The Offshore Valuation Group

The offshore valuation:

a valuation of the UK's offshore renewable energy resource.

Executive Summary

The Offshore Valuation Group is an informal collaboration of government and industry organisations who have come together to address the question: what is the value of the UK's offshore renewable energy resource?

1. The Department of Energy & Climate Change
2. The Scottish Government
3. The Welsh Assembly Government
4. The Crown Estate
5. Energy Technologies Institute
6. Scottish & Southern Energy
7. RWE Innogy
8. E.ON
9. DONG Energy
10. Statoil
11. Mainstream Renewable Power
12. Renewable Energy Systems (RES)
13. Vestas
14. Public Interest Research Centre

Boston Consulting Group was commissioned to provide analysis. The project was coordinated by Public Interest Research Centre. This report was undertaken to better understand the potential value of the UK's offshore renewable energy resource. Its findings do not necessarily represent the policies or views of all the members of the Offshore Valuation Group.

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2 Executive Summary

The Offshore Valuation Group came together to answer a central question for the United Kingdom: What is the value of our offshore renewable energy resource?

What we found has exceeded our expectations. In harnessing 29% of the practical offshore renewable resource by 2050:

- **the electricity equivalent of 1 billion barrels of oil could be generated annually, matching North Sea oil and gas production and making Britain a net electricity exporter;**
- **carbon dioxide reductions of 1.1 billion tonnes would be achieved by the UK between 2010 and 2050 – a major contribution towards 2050 climate targets;**
- **145,000 new UK jobs could be created by industry.**

The next four decades of technological development could enable us to harness a practical resource ten times the size of today's planned deployments. Integration with neighbouring electricity networks though a 'super-grid' could provide access to a single European electricity market, enabling the UK to sell renewable electricity across the continent.

We assessed the extent of the practical resource through a detailed mapping process based on five electricity generating technologies: wind with fixed and floating foundations; wave; tidal range; and tidal stream. The full practical resource - 2,131 TWh/year - exceeds current UK electricity demand six times over.

Three deployment scenarios were examined to reveal a landscape of different options. Each scenario envisages a level of deployment greater than that currently planned but exploiting less than the full practical resource.

	Installed capacity	Resource utilisation	Capital expenditure	Annual Revenue in 2050	
Scenario 1	78 GW	13%	£170B	£28B	50% UK demand
Scenario 2	169 GW	29%	£443B	£62B	Net *electricity* exporter
Scenario 3	406 GW	76%	£993B	£164B	Net *energy* producer

The scenarios are neither predictive nor prescriptive. Their achievability will ultimately be determined by the level of the UK's ambition; by the level of demand for the UK's renewable electricity in the wider European market; and by evolving technology costs.

* New capacity editions plus offshore grid costs.

The infrastructure deployment required is similar in scale to that of oil and gas in recent decades. The major expansion of the supply chain this needs will not happen on its own, however, but will take strong and continuing support from government and industry in the coming years.

Scenarios forecast the deployment of estimated least-cost options for each decade, based on 78 geographically-specific site-types. Models of technological advances for each of the five technologies were constructed, using learning rates driven by deployment levels over time.

The net value derived in each of these scenarios is sensitive to a number of variables - foremost among them, future costs of electricity generation from the various offshore renewable technologies and development of the European electricity market.

Applying our cost estimates for Scenario 2, coupled with DECC's central wholesale price forecasts, implies a net present value from exports of £31 billion. Here the key sensitivity is the price at which Europe is willing to buy UK renewable electricity at scale: if higher DECC price scenarios are used this value rises and if alternative European price estimates are used in place of DECC's, the net value could be more neutral**.

Whilst the value identified by this study cannot be guaranteed as far ahead as 2050, some key enablers can ensure the UK does not prematurely give up the option of accessing this potentially significant export market. These are:

- **Make Offshore Wind Round 3 grid connections 'super-grid compliant' to avoid locking out potential future electricity sales to Europe (in scenarios 2 and above);**
- **Take a leadership role in the current EU super-grid negotiations, to ensure that the UK derives maximum value from its design and implementation;**
- **Continue to develop the UK supply chain as a key to deployment at scale and least cost;**
- **Evaluate and where appropriate, facilitate new financing structures that complement the fundamental features of renewable energy infrastructure and can support the scale and speed of industrial growth required.**

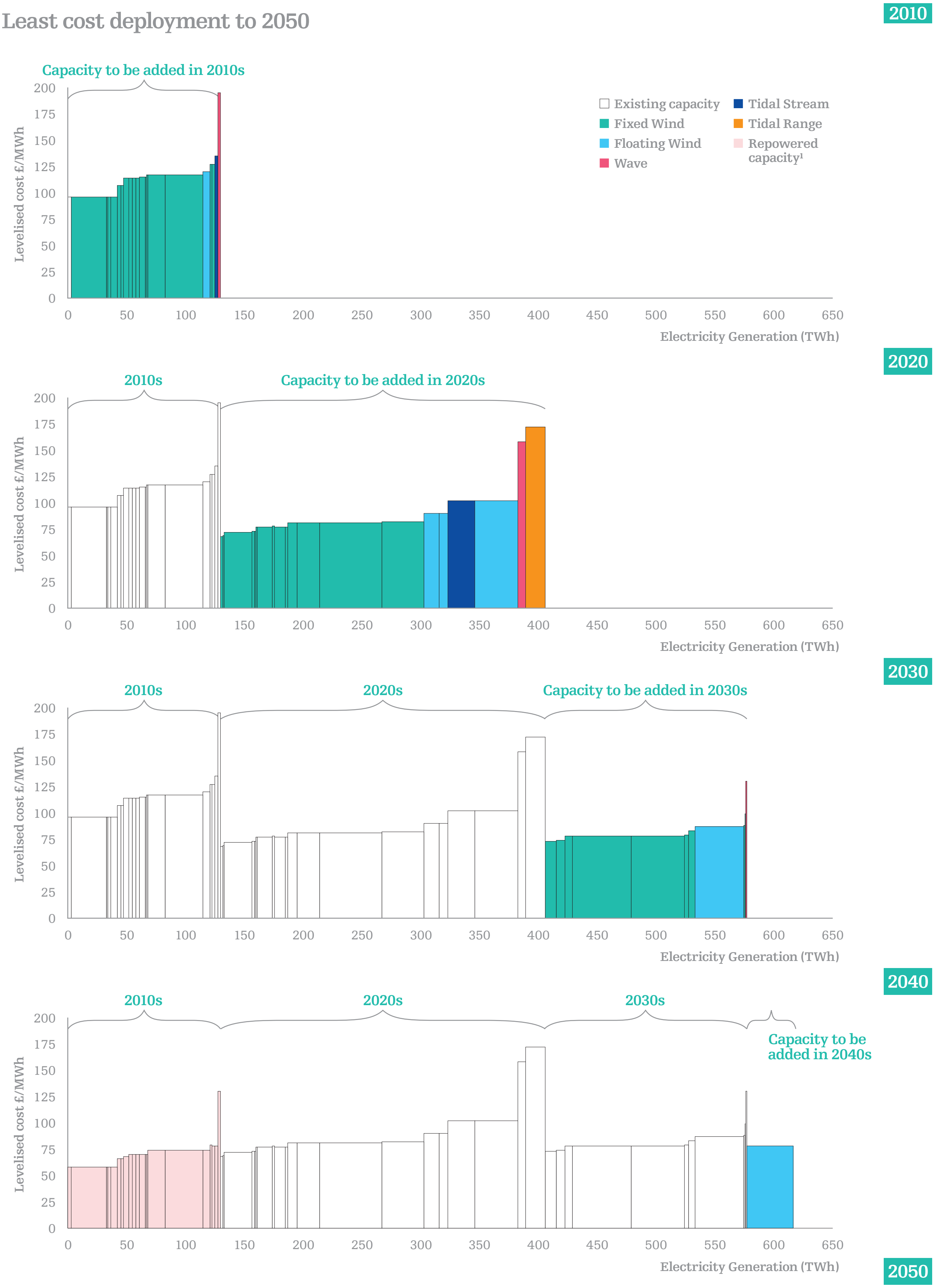
The UK is now most of the way through its first great offshore energy asset, our stock of hydrocarbon reserves. The central finding of this report is that our second offshore asset, of renewable energy, could be just as valuable. Britain's extensive offshore experience could now unlock an energy flow that will never run out.

** For example, the price forecasts from the European Climate Foundation 2050 EU Roadmap (2010).

Scenario 2

169 GW; 29% practical resource; net electricity exporter in 2050

Least cost deployment to 2050



For clarity, the smallest site types do not appear in these graphics.