



UK offshore wind industry progress to cost reduction

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Agenda

1. Introduction to ORE Catapult
 2. Cost Reduction Monitoring Framework (CRMF) 2014
 3. CRMF 2015
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Catapults: A long-term vision for innovation & growth



Catapults

- Established by Innovate UK, part of a network of 7 Catapults
- Selected for their strength within the UK economy
- Designed to transform the UK's capability for innovation

The Offshore Renewable Energy Catapult

*Abundant, affordable energy from
offshore wind, wave and tide*

Cell Therapy
Catapult

Connected Digital
Economy Catapult

Future Cities
Catapult

High Value
Manufacturing
Catapult

Offshore
Renewable
Energy Catapult

Satellite
Applications
Catapult

Transport
Systems Catapult

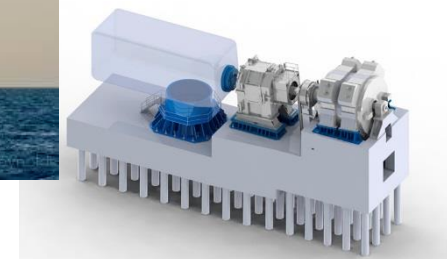
ORE Catapult headquarters and National Renewable Energy Centre



Glasgow, HQ



Blyth, National Renewable Energy Centre



Collaboration & Partnership

Industry Advisory Group Chair: SPR

Responding to industry need



Research Advisory Group Chair: Edinburgh University

Access to best research & facilities



Partnerships & strategic alliances



Offshore Wind Programme Board

Green Investment Bank

SMEs

Accelerating the identification, development & commercialisation of innovative technology

ORE Catapult innovation challenges

Knowledge Area	Innovation Challenge Area (examples)
Blades	Blade erosion, health monitoring, improved manufacturing process & quality.
Drive Trains	Condition monitoring, hydraulic to electrical power take off, bearing reliability
Wind & Ocean Conditions	Utilise existing met ocean data, remote sensing (e.g. LIDAR)
Electrical Infrastructure	Cable protection, dynamic cables
Foundations & substructures	Structural health monitoring, pin piling
Installation & decommissioning	Mooring systems, connection/disconnection devices
Operation & Maintenance	Access systems, asset management

www.ore.catapult.org.uk/innovation-challenges

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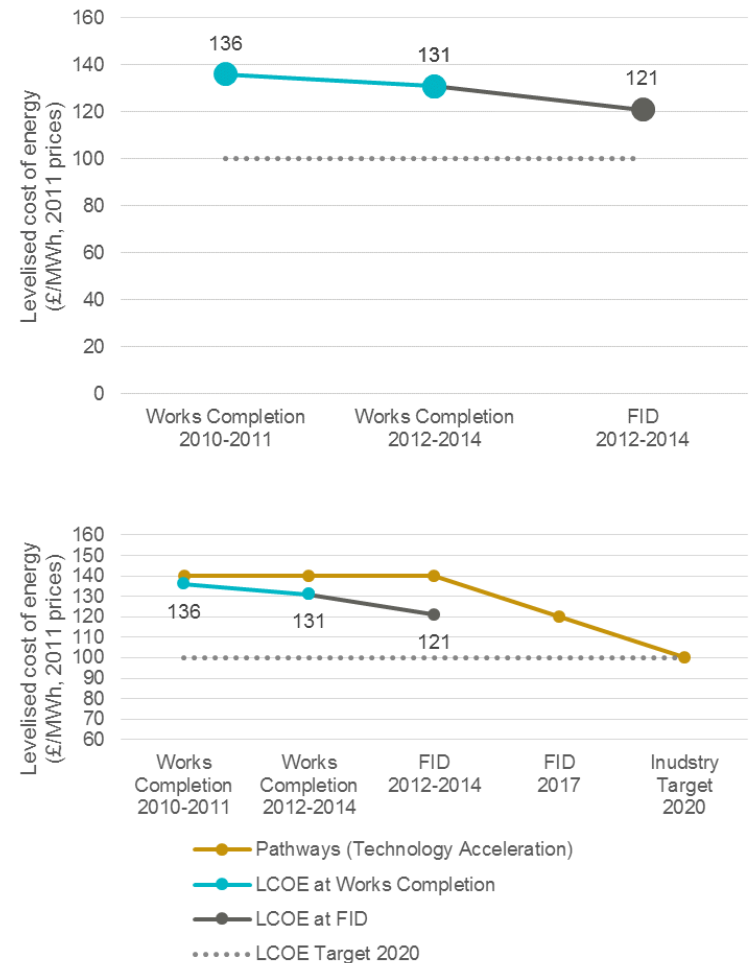
Cost Reduction Monitoring Framework (CRMF) 2014



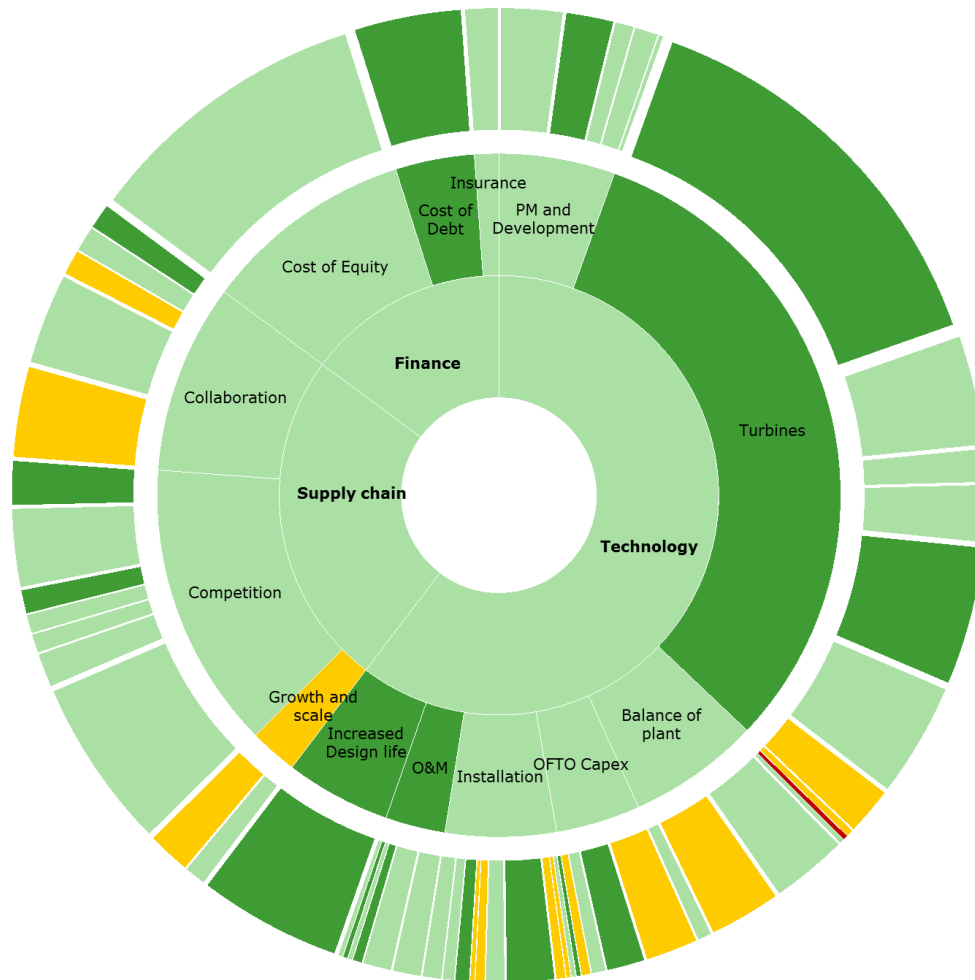
- Delivers recommendations on innovation spending to government
- 3 work streams to monitor cost reduction: technology, supply chain and finance
- CRMF spanned 2 studies: Quantitative and qualitative

CRMF 2014: Quantitative Assessment - Summary

- **LCoE for Offshore Wind farms is falling**
- The 2012-2014 FID projects group is dominated by projects using **6MW turbines**, whilst the other LCoE figures reflect projects with an average turbine size of 3.4MW – 3.6MW
- 6MW and larger turbines have become commercially available earlier than anticipated.
- Participation from a **wider section of the supply chain** is crucial to continued cost reduction. This includes sectors that have opportunities outside of the offshore wind sector.
- It is **uncertain whether the current market conditions** will support further long term investment in technology development and supply chain industrialisation. There is limited capacity within the current CfD auction process and little certainty of the market beyond.



CRMF 2014: Qualitative Assessment - Summary



- In 2014 the offshore wind industry was on target to achieve an LCoE of £100/MWh for projects reaching FID in 2020.
- Progress in the development of:
 - larger turbines
 - XL monopiles
 - O&M
 - Extended design life
- Growth and scale is behind target
- Deeper water site technologies are not being developed quickly enough (e.g. jacket and/or gravity-based foundations and HVDC connections).

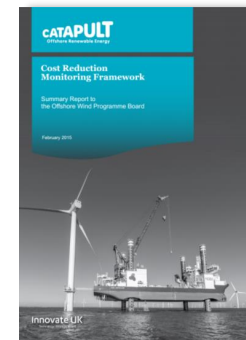
Recommendations for the OWPB to ensure that progress continues and the 2020 target is achieved, included:

1. Clarify the **Government's future programme**, and level of regulatory support for offshore wind, after the current Contract for Difference (CfD) auction and with respect to the Levy Control Framework beyond 2020.
 2. Encourage the **demonstration of balance of plant innovations** such as novel foundations and electrical infrastructure optimisation.
 3. Investigate the potential impact of lower than anticipated levels of **investment in the jack-up and heavy lift construction vessel fleets**, particularly for foundation installation.
 4. Support the capture and sharing of **knowledge and best practice** through increased collaboration with a view to increasing the predictability of project execution.
 5. Continue to **monitor cost reduction progress in the UK** and extend to take consideration of European offshore wind development.
 6. Further consideration should be given to identifying and addressing the gaps in **skills and expertise** required to deliver and operate an offshore wind farm.
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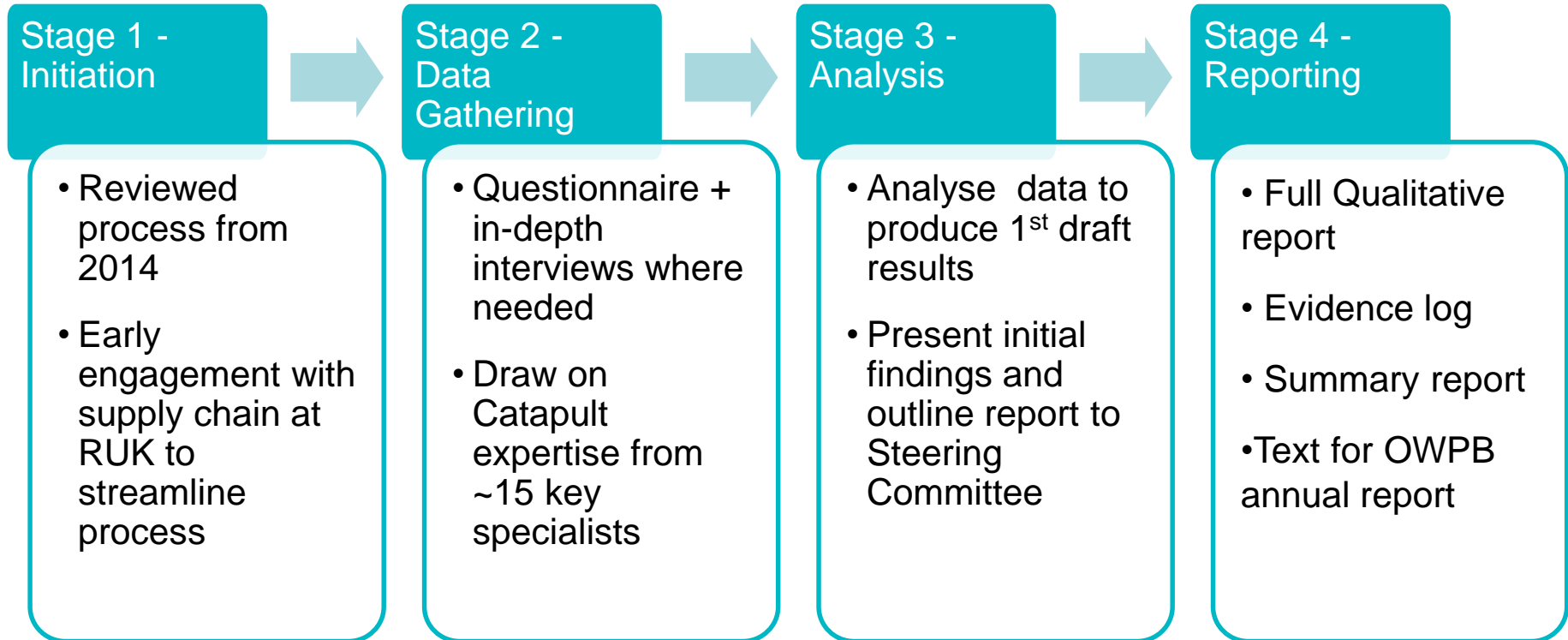
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- Only qualitative study to be undertaken in 2015
- As in 2014, 3 work streams and their contribution to LCOE reduction:
 - Technology: 60%
 - Supply chain: 25%
 - Finance: 15%

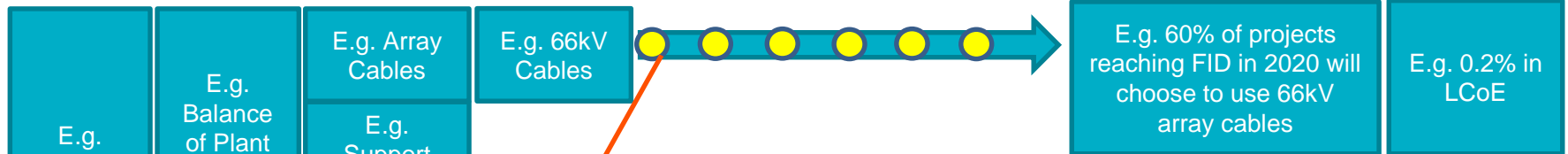


2015
study

CRMF 2015: Process for delivery



CRMF 2015: Measuring indicators



Indicator milestones
e.g. in 2015 10% EU commercial projects will contract using 66kV cables

In 2015 – no projects contract 66kV cables

Indicator scorecard	2015 indicator milestone	2020 Outlook – based on probability
Ahead of target	+30% projects contract	Green
On Target	20% project contract	Light Green
Behind target	0% projects contract	Yellow
Missed target	N/A	Red

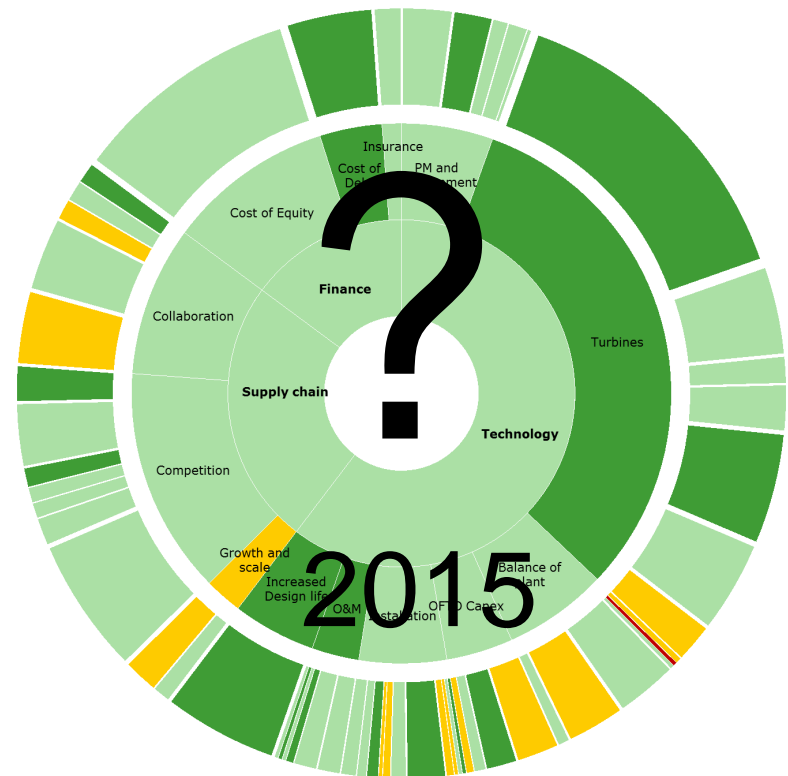
e.g. Indicator scores a 2 behind target and an outlook of red

CRMF 2015: O&M indicators

Level 1 Indicators	Level 3 indicators	2020 Vision (i.e. where the indicator needs to be to hit £100/MWh)
O&M	Turbine Condition-based maintenance	All turbines contracted have fully integrated control, condition monitoring and SCADA systems and are maintained using CBM.
	Access solutions from vessel to turbine	Transfers from vessel to turbine up to 2.5 Hs on 90% of wind farms
	Improvements in transfer from shore to turbine	100% CTVs 2nd or 3rd gen, with majority of 3rd gen
	Inventory management	90% of projects use sophisticated inventory management techniques
	Offshore crew accommodation	OSVs used by all far (70km+) offshore sites, supported by two or more daughter vessels, combined with new processes to maximise the efficiency of the vessels and personnel
	OFTO O&M	OFTOs utilise condition monitoring on majority of assets, with some sharing of vessels and spares, leading to cost savings of 10%

CRMF 2015: Results

- Currently gathering responses from industry
- The Report will be published by ORE Catapult on behalf of the OWPB
- Target report publication in January 2015
- Will be available to download from ORE Catapult website



Published reports

- **CRMF Report**

- Commissioned 2014 by the OWPB. Charts progress between 2011-2014 on cost reduction, measured in lifetime costs

- **Marine Financing Report**

- Identifies measures to bolster marine energy sector funding

- **Operations and maintenance in offshore wind: key issues for 2015/16**

- This paper outlines the key industry issues that new O&M products and services need to address in order to deliver into the offshore wind market.

