

Ocean energy uptake: Solutions to technical challenges

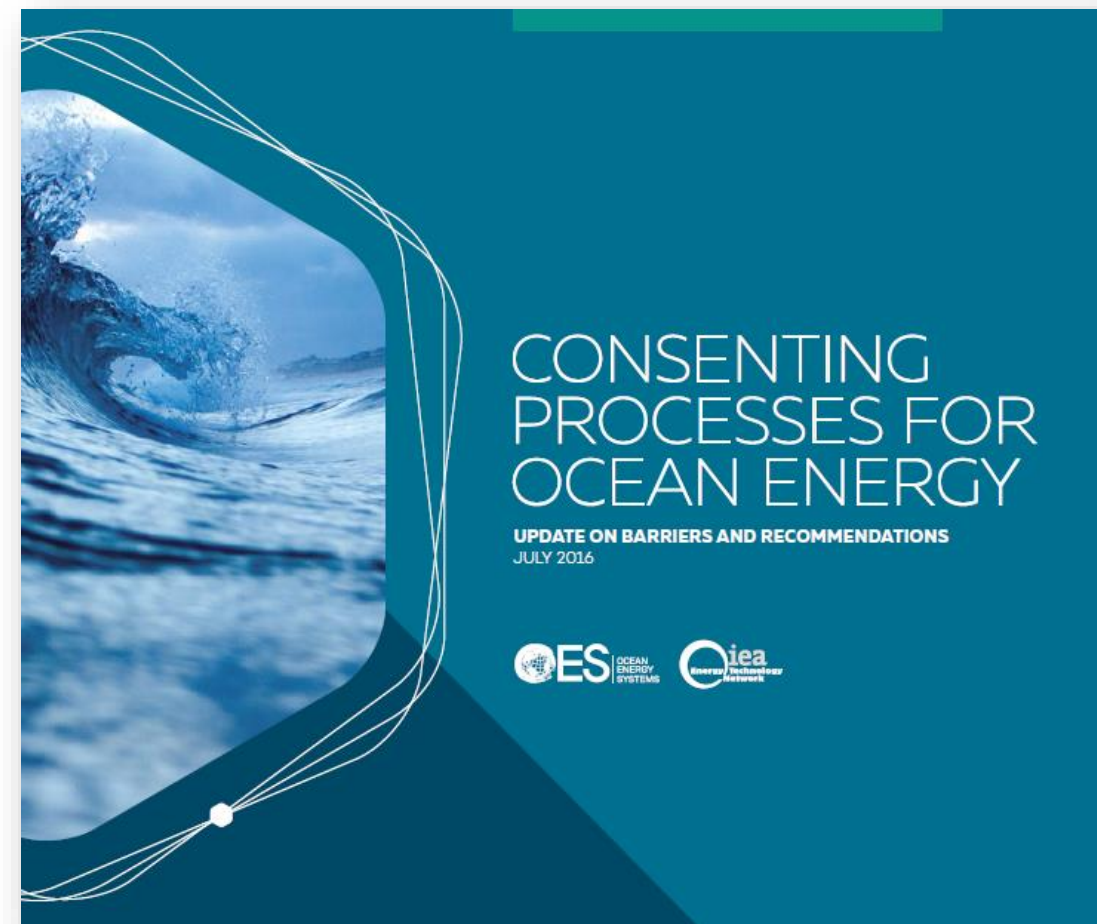
Yann-Hervé De Roeck
OES TCP Vice-Chair

Consenting Processes for Ocean Energy

→ OPERATING AGENT: WavEC (Portugal)

OBJECTIVES and ACHIEVEMENTS:

- Provide a holistic picture of the situation in each OES member country
- Particular emphasis on investigating the main barriers associated with permitting and licensing with a view to advising regulators and decision-makers
- Developers were given the opportunity to provide their views and insights on barriers
- Particular attention to Marine Spatial Planning and how this is influencing consenting processes
- 10 Key Recommendations



Environmental Issues

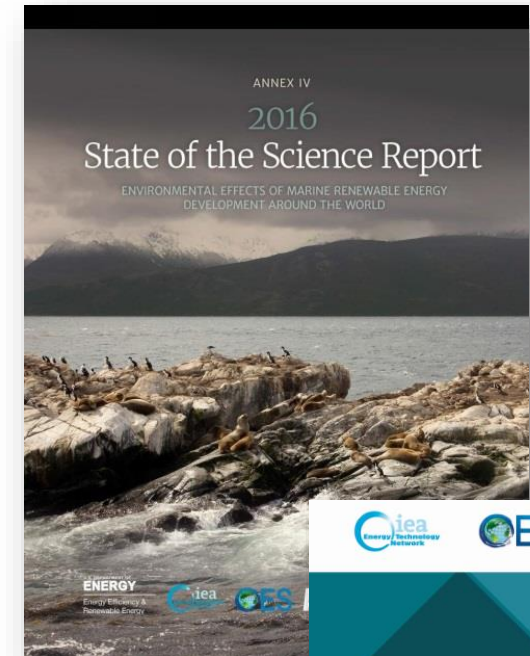
Making existing information available and accessible

→ OPERATING AGENT: DOE (USA)

The screenshot shows the Tethys Knowledge Base website. The URL is tethys.pnnl.gov/knowledge-base-marine-energy. The page title is 'Knowledge Base' and the current view is 'Marine Energy Content'. A search bar contains 'Marine Energy Content' and the results show 1459 items. The table below lists several articles.

Title	Author*	Date**	Type of Content	Technology Type	Stressor	Receptor
Reviews of Power Supply and Environmental Energy Conversions for Artificial Upwelling	Zhang, D., et al.	April 2016	Journal Article	OTEC, Wave	N/A	Nearfield Habitat
A World First: Swansea Bay Tidal Lagoon in Review	Waters, S., Aggidis, G.	April 2016	Journal Article	Tidal	N/A	N/A
Underwater Noise Modelling for Environmental Impact Assessment	Farcas, A., Thompson, P., Merchant, N.	February 2016	Journal Article	Marine Energy general, Offshore Wind	Noise	N/A
Marine Fouling Assemblages on Offshore Gas Platforms in the Southern North Sea: Effects of Depth and Distance from Shore on Biodiversity	van der Stap, T., Coolen, J., Lindeboom, H.	January 2016	Journal Article	N/A	Static Device	Benthic Invertebrates
A Methodology for Multi-Criteria Design of Multi-Use Offshore Platforms for Marine Renewable Energy Harvesting	Zanutigh, B., et al.	January 2016	Journal Article	Marine Energy general, Offshore	N/A	Socio-economics

Access Tethys Knowledge Base



Ocean Energy Policies

→ OPERATING AGENT: SEAI (Ireland)

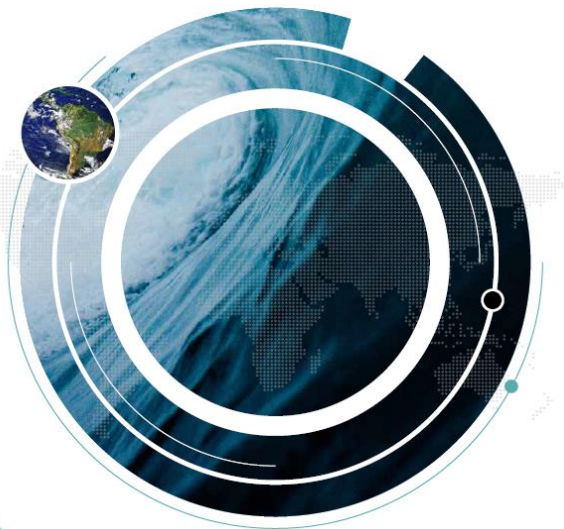
TABLE 1: POLICY SUPPORT MECHANISMS

NATIONAL STRATEGY				MARKET INCENTIVES					FINANCING			
Ocean energy targets	Roadmap for ocean energy	Detailed resource assessment	Marine spatial plan	Feed-in tariff or Premium	ROC	Tradable green certificates	RE portfolio standard	Open sea testing centers	Streamlined licencing regime	Fundamental R&D	Protype testing	Testing centers

	NATIONAL STRATEGY				MARKET INCENTIVES					FINANCING			
	Ocean energy targets	Roadmap for ocean energy	Detailed resource assessment	Marine spatial plan	Feed-in tariff or Premium	ROC	Tradable green certificates	RE portfolio standard	Open sea testing centers	Streamlined licencing regime	Fundamental R&D	Protype testing	Testing centers
Australia			x	x							x	x	
Belgium			x	x			x		x	x	x	x	
Canada	x	x	x	x	x				x	x	x	x	x
China	x	x	x	x				UD			x	x	x
Denmark		x			x				x	x	x		
European Union		x									x	x	x
France	x		x	UD	x			x	UD		x	x	x
Germany			x	x						x	x		
India			x								x	x	
Ireland	x	x	x	UD	x			x	UD		x	x	x
Italy	x				x						x	x	x
Japan		x	x						x		x	x	x
Korea	x	x	x				x	x	UD		x	x	
Mexico							x				x		
Netherlands			UD						x				
Monaco				x						x			
Norway				x			x	x			x		
New Zealand			x	x					UD				
Nigeria			UD										
Portugal	x			x					UD	x	x	x	
Singapore									UD		x	x	x
South Africa			UD										
Spain	x		x						x	UD	x	x	x
Sweden			UD	UD			x	x			x	x	
United Kingdom	x		x	x	x	x			x	x	x	x	x
USA			x	x					x	UD	x	x	x

NATIONAL STRATEGIES FOR OCEAN ENERGY

- Depending on their TRL, developers might benefit from differentiated incentive programs and market pull options



Stage Gate Metrics on Ocean Energy

→ OPERATING AGENT: European Commission

OBJECTIVES:

Ongoing need to develop a process for defining appropriate and rigorous metrics for measuring success in a number of critical target areas of ocean energy technology development.

To build clarity, information and understanding to support the definition of a fully defined set of metrics and success thresholds.

To establish a common international stage gate metrics framework to be used by technology developers, investors and funders.

Internationally accepted approach

BENEFITS

Ability to measure technology development progress

Methodology to assist in the management of competitive calls

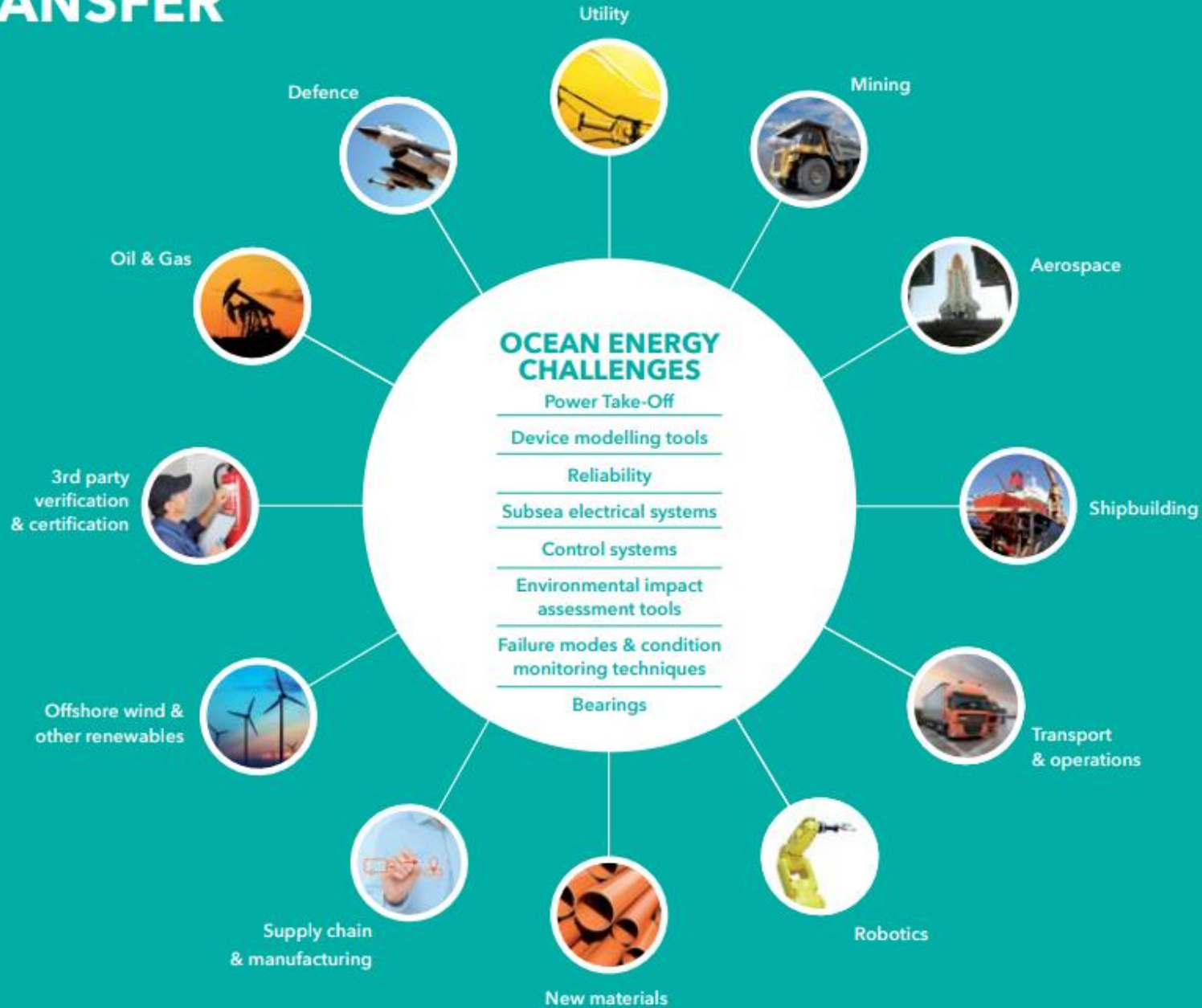
Approach for ensuring appropriate allocation of funding

To aid in building technology confidence in investors

Ability to make cross technology funding comparisons

Decision making assistance for private and public funders

TECHNOLOGY TRANSFER



ANALYSIS performed in:

OES OCEAN ENERGY SYSTEMS **iea** Energy Technology Network

AN INTERNATIONAL VISION FOR OCEAN ENERGY 2017

INDUSTRIAL GOAL
By 2050, ocean energy has the potential to have deployed over 300 GW of installed capacity.

SOCIETAL GOAL
By 2050, ocean energy has the potential to have created 680,000 direct jobs and saved 500 million tonnes of CO₂ emissions.

International Levelised Cost of Energy for Ocean Energy Technologies

→ OPERATING AGENT: The University of Edinburgh (UK)

ACHIEVEMENTS

Through investigation of LCOE for wave, tidal and OTEC technologies; consistent methodology applied

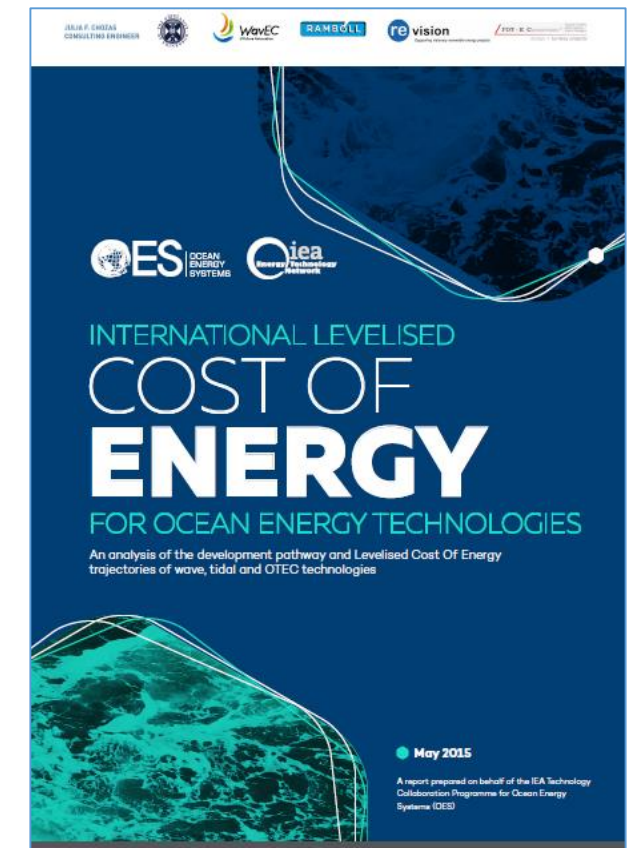
Cost reduction trajectories on an international level

Industry consultation - development of revised cost models

High costs intrinsic to the early stage development of technology

Cost reduction trends: clear trajectory towards a more affordable LCOE

Costs in the long-term are expected to decrease from the first commercial project level as experience is gained with deployment



THANK YOU



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