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Wave and tidal progress in the UK

Skye Holcombe Henley

European Marine Policy Officer

2012 Year in Review

General Developments

- 37 wave and tidal sites leased around the UK = 1.7GW potential capacity
- Marine Energy Parks designated:
  - January 2012: South West (from Bristol to Cornwall and the Isles of Scilly)
  - July 2012: Pentland Firth & Orkney Waters
- Electricity Market Reform (White Paper released 2011)
- Draft Energy Bill (released November 2012)
- Capital support MEAD & MRCF (potential Crown Estate funding)
- Likely deployment of around 250MW of devices by the end of 2020
- First generation W&T arrays 2014-2017

Industrial Investment

- Andritz Hydro acquired Hammerfest Strøm, forming Andritz Hydro Hammerfest
- Siemens acquired Marine Current Turbines
- ABB Technology Ventures invested £5 million in Scotrenewables Tidal Power, complementing ABB's investment in Aquamarine Power in 2011.
- Alstom acquired TGL from Rolls Royce for £65 million.
- DCNS has stated that it intends to increase its holding in OpenHydro to 60% - cost equivalent of approximately £110m

Testing & Demonstration Facilities

New test facilities

- FloWave TT (a subsidiary of the University of Edinburgh) scheduled to complete construction of onshore tank test facility in 2013
- The Coastal Ocean and Sediment Transport (COAST) laboratory, opened at Plymouth University Oct 2012

Device deployment in testing locations

- European Marine Energy Centre (EMEC), Orkneys
- Wave Hub, South West Marine Energy Park, Cornwell
- National Renewable Energy Centre (Narec), Blyth (Newcastle)

Device development – Tidal stream

Full scale tidal devices installed or operating in 2012

Concept design

•Technology convergence towards a three bladed, horizontal axis.

•Oscillating hydrofoils and shrouded devices still being developed, each suited to different site characteristics.

Operator	Device	Location
Andritz Hydro Hammerfest	HS1000	Fall of Warness, EMEC
Marine Current Turbines	SeaGen	Strangford Lough, Northern Ireland
Neptune Renewable Energy	Proteus	North Humberside
OpenHydro	Open Centre turbine	Fall of Warness, EMEC
Scotrenewable s Tidal Power	SR250	Fall of Warness, EMEC
TGL	500kW turbine	Fall of Warness, EMEC

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Device development - Wave

Full scale wave devices installed or operating in 2012

Concept design

• Wave sector not demonstrating technology convergence like tidal stream.

• Three leading manufacturers all employing different concepts.

Operator	Device	Location
Aquamarine Power	Oyster 800	Billia Croo, EMEC
E.ON	Pelamis P2	Billia Croo, EMEC
Fred Olsen	Bolt "Lifesaver"	FaBTest, Cornwall
ScottishPower Renewables	Pelamis P2	Billia Croo, EMEC
Seatricity	Oceanus	Billia Croo, EMEC
Wello	Penguin	Billia Croo, EMEC

Developments in Scotland

Marine Policy & Planning

- Marine Energy Action Plan released June 2012 - update to 2009 Marine Energy Road Map
- Sectoral Marine Plans for offshore wind, wave and tidal energy in Scottish Waters to promote coordination and ease planning difficulties.

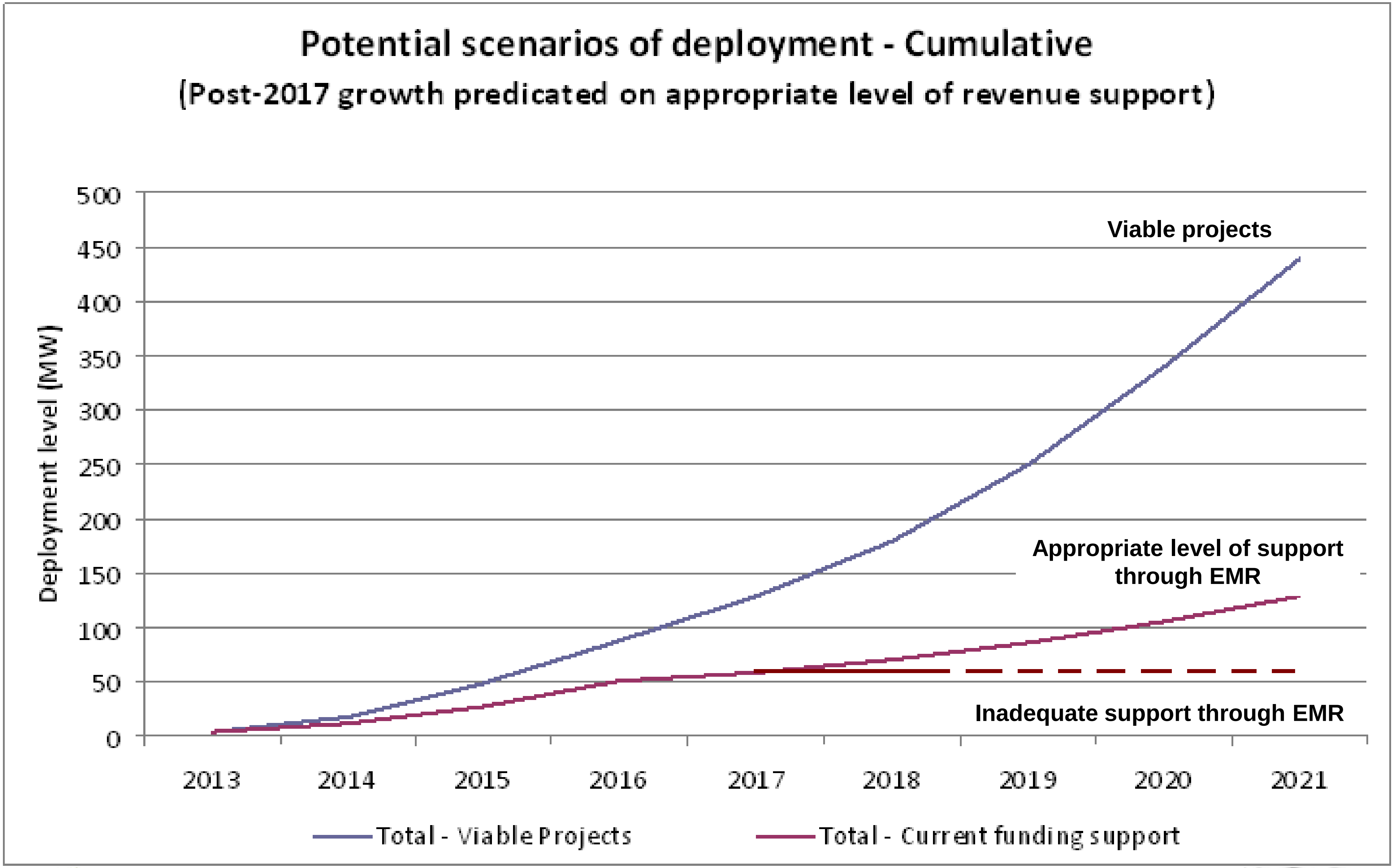
Grid

- Intergovernmental Scottish Islands Renewables Steering Group established October 2012
- Ofgem completed review of Transmission Network Use of System (TNUoS) charging arrangements
- Ongoing examination of island transmission charges

Market: Capital Support

- £20m Marine Energy Array Demonstrator (MEAD) [UK govt]
- £18m Marine Renewables Commercialisation Fund (MRCF) [Scotland govt]
- £20m Crown Estate support for two wave and/or tidal stream array projects (3MW or greater)
- £10.5 m competition - Marine Energy: Supporting Array Technologies (MESAT) [TSB]
- £10m Saltire Prize – Energy generation [Scotland govt]
- £7.9m WATERS2 –awarded to 5 developers [Scotland govt et al]
- £103m Scottish Government Renewable Energy Investment Fund (REIF) (loans, equity available for marine projects)
- £21m Energy Technologies Institute Marine Programme - 2008 to 2018 (investments rather than grants)

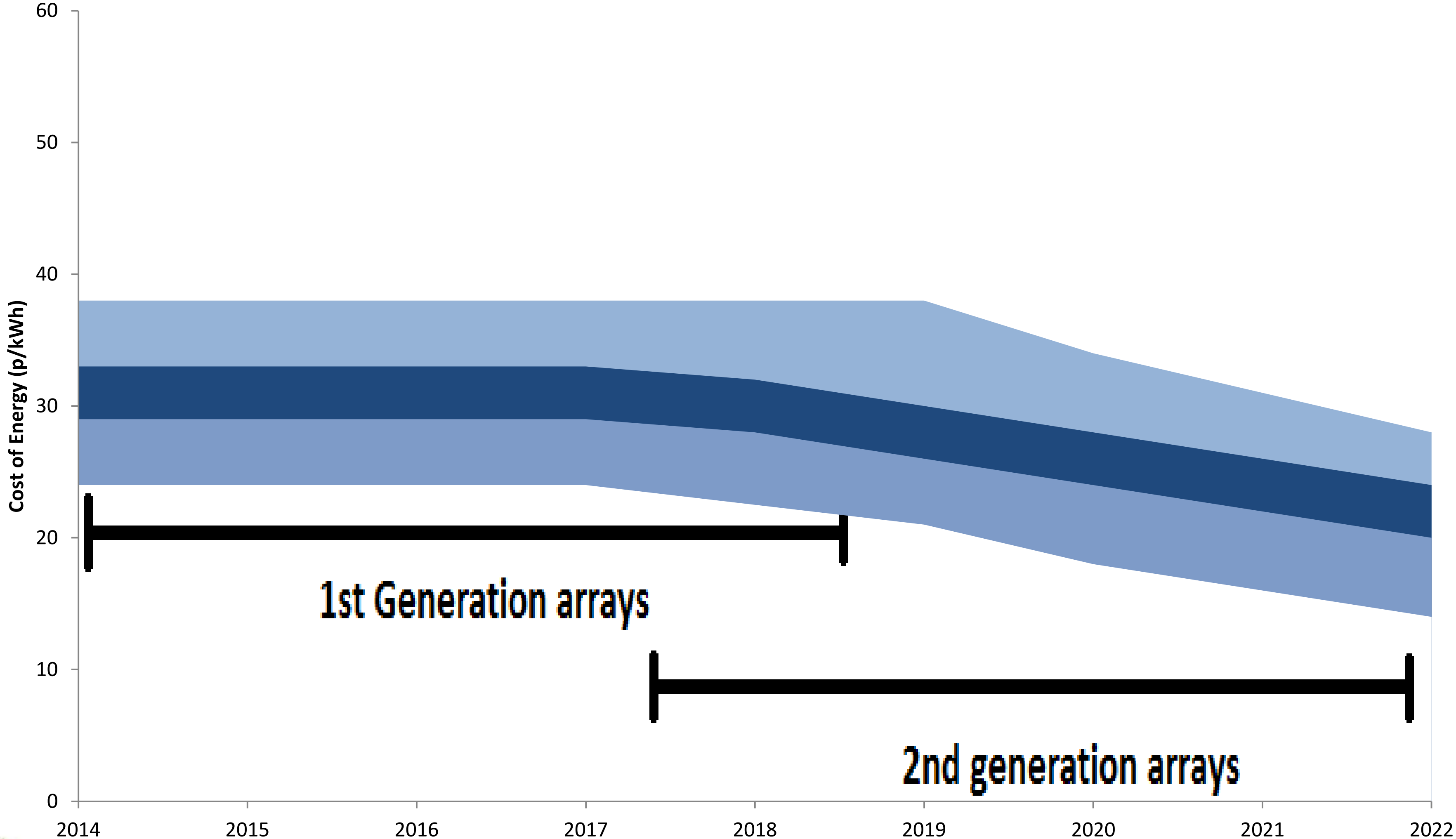
Charting the future – realistic deployment



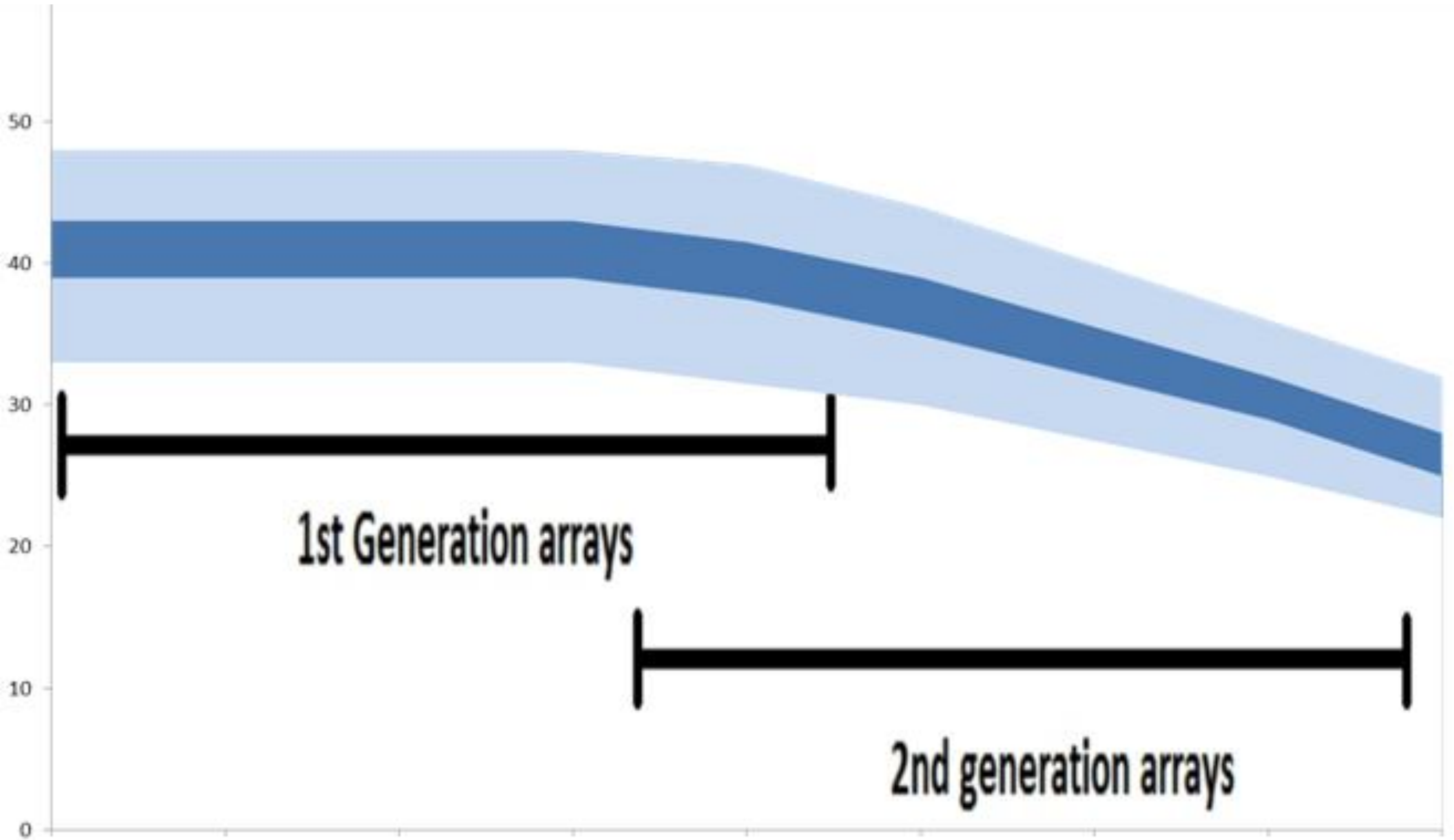
Market: Revenue Support

- Five ROCs/MWh for wave and tidal projects of up to a limit of 30MW from 2013/14 to 2016/17
- EMR: Phasing out of Renewables Obligation (RO) 2014-2017
- Introduction of FIT Contract for Difference (CfD) (from 2014)
  - Financial mechanism (removes obligation for renewable generation)
  - Level of support set by Strike Price
  - Funding provided through Levy Control Framework (£7.6bn)
- Strike price determined at ministerial level
  – Announcement of draft strike prices ~ June 2013
  – Post-announcement consultation over summer 2013
- National Grid call for evidence
  – £280-£300 per MWh for tidal stream (20yr contract)
  – £300-£320 per MWh for wave (20yr contract)

Tidal Stream LCOE



Wave LCOE



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Progress despite adversity

Ongoing challenges

1. Finance
2. Grid
3. Consenting

Despite challenges – industry has made and is making great strides towards positioning itself as a long-term source of renewable energy for the UK.

2013 Industry engagement

- **RenewableUK Wave and Tidal Conference**
  - 27 (pm) and 28 February, London

- **Strategic Initiative for Ocean Energy (Europe) Consultation workshop**
  - 27 (am) February, London (free event, all welcome)

Discusion panels:

1) Where we are now: Strategy for removing non-technological barriers to industry growth
2) Where we are going and how we plan to get there: Uniting the industry behind a common vision up to 2050

Register at: http://www.si-ocean.eu/en/News-Events/CHAMP-events/