

The European Commission's science and knowledge service

Joint Research Centre



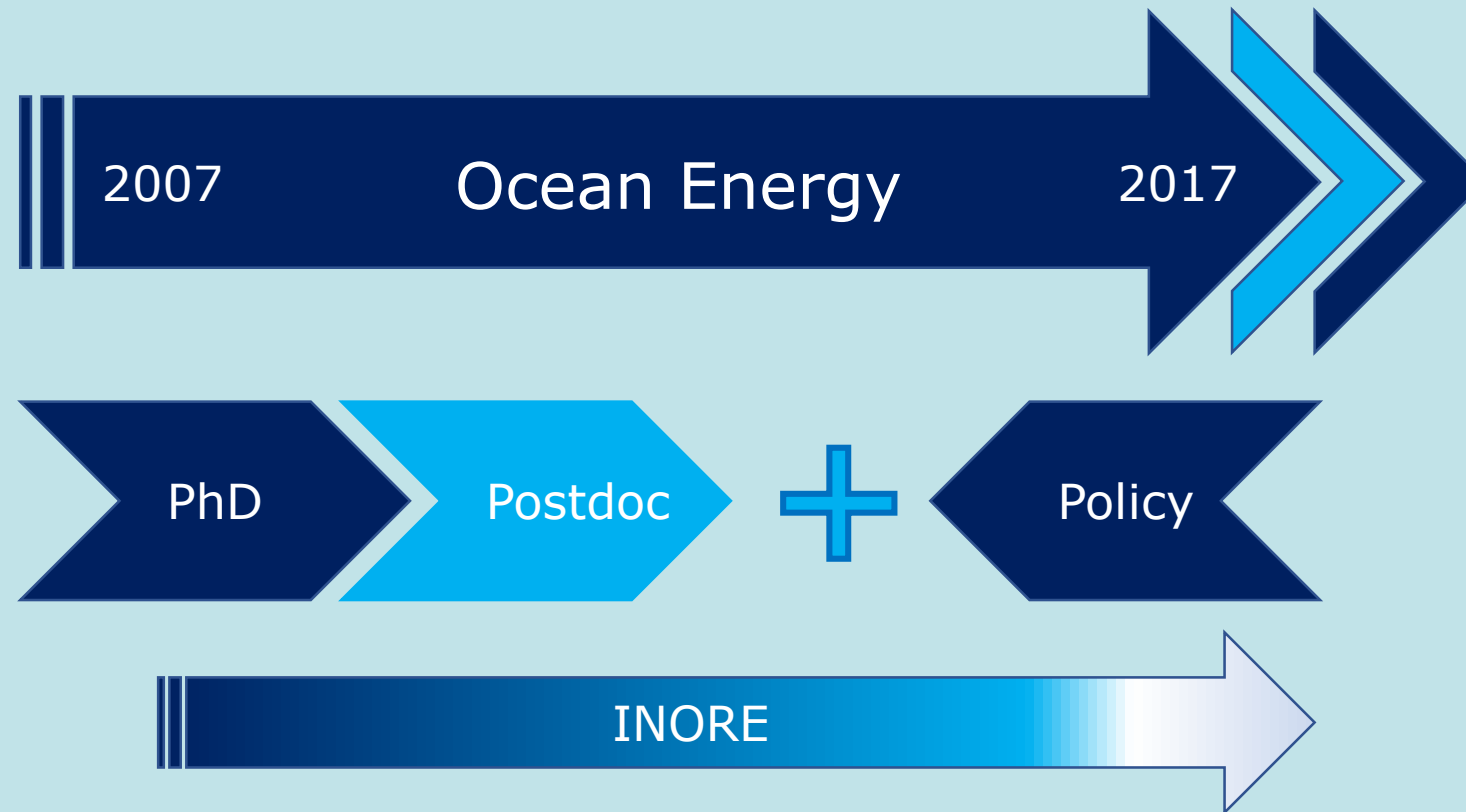
European
Commission

Ocean energy research. Navigating through the policy and networking sea

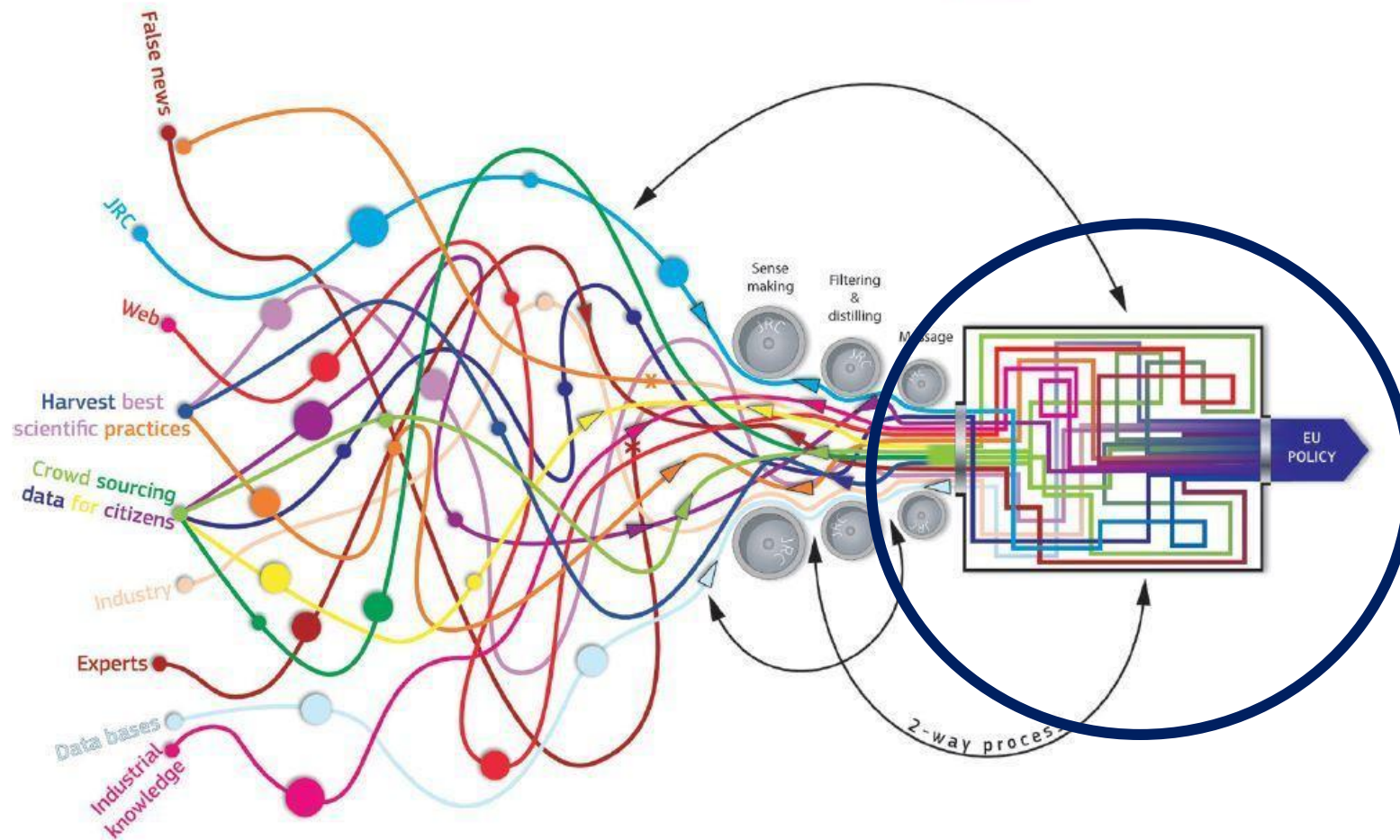
Davide Magagna

27 November 2017 – TUDelft

Outline



Policy outlook



Ocean Energy an emerging sector

Targets (installed WEC capacity) by 2020:



500 MWe ► €1.75bn in sales



1360 MWe ► €4.76bn in sales

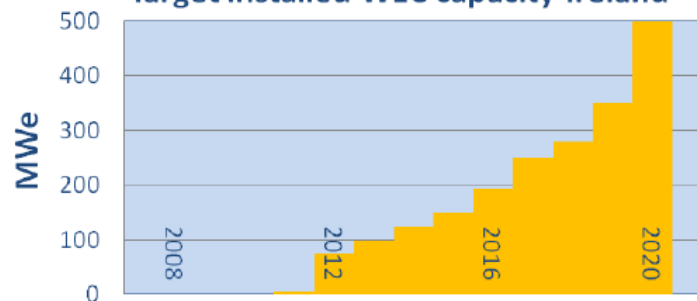


1500 MWe ► €5.25bn in sales



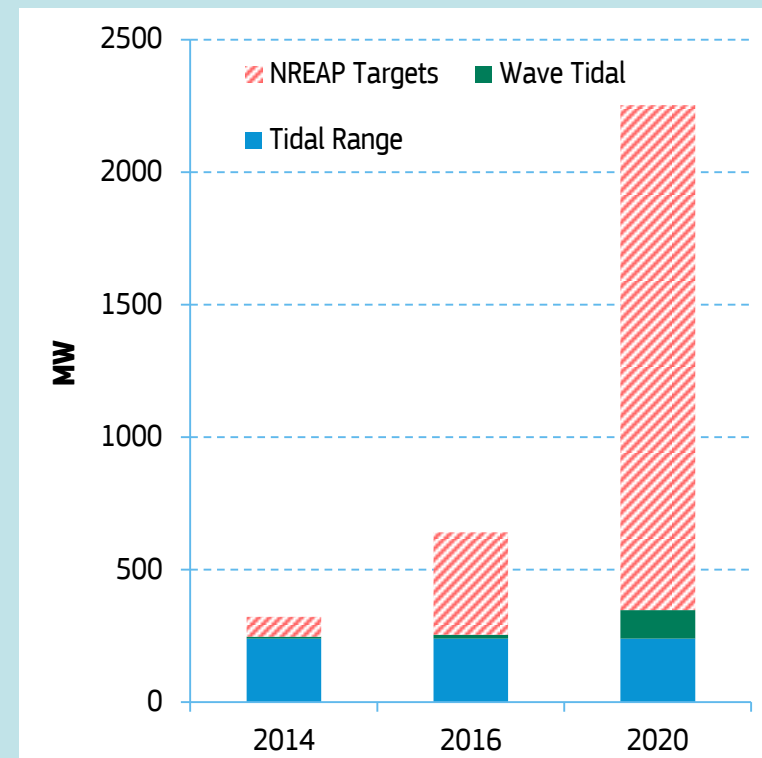
500 MWe ► €1.75bn in sales

Target installed WEC capacity Ireland



2008

Wavebob presentation in 08



2017

JRC Ocean Energy Status Report

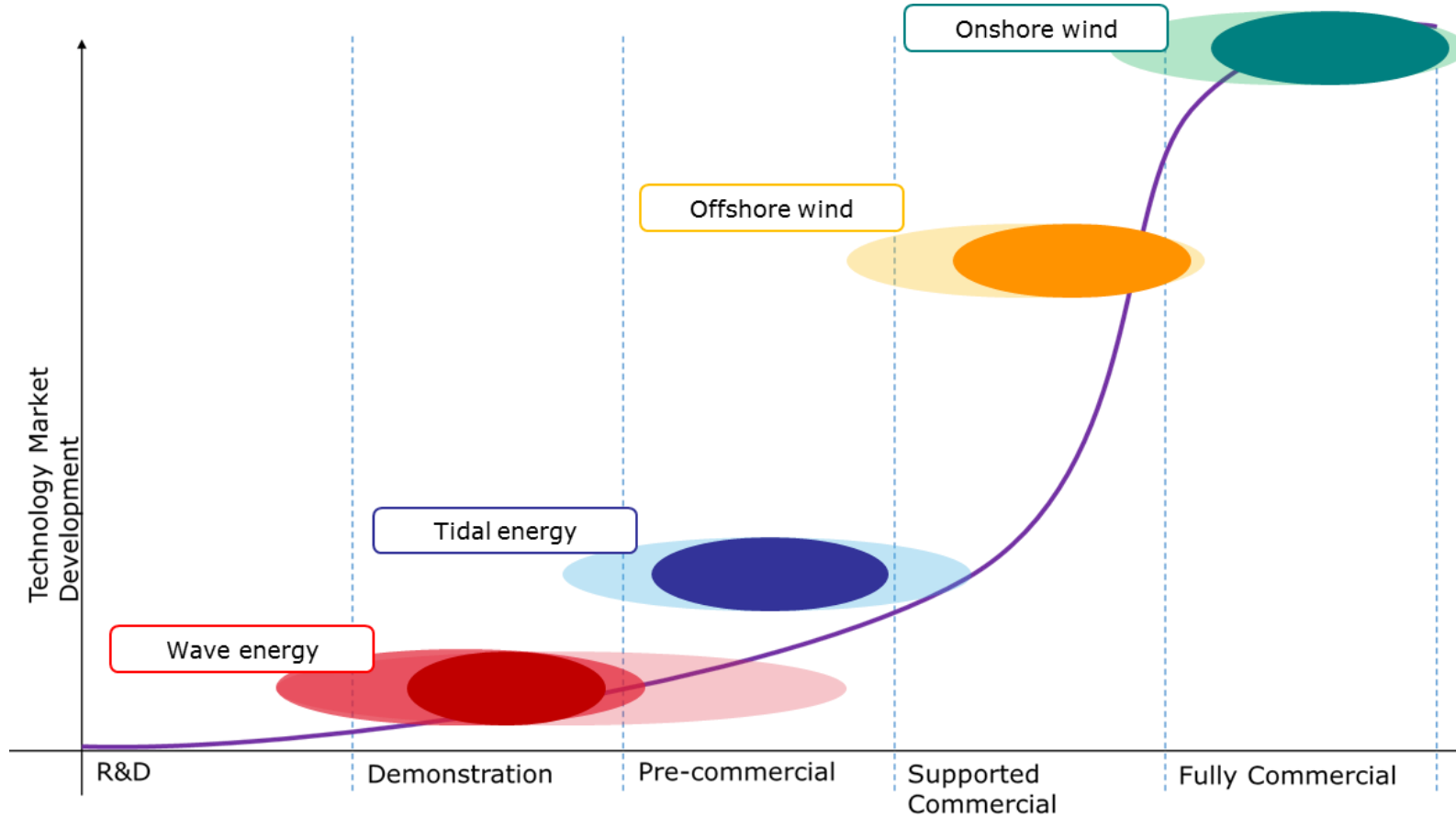


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Ocean Energy 10 years apart



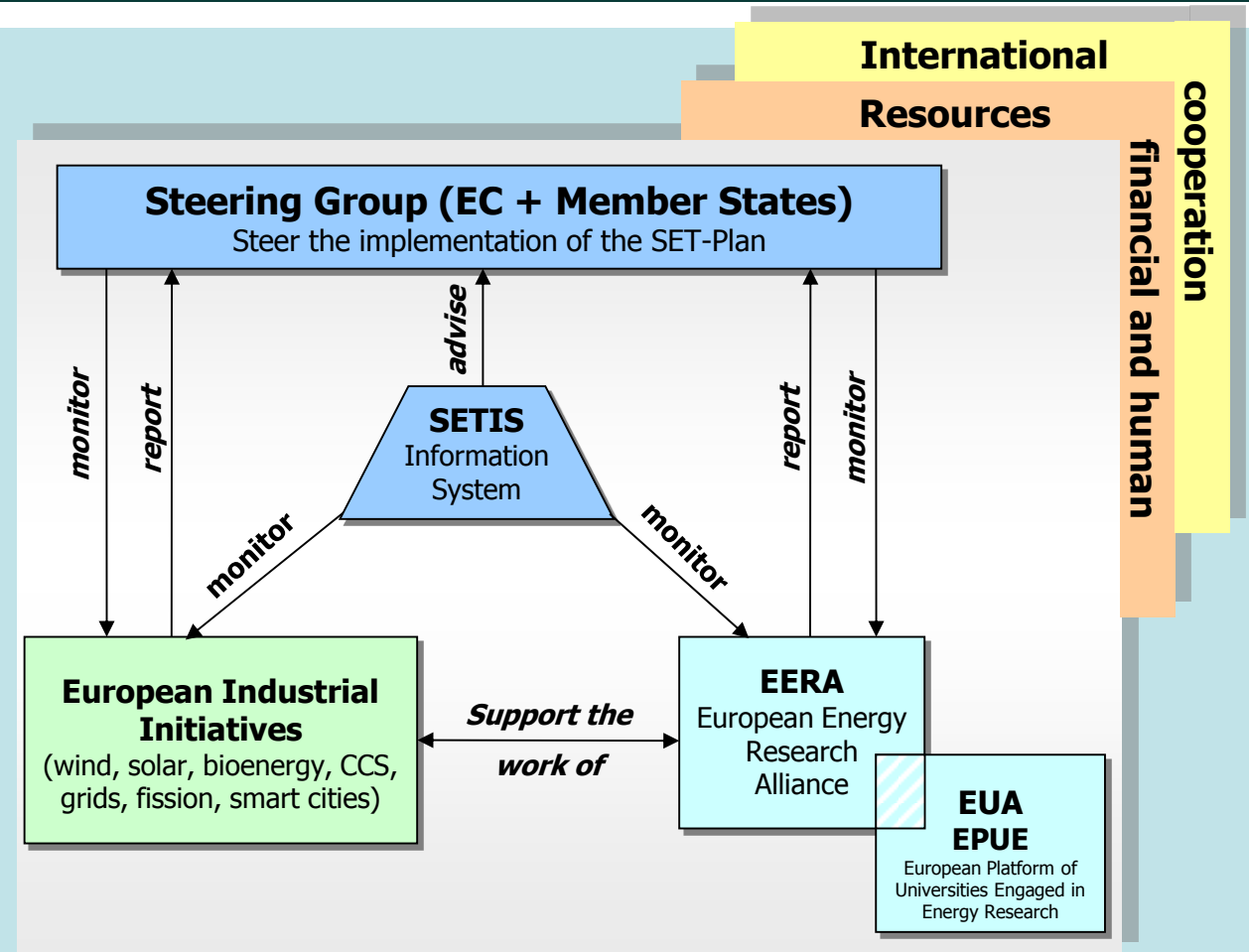
State of play of the sector



European policy: SET-Plan

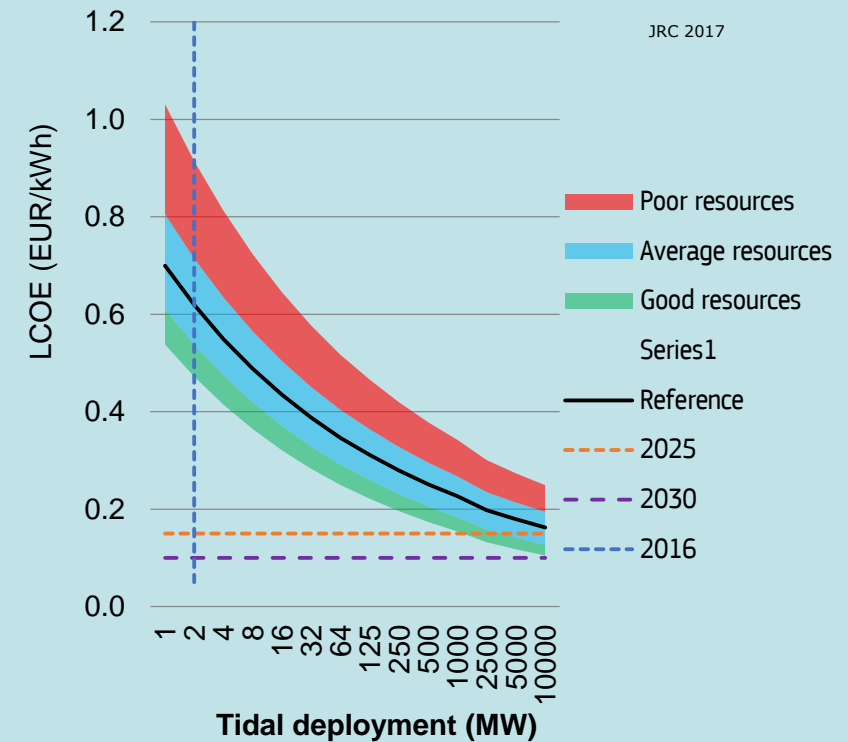
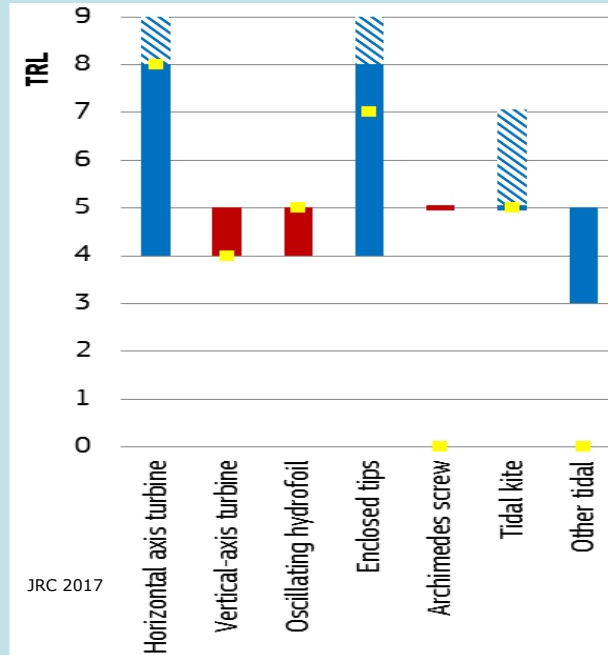
- Identify energy technology and RD&D objectives
- Effectiveness of SET-Plan in meeting EU energy and climate change goals
- EU no 1 in Renewable
- Development of cost competitive ocean energy technologies with high market potential for Europe:

- Tidal stream 15ct€/kWh by 2025
10ct€/kWh by 2030
- Wave energy 15ct€/kWh by 2030
10ct€/kWh by 2035



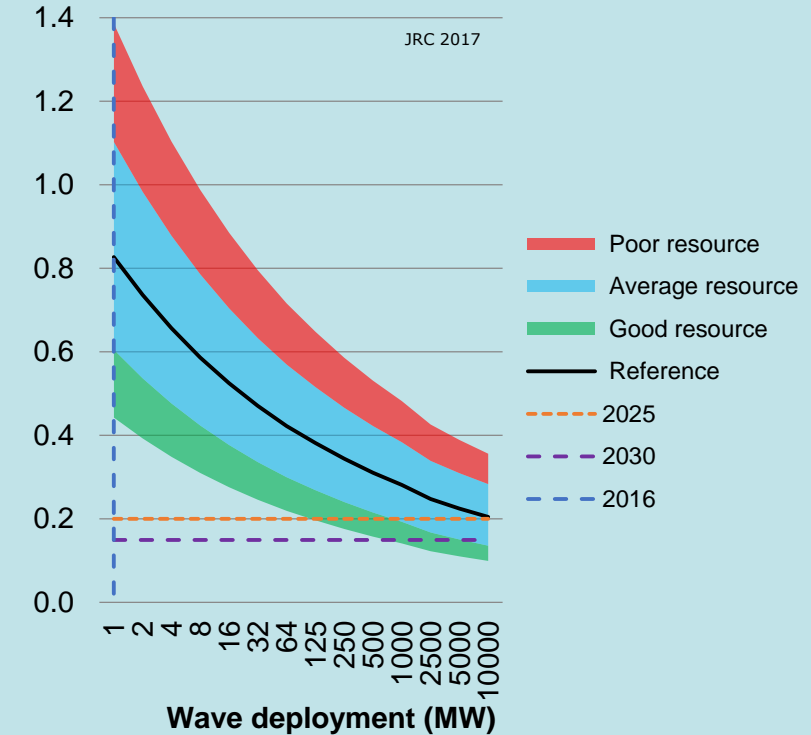
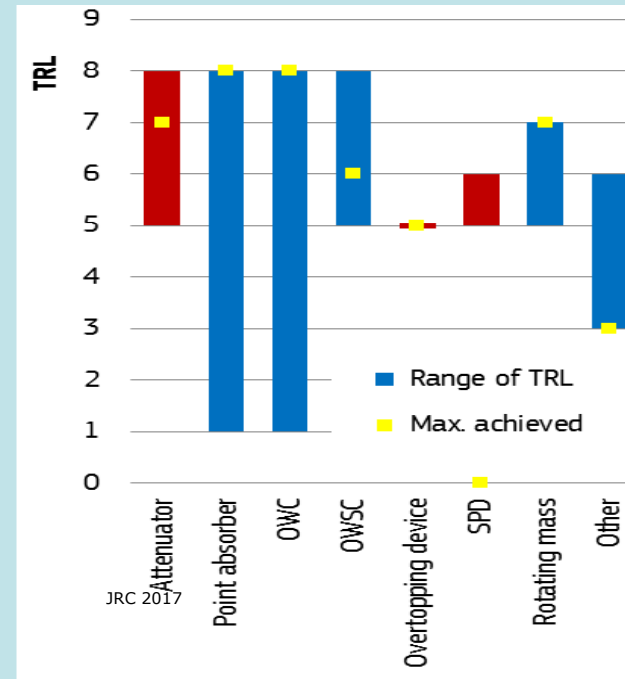
State of play of the sector – Tidal Energy

KPI	2025 AIM	Tidal Energy
LCOE	15-20 cEUR/kWh	54-71 ●
Availability	>85%	75-95 ●
Capacity factor	>25%	20-36 ●
Array demo	>10 MW installed	10 MW demo ●



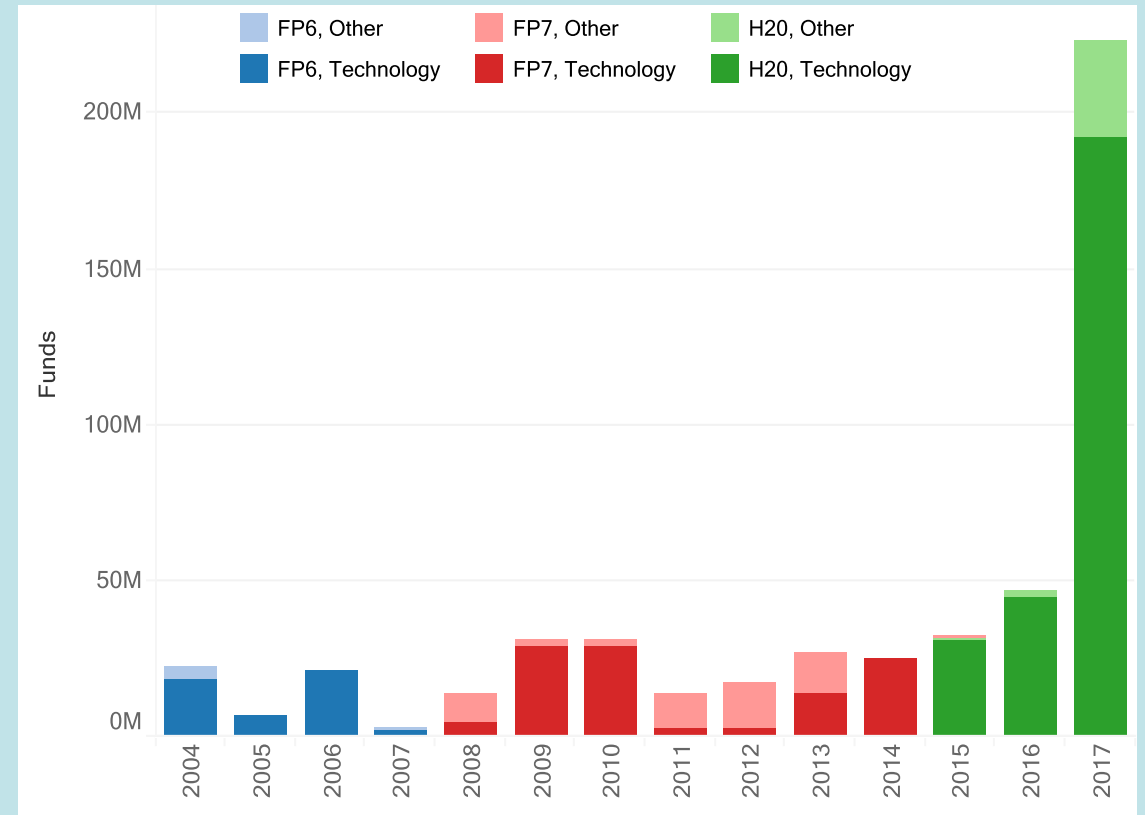
State of play of the sector – Wave Energy

KPI	2025 AIM	Wave Energy
LCOE	15-20 cEUR/kWh	60-110 ●
Availability	>85%	65-80 ●
Capacity factor	>25%	22-33 ●
Array demo	>10 MW installed	Single Units ●



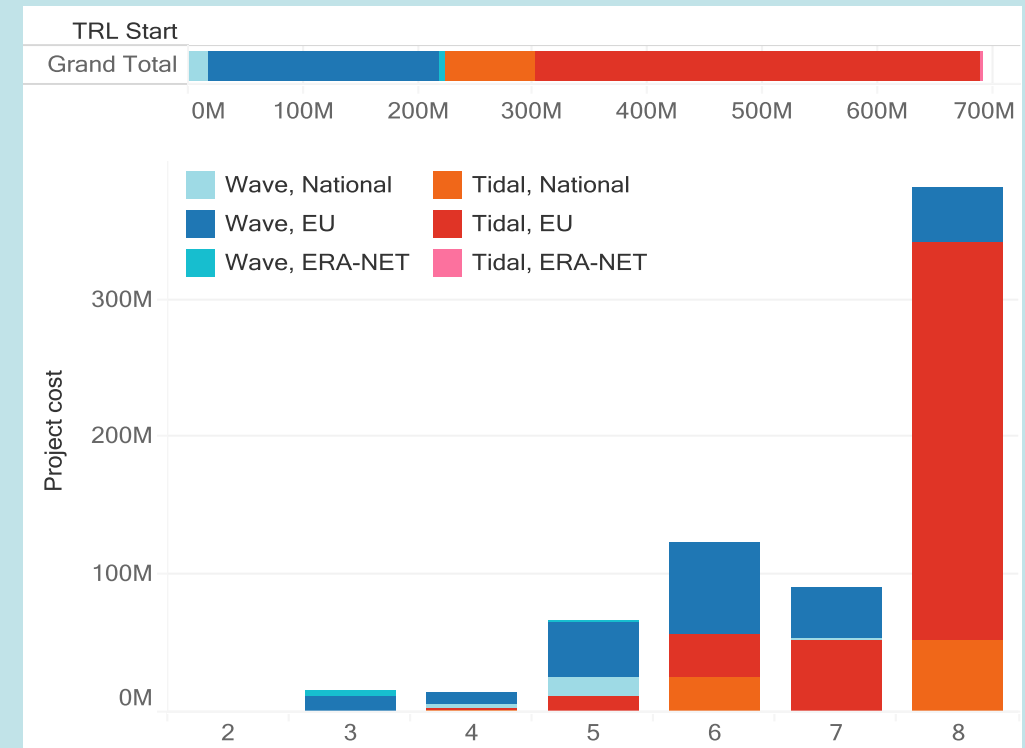
EU Support

- 516 m EUR have been awarded to R&D projects on ocean energy technologies
- 345 m EUR directed to the development of ocean energy technologies
 - development of prototypes, for single device demonstration or supporting the deployment of first-of-a-kind ocean energy farms
- EU funds are collaborative



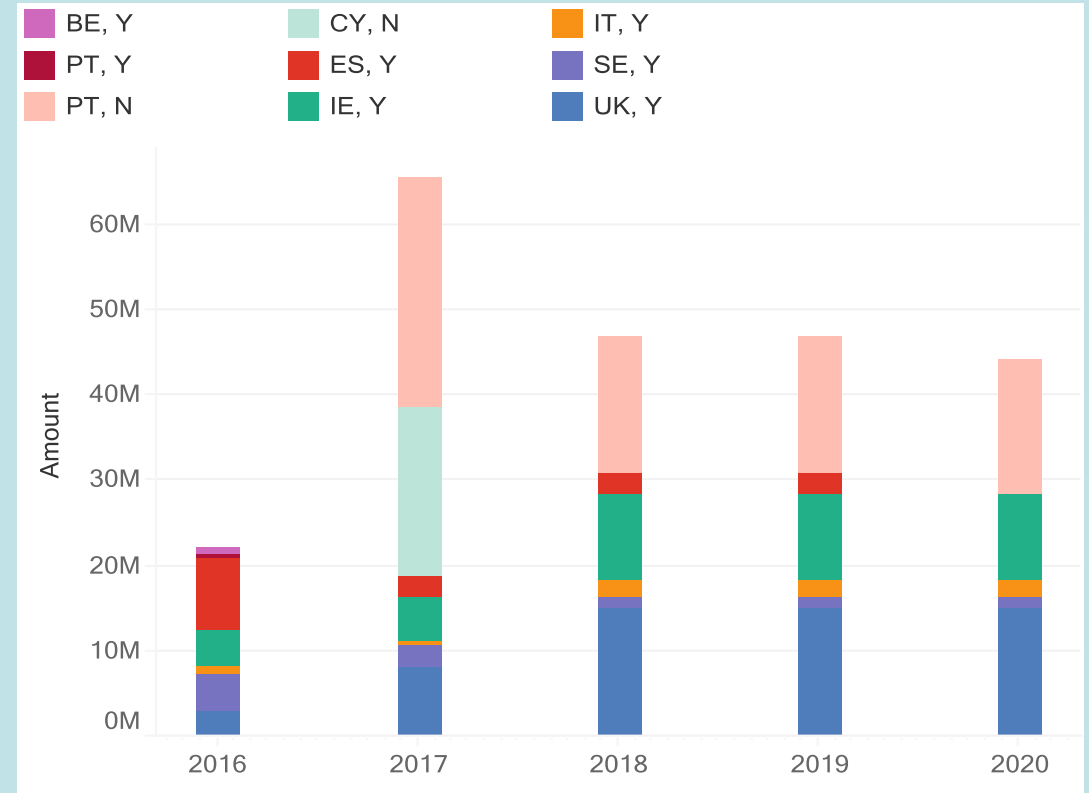
EU Support

- Including national support 690 m EUR have been committed to ocean energy technology development
- 223 m EUR have been directed to Wave energy R&D,
- 470 m EUR to tidal energy R&D
- United States Department of Energy has provided \$327 million in funds to ocean energy, \$251 million wave energy R&D
- Tidal support for higher TRL

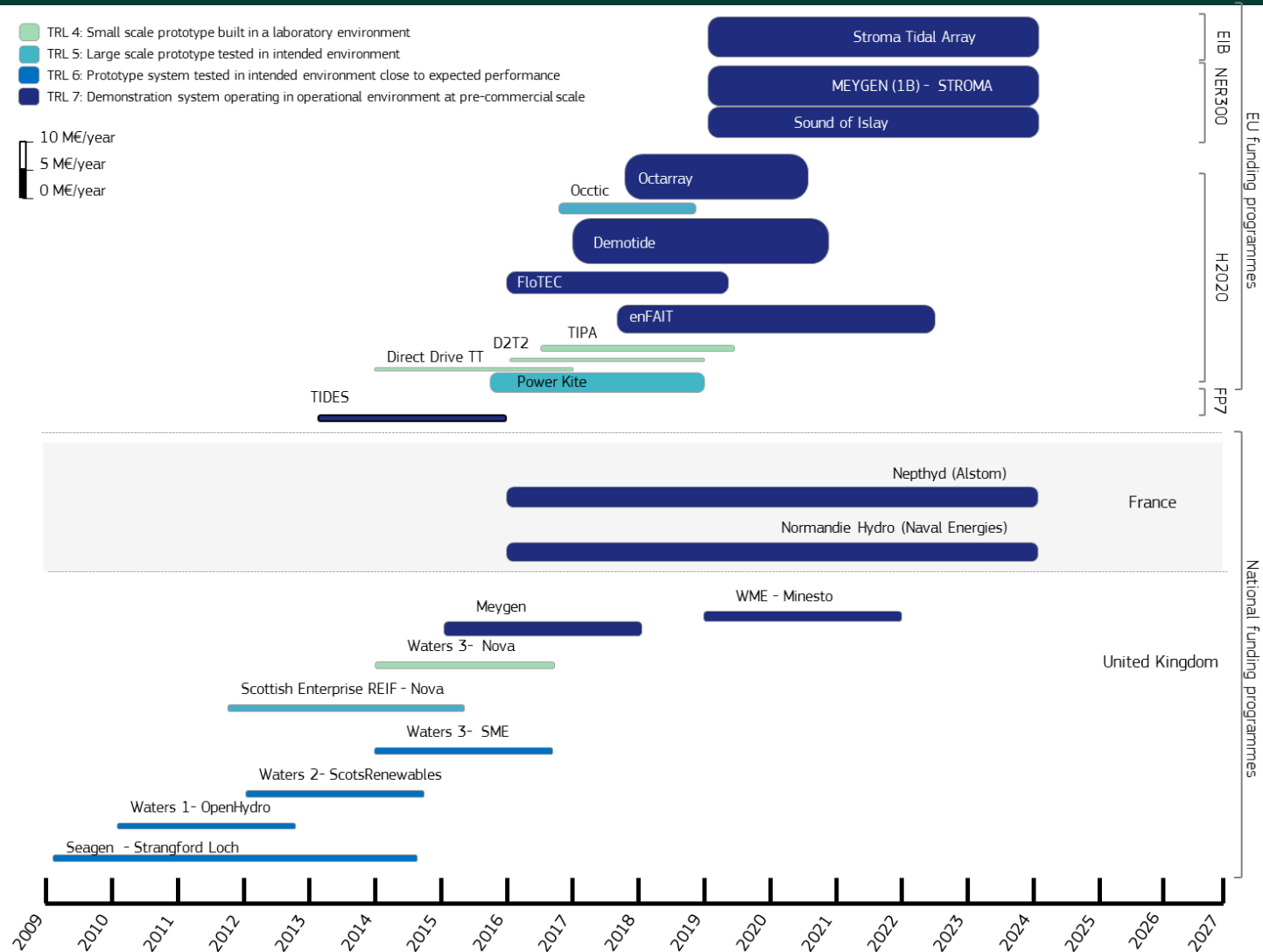


National Support

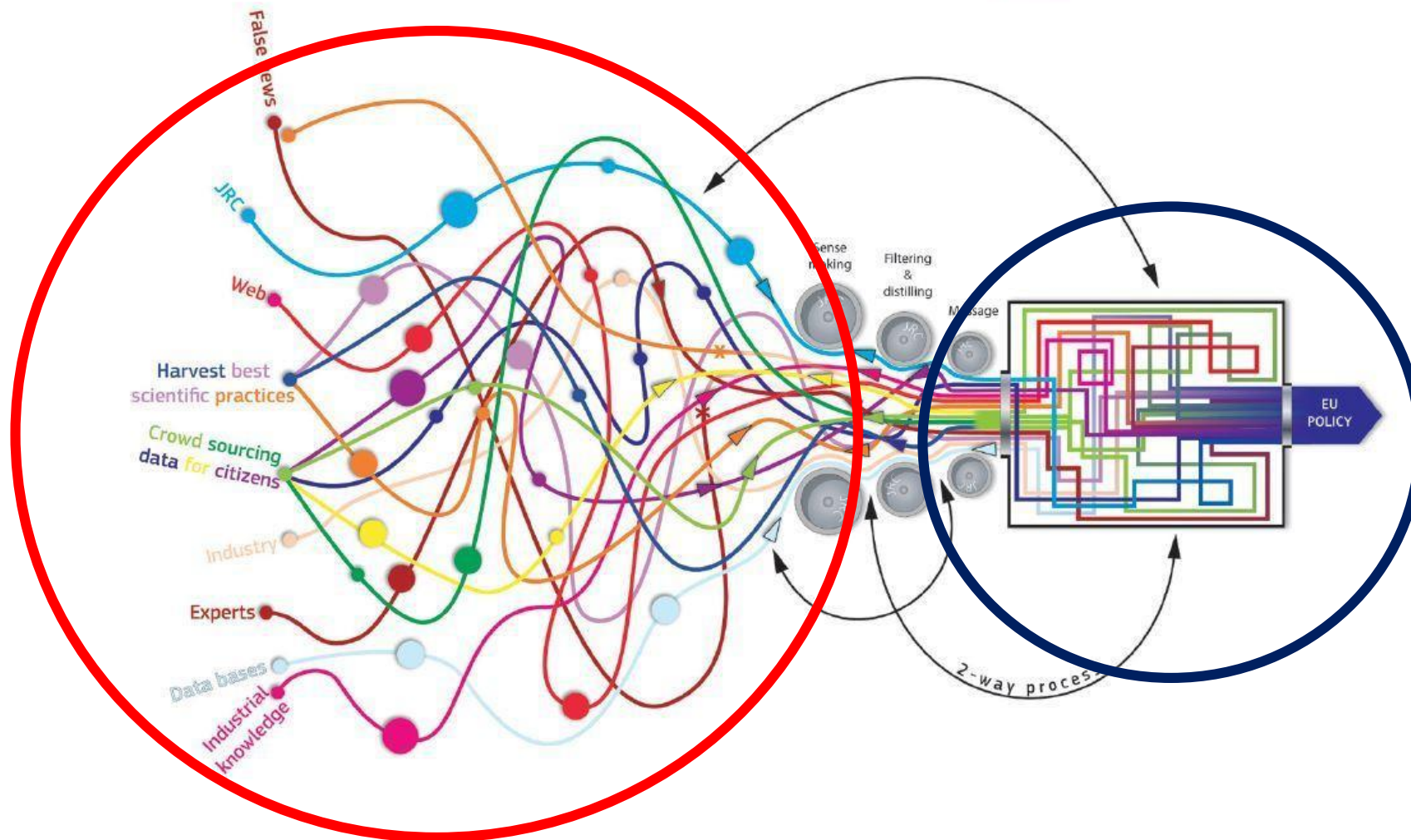
- 10 countries are part of the SET-Plan
- 200 m EUR to support ocean energy up to 2020
- Involved countries have specific support for ocean energy
- Other countries such as France has support in place for tidal arrays and FiT



EU Support



What about R&D?



What about R&D?

COLLABORATION

Technology
Development

R&D for early stage technology

Energy yield optimisation

Reliability

Costs reduction

PTO

Moorings

Gap analysis
Workshops

H2020
Calls

Deployment and Risk
Reduction

Initial array deployment

Proof of value, identification of cost
reduction pathways and stimulus for
RD&D 4

Large arrays

Demonstration for new technologies

Reduction of OPEX / CAPEX

Harsh Environments

Supply chain and manufacturing
pulling

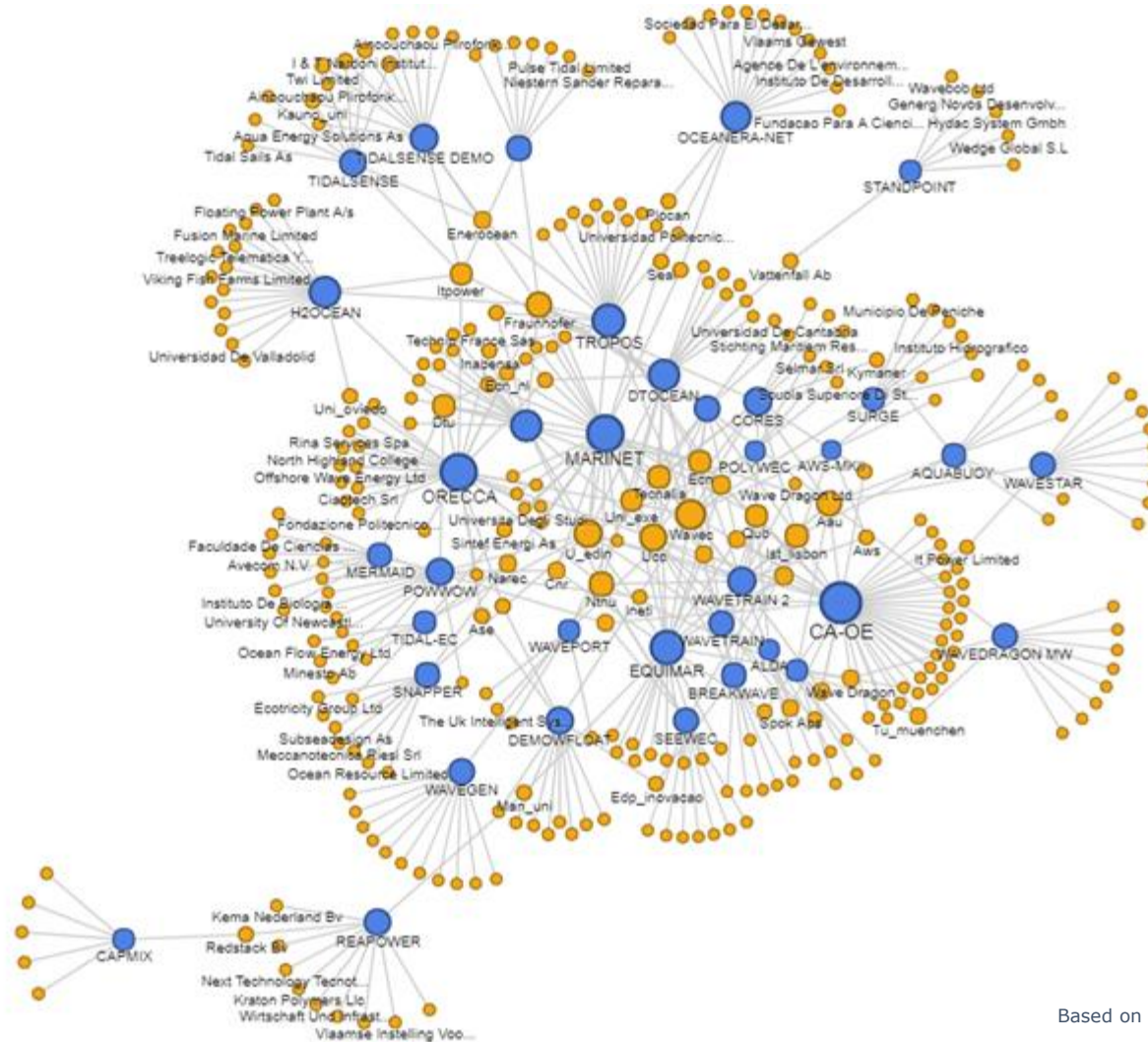
Resource (modelling)

Socio-Economics

Environmental monitoring

Cross-sector contamination

Interacting actors



Based on FP6/FP7



What is INORE

An international association of early-stage researchers:

- **PhD and Masters students**
- **Postdocs**
- **Professionals just starting their career**

Working in offshore renewable energy :

- **Fixed and Floating Offshore Wind**
- **Wave Energy**
- **Tidal Energy**
- **Thermal Energy**



A bit of history

Founded in 2006 in Norway by a group of PhD students

First committee meeting in 2007, participants of 4 countries

February 2014: Established head office in the UK (Plymouth)

Since 2015 INORE is a non-profit association (Limited by Guarantee Company)

1425 members from 76 countries

Mission: **Advance education and share knowledge**

Organized by volunteers and funded by sponsors





Community

International & interdisciplinary

1400+ members

75+ countries

all aspects of ORE



Databases

Well connected

www.INORE.org

researchers and research

INORE



Activities

Fun, friendly and informal

Symposia

Workshops

BECS Scholarships

Networking



INORE committee

Caitlyn Clark – Chair

Hanna Torrens-Spence – Vice-chair

Simon Burmester – Secretary

Chris Sharp & Francois-Xavier Fay – Web Manager

Mojtaba Kamarlouei – Sponsorship Coordinator

Owain Roberts – Finance Manager

Loup Suja-Thauvin & Anke Bender – Outreach Coordinator

Aisha McKee – Event Coordinator

- **Nicolas Tomey Bozo – Event Coordinator – European Symposium**
- **Christine Hirt – Event Coordinator – North American Symposium**



Knowledge exchange



Learning from what others are doing and how this can impact your own work

Training



Hands on collaboration with experts on key issues

Possibility



Funds to support collaboration studies / ways to interact in the future

Blue Energy Scholarships



The scholarships are sponsored by Ocean Energy Systems (OES)

- Initiative is aimed to:
 - Enable collaborative research work among different INOREans.
 - Facilitate access to research facilities available in a lab.
 - Motivate the publication of the collaborative research work in scientific papers.
 - Amount of scholarship: up to 1000 EUR
- Eligibility conditions:
 - At least 2 INOREans coming from 2 different research institutions.
 - The members of the team have to be part of research institutions of different countries
 - To produce a scientific publication in a journal or a conference.
- More info: www.inore.org

What's next?

- Get involved with Inore
- Collaborate with people that are working on similar research
- Explore possibilities for training / learning/ improving



Inore Events

- Symposium

- North American 2018 – East Coast of USA
- European 2018

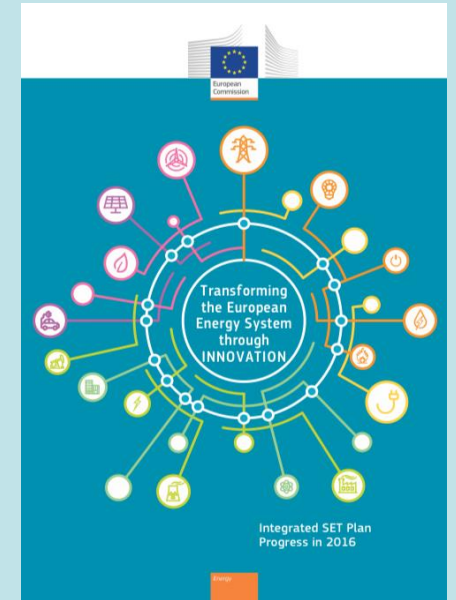
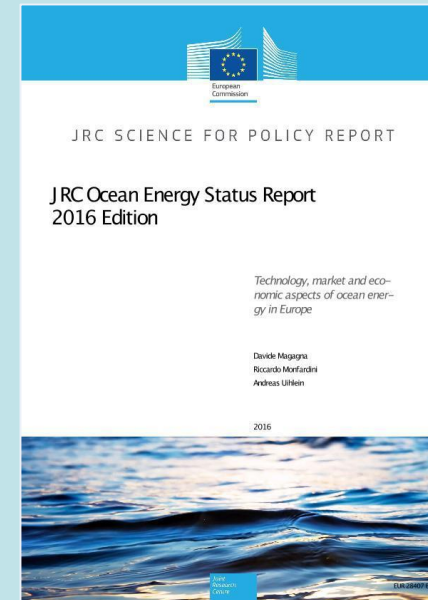
- Workshops

- MREC/METS, Washington D.C., May 2018
- ICOE, Normandy, June 2018
- AWTEC, Taiwan, September 2018



Summarising

- The ocean energy sector is on the right path, but the road is still very long
- Right now strong political commitment to support ocean energy
- F.O.A.K farms costly
- Collaboration is key to a successful ocean energy sector





Any questions?

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