

- 1. Introduction and Welcome:** *Gianmaria Sannino, IWG Chair and Head of Climate Laboratory, Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA)*
- 2. OceanSET second Annual Report findings:** *Patricia Comiskey, Ocean Energy Programme Manager Sustainable Energy Authority of Ireland (SEAI)*
- 3. 100MW of Ocean Energy in Europe by 2025:** *Matthijs Soede, Policy Officer, European Commission DG Research & Innovation, European Commission*
- 4. 2030 Vision: The Growth Pathway for Ocean Energy:** *Lotta Pirttimaa, Policy and Project Officer Ocean Energy Europe*
- 5. Q&A session**





1 | Welcome



Brussels, 15.9.2015
C(2015) 6317 final

COMMUNICATION FROM THE COMMISSION

Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation

Strategic Energy Technology (SET) Plan

EU Number 1 in renewable energy

1. Sustain technological leadership by developing highly performant renewable technologies and their integration in the EU's energy system.
2. Reduce the cost of key technologies.



SET Plan – Declaration of Intent
on Strategic Targets in the context of an
Initiative for Global Leadership in Ocean Energy

Purpose of this document

This document¹ is intended to record the agreement reached between representatives of the European Commission services, representatives of the EU Member States (Iceland, Norway, Turkey and Switzerland), and representatives of the SET-Plan stakeholders most directly involved in ocean energy², on the implementation of the actions contained in the SET-Plan Communication³, and specifically the strategic targets for the priority "Number 1 in renewable energy" for what concerns ocean energy.

Declaration of Intent for Ocean Energy

Levelized cost of energy targets:

| | Tidal Stream | Wave |
|------|--------------|------------|
| 2025 | ≤15 c€/kWh | ≤20 c€/kWh |
| 2030 | ≤10 c€/kWh | ≤15 c€/kWh |
| 2035 | | ≤10 c€/kWh |



SET-Plan

Ocean Energy - Implementation Plan

Final

21 March 2018

adopted by SET-plan steering committee

SET Plan

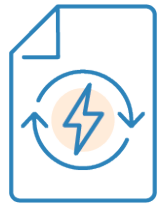
Ocean Energy Implementation Plan

11 technology development actions creating "a structured approach ... [for] a development path ... [to] a commercially viable wave and tidal industry".

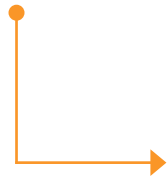


From the SET Plan to OceanSET

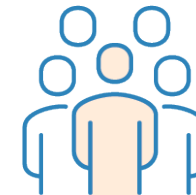
How it works



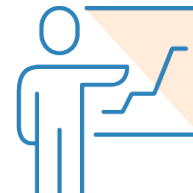
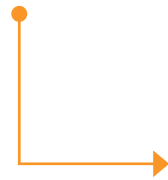
The **SET Plan** is the technology pillar of the EU's energy and climate policy



An **Implementation Plan** was developed for ocean energy actions in the SET Plan



The **Implementation Working Group** will deliver actions



OceanSET



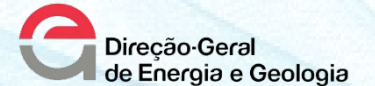
Overview of OceanSET

OceanSET aims to obtain a solid understanding of **evolution in the European ocean energy sector** in order to **optimally tailor future funding** for member states, regions and the European Commission.



OceanSET Report YEAR 2

26th of May 2021



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2 | OceanSET Progress to date

- The OceanSET project has the overall goal to support the realisation of the ocean energy SET Plan IP
- OceanSET is focusing on assessing the **progress of the Ocean Energy sector** and monitoring funded projects in delivering successful supports.
- Relevant data is being collected annually to inform MS and the EC on the progress of the sector.

| Work Package | Code | Leader |
|--|------|--------|
| Ethics requirements | WP1 | SEAI |
| Mapping & Analysis | WP2 | SEAI |
| Finance | WP3 | WES |
| Pre-Commercial Procurement Programme Development | WP4 | WES |
| Monitoring & Review | WP5 | DGEG |
| Communication & Dissemination | WP6 | FEM |
| Management | WP7 | SEAI |



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An annual process comprising 4 key stages:



- To **gather information** on the ocean energy sector across Europe
- To **compile and analyse** the data collected from stakeholders and to conduct a gap analysis
- To **assess the progress** of the ocean energy sector by tracking key metrics and to consider other factors (identification of best practices, state-of-the-art...)
- To **provide recommendations** on the next steps required to progress the implementation of the SET Plan and suggest approaches to stimulate industry and research progress in key priority areas

4 types of information aligned with the requirements of the Implementation Plan



General

Policy
Revenue support



Technical

Technology deployment
Supply chain
LCOE analysis



Financial

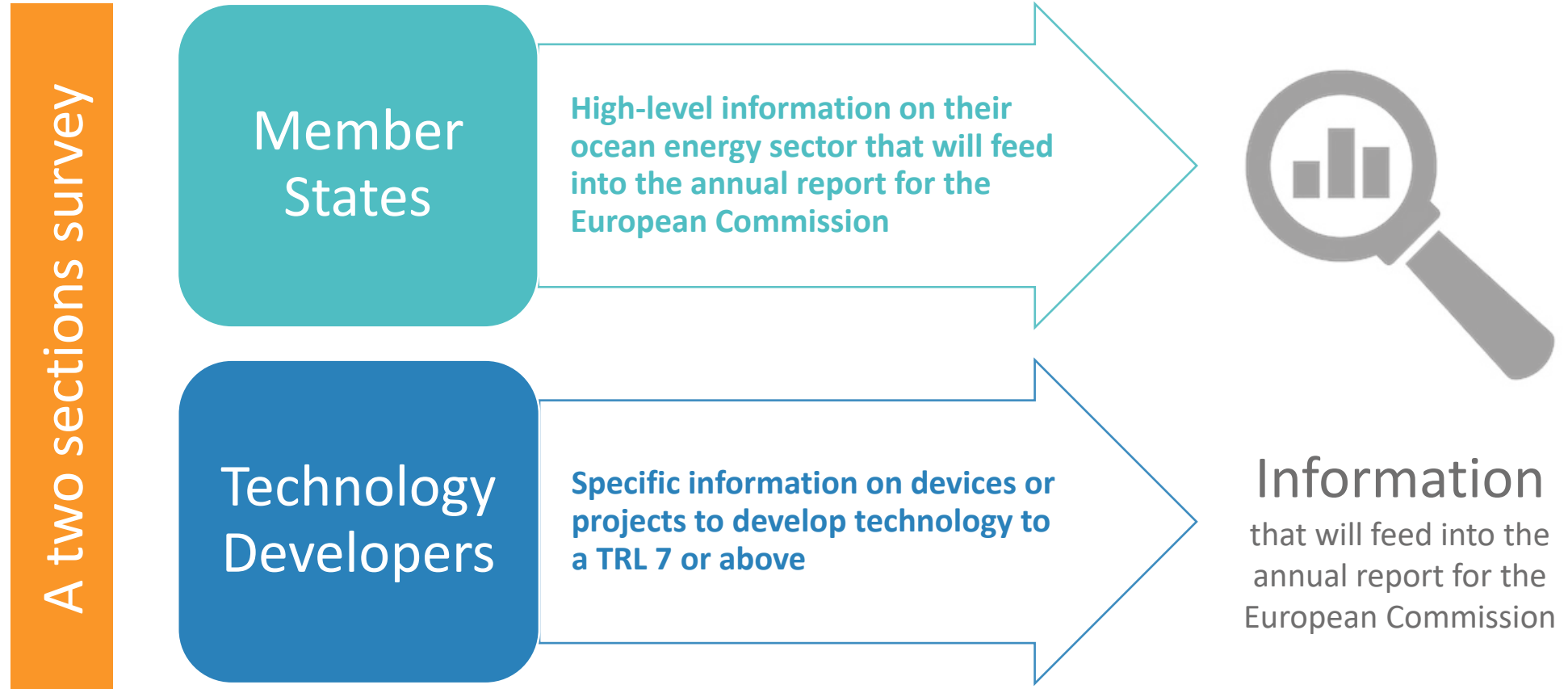
Pre-commercial
procurement



Environmental

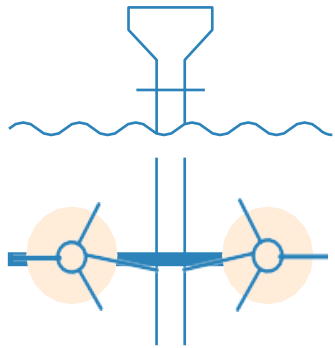
Measures for
consenting

What targets for such a survey?



Summary of Results

Annual report key findings – 2019

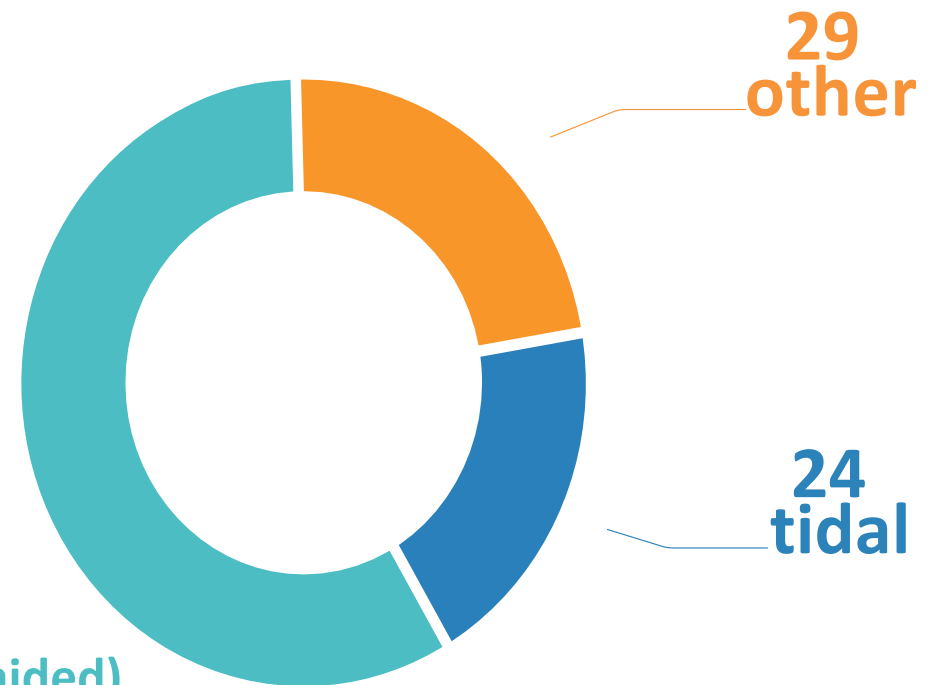


A total of

127

ocean energy projects supported

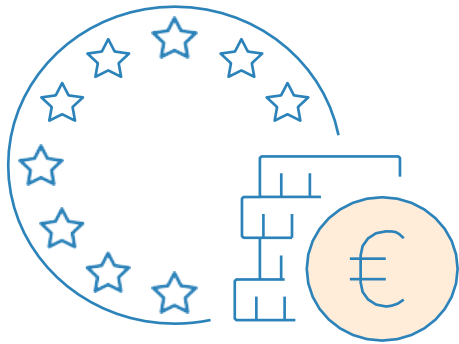
74
wave



- 16 projects EU Funded (€115M total value; €83M grant aided)
- 11 Projects were ERANET with 26 partners
- Strong collaboration being built in the sector

Summary of Results

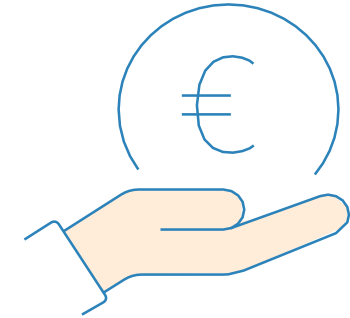
Annual report key findings – 2019



€42.7

million in public funding from member states and regions

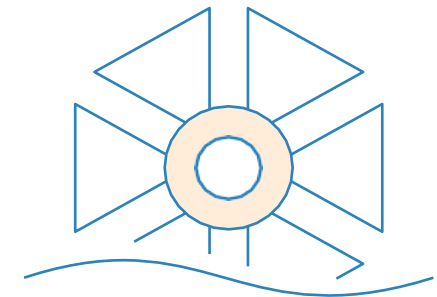
8 member states have an **ocean energy budget**



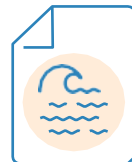
10 member states have **test site facilities**

10 member states

were **funding ocean energy projects** and **9** were funding TRL 7+



9 member states have an **ocean energy policy**



Summary of Results

Ocean energy projects survey

Member states reported 25 projects over TRL 7 active in 2019. Developers reported target values from a selection of projects.



11 tidal projects

- > Mainly horizontal axis turbines
- For 1 – 2 MW rated capacities:
 - > **67%** **average** annual availability for tidal prototypes
 - > **8.38** €/W average capital expenditure
 - > **1.08** €/W/year average operational expenditure



12 wave projects

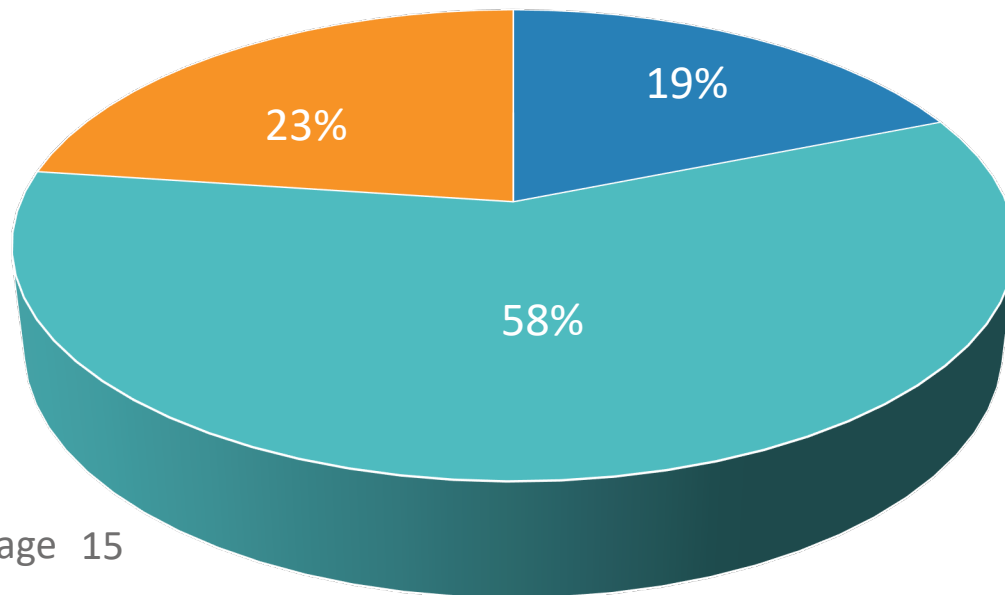
- No technology front runner
- > Technologies included attenuator, point absorber and oscillating wave surge converter
- For 0.15 – 1.15 MW rated capacities:
 - > **67%** **average** annual availability for wave prototypes
 - > **2.01** €/W average capital expenditure
 - > **0.32** €/W/year average operational expenditure

2 other projects

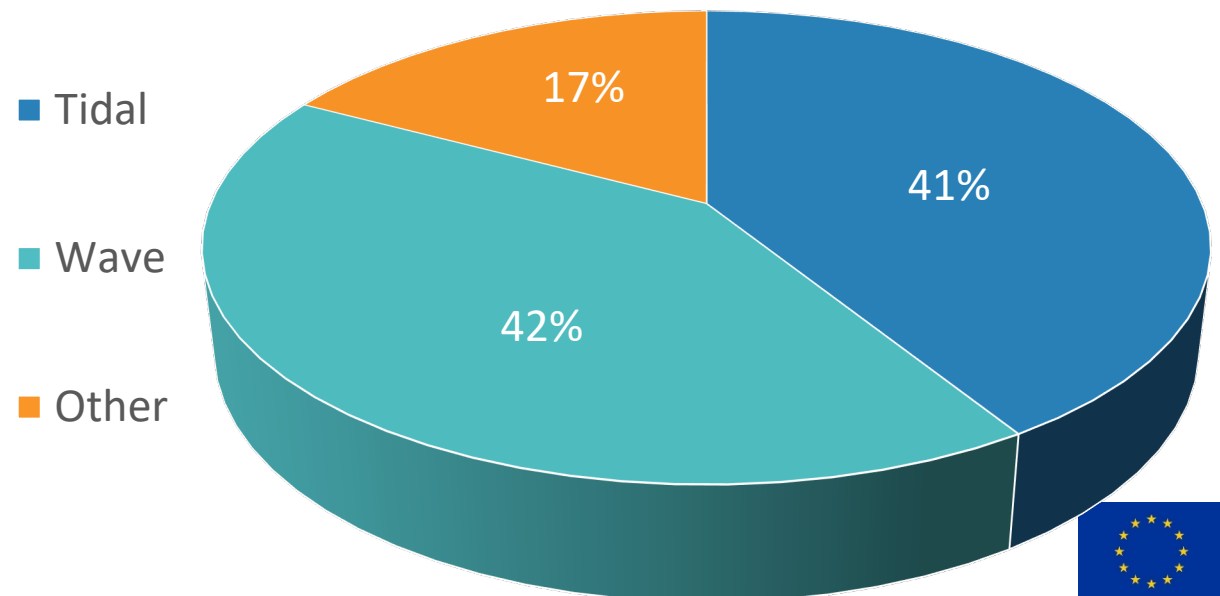
Results of Survey 2- 2019

| | TRL 1-6 | TRL 7+ | Unknown | Total |
|--------------|-----------|-----------|-----------|------------|
| Wave | 46 | 12 | 16 | 74 |
| Tidal | 5 | 11 | 8 | 24 |
| Other | 7 | 2 | 20 | 29 |
| Total | 58 | 25 | 44 | 127 |

Number of Projects



Value of Projects

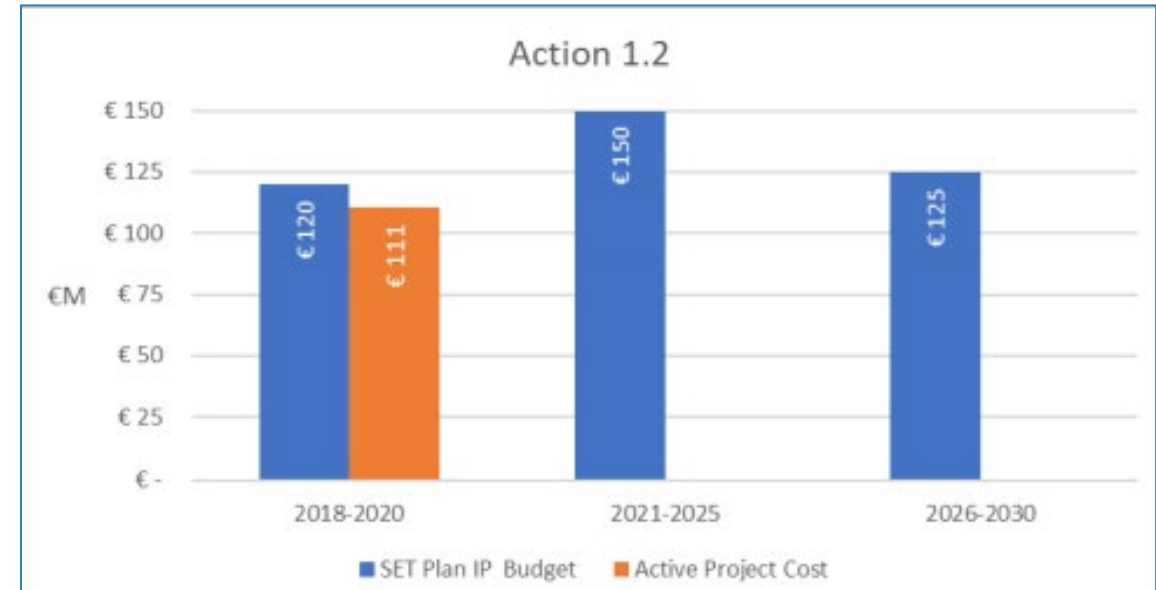
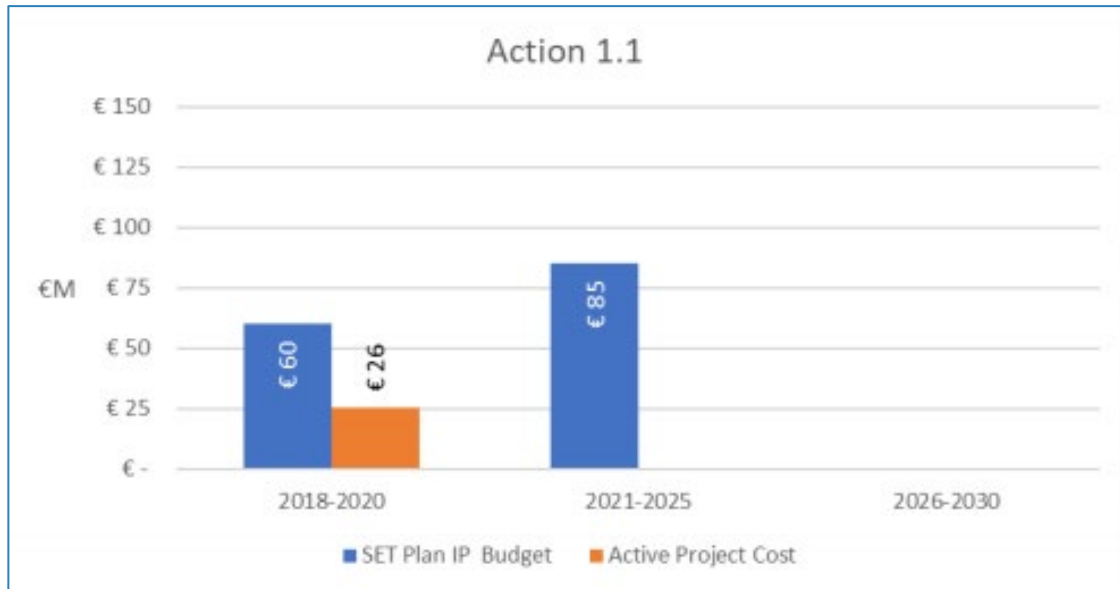


Results of Survey 2- 2019

| Action Title | Details | Proposed IP Funding | | |
|---|--|---------------------|---------------|-----------------------------|
| | | Period | Total | Discovery Phase (2018-2020) |
| 1.1: Tidal Energy technology device development and knowledge building up to TRL6 | Novel systems / sub components tidal technologies | 18-25 | €145M | €60M |
| 1.2: Tidal energy system (device and array) demonstrations and knowledge building in operational environment (TRL 7-9) | 3 x full scale device demonstrations 4 x 10MW arrays | 19-22 | €395M | €120M |
| | | 20-25 | | |
| 1.3: Wave energy - technology device development, including system demonstration and knowledge building (up to TRL6) | Novel sub systems / concepts wave technologies TRL4-6 | 18-30 | €222.5M | €60M |
| 1.4: Wave energy – device and array system demonstration at large scale device and early demonstration array scale and leading onto large scale deployment (TRL 7-9). | Full scale device demonstration Implementation of up to 4 arrays | 18-25 | €335M | €60M |
| | | 25-30 | | |
| 1.5: Installation, logistics and testing infrastructure as well as supply chain development for the wave and tidal sectors | Infrastructure to support ocean energy Supply chain development | 18-30 | €100M | ~€10M |
| 1.6: Development of stage gate metrics (technical standards and guidelines) for wave technology evaluation. | Definition and implementation of EU-wide agreed stage-gate metrics for wave energy | 18-19 | €6.5M | ~€1.5M |
| Total | | | €1204M | €311.5M |





Results of Survey 2- 2019

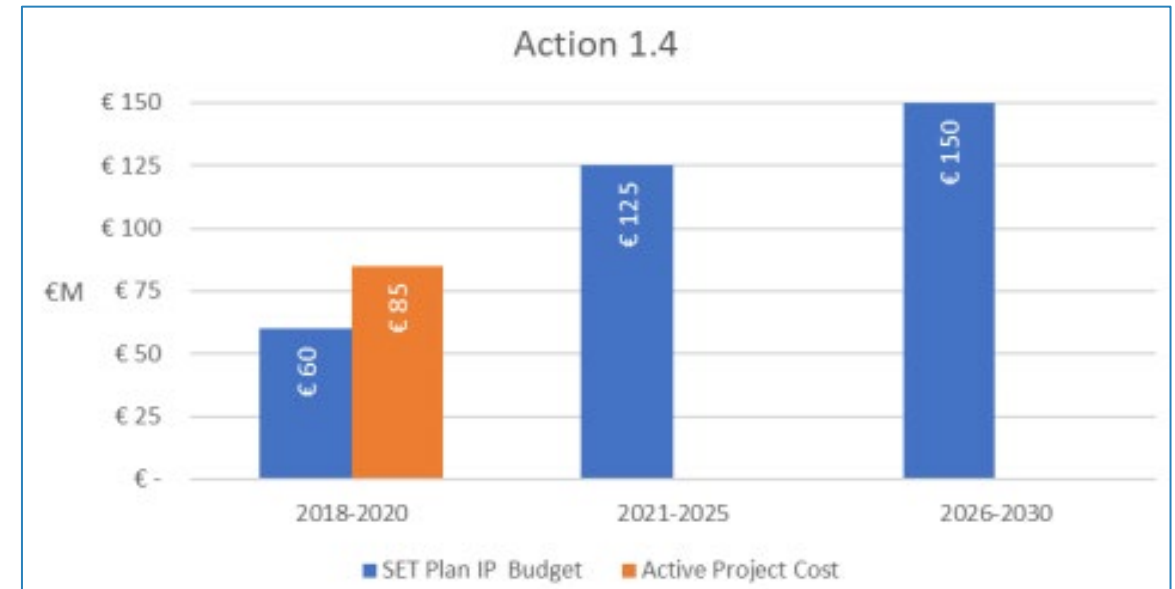
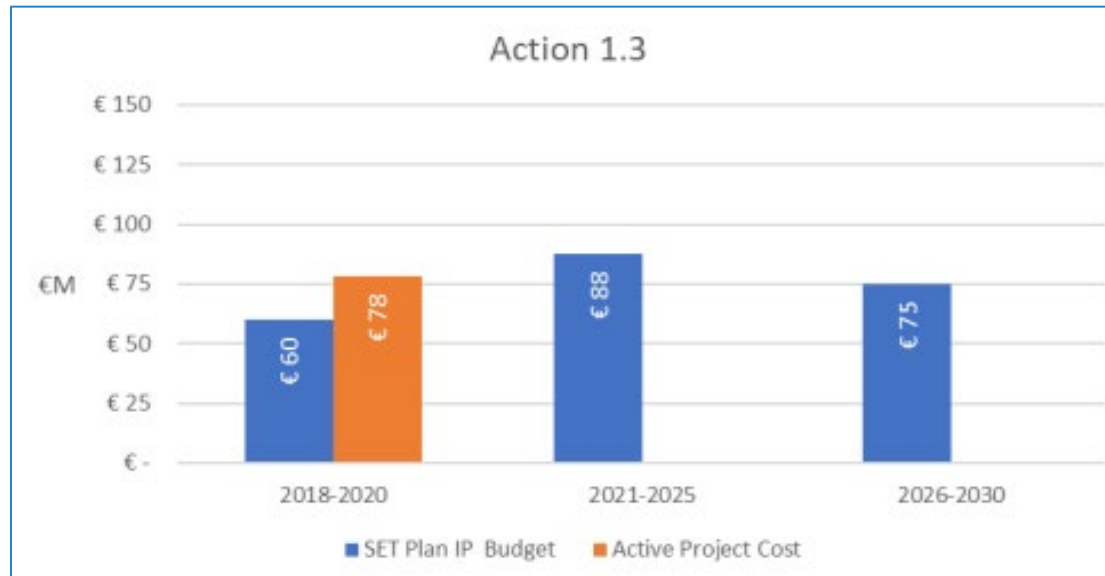


Action 1.1 Tidal Energy technology device development and knowledge building up to TRL 6

Action 1.2 Tidal energy system demonstration in operational environment (TRL 7-9)



-  Proposed budget in Implementation plan
-  Actual data from surveys

Results of Survey 2- 2019



Action 1.3 Wave energy technology development and demonstration up to TRL 6

Action 1.4 Wave energy system demonstration and deployment TRL 7-9

-  Proposed budget in Implementation plan
-  Actual data from surveys



SET Plan IP 11 Technology Development Actions are outlined below by using a traffic light system to identify the progress OceanSET has made during the first year of the discovery phase. This is a review of the progress OceanSET have made in mapping the Ocean Energy sector against these 11 actions, not of the fulfilment of these actions.

- Green: on track
- Orange: behind progress
- Red: no activity or progress

| Technical Actions | | Year 1 | Year 2 |
|-----------------------|--|--------|--------|
| 1.1 | Tidal Energy technology device development and knowledge building up to TRL 6 | Green | Green |
| 1.2 | Tidal energy system demonstration in operational environment (TRL 7-9) | Green | Green |
| 1.3 | Wave energy technology development and demonstration up to TRL 6 | Green | Green |
| 1.4 | Wave energy system demonstration and deployment TRL 7-9 | Green | Green |
| 1.5 | Installation, logistics and testing infrastructure [and] supply chain development. | Orange | Orange |
| 1.6 | Co-ordinate the development of standards and guidelines for technology evaluation and LCOE analysis. | Green | Green |
| Finance Actions | | | |
| 2.1 | Creation of an investment fund for Ocean Energy farms | Red | Red |
| 2.2 | Creation of an EU insurance and guarantee fund to underwrite project risks. | Red | Orange |
| 2.3 | Pre-Commercial Procurement (PCP) action for development of wave energy technology. | Green | Green |
| Environmental Actions | | | |
| 3.1 | Development of certification and standards to support the offshore renewable technology sector | Red | Red |
| 3.2 | De-risking environmental consenting through an integrated programme of measures | Orange | Orange |

- More data available –but still gaps that need to be addressed
- Good momentum built with MS and industry gathering data- want to continue this by reducing reporting challenges
- Inclusion of EU projects is important to reflect overall activity
- Research timelines can differ depending on programme –year on year analysis can be a challenge
- Good collaboration on projects noted
- Overall sector was well supported in 2019



- Next survey will go out to MS – but will access to data gathered to date
- Data to be gathered on actions not yet sufficiently addressed
- IWG will consider current IP Actions for review and update
- OceanSET will work with developers to improve data collection
- OceanSET will align with work being done on other projects- eg IEA-OES



Thank you for your attention!

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- Microphones and Cameras for attendees will be switched off.
- Please use **Q&A** to send questions to the panel.





100MW of Ocean Energy in Europe by 2025

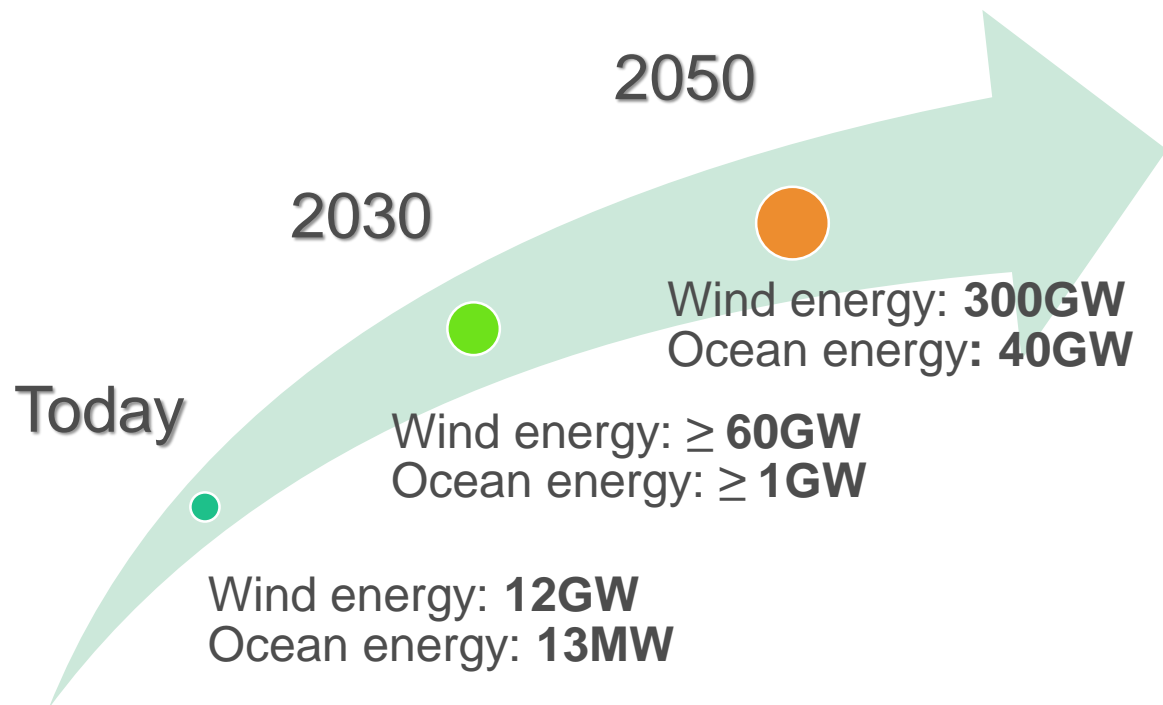
Launch OceanSET Annual report 2021 – 26-05-2021

Matthijs Soede

European Commission, DG Research and Innovation

Overall objectives

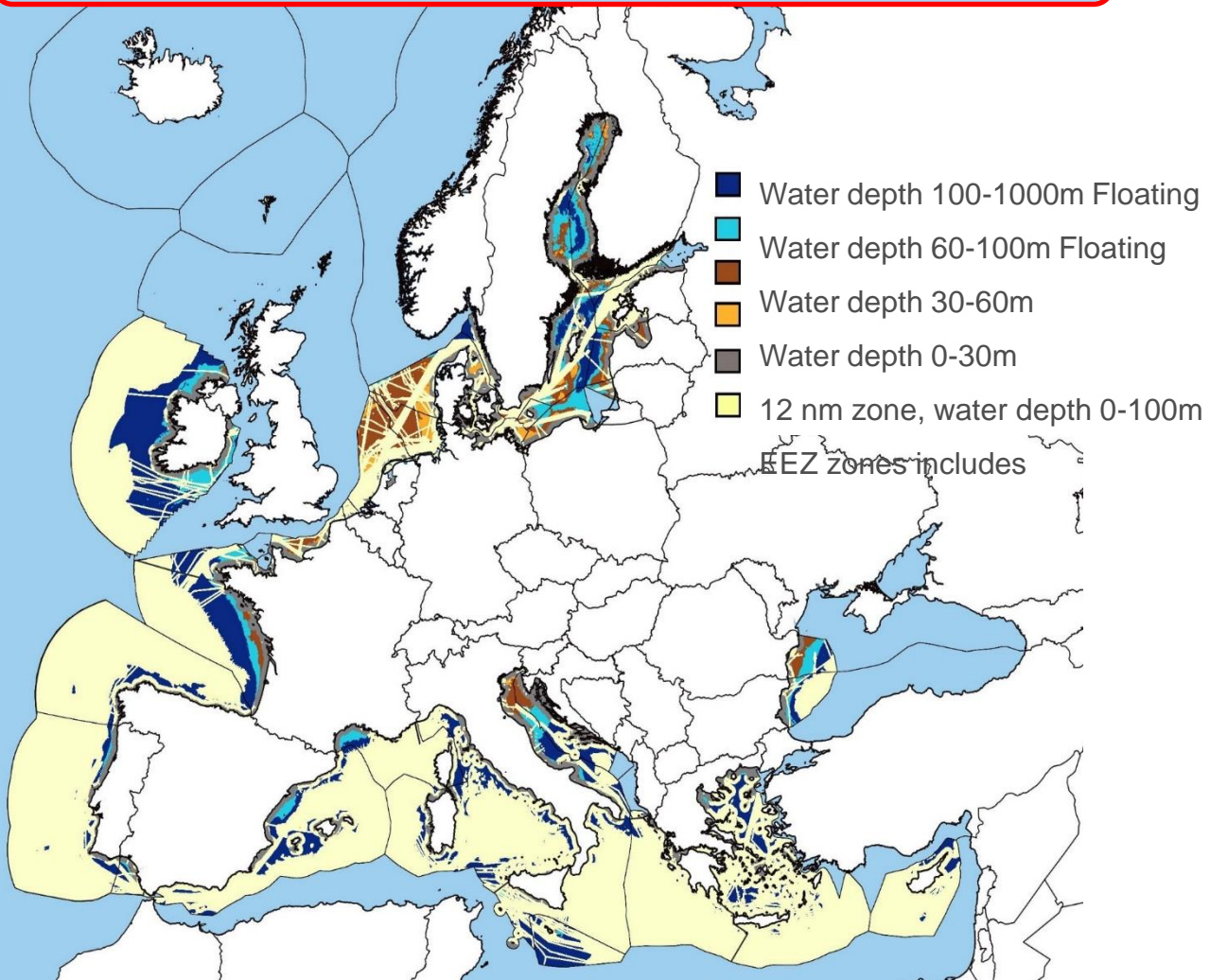
Offshore Renewable Energy Strategy



- Set ambitious targets for the growth of the offshore renewable energy sector
- Encourage public and private investment in new infrastructure and research
- Provide a clear and stable legal framework

The entire EU considered

Energy potential in all EU sea basins



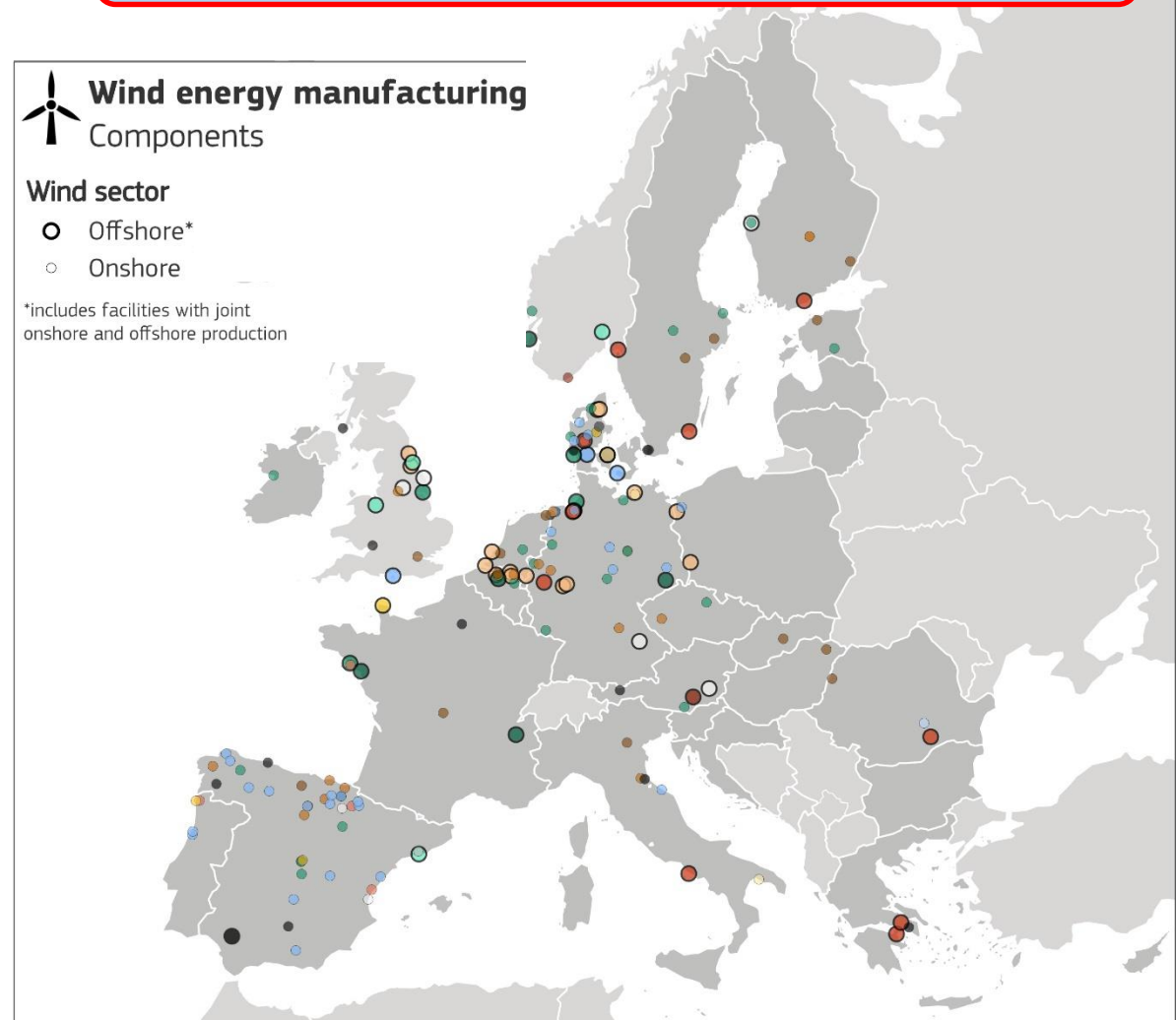
Industrial potential in all EU MS

Wind energy manufacturing Components

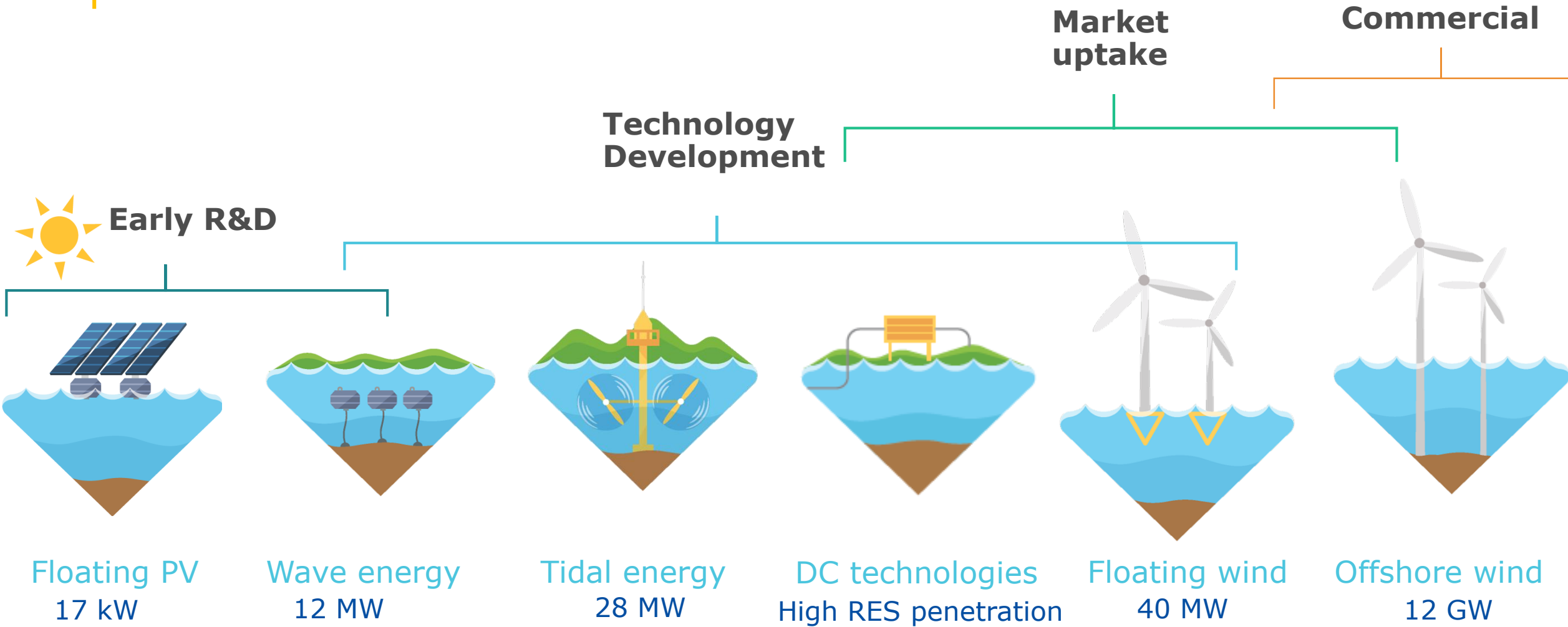
Wind sector

- Offshore*
- Onshore

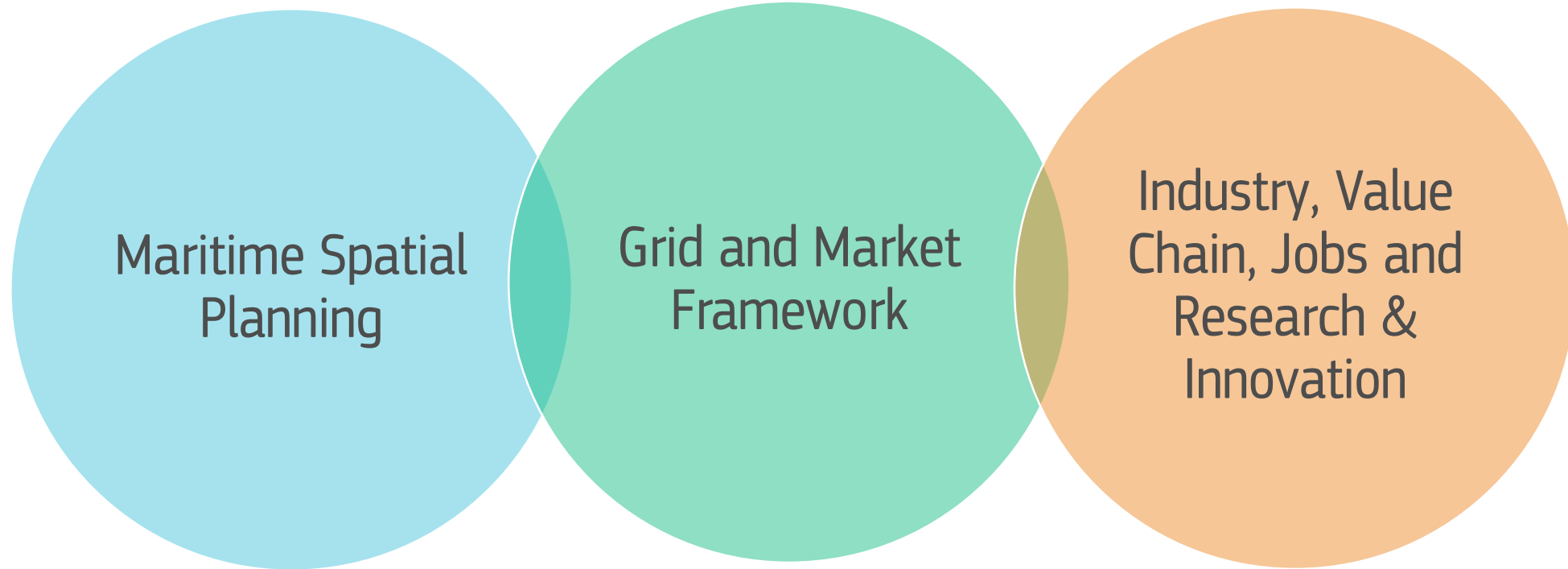
*includes facilities with joint onshore and offshore production



All offshore renewable technologies considered

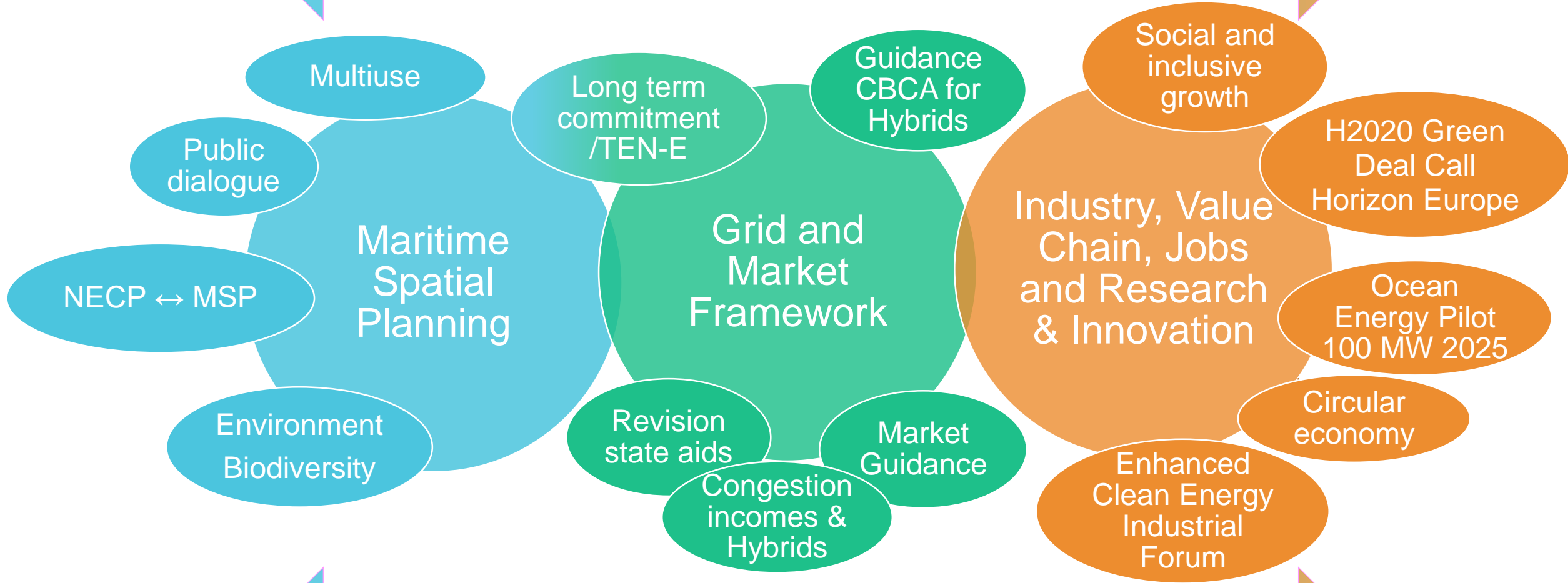


3 focus areas



3 focus areas

← **Private investment, national and EU Funds** →



← **Regional Cooperation** →

Implementation of the strategy

- Modelling of future energy system
 - Technology/market readiness
- From demonstration to large scale pilot projects (4-5 projects of 20-25 MW?)
- Large scale investments
 - Regional/national/EU public/private funding
- Need for reliable data

Thank you



ETIPOCEAN

European Technology & Innovation Platform for Ocean Energy

2030 Vision: The Growth Pathway for Ocean Energy

Lotta Pirttimaa, Policy & Project Officer, Ocean Energy Europe



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Photo: Eni

2030 Ocean Energy Vision

Industry analysis of future deployments,
costs and supply chains

SUPPORTED BY



ETIP Ocean brings the sector together

- Promotes ocean energy development – EU & globally
- Recognised European Commission advisory body & part of SET Plan
- Strong influence on policy & funding opportunities
- Knowledge-sharing: wide network of ocean energy professionals

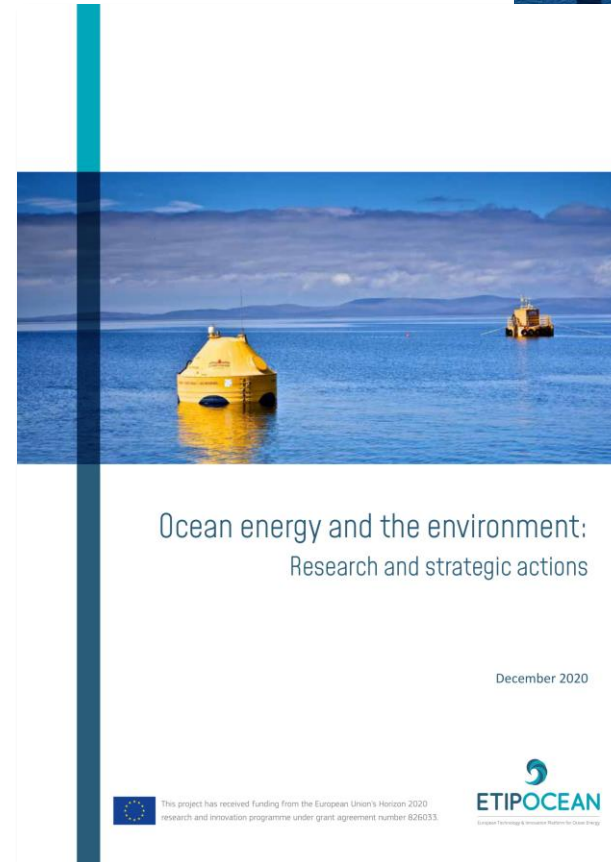


Publications based on consultation & knowledge-sharing webinars

- Strategic Research & Innovation Agenda
- Ocean energy & the environment

Coming soon:

- GVA study
- Socioeconomic study





Tidal – Pilot farms driving progress

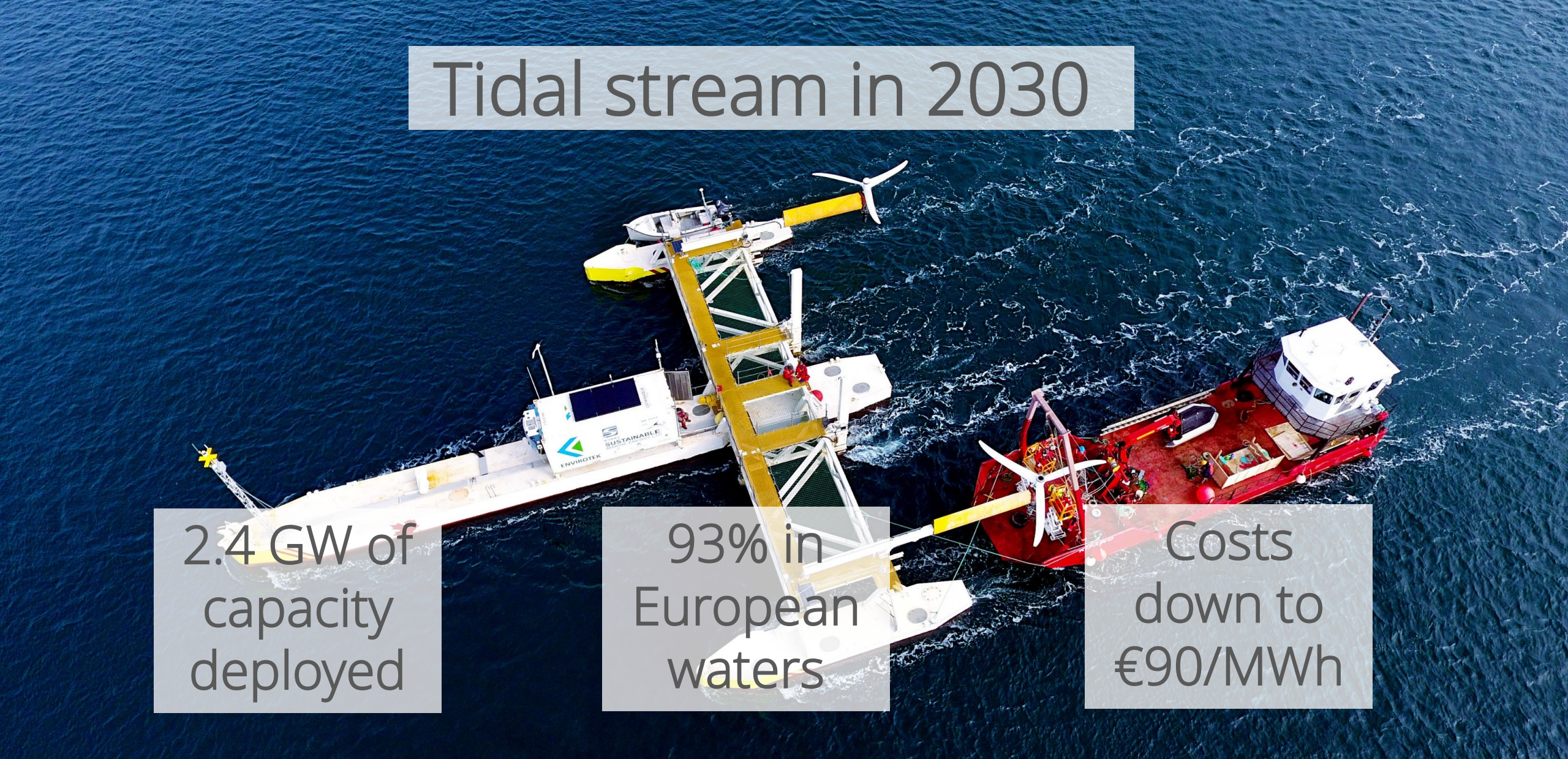




Tidal – Pilot farms driving progress



Tidal stream in 2030



2.4 GW of capacity deployed

93% in European waters

Costs down to €90/MWh



Tidal stream in 2030

- Tidal farms at utility scale in France, the Netherlands, United Kingdom and specific sites in the Mediterranean
- Exploitation of first lower-flow sites with improved tech + tidal kites
- First exports to markets such as Canada, Indonesia, Japan

2.4 GW of
capacity
deployed

93% in
European
waters

Costs
down to
€90/MWh





Wave – race to reach the markets





Wave – race to reach the markets



Wave in 2030

494 MW of
capacity
deployed

87.5% in
European
waters

Costs
down to
€110/MWh



Wave in 2030

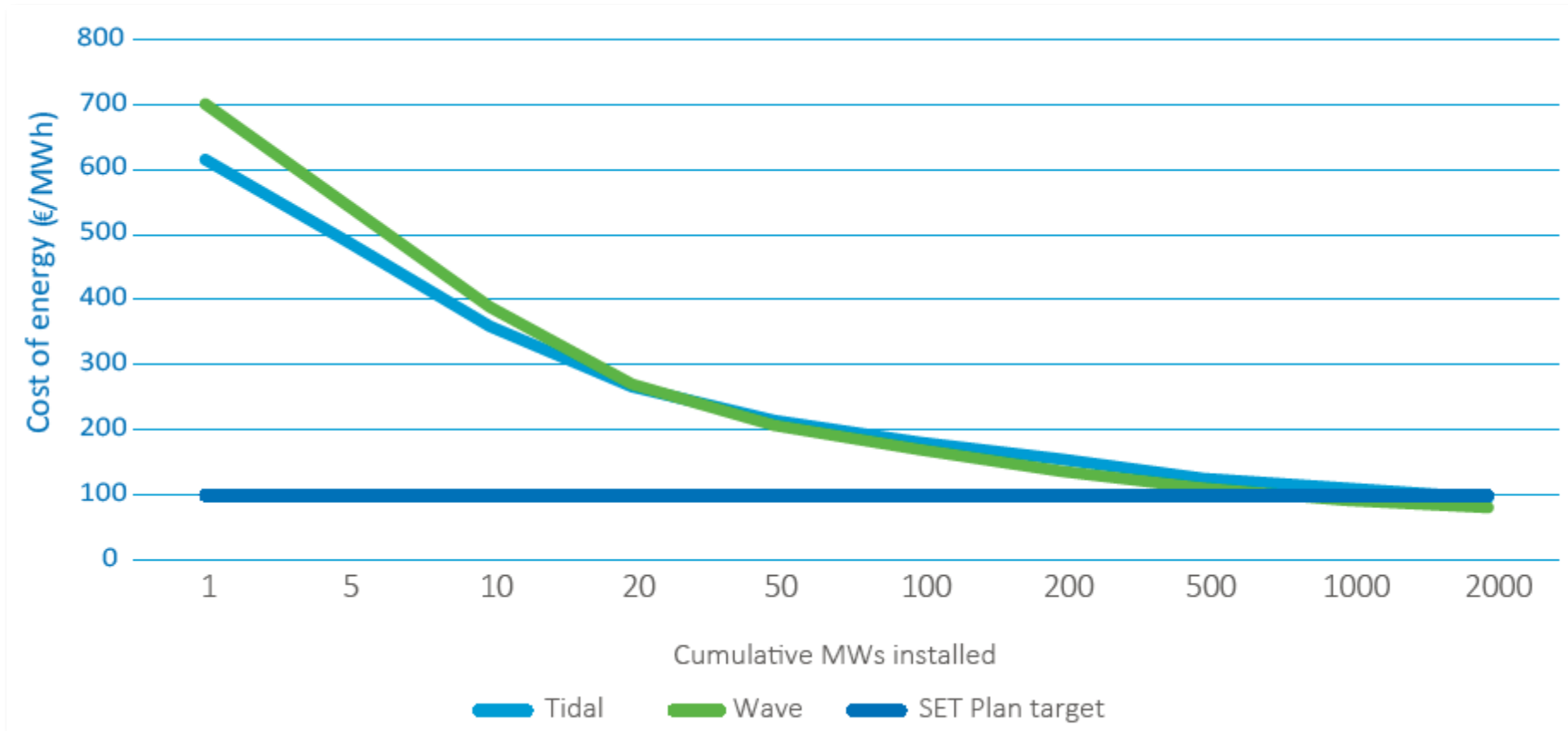
- Large wave farms at utility scale along Atlantic coast
- Smaller farms at utility scale in Mediterranean and North Sea
- Some floating wind co-location
- Exploitation of European + global niche markets (islands + offshore platforms)
- First exports to markets such as US, Chile, India

494 MW of
capacity
deployed

87.5% in
European
waters

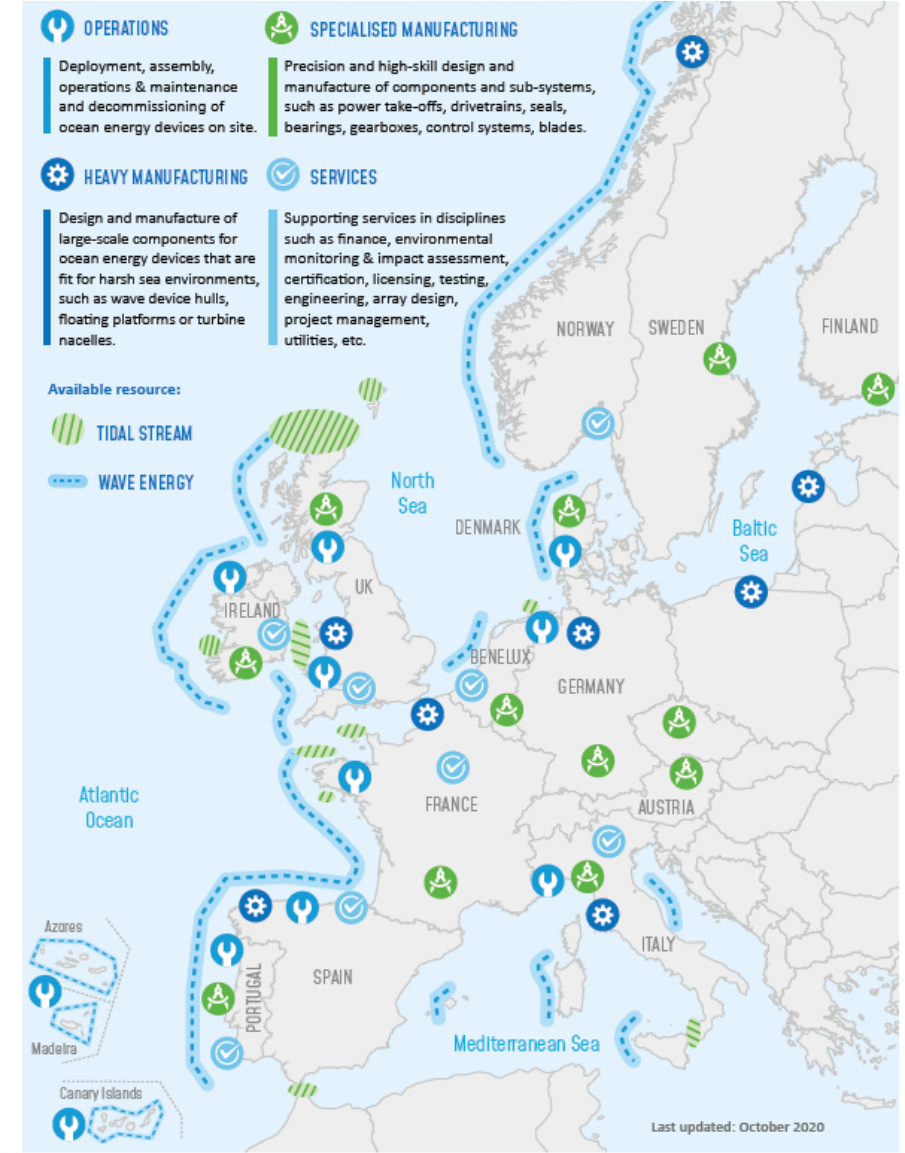
Costs
down to
€110/MWh

Deployments reduce costs dramatically



Opportunities for all Europeans

- Revitalises underused ports and maritime infrastructure
- Uses specialised manufacturing expertise from automobile & aerospace sectors
- Services supplied from across Europe



Solutions are well known

1. Clear + ambitious market signals
 - Attract investors, utilities, large manufacturers
2. Unlock next phase of deployments
 - Accessible revenue support
 - Fit-for-purpose planning + consenting framework
3. Financial instruments to reduce cost of capital
 - Grants
 - Guarantees for loans, equity + insurance coverage
4. Continue technology push
 - R&I activities continue to improve the technology

Thank you!



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Supported by



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