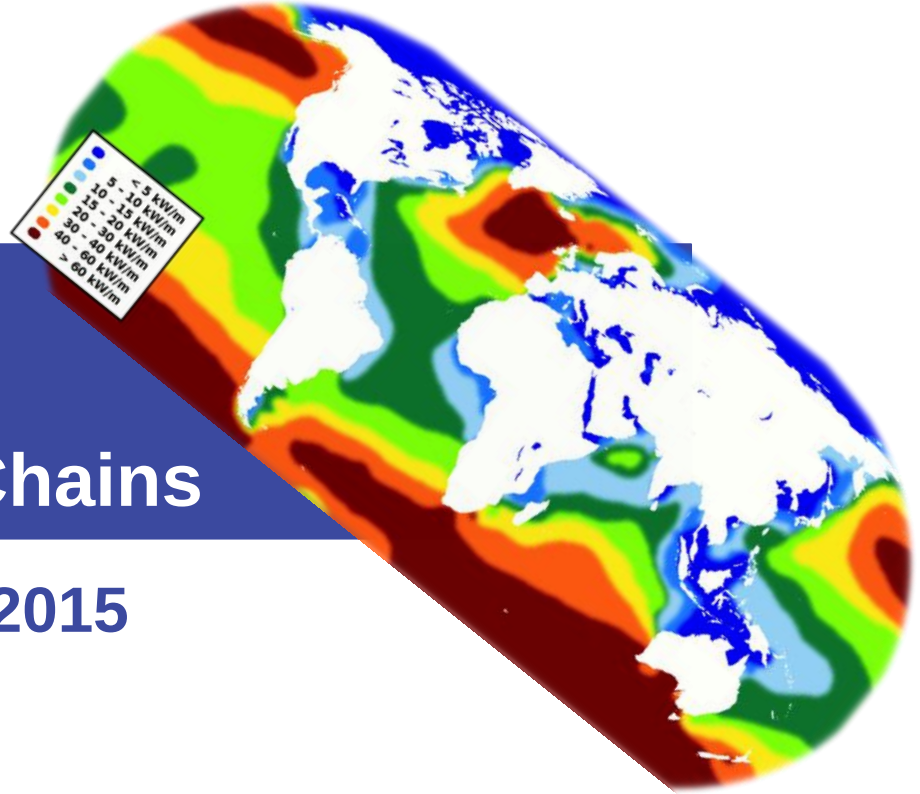
Global Development Opportunities for the UK Wave and Tidal Supply Chains



RenewableUK Wave & Tidal 2015

Edinburgh

Giles Hundleby

26 February 2015

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Agenda

Contents

- BVGA report on W&T supply chain
  - Overview
  - Key conclusions & recommendations
- Global opportunity
- Cost of energy challenge
- Technology development needs
- Infrastructure support
- Industry & Government strategy
- UK content & supply chain plans
- Conclusions

Selected clients

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- Market and supply chain
  - Analysis and forecasting
  - Strategic advice
  - Business and supply chain development
- Economics
  - Socioeconomics and local benefits
  - Technology and project economic modelling
  - Policy and local content assessment
- Technology
  - Engineering services
  - Due diligence
  - Strategy and R&D support

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BVGA latest analysis on wave and tidal sectors

Report for RenewableUK & Scottish Renewables published February 2015

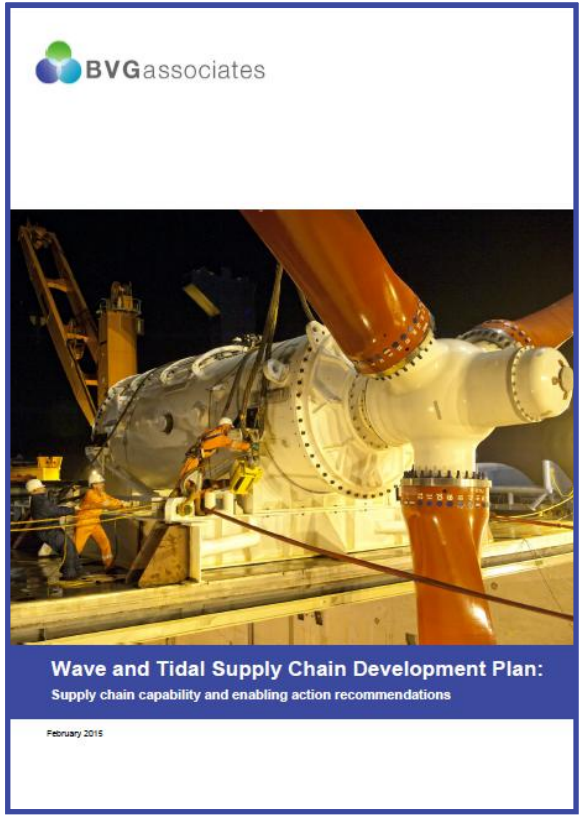
Overview

- Commissioned in August 2014

- Phase 1: Literature review and aide memoire development
  - Looked at initiatives in other industries:
    - Danish onshore wind
    - UK offshore wind
    - Automotive and Defence
    - Nuclear and oil and gas sectors
  - Identified key initiatives for wave and tidal sectors
  - Developed aide memoire for industry engagement

- Phase 2: Assessing views on supply chain support initiatives and supply chain capability
  - Industry engagement with 26 organisations
  - Identified views on initiatives in three areas and on supply chain capability across 12 sub-elements

- Phase 3: Developing conclusions and recommended actions
  - UK and export market opportunities
  - Sector commitments
  - Market growth initiatives
  - UK supply chain support initiatives

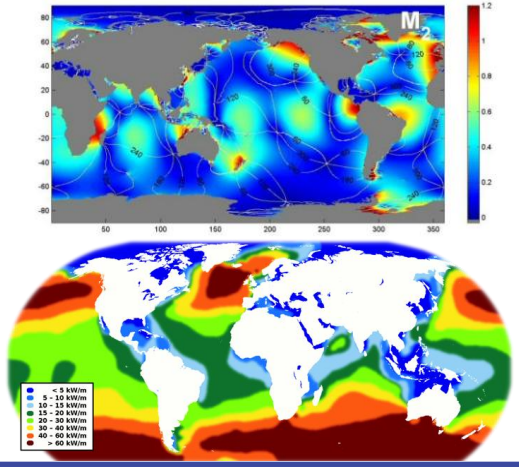


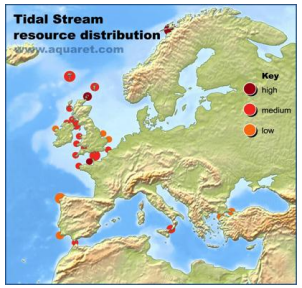
Global opportunity for wave and tidal energy

All offshore renewables are major potential energy sources

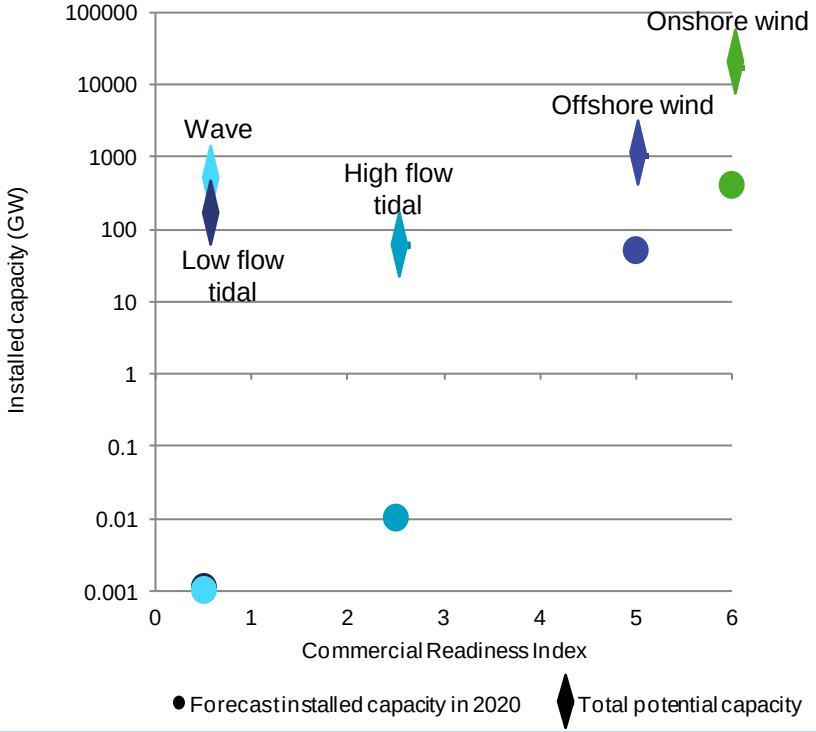
Challenge to mature the technology

- Wave and low–flow tidal energy have the greatest potential to deliver renewable energy
- High flow tidal is the most developed marine renewable, but has much lower total potential
- All marine renewables have to compete with the global potential and technology maturity of onshore and offshore wind





Installed power versus technology maturity



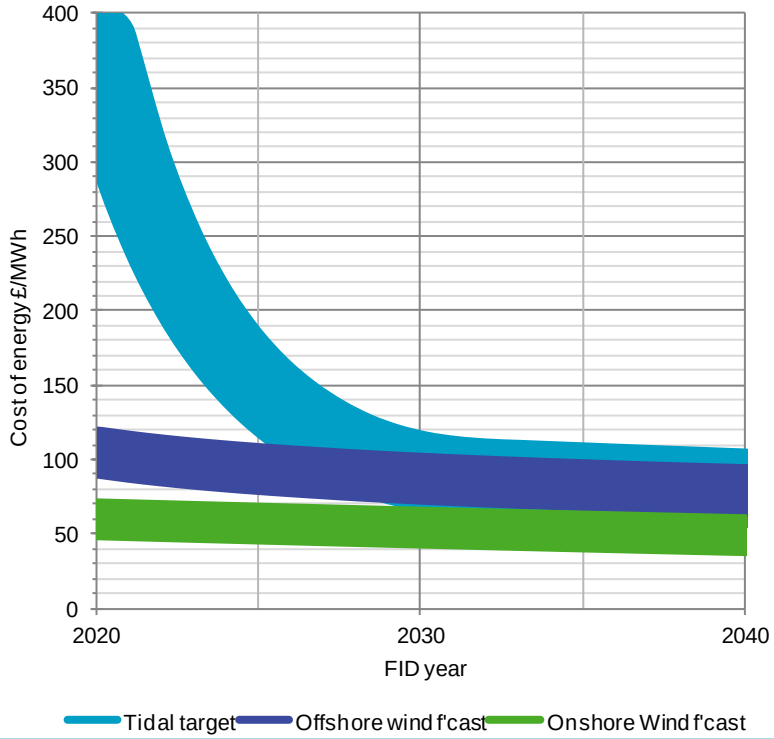
Cost of energy trajectory is a key driver and challenge

LCOE can reduce through technology and learning as increasing volume is deployed

Challenge to meet competing cost trajectories

- Onshore wind is already low cost, and could improve further with technology. Locations can be limited by local or national politics & availability of grid connection
- Offshore wind energy is on a clear downward trajectory through increasing volumes, learning and especially through new large turbines and project finance structures
- To compete with wind and capture their 'natural' shares of the global renewables market, wave and tidal need to be on a trajectory that closes to that of offshore wind in a reasonable time and volume installed.
- For tidal, based on overall LCOE learning rates of 13% equality can be approached:
  - In 15 years (to 2030)
  - Assuming 2GW of capacity installed in a suitable schedule up to this date (itself a challenge)
- For wave, technology needs to get to where tidal is today to make any sensible forecasts, but the trajectory will need to be similar, albeit delayed

Cost of energy to 2030 and beyond



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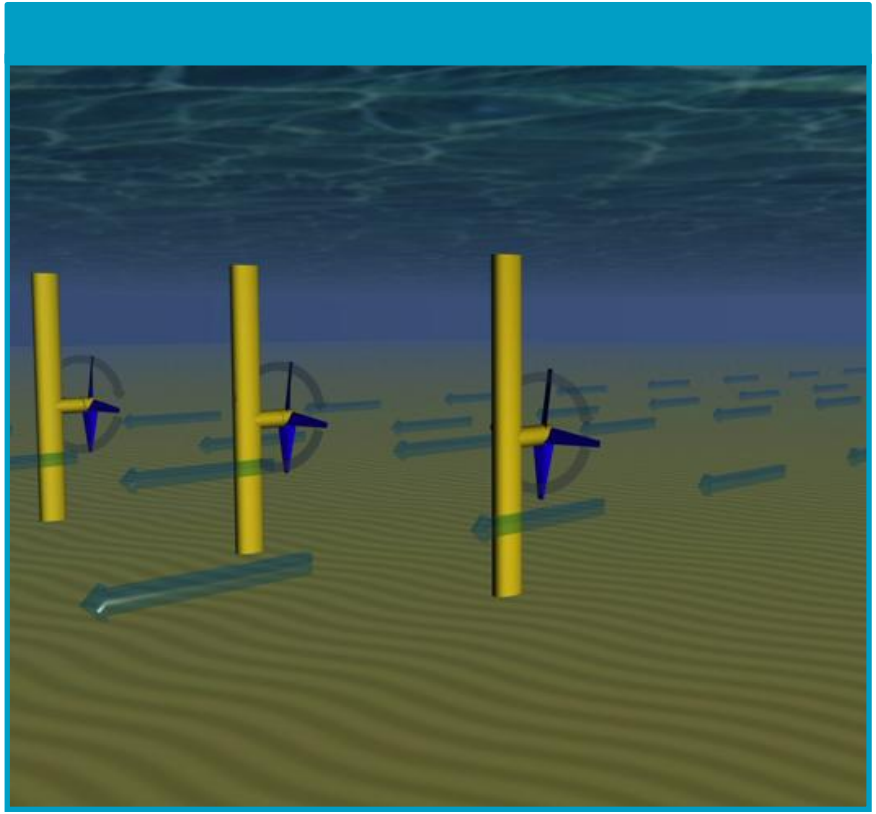
Technology developments for tidal

Accelerate focused technology development and deployment

Array projects and focused development

- Funding:
  - R&D funding for cost and risk reduction projects including installation and construction. The focus should be on technology development and demonstration of non-wind derived foundation & mooring systems and installation solutions for foundations, devices and cables, always with an eye to solutions that can give sufficient LCOE savings.
  - Project support funding to enable the next 2-3 arrays to be financially viable and to accelerate their construction.
- Funders:
  - DECC / GIB / SE / ORE Catapult / H2020 co-funding.
- When:
  - Array projects: Now to 50MW installed tidal energy capacity; R&D, ongoing.
- Comment
  - Additional funding / loans will need to be provided for the first few arrays covering a high proportion of costs
  - Additional funding may be required to deliver fast response, and pro-active (not technology-neutral) interventions, especially in the area of low-flow technologies.



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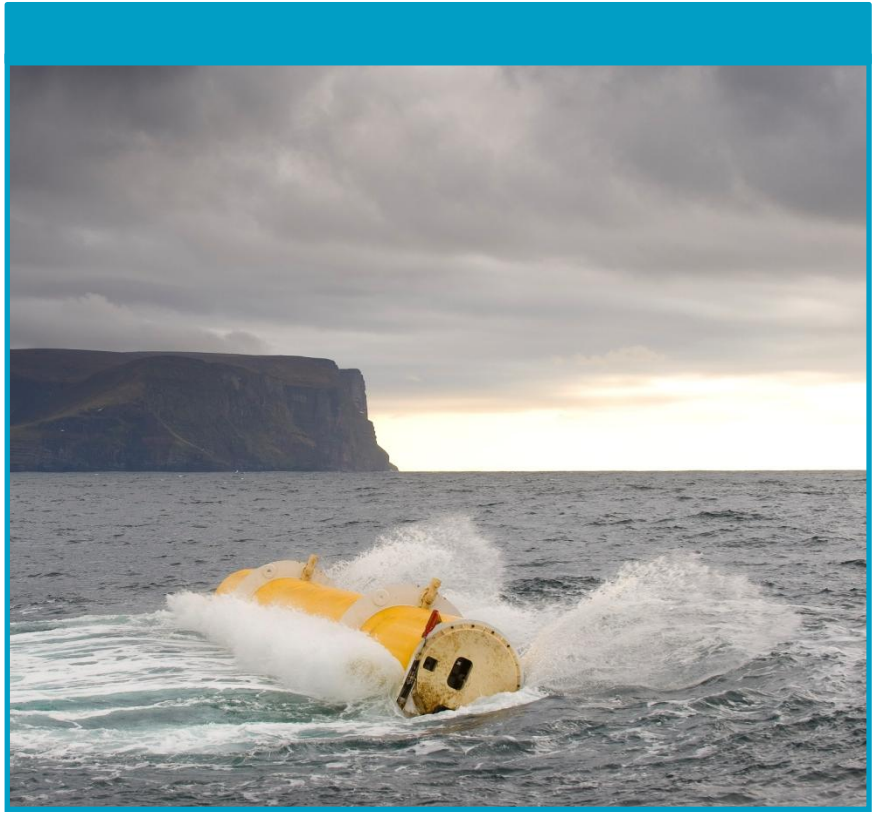
Technology developments for wave

Accelerate focused technology development and deployment

Component and system development

- Funding
  - R&D funding for projects, accelerating identification and selection of the optimum technologies, and development of critical components, subsystems and services that are likely to be needed whatever the technology choices.
- Funders:
  - DECC / ORE Catapult / WES co-funding.
- When:
  - Until 10MW installed wave energy capacity.
  - Funding route thereafter may follow the tidal model.
- Comment
  - Additional funding may be required to deliver fast response, and pro-active (not technology-neutral) interventions.



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Infrastructure support

Provide infrastructure funding to enable efficient build-out

Grid connections and port infrastructure

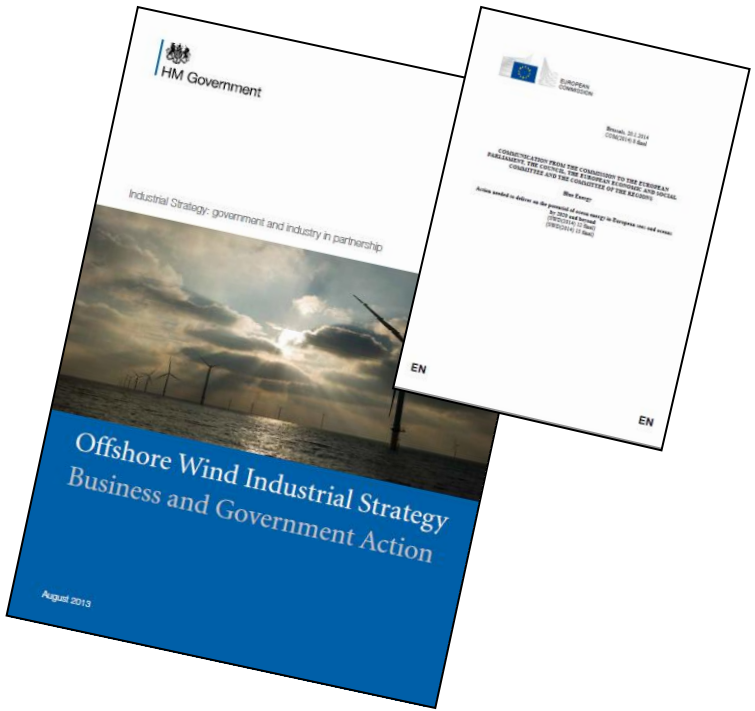
- Funding
  - Funding availability for new grid connections and generic project infrastructure such as port upgrades. This should be in parallel with development of projects noted above and with support to the development of the ‘needs case’ for the transmission operator.
- Funders:
  - LEPs / SE / HIE
- When:
  - Now to 2020 (and beyond as required).
- Comment
  - Port infrastructure development lead times are 4-5 years.
  - Grid connection lead times can be longer.

Industrial strategy needs

Establish industry and government needs to jointly deliver a robust future for wave and tidal

Strategy builds on industry commitment

- Action
  - Development and publication of a cross-department government strategy. This should be roughly in line with the industrial strategies published for other sectors, but shorter and more focused, recognising the smaller scale of these sectors compared with the other major industrial strategies. It should recognise the difference between the wave and tidal sectors and document government intent towards the industrialisation of each.
- Owner:
  - Industry / DECC / RenewableUK
- When:
  - Q4 2015
- Comment
  - Industrial strategies have, to date, been focused on bigger sectors. Offshore wind is by far the smallest sector currently with a government industrial strategy – it is not anticipated that a similar, full process will be undertaken.



UK content & supply chain plans

Develop a route to a sustainable supply chain offering local content and export benefits

Take learning from offshore wind supply chain plans

- Action
  - Development and publication of statements regarding market size expectations and CfD strike price levels or negotiation mechanisms beyond 2020.
  - Development and publication of UK content monitoring / supply chain plan requirements, with a plan for implementation of the associated legislative instruments.
  - Development of ambitious ‘industry aspiration’ targets for UK content in domestic & export projects.
- Owner:
  - DECC with industry support
- When:
  - Q4 2015
- Comment
  - Current CfD/RO funding for up to 100MW only applies at current rate until 2020.
  - CfD is currently fixed and is generally not negotiated on a case-by-case basis.
  - Supply Chain Plans are not currently required for wave and tidal projects under 300MW.
  - A UK content methodology has just been approved for offshore wind.

Conclusions

Establish industry and government needs to jointly deliver a robust future for wave and tidal

Conclusions

- The sectors need to establish and commit to credible pathways to a market size, UK turnover, socioeconomic benefit and most importantly, LCOE trajectory.
- This needs to be at a rate against MW installed and at an investment cost that it makes sense for governments to support.
- The pathways need technical, cost and market size milestones that can be monitored to give confidence in progress.
- Fundamental prerequisite for growth in the supply chain is establishment of a market and visibility of market growth.
- This growth needs to be to a sufficient size to be attractive to suppliers. There are initiatives that can be taken to facilitate this, that hold the sectors accountable.
- Other initiatives can ensure that the supply chain adds as much value to the UK economy and creates as many UK jobs as possible.
- As a result, we will be able to build up the relevant skills and experience and put the UK in the best position to benefit from exporting to the global market, which we are confident, will follow.

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Thank you

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Appendix

TRL and CRL

A pictorial representation of the TRL and CRL Indexes demonstrates that the Commercial Readiness Index begins once the technology is at the stage where it can be trialled and demonstrated in the field.

The Index extends to when the technology or application is being commercially deployed and has become a bankable asset class.