



European
Ocean Energy

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INDUSTRY VISION PAPER

2013

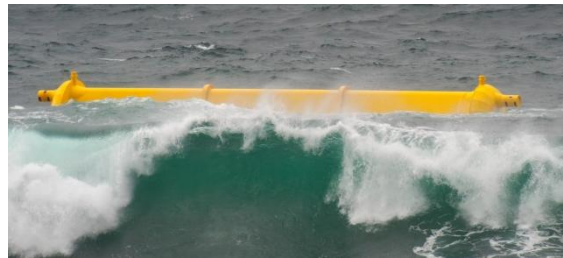
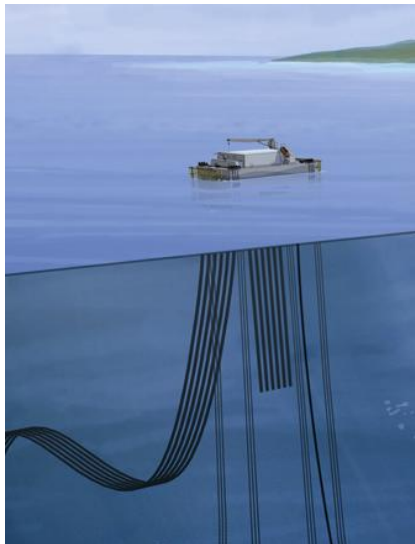


OCEAN ENERGY for EUROPE

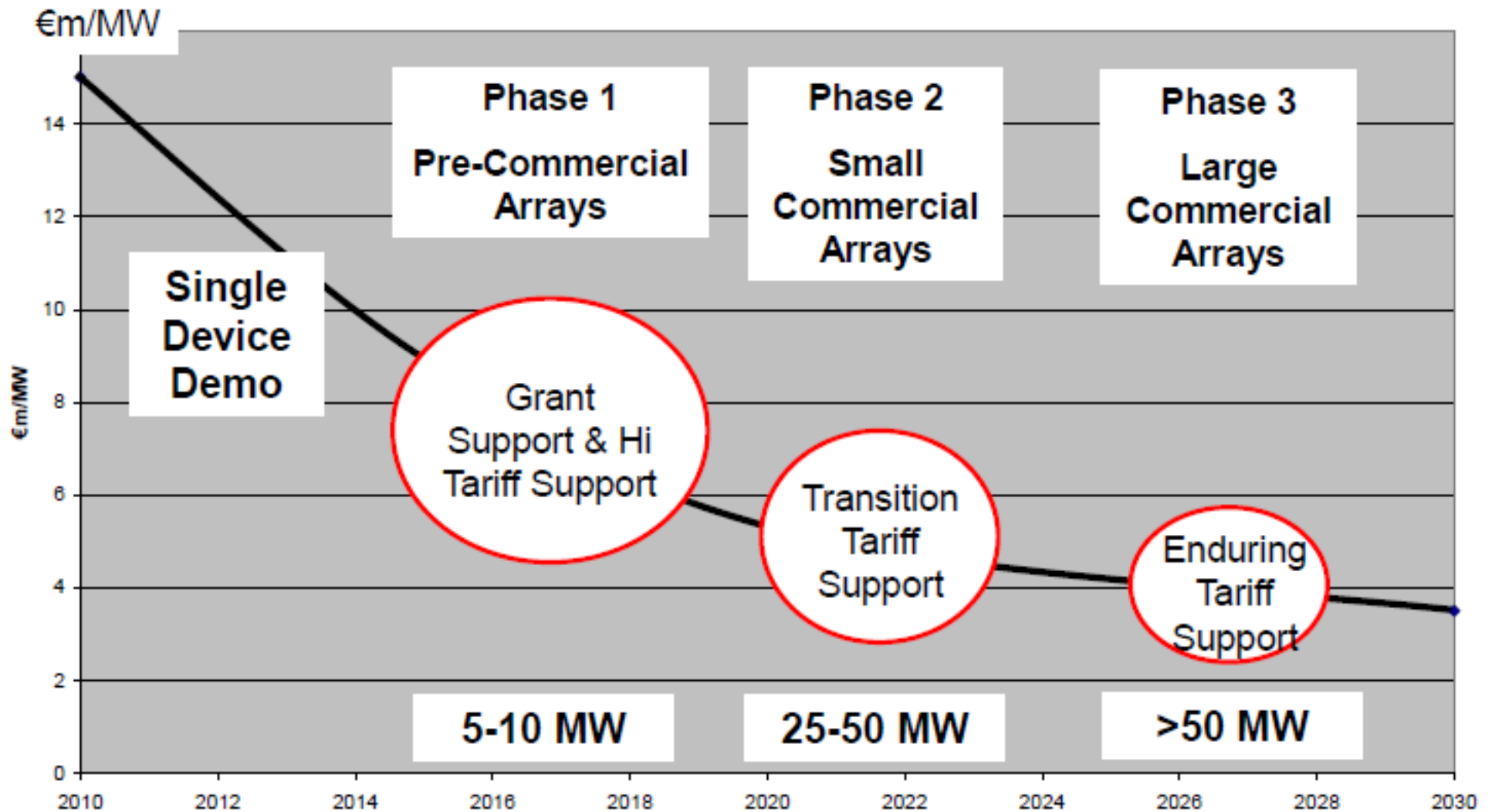
Representing a Fast Growing Sector:

- **Over €600m** private sector investment in the last 7 years
- EU installed capacity has tripled in 4 years – over **10MW in 2013**, 3.5 in 2009
- **2GW** of projects in planning pipelines

Wave, tidal, OTEC and salinity gradient...



Industry Vision



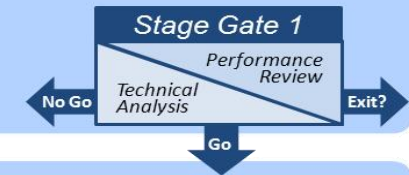
Wave Energy Structured Development Protocol



STAGE
1

Concept Model; [TRL 1 - 3]

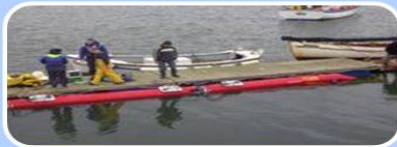
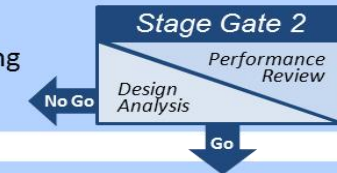
- Design Validation Testing in Regular Waves
- Device Optimisation Trials in Irregular Waves
- **Scale Guide: 1:25 – 100 (Small)**



STAGE
2

Design Model; [TRL 4]

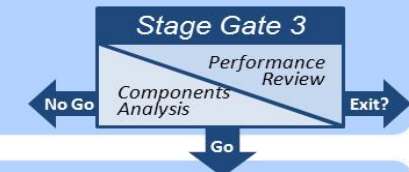
- Performance Verification in Realistic Seaways
- Component, Power Take-Off & Control Monitoring
- **Scale Guide: 1:10 – 25 (Medium)**



STAGE
3

Sub-Systems Model; [TRL 5 - 6]

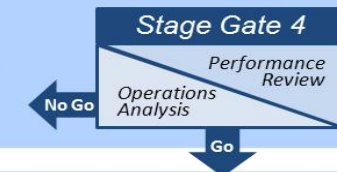
- Fully Operational Converter Sea Trials
- Evaluate Energy Production in Real Seaways
- **Scale Guide: 1:2 – 5 (Large)**



STAGE
4

Solo Device Proving; [TRL 7 – 8]

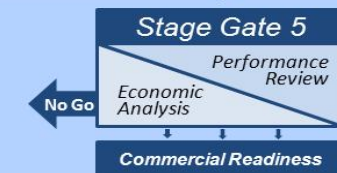
- Full Size Power Plant; Technical Deployment
- Advance Pre-Production to Pre-Commercial Unit
- **Scale Guide: 1:1 – 2 (Prototype)**







STAGE
5

Multi-Device Demonstration; [TRL 9]

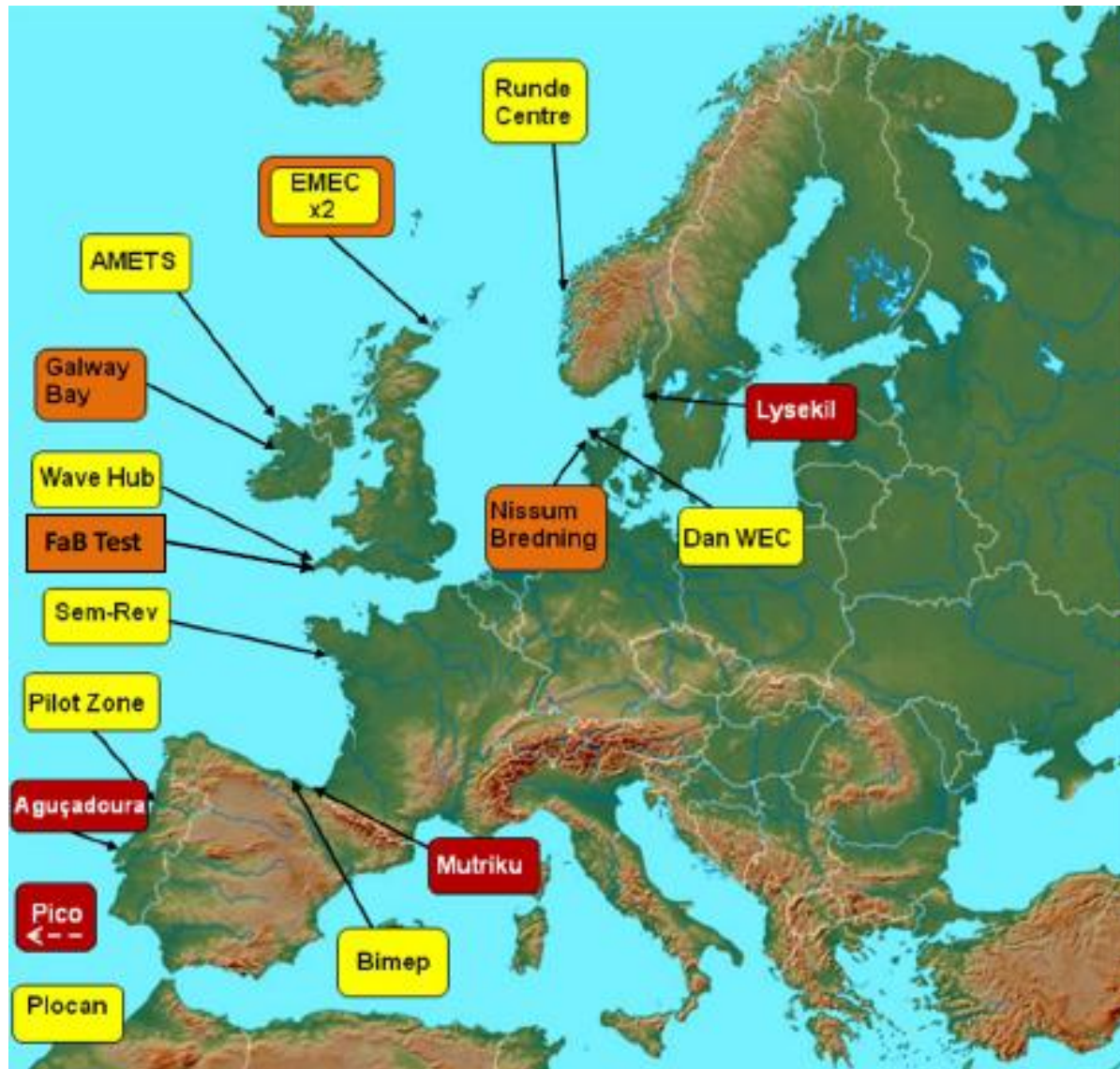
- Final Commercial Unit; Economic Deployment
- Small Array Trials of 3 – 5 Devices; Grid Issues
- **Scale Guide: 1:1 (Full)**



Tidal Stream Turbines – Development Path

Year of installation	1994	2003	2008	today 2014/15
Device	Proof of concept	SeaFlow	SeaGenS-1.2MW	SeaGenS-2MW
				
Maturity	Proof of concept	Part-scale prototype	Full-scale prototype	Commercial arrays
Rated Power	15 kW	300 kW	1.2 MW	Arrays of 2.0 MW turbines (>10 MW)
Location	Loch Linhe, UK	Lynmouth, UK	Strangford Lough, UK	UK

European Test Centres and Demonstration Sites



UK Industry Demonstrators 2013



Irish Developments



Open Hydro Ltd

Tidal Stream Turbine



Ocean Energy Ltd

Wave Energy Device

INDUSTRY VISION

2015

RELIABLE

Several arrays up to 10MW

2020

COST CONFIDENCE

Front-runners installing up to 50MW arrays

2025

MARKET-ROLLOUT BEGINS

Cost-competitive commercial farms

2050

MAINSTREAM – 100GW

Renewable Energy Supplier



Offshore Renewables in an All Islands Market



Current “Best New Entrant” Renewable:



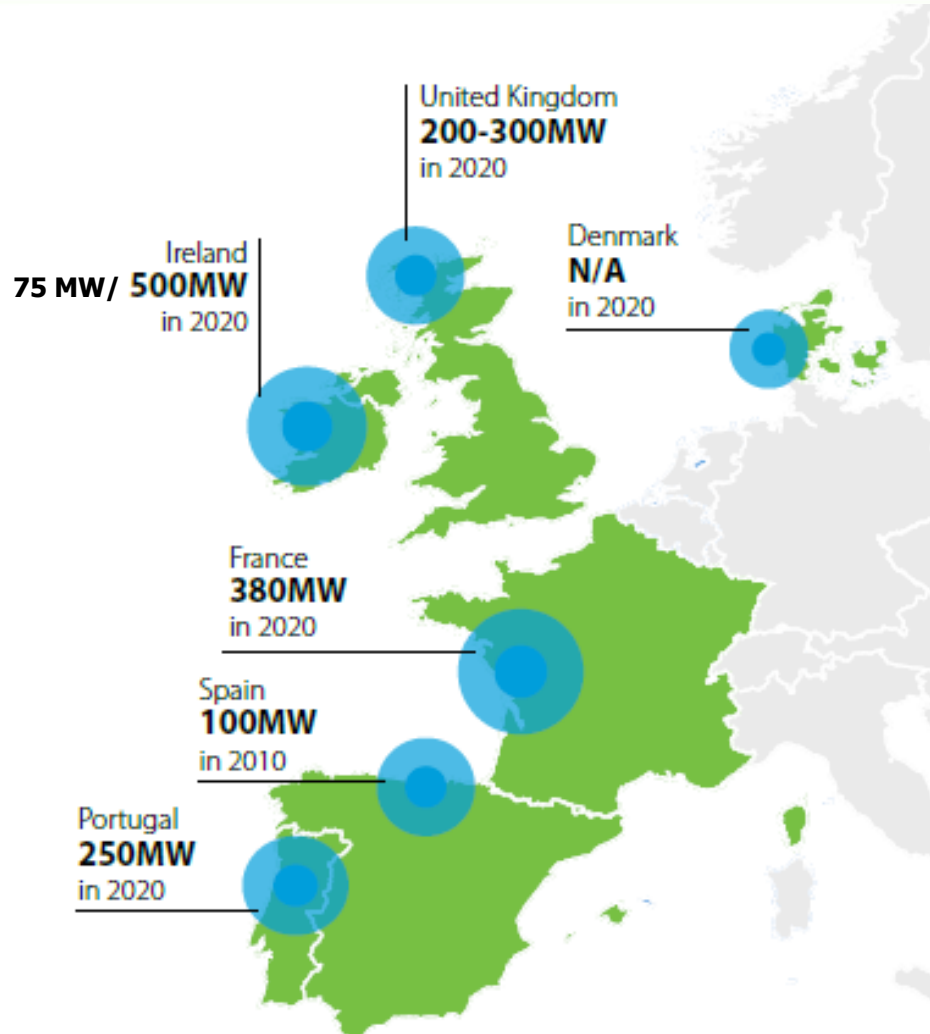
Onshore Wind

- UK O/Wind Operational
2.6 GW Operational
~7GW planning / approved

Future Offshore Options:

- ▲ UK O/Wind Options to R3
~ 50 GW
- ▤ Wave Resource Regions
- ▨ Tidal Resource Regions

EUROPEAN OCEAN ENERGY – the benefits



Physical balancing & Price

- power from new locations
- out of synch
- Higher penetration of renewables on grid
- Maximising asset value of grid infrastructure

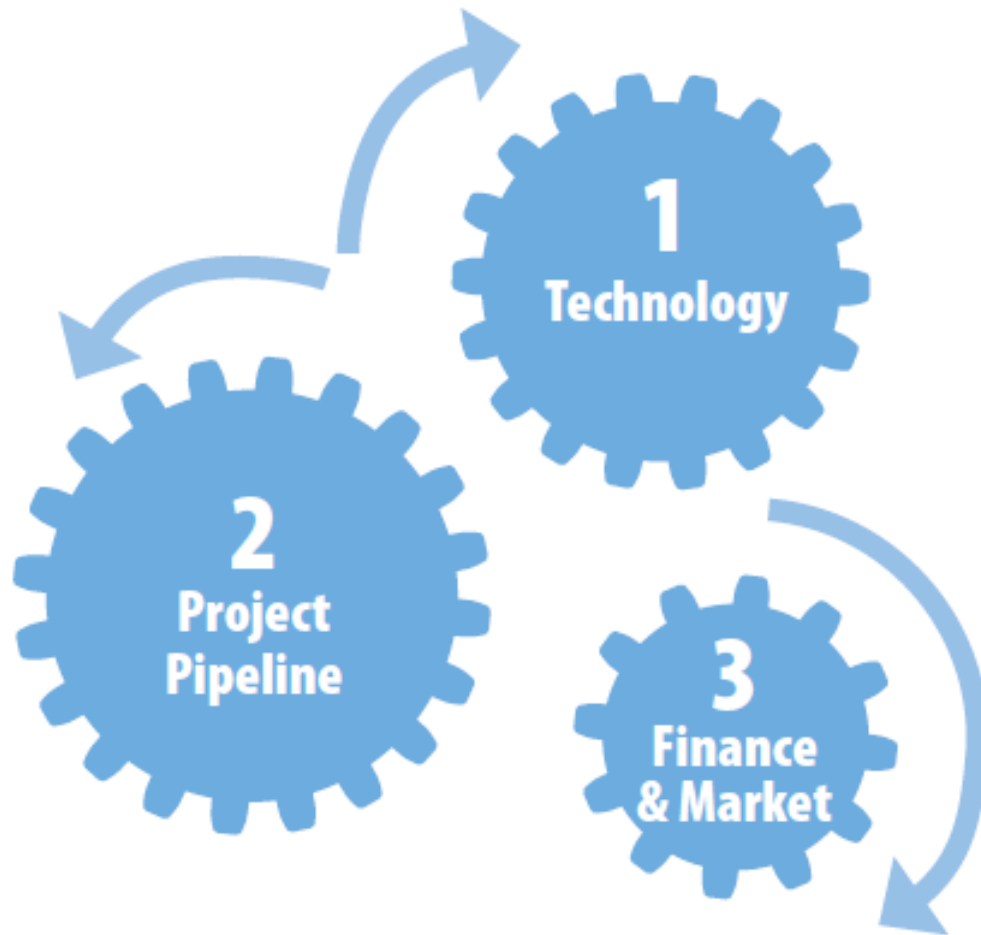
Energy Security

- Untapped indigenous resource
- Increases geographic & technical choice for utilities

Industrial Growth & Jobs

- 1000 jobs today to 20,000 in 2035
- Export & internal trade

A 3-Point plan for unlocking growth



Technology Advancement

- Deliver reliable and affordable technology
- Cost reduction pathway

Project Pipeline

- Supply chain
- Infrastructure
- Leasing, planning & consents
- Public acceptance

Finance & Market Mechanisms

- Market pull – grants
- Market push – revenue support
- Private & public investment strategy to manage risk and increase investor confidence

1. Technology Advancement



Goals

- Accelerate delivery of low-cost solutions to the market-place
- A strategic plan for HORIZON 2020, MS & private sector funding.

Deliverables

- Commercial priorities:
 - ✓ Cost reduction pathway
 - ✓ Technical innovation plan
- Engage supply chain

Structure & Partnerships

- DG RTD to chair TIP
- SI Ocean: cost reduction & technology agenda

2. PAN-EUROPEAN Project Development Pipeline



Goals

- EU gold-standard model policy framework
- Identify and adopt best practice

Deliverables

- Expert assessment of viable EU projects & recommendations on reducing risk in each area.

Structure & Partnerships

- DG RTD, DG MARE, DG ENER & DG Enterprise to chair relevant work groups.
- SI Ocean – policy report.

3. Financing & Market Mechanisms



Goals

- Accelerate market entry & roll-out
- Maximise private-public investment & risk sharing
- Funding stream for project development – at all stages

Deliverables

- Pro-investment policy frameworks
- Project bankability
- Level playing field
- NER 300 & beyond
- Viable project assessment & timeline for Europe

Structure & Partnerships

- EIB, DG ENER to be invited chair
- SI Ocean: market entry strategy

NER 300 Support



WestWave Project

- Opportunity for first wave energy project in Ireland: 5 MW
- Up to €19.8 Funding awarded under EU NER300: Wave Energy category
- Project consortium includes four of the leading technologies
- Project supported by industry via a number of Associate Partners
- Opportunity to develop the Supply Chain for Ocean Energy in Ireland



www.WestWave.ie (images courtesy of Aquamarine Power, Wavebob, Ocean Energy, Pelamis Wave Power)

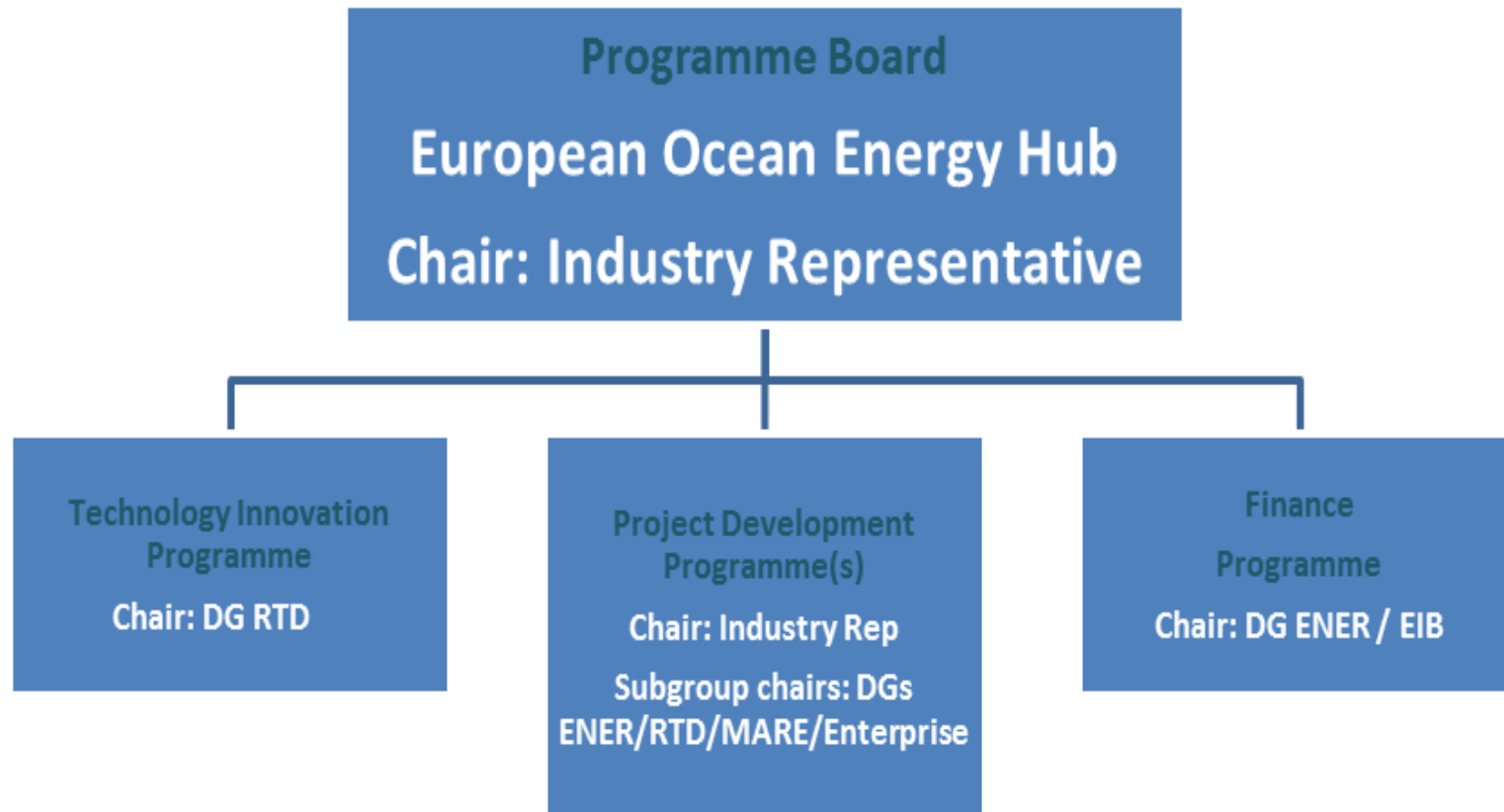


Cooperation, Coordination & Collaboration

SET Plan inclusion & European Industrial Initiative

ERA-NET Coordination

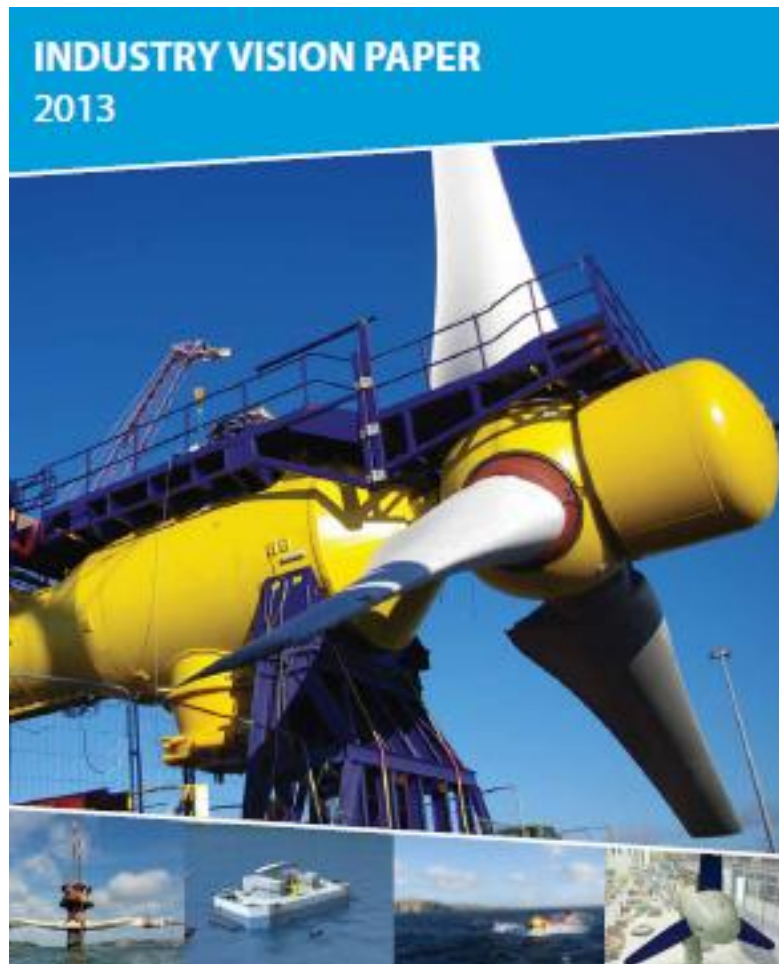
SI OCEAN & Industry leadership





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Thank you for listening