SEETIPOCEAN

# Strategic Research Innovation Agenda (SRIA)

## TWG Information Webinar

tecnalia
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

Ocean Energy Europe

THE UNIVERSITY of EDINBURGH

# Contents

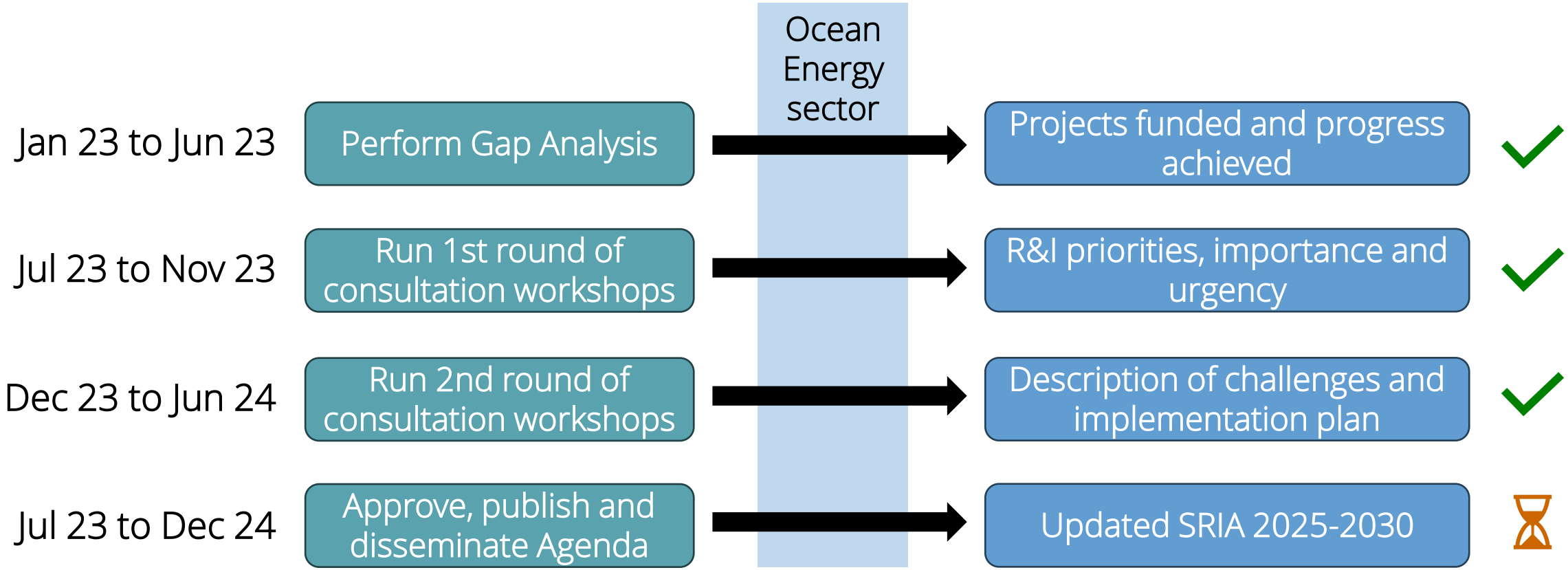


# Introduction

# SRIA for Ocean Energy

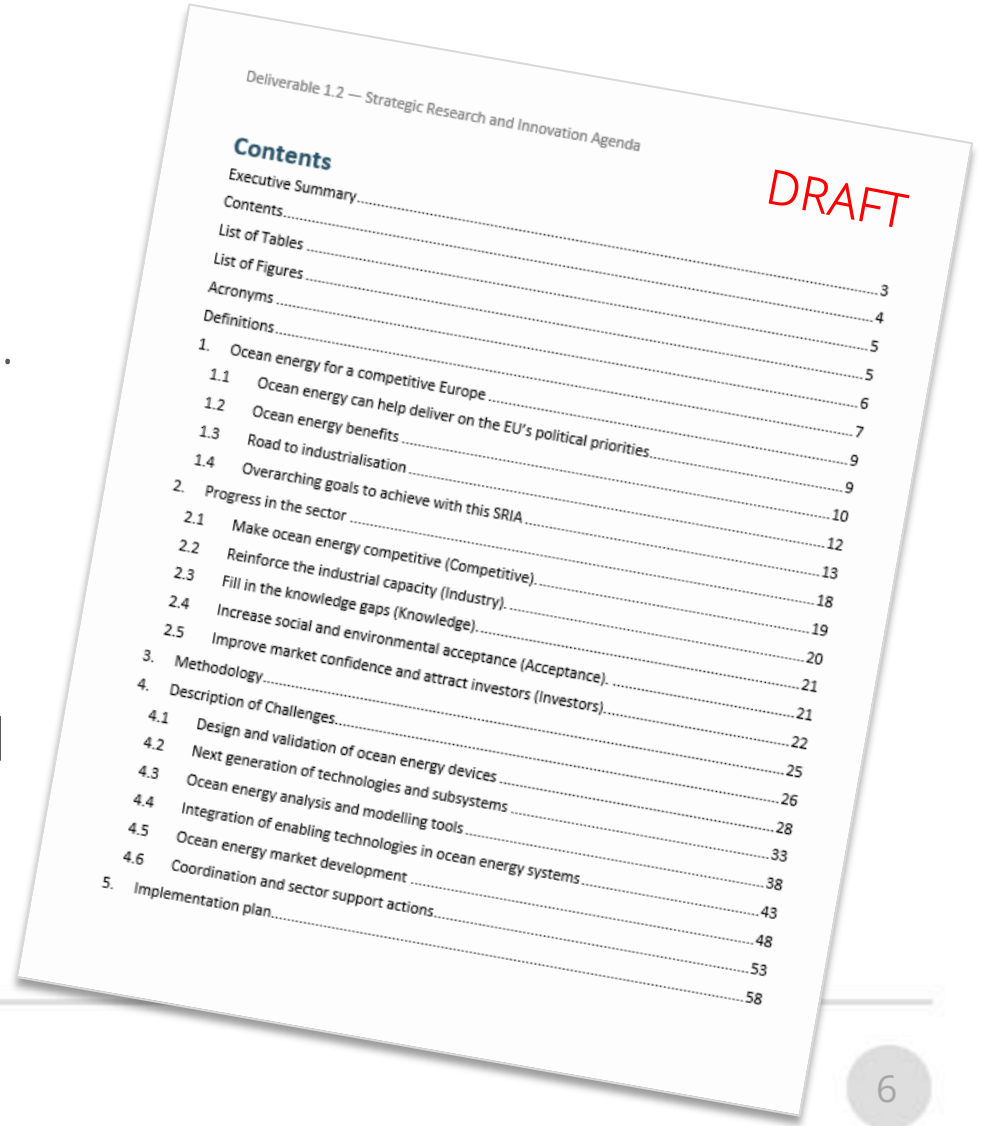
- A **reference document** for the whole ocean energy sector: 2016, 2020 & 2024 editions
- Outlines priority **research, development and innovation challenges** expected to deliver the greatest cost reductions
- Defines specific objectives and actions **towards ocean energy commercialisation**
- Provides **guidance to all funders** of Research & Innovation: industry, EU, national and regional

# Methodology for the SRIA update



# SRIA structure

- **Foreword** by a director of DG RTD.
- Overview of the **importance of ocean energy** in achieving the European Union's political priorities.
- **Progress of ocean energy**, focusing on five key themes: Competitiveness; Industry; Knowledge; Acceptance; & Investors.
- **Methodology** for the SRIA update.
- **Description of challenges and priorities** that need to be addressed to advance the industry.
- Indicative **budget and timeline** for the implementation of the SRIA.



# Today's objective

- To present an overview of the SRIA to get **feedback** from the sector in order to ensure it reflects the outcomes from previous consultations

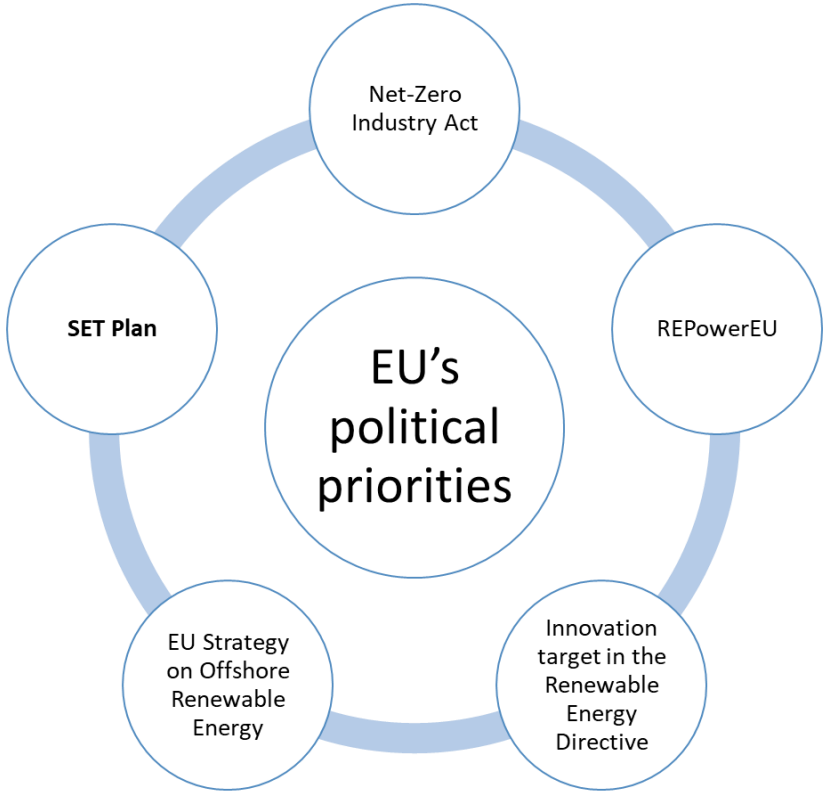
- **What** we specifically need from you:
  1. Do you agree with the overall vision, progress and priorities described in the draft SRIA?
  2. Are the budget and timeline appropriate to address the sector needs?
  3. Please review the draft and its consistency across sections.

**Deadline**: 16 July COB

# Ocean energy for a competitive Europe

# Ocean Energy for a competitive Europe

## Helps deliver on the EU's political priorities




## Provides significant benefits

- Enhances Europe's competitiveness
- Creates jobs across Europe
- Supports environmental sustainability
- Strengthens the EU's energy security
- Can become a massive export market
- Is ready to deliver

## Road to industrialisation

# Overarching goals to achieve with the SRIA

| What | How |
| --- | --- |
| Make ocean energy competitive | Power performance, Operative performance and Affordability |
| Reinforce the industrial capacity | Manufacturability, Local content & Technology push policies |
| Fill in the knowledge gaps | Mitigate technical risks, Knowledge exchange & Standardisation |
| Increase social & environmental acceptance | Life cycle analysis, Environmental impact & Social impact |
| Improve market confidence & attract investors | Bankability, Credible technology projections & Added benefits |

# Progress in the sector

# Progress of Ocean Energy (I)

## Tidal stream: Pre-commercial farms

- Tidal pilot farms producing energy since 2016.
- 94 MW will be added in UK waters.
- 14 MW supported by EU grants.
- 17.5 MW in France.

## Wave energy: Testing and demonstration

- Several scaled and full-scale wave devices are undergoing testing and demonstration.
- Wave energy is preparing for 4 pilot farms supported by Innovation Fund and Horizon Europe.

# Progress of Ocean Energy (II)

## Make ocean energy competitive

- Tidal Energy reached 93 GWh in 2023.
- Success Story: SIMEC Atlantis' MeyGen project
  - Phase 1A: 4 x 1.5 MW turbines.
  - Future phases plan expansion to 398 MW.

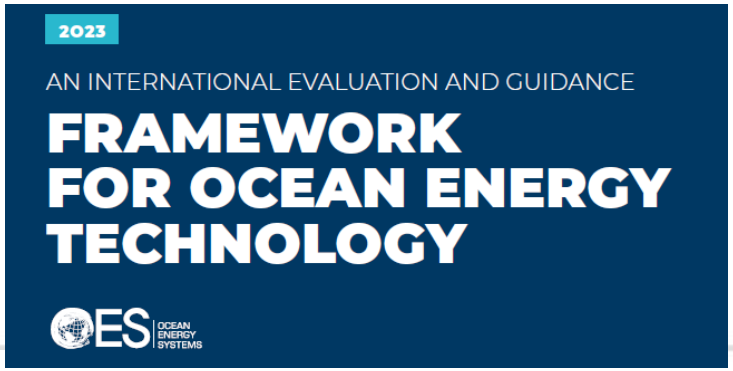

## Reinforce the industrial capacity

- GVA and jobs creation from manufacture, O&M, with significant local content, thus supporting just transition.
- Success Story: CorPower Ocean's HiWave-5 project
  - Mostly done by local suppliers, such as Costa & Rego.
  - €16m investment in a new R&D, manuf. and service centre.

# Progress of Ocean Energy (III)

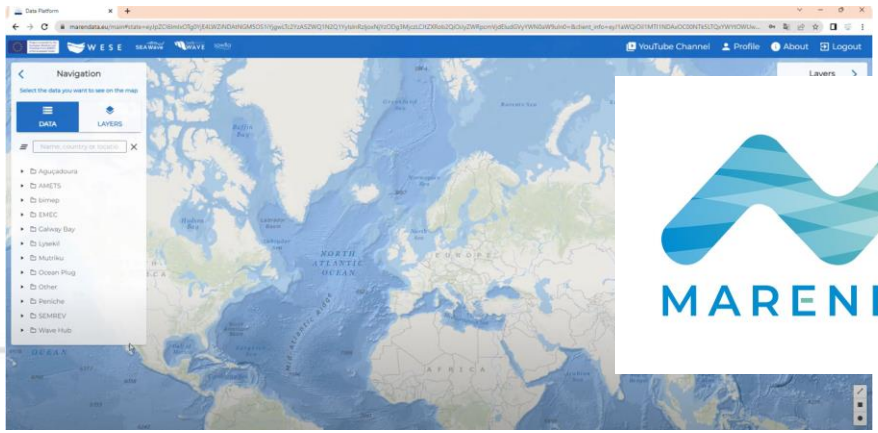
## Fill in the knowledge gaps

- International collaboration is essential to access to knowledge in a wide range of fields.
- Success Story: IEA-OES Technology Collaboration Programme
  - Since its creation in 2021 has developed various guidelines and two databases.
  - The evaluation and guidance framework has been implemented by WES and EuropeWave for wave energy development.




## Increase social and environmental acceptance

- Sector needs a balance between assuming some risks and learning from evidence.
- Success Story: SafeWave project
  - Environmental impacts of wave energy developments,
  - Potential conflicts between ocean energy and marine users,
  - Complex and long consenting processes,
  - Opposition among host communities of future deployments.



# Progress of Ocean Energy (IV)

## Improve market confidence & attract investors

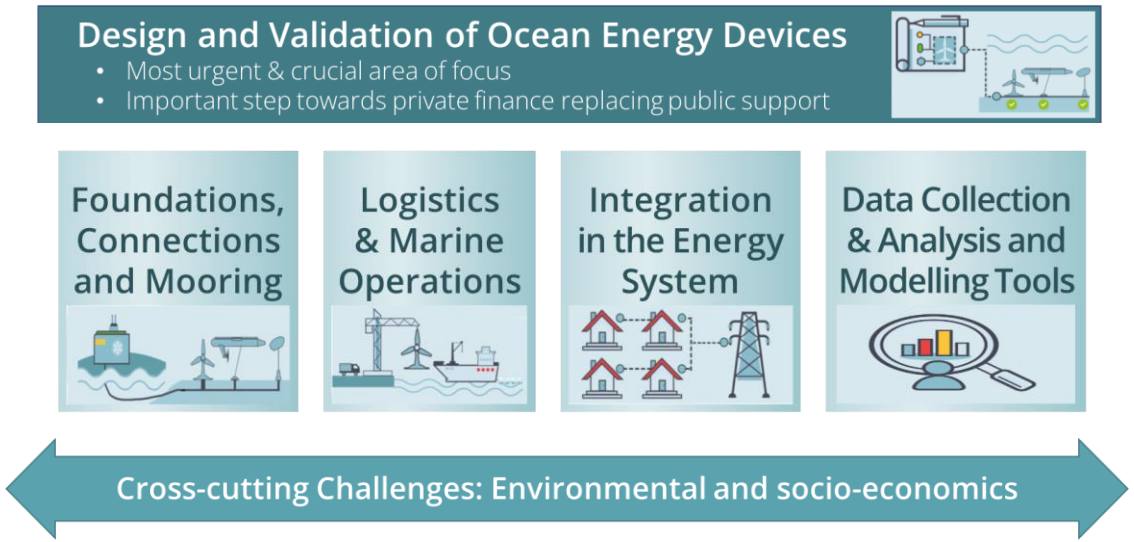
- A pipeline of projects based on revenue support such as the UK CfD mechanism.
- Public investment such as EuropeWave can help to give confidence to future investors.
- Off-grid applications such as WavePiston (Canary Islands) and Mocean (Orkney).
- Promising collaborations between technology developers and industrial investors are already happening in Europe

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Investor | TotalEnergies | | Shell | | equinor | ESB & Simply Blue Group | ENGIE | Qair | sev |
| Technology | CorPower Ocean™ | mocean energy & verlume | OR.PC | WAVEPISTON | HAVKRAFT SEA THE FUTURE | CorPower Ocean™ | ORBITAL MARINE POWER | HydroQuest Smart power solutions | Minesto |

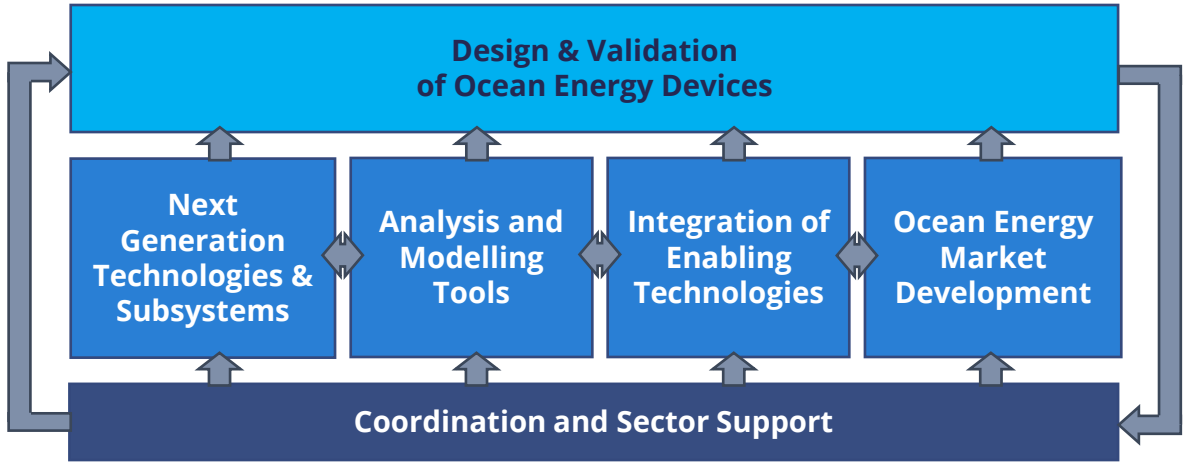
# Challenge Areas and Priority Topics

# Challenges Areas: Research and Innovation priorities

## SRIA 2021-2025




## SRIA 2025-2030




Top: Maintains Design and Validation as the central priority to achieve an ambitious cost reduction

Centre: Four challenges aiming to increase technology maturity and prepare for large scale deployment

Bottom: Supporting innovation efforts to leverage private investment

# Description of Challenge Areas

- **General description** of the challenge area
  - Motivation
  - Level of activity between 2020-2024
  - Main challenges
- **Specific priority topics**
  - Context
  - Main impacts (5 goals)
  - Applicability (wave / tidal / other)
  - Scope of Actions
  - Expected Outcomes
  - Implementation (TRL, type, nº, size of projects)

| Challenge Areas | | Priority Topics | |
|---|---|---|---|
| I | Design and validation of ocean energy devices | I.1 | Demonstration of single devices |
| | | I.2 | Demonstration of pilot farms |
| | | I.3 | Design and validation of other ocean energy technologies |
| II | Next generation technologies & subsystems | II.1 | Disruptive wave energy devices |
| | | II.2 | Innovative PTO and control systems |
| | | II.3 | Advanced moorings, foundations & electrical connections |
| III | Ocean energy analysis and modelling tools | III.1 | Advanced simulation of ocean energy subsystems and devices |
| | | III.2 | Analysis and planning tools for ocean energy farm deployment |
| | | III.3 | Modelling and simulation of farm construction and operation |
| IV | Integration of enabling technologies | IV.1 | Innovative materials and manufacturing processes |
| | | IV.2 | Application of latest instrumentation & sensor technology |
| | | IV.3 | Use of artificial intelligence and big data |
| V | Ocean energy market development | V.1 | Application of ocean energy in off-grid markets |
| | | V.2 | Demonstrating grid-scale benefits of ocean energy |
| | | V.3 | Co-location of multiple technologies |
| VI | Coordination and sector support actions | VI.1 | Coordinating sector efforts |
| | | VI.2 | Accessing and upgrading testing facilities |
| | | VI.3 | Support to ocean energy sector development |

# List of 6 Challenge Areas and 18 Priority Topics

| Challenge Areas | | Priority Topics | | Aim |
|---|---|---|---|---|
| I | Design and validation of ocean energy devices | I.1 | Demonstration of single devices | Validate system improvements and upgrades to reduce risks |
| | | I.2 | Demonstration of pilot farms | Achieve commercial maturity of OE technologies |
| | | I.3 | Design optimisation of other ocean energy technologies | Improve perform. & reliability OTEC, SWAC, Salinity, Tidal Range |

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| II | Next generation of technologies and subsystems | II.1 | Disruptive wave energy devices | Demonstrate a step-change improvement in LCOE |
| | | II.2 | Innovative PTO and control systems | Improve performance, reliability and power quality |
| | | II.3 | Advanced moorings, foundations & electrical connections | M&F and electrical connections that can reduce the LCOE |

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| III | Ocean energy analysis and modelling tools | III.1 | Advanced simulation of OE devices and subsystems | Improve modelling confidence of devices and subsystems |
| | | III.2 | Analysis and planning tools for OE array deployment | Increase resolution/accuracy of hydro & environmental models |
| | | III.3 | Modelling and simulation of array construction & operation | Optimise the offshore logistics and marine operations |

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| IV | Integration of enabling technologies in ocean energy systems | IV.1 | Innovative materials and manufacturing processes | Demonstrate potential benefits in realistic ocean conditions |
| | | IV.2 | Application of latest instrumentation & sensor technology | Demonstrate applicability to multiple ocean energy devices |
| | | IV.3 | Use of artificial intelligence and big data | Apply recent advances to support analysis & decision-making |

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| V | Ocean energy market development | V.1 | Application of ocean energy in off-grid markets | Remove the remaining obstacles to technology growth |
| | | V.2 | Demonstrating grid-scale benefits of ocean energy | Promote OE through theoretical studies & real demonstration |
| | | V.3 | Co-location of multiple technologies | Increase use of sea space, social & environmental acceptance |

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| VI | Coordination and sector support actions | VI.1 | Coordinating sector efforts | Foster coordination, knowledge sharing & standardisation |
| | | VI.2 | Accessing and improving testing facilities | Facilitate testing of components & systems in real conditions |
| | | VI.3 | Support to ocean energy sector development | Provide non-technical support to companies and professionals |

# Implementation Plan

# Public and private budget needed

| Challenge Areas | Topic Description | Nº of Total | Total funding (M€) | Total budget (M€) | % | |
|---|---|---|---|---|---|---|
| Design and validation of ocean energy devices | Demonstration of single devices | 16 | 108.0 | 162.0 | 11.9% | 57.7% |
| | Demonstration of pilot farms | 10 | 300.0 | 600.0 | 43.9% | |
| | Design and validation of other ocean energy technologies | 9 | 18.0 | 26.4 | 1.9% | |
| Next generation technologies and subsystems | Disruptive wave energy devices | 10 | 20.0 | 29.4 | 2.2% | 10.8% |
| | Innovative PTO and control systems | 9 | 30.0 | 44.7 | 3.3% | |
| | Advanced moorings, foundations & electrical connections | 12 | 49.0 | 73.2 | 5.4% | |
| Ocean energy analysis and modelling tools | Advanced simulation of ocean energy subsystems and devic | 8 | 19.0 | 28.2 | 2.1% | 5.4% |
| | Analysis and planning tools for ocean energy farm deployme | 7 | 12.5 | 18.3 | 1.3% | |
| | Modelling and simulation of farm construction and operatio | 10 | 18.5 | 27.0 | 2.0% | |
| Integration of enabling technologies | Innovative materials and manufacturing processes | 11 | 26.5 | 39.0 | 2.9% | 7.5% |
| | Application of latest instrumentation & sensor technology | 12 | 28.5 | 42.0 | 3.1% | |
| | Use of artificial intelligence and big data | 12 | 15.0 | 21.3 | 1.6% | |
| Ocean energy market development | Application of ocean energy in off-grid markets | 12 | 46.5 | 69.0 | 5.1% | 12.1% |
| | Demonstrating grid-scale benefits of ocean energy | 11 | 30.5 | 45.0 | 3.3% | |
| | Co-location of multiple technologies | 9 | 34.5 | 51.0 | 3.7% | |
| Coordination and sector support actions | Coordinating sector efforts | 6 | 6.0 | 8.4 | 0.6% | 6.6% |
| | Accessing and upgrading testing facilities | 8 | 44.0 | 66.0 | 4.8% | |
| | Support to ocean energy sector development | 7 | 11.0 | 15.9 | 1.2% | |
| **Total** | | **180** | **822** | **1,366** | **100.0%** | **100.0%** |

# Nº and size of projects

| Type of Funding | Size of projects | | | | |
|---|---|---|---|---|---|
| | Very small | Small | Medium | Large | Very Large |
| Public Funding (M€) | <1 | 1-3 | 3-8 | 8-20 | 20-40 |
| Private Funding (M€) | 0-0.2 | 0.2-1.5 | 1.5-4 | 4-10 | 10-40 |
| Total Budget (M€) | <1.2 | 1.2-4.5 | 4.5-12 | 12-30 | 30-80 |
| **Total № of projects per size** | **64** | **48** | **38** | **20** | **10** |

| Challenge Areas | Early | Mid | Late | Trend in the nº of projects |
|---|---|---|---|---|
| Design and validation of ocean energy devices | 16 | 10 | 9 |  |
| Next generation technologies and subsystems | 6 | 8 | 16 |  |
| Ocean energy analysis and modelling tools | 10 | 9 | 5 |  |
| Integration of enabling technologies | 8 | 17 | 8 |  |
| Ocean energy market development | 9 | 10 | 16 |  |
| Coordination and sector support actions | 6 | 8 | 8 |  |
| **Total** | **55** | **62** | **62** |  |

# Main funders per Challenge Area

| Challenge Areas | EU | Countries | Private |
|---|---|---|---|
| Design and validation of ocean energy devices | 48% | 6% | 46% |
| Next generation technologies and subsystems | 32% | 35% | 33% |
| Ocean energy analysis and modelling tools | 24% | 44% | 32% |
| Integration of enabling technologies | 26% | 43% | 32% |
| Ocean energy market development | 42% | 26% | 32% |
| Coordination and sector support actions | 34% | 34% | 32% |
| **Total** | **42%** | **18%** | **40%** |

# Thank you, Any Questions?

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Joannès Berque,
Jose Luis Villate

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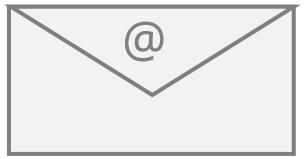
& TECHNOLOGY ALLIANCE

# Next steps

# Next steps

**9 July**
Webinar

**16 July**
Your feedback




**End of July**
SRIA submission

**September**
EC approval

**October**
Final publication

1. Do you agree with the overall vision, progress and priorities described in the draft SRIA?
2. Are the budget and timeline appropriate to address the sector needs?
3. Please review the draft and its consistency across sections.

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