Ocean Energy Europe

Photo: Eni

2030 Ocean Energy Vision

Industry analysis of future deployments, costs and supply chains

SUPPORTED BY

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Contents

Executive Summary

Industry analysis

This industry analysis considers the evolution of European tidal and wave technology to 2030. It projects deployments in high and low growth scenarios. The analysis also examines how energy costs will reduce and supply chains grow, as more ocean energy is deployed.

In a high growth scenario:

TIDAL STREAM

WAVE ENERGY

2.9 GW

can be deployed globally by 2030.

92% of this (2.6 GW) will be in European waters.

€90/MWh

These deployments will drive down the cost.

€110/MWh

Cost reduction drivers will be the same as other renewables.

Supply chain

The supply chain will span Europe, with the majority of economic activity and value going to those territories which take first-mover advantage.

A supportive policy framework is needed to deliver on this vision:

A European Strategy for Offshore Renewable Energy with **ambitious deployment targets** for ocean energy – including **3GW by 2030**.

An ‘Ocean Energy Alliance’ of European and national authorities who provide **accessible revenue support** and **supportive permitting frameworks** for demonstration projects.

Continued European-level support for **research & innovation actions** - to further progress the technology.

An **Insurance and Guarantee Fund** to reduce financing costs and attract commercial insurers into market.

An **Export Strategy** to ensure European leadership of a €53bn annual market.

Powering the Green Deal with blue energy

Photo: SIMEC Atlantis Energy

Ocean energy will deliver large volumes of the renewable energy that Europe needs

100GW Capacity

10% of Europe's electricity consumption

Ocean energy can deliver 100 GW of capacity by 2050 – equivalent to 10% of Europe's electricity consumption today.

With almost 45% of Europe's citizens living in coastal regions, ocean energy can be readily delivered where it is needed.

Ocean energy will help deliver a prosperous transition

Ocean energy global market

€53bn / year by 2050

Ocean energy will deliver economic recovery as well as decarbonisation. The European Commission estimates that ocean energy can contribute up to a cumulative €5.8bn in Gross Value Added between now and 2030[1]. Economic activity will take place across the continent – from industrial powerhouses with under-used supply chains to coastal regions with expertise in offshore operations and shipbuilding.

Ocean energy works in harmony with local communities

Operates in harmony with the environment

Ocean energy has a very low visual impact, preserving the aesthetic and touristic value of the environment. It also has a very limited environmental impact and in some cases can create new habitats or foraging areas for marine species.

EUROPEAN GREEN DEAL

Ocean energy complements other renewables and balances electricity systems

Ocean energy can play an important role in balancing Europe's electricity grid, which will high levels of variable renewable power.

Regulated by the moon, tidal stream is 100% predictable. The time between tides is so short that even a small amount of storage can deliver non-stop tidal power.

Wave works particularly well with wind – when the wind dies down, wave energy can step in to maintain power production. Combined, wind and wave together produce an overall power output that is smoother, and more reliable.

Driven by the moon
Tidal stream is 100% predictable
years in advance

Wave energy: complements variable renewables

Ocean energy sector is led by European companies

European companies lead the world in ocean energy. In tidal stream, the world's first offshore arrays are located in Europe, as is the world's largest array, and the world's largest turbine. In wave energy, Europe has the largest number of full-scale wave energy devices. Europe has a chance to consolidate this lead and dominate a new, high-value global market.

European companies
World leader in **tidal stream** and **wave energy**

Ocean energy will help deliver a just transition

Ocean energy can create 400,000 jobs by 2050. Many of these jobs will revitalise coastal communities that historically served shipbuilding, fishing and the oil & gas sector

Ocean energy can create
400,000 jobs by 2050

[1] 'The EU Blue Economy Report 2020' European Commission, 2020 - page 116

2030 deployment projections

Photo: Seabased

HIGH Growth Scenario
A European recovery driven by decarbonisation

TIDAL STREAM

2,388 MW installed by 2030

93% of capacity in EUROPE

Cost reduced to circa **€90/MWh**

WHAT THIS LOOKS LIKE

- Tidal farms at utility scale in France, Netherlands, UK and specific sites in Mediterranean
- Exploitation of first lower-flow sites with improved technology and kite technology
- First exports to markets such as Canada, Indonesia, Japan

WAVE ENERGY

494 MW installed by 2030

87.5% of capacity in EUROPE

Cost reduced to circa **€110/MWh**

WHAT THIS LOOKS LIKE

- Large wave farms at utility scale along Atlantic coastline
- Smaller farms at utility scale in Mediterranean and North Sea
- Some floating wind co-location
- Exploitation of European and global niche markets - islands and offshore platforms (oil & gas, aquaculture)
- First exports to markets such as United States, Chile, India

See page 8 for scenario analysis. See Methodology Annex (page 20) for sources.

HIGH Growth Scenario
A European recovery driven by decarbonisation

Scenario drivers: PEST[2] analysis

P — POLITICAL

- Ocean energy and renewables are identified by the European Commission and several national governments as a key means of delivering decarbonisation and economic recovery.
- European Strategy for Offshore Renewable Energy sets ambitious targets for ocean energy development and identifies the actions necessary to realise this ambition – notably attainable revenue support.
- More central planning of economy and significant national public spending post COVID-19.
- European Green Deal is enacted and includes strong & rapidly accelerating greenhouse gases & renewable penetration targets.
- Some inter-country cooperation to create cross-border ocean energy projects.

E — ECONOMIC

- Short-term focus on roll-out of attainable revenue support at a national level.
- Revenue support and deployment targets attract larger organisations into the sector – OEMs, utilities, oil & gas actors.
- Very high penetration of renewables across Europe – significant grid balancing actions needed. Deployments boosted by value placed on tidal's 100% predictability and wave's complementarity with wind.
- Electrification of transport, heating & cooling, green hydrogen drive large increase in electricity demand.
- Continued growth in fixed and particularly floating wind enables important synergies (shared components, sub-systems & installations, complementary operations, co-located projects delivering more predictable and stable aggregate power).

S — SOCIAL

- Ocean energy's very limited visual impact means that consenting/ permits are rapidly awarded.
- Marine Spatial Planning framework used to maximise use of offshore space and enable co-location of activities.

T — TECHNOLOGICAL

- The actions in the 'Strategic Research & Innovation Agenda' & the European Offshore Renewable Energy Strategy are executed in the next 5 years – including revenue support for demonstration projects.

METHODOLOGY / DATA SOURCES

[2] PEST = Political, Economic, Social, Technology. An analytical framework of macro-environmental factors used in strategic management.

Deployment figures from '**Ocean Energy Market Study**' commissioned by European Commission - 'Optimistic' scenario.

Consistent with **IEA World Energy Outlook 2019** - 'Sustained Development Scenario EU' scenario.

LOW Growth Scenario

Europe delivers on SET Plan targets[3]

TIDAL STREAM

1,324 MW installed by 2030

93% of capacity in EUROPE

Cost reduced to circa **€100/MWh**

WHAT THIS LOOKS LIKE

- Demonstration projects in France, Netherlands, UK extended out to larger farms
- Kite technology expanded at specific lower-flow sites

WAVE ENERGY

178 MW installed by 2030

87.5% of capacity in EUROPE

Cost reduced to circa **€150/MWh**

WHAT THIS LOOKS LIKE

- Growth largely dependant on markets such as islands and offshore applications (oil & gas, aquaculture, first floating wind co-location)
- Demonstration projects in one or two countries expanded out to larger farms

See page 10 for scenario analysis. See Methodology Annex (page 20) for sources.

[3] Industry, regional, national and European authorities agreed cost targets for wave and tidal, within the framework of the The Strategic Energy Transition Plan (SET Plan). By 2030 tidal should reach €100/MWh and wave should reach €150/MWh.

LOW Growth Scenario
Europe delivers on SET Plan targets

Scenario drivers: PEST analysis

P POLITICAL

- One or two European countries seize the opportunity of the European Strategy for Offshore Renewable Energy.
- These countries enact the Strategy's actions (notably accessible revenue support), lead SRIA actions and take advantage of European funding instruments (e.g. InnovFIN EDP, Innov. Fund, InvestEU).
- European Green Deal is enacted but 2030 climate targets not as ambitious as initially envisaged.
- Some countries take full advantage of the Green Deal to simultaneously transition their economies and recover from recession.

E ECONOMIC

- Revenue support for tidal demonstration projects starts in 2021 and for wave in 2025, in one or two countries.
- Benefits (jobs, CO_2 avoided, industrial supply chains, exports) go primarily to these countries.
- Growth in floating wind enables important synergies (shared components & sub-systems, similar operating strategies, shared installations, joint projects delivering more consistent aggregate power).
- 178MW deployed drives down costs dramatically and paves the way for significant acceleration of deployment in early 2030s.

S SOCIAL

- Ocean energy's very limited visual impact means that consenting/ permits are rapidly awarded in front-runner countries.
- Front-runner European countries work together to harmonise licensing and consenting.

T TECHNOLOGICAL

- Core actions of 'Strategic Research & Innovation Agenda' are executed by front-runner European countries[4].

METHODOLOGY / DATA SOURCES

'SET Plan Declaration of Intent on Strategic Targets in the context of an Initiative for Global Leadership in Ocean Energy' sets targets of €100/MWh (tidal) and €150/MWh (wave) by 2030.

The SET Plan targets are applied to tidal & wave cost reduction curves (see next section) to determine necessary deployment.

[4] 'Strategic Research & Innovation Agenda for Ocean Energy' available at: https://oceanenergy-europe.eu/wp-content/uploads/2020/05/ETIP-Ocean-SRIA.pdf

Accelerated growth is possible
A wave developer case study

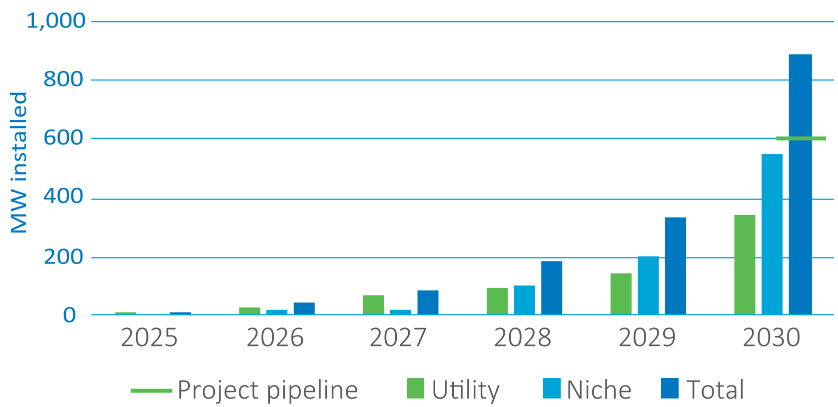
Accelerated deployment of wave energy is possible, thanks to:

- **The wide variety of different geographical markets and niche applications across the globe**
- **Smaller units mean more machines produced and faster learning per MW deployed**
- **Shared learnings from floating wind research & innovation**

Case study

A European wave developer has identified 877MW of potential market opportunities for its technology by 2030. They are developing a project pipeline of 600MW to be deployed over the next decade.

Potential market opportunities up to 2030



Utility markets Revenue support required	Niche markets No revenue support
PORTUGAL	ISLANDS (CANARIES)
IRELAND	ISLANDS (HAWAII)
FRANCE	OFFSHORE OIL & GAS (NORWAY)
UNITED STATES – PACIFIC COASTLINE	OFFSHORE OIL & GAS (GLOBAL)
UNITED KINGDOM	

Pipeline based upon:

- **A 'bankable' wave device by 2024**
  > A device with at least 8,000 hours of continuous array operations. Performance and Availability Statements from independent certifier.
- **Attainable revenue support in 2-3 key markets by 2021/2022**
  > Project developers can invest in permitting and grid connection now and take a Final Investment Decision in 2023/2024.

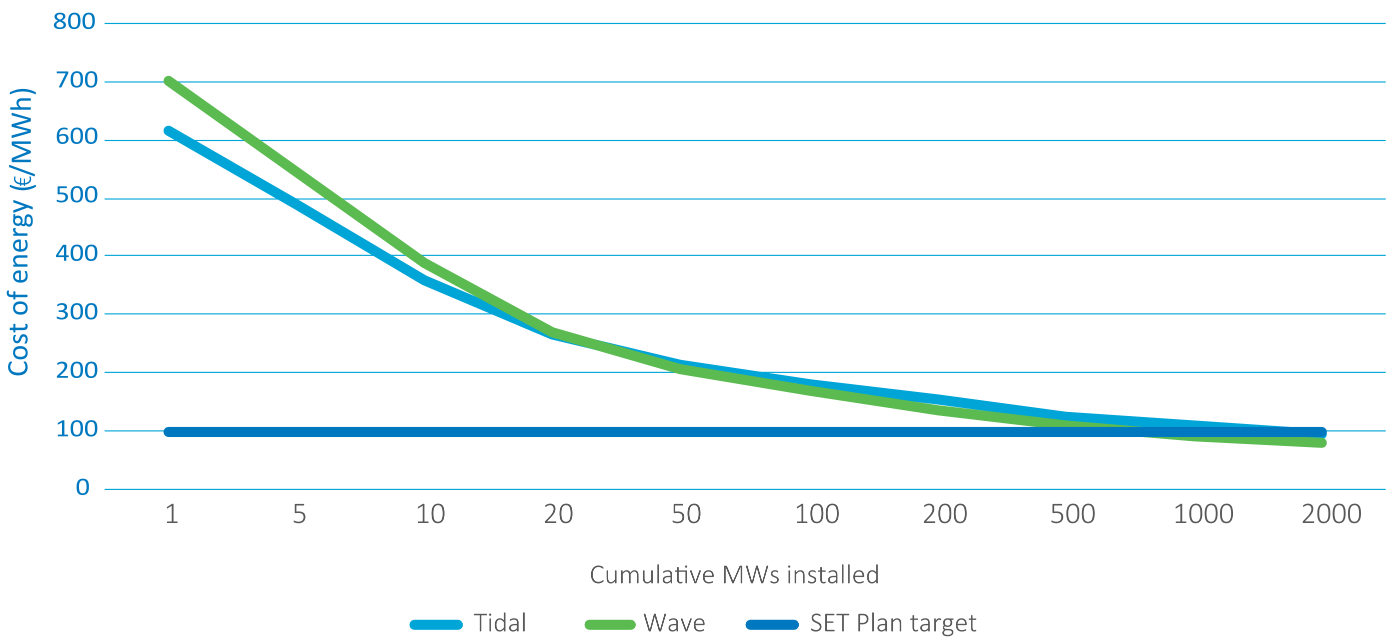
A rapid cost reduction pathway

Photo: Hydroquest

A clear path to rapid cost reduction

As more wave and tidal capacity is deployed, the cost of energy will reduce dramatically.

Ocean energy costs & deployed capacity

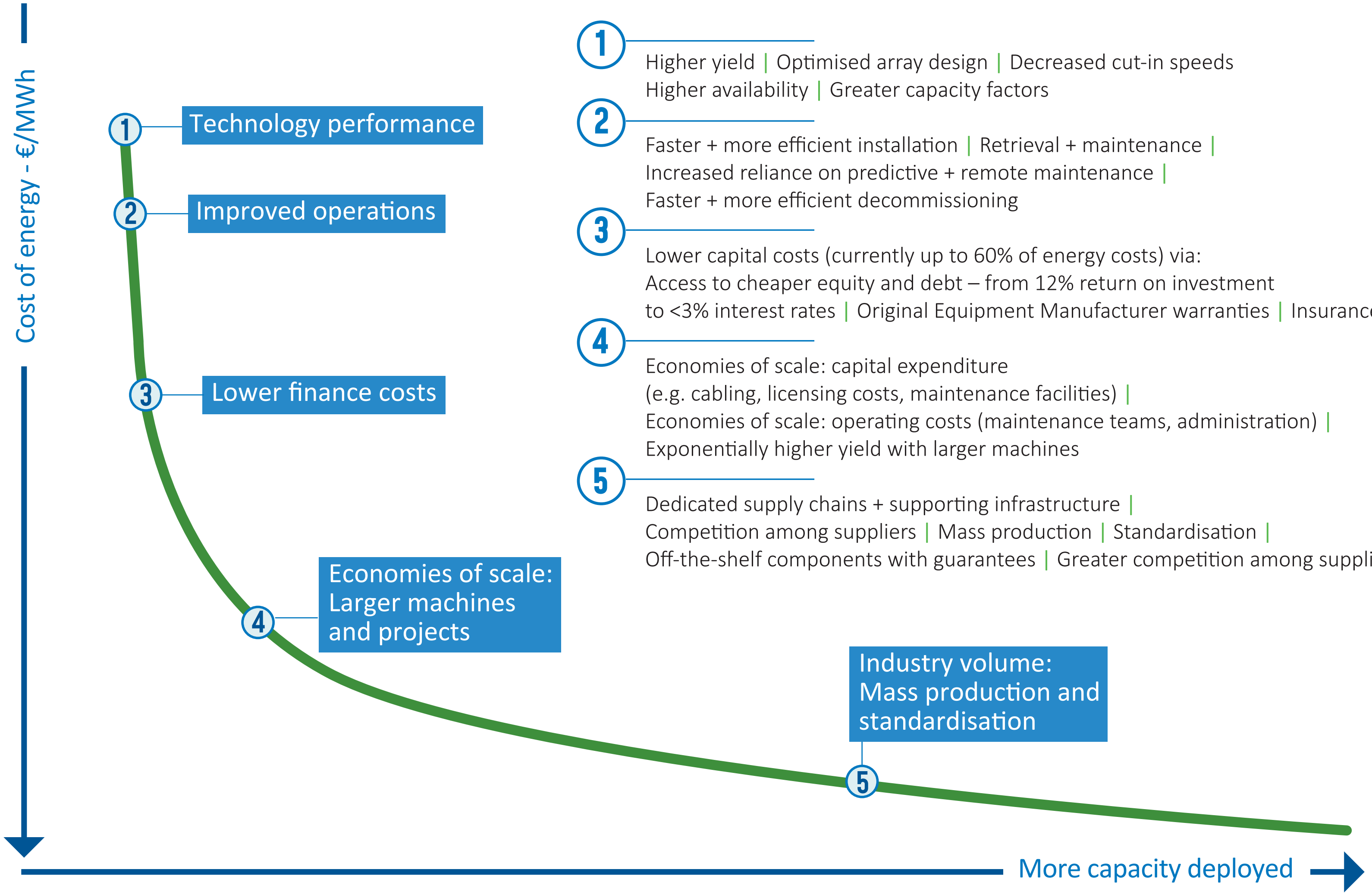


Megawatts (MW)	1	5	10	20	50	100	200	500	1000	2000
TIDAL	616	489	361	267	214	181	154	126	108	94
WAVE	702	546	387	269	207	168	136	110	92	81

See Methodology Annex (page 20) for methodology and data sources.

Cost reduction drivers well understood & field-tested

Ocean energy will experience the same cost reductions as wind and other renewable technologies.



1. Higher yield | Optimised array design | Decreased cut-in speeds
Higher availability | Greater capacity factors

2. Faster + more efficient installation | Retrieval + maintenance |
Increased reliance on predictive + remote maintenance |
Faster + more efficient decommissioning

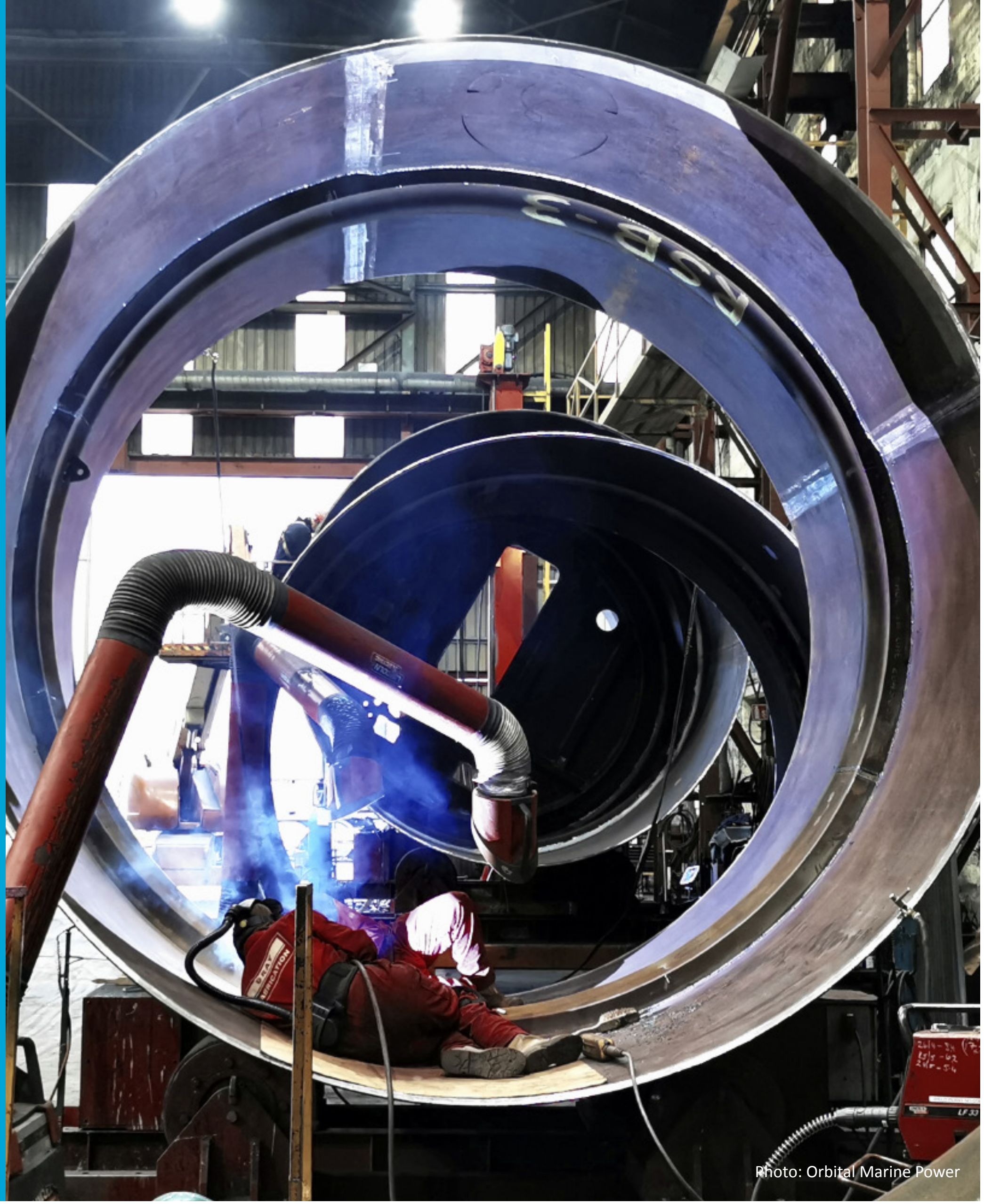
3. Lower capital costs (currently up to 60% of energy costs) via:
Access to cheaper equity and debt – from 12% return on investment to <3% interest rates | Original Equipment Manufacturer warranties | Insurance coverage

4. Economies of scale: capital expenditure (e.g. cabling, licensing costs, maintenance facilities) |
Economies of scale: operating costs (maintenance teams, administration) |
Exponentially higher yield with larger machines

5. Dedicated supply chains + supporting infrastructure |
Competition among suppliers | Mass production | Standardisation |
Off-the-shelf components with guarantees | Greater competition among suppliers

See Methodology Annex (page 20) for methodology and data sources.

2030 supply chain: Opportunities across Europe



European ocean energy supply chain potential

A mapping based on ocean energy activity to date and existing complementary supply chains

Ocean Energy Europe

OPERATIONS

Deployment, assembly, operations & maintenance and decommissioning of ocean energy devices on site.

SPECIALISED MANUFACTURING

Precision and high-skill design and manufacture of components and sub-systems, such as power take-offs, drivetrains, seals, bearings, gearboxes, control systems, blades.

HEAVY MANUFACTURING

Design and manufacture of large-scale components for ocean energy devices that are fit for harsh sea environments, such as wave device hulls, floating platforms or turbine nacelles.

SERVICES

Supporting services in disciplines such as finance, environmental monitoring & impact assessment, certification, licensing, testing, engineering, array design, project management, utilities, etc.

Available resource:

TIDAL STREAM

WAVE ENERGY

Last updated: October 2020

AUSTRIA

- **ANDRITZ Hydro Gmbh**, *NKE*

BALTICS

- Ship building & repair

BENELUX

- Tidal resource
- Offshore operators: **Allseas, SBM Offshore,** *DEME Group*
- **Tocardo, Laminaria, SeaQurrent**
- Automotive suppliers for bearings, seals, electronics, materials, control systems, power take offs
- *DAMEN Shiprepair*
- Engineering: *John Cockerill*
- Finance, certification, business developement: *Dutch Marine Energy Centre*

CENTRAL EUROPE

- *Wikov MGI, Gurit, Habia, 2JCP*
- Automotive and other aerospace suppliers for bearings, seals, electronics, materials, control systems, power take offs
- Ship building & repair: *CRIST*

DENMARK

- Wave resource
- **Floating Power Plant, Wavepiston, Resen Waves**
- Wind energy suppliers for control systems & blades
- *Svendbord Brakes*

FRANCE

- Wave & tidal resource
- **Sabella, HydroQuest, GEPS Techno, Naval Energies, EEL Energy**
- Automotive and aerospace suppliers for bearings, seals, electronics, materials, control systems, power take offs
- *DAMEN Shiprepair*, **Constructions Mécaniques de Normandie, Naval Group**
- Finance: *Bessé*
- Engineering: *Kraken Subsea Solutions*
- Certification: *Bureau Veritas*
- Utility: Engie, EDF

FINLAND

- **AW Energy, Wello,** *Wärtsilä, Hydman Oy*

GERMANY

- **SINN Power, NEMOS, Schottel, Andritz Ravensburg facility,** *Siemens, Bosch Rexroth, Schaeffler*
- Automotive and aerospace suppliers for bearings, seals, electronics, materials, control systems, power take offs.
- Wind energy suppliers for pitch & yaw control systems
- Ship building & repair

IRELAND

- Wave & tidal resource
- **Ocean Energy Ltd, Gkinetic, SWIRL Generators,** *EIRE Composites*
- Engineering: Dublin Offshore Consultants
- Finance: *Exceedence*
- Project development: *DP Energy, Simply Blue*

ITALY

- Wave & tidal resource
- Offshore operators: Saipem
- **Eni, 40South Energy, Umbra Group**
- Wind energy suppliers for pitch & yaw control systems
- Automotive and other aerospace suppliers for bearings, seals, electronics, materials, control systems, power take offs: *Bonfiglioli, ASG Superconnector, OCEM Power Electronics, Prysmian Group*
- Ship building & repair: *Fincantieri*
- Utility: *Enel Green Power, Eni*

NORWAY

- **Havkraft, Fred Olsen**
- Wave resource
- Offshore operators: Fred Olsen, **Seabased**
- Certification: *DNV GL*

PORTUGAL

- Wave resource
- *Composite Solutions, ASM, Kymaner Tecnologias Energeticas*
- Viana do Castelo shipyard
- Environmental & engineering: *WavEC*

SPAIN

- Wave & tidal resource
- **IDOM, Magallanes Renovables, Wedge Global**
- Wind energy suppliers for gearboxes, blades, pitch drives
- *Vicinay Cadenas*
- Wind energy suppliers for towers, jackets, and nacelle housings

SWEDEN

- **CorPower Ocean, Minesto, Ocean Harvesting,** *ABB, SKF, Hempel, Swepart Transmission*
- Engineering: *Royal Haskoning DHV*

UK

- Wave and tidal resource
- Offshore operators + service providers such as *Leask Marine, Green Marine, Inyanga Marine, 4C Solutions*
- **Orbital Marine Power, Nova Innovation, SIMEC Atlantis, Marine Power Systems, QED Naval, SME, Bombora Wave Power, Hydrowing,** *Wichita Clutch UK, Twiflex UK*
- Manufacturers and facilities in shipbuilding, wind and other sectors: *Harland & Wolff, FAUN Trackway*
- Finance: *Renewable Risk Advisors, Deja Blue Consulting*, London City
- Accreditation + certification: *Lloyds Register, European Marine Energy Centre*

Ocean energy technology developers are indicated in bold.
Ocean energy supply chain companies are indicated in italics.

Individual companies mentioned have all undertaken ocean energy activities. Supply chains mentioned have clear synergies with ocean energy.

Delivering on the vision:

Policy recommendations

Photo: Mike Brookes-Roper/EMEC

Policy recomendations

To deliver deployments, cost reductions and a new industry by 2030, the right policy framework is key.

Set a European Strategy for Offshore Renewable Energy that is ambitious for ocean energy

- Establishing clear targets for ocean energy will help attract the investors, Original Equipment Manufacturers and the utilities needed to deliver larger projects and scale-up the industry.

Ocean energy can deliver:

BY 2025

- **100,000 EU homes** powered by ocean energy

BY 2030

- **3GW** of deployments

BY 2050

- **100GW** of deployments

Launch an Ocean Energy Alliance to support deployments

- Bring European, national and regional authorities together to establish clear direction for sector.

An Ocean Energy Alliance can deliver:

- Accessible revenue support at national level - to unlock demonstration projects
- Access to the sea and permitting – via informed Marine Spatial Plans and alignment of environmental requirements

Policy recomendations

To deliver deployments, cost reductions and a new industry by 2030, the right policy framework is key.

Earmark €300m for European-level ocean energy R&I to 2025

- Continued research & innovation investment is crucial to maintain technology's progression.
- The European Technology and Innovation Platform for ocean energy (ETIP Ocean) has identified the individual research actions necessary to progress the technology[5].

€300m of European-level R&I funding can deliver:

- **€335m** of matching private investment

Set up an Insurance and Guarantee Fund for ocean energy

- Fund will cover and mutualise the technological risks of several pilot and pre-commercial projects – immediately reducing financing costs.

Insurance and Guarantee Fund can deliver:

- Affordable immediate coverage from commercial insurers who are attracted into market and long-term lower financing costs

Launch an Export Strategy for offshore renewables

- Mandate to explicitly finance the construction of devices in Europe for deployment internationally
- Provide EU guarantees and fund feasibility studies for export projects

Export Strategy can deliver:

- European leadership of a global market worth up to **€53bn annually by 2050**

[5] See Strategic Research & Innovation Agenda for Ocean Energy' May 2020, ETIP Ocean, page 27.

Methodology & data sources


Photo: Wavepiston

Deployment projections

High scenario

- Deployment figures are taken from an industry study commissioned by the European Commission – 'Market Study on Ocean Energy', COGEA & WavEC, May 2018.
- These figures have been validated in consultation with the industry and are in line with other published projections, namely the 'World Energy Outlook 2019' International Energy Agency, November 2019.
- The 'Market Study on Ocean Energy' undertook an extensive survey of the pipeline of projects for wave and tidal during the 2020-2022 period.
- The pipeline was extrapolated out to 2030 based on the average number of annual ocean energy projects between 2013-2017, controlling for advancements in TRL levels. Project capacity and duration were based on data collected in the survey.

Low scenario

- The 'SET Plan Declaration of Intent on Strategic Targets in the context of an Initiative for Global Leadership in Ocean Energy' sets targets of €0.1/kWh for tidal energy and €0.15/kWh for wave energy by 2030.
- Cost reductions to achieve these targets will be realised by increasing the volumes of deployed capacity.
- The volumes of capacity required to reach the SET Plan cost targets were identified with reference to the cost reduction projections for tidal and wave respectively – see methodology on 'Calculation of Levelised Cost of Energy'.
- These volumes were set for 2030. The deployment trajectory for tidal stream from 2021 to 2030 assumes a Compound Annual Growth Rate (CAGR) of 63%. The deployment trajectory for wave assumes the deployment of individual demonstration projects of 1-2MW each between now and 2025. From 2025 a 63% CAGR is assumed for wave.
- The 63% CAGR corresponds to the historical CAGR of global offshore wind between 2000 and 2007. During these years global offshore wind cumulative deployments grew from 36MW to 1106MW. This is in line with the growth phase that ocean energy will pass through – moving from smaller precommercial demonstration projects to larger fully commercial developments.
- The 63% growth assumption may be conservative, as ocean energy will benefit from the experiences of offshore wind (infrastructure, licensing & permitting frameworks, private investor familiarity) and therefore should be able to surpass these growth rates.

For a more detailed explanation of the methodology, see the Methodological Annex.

Cost reduction projections

Tidal stream

- The relationship between Levelised Cost of Energy (LOCE) and cumulative deployed capacity for tidal stream is taken from 'Tidal Stream And Wave Energy Cost Reduction And Industrial Benefit' ORE Catapult, May 2018.
- This Report gathered data from multiple European tidal developers on their input costs and used this to derive a cost (per kWh) of tidal energy generated.
- An analysis of the value chain was conducted to identify cost reduction opportunities, based on economies of scale and volume, accelerated learning, learning by doing, innovation and lower costs of capital.
- Learning rates were applied to existing tidal costs. Learning rates quantify the % reduction in capital and operational expenditure, associated with each doubling of capacity. Learning rates vary according to segment – the weighted average learning rate for capital costs is 11.5%. The weighted average cost for operating costs is 9.7%
- ORE Catapult also estimated increases in capacity factor and project lifespan, and anticipated reductions in the cost of capital as the technology is de-risked. Estimates rely again upon prior experience with offshore wind.
- The LCOE figures were reported in 2012 British Pounds. These figures were converted to 2016 Euro, to remain consistent with the 2016 SET Plan targets.
- Figures were first converted to 2016 British Pounds, using annual UK inflation data. An exchange rate of £1 = €0,877883717514124 was used. This was the average exchange rate for 2019 as extracted from www.forex.com.

Wave

- The ORE Catapult methodology employed for tidal stream was adopted for wave.
- Cost data was collected from 7 wave technology developers who had previously deployed a device of at least ¼ scale at sea for at least 3 months. The survey was designed to be consistent with the survey used to inform the ORE Catapult report.
- Learning rates (11.4% weighted average for capital costs and 9.4% for operating costs) and the cost of capital for tidal were applied to wave energy. Project lifespans and capacity factors were assessed based on the specificities of wave technology.

Differences between tidal stream and wave cost developments

- Initial wave deployments are more expensive than tidal stream deployments primarily due to less convergence at present.
- Wave subsequently becomes cheaper than tidal as more capacity is deployed, as there is greater scope for design convergence and increases in the size of individual units.

 For a more detailed explanation of the methodology, see the Methodological Annex.

2030 Supply chain potential

Purpose of the map

- The 2030 supply chain will depend upon the actions and decisions of national and regional authorities today.
- This map presents the potential that individual countries have to establish ocean energy economic activities and jobs in their territory.

Approach

The Ocean energy supply chain is broken down into four categories:

- Operations: Deployment, assembly, operations & maintenance and decommissioning of ocean energy devices on site. By necessity these activities take place at or close to the location of ocean energy deployments – i.e. where the wave and tidal resource is located.
- Specialised Manufacturing: Precision and high-skill design and manufacture of components and sub-systems, such as Power Take Offs, drivetrains, seals, bearings, gearboxes, control systems, blades. Often this activity takes place in regions which have pre-existing relevant supply chains in other sectors such as automotive, precision tool making, advanced manufacturing.
- Heavy Manufacturing: Design and manufacture of large-scale components for ocean energy devices that are fit for harsh sea environments, such as wave device hulls, floating platforms or turbine nacelles. Typically this activity occurs in regions which have a history of heavy manufacturing. Often this takes place close to coastlines and in shipyards, but individual components are occasionally transported from landlocked regions.
- Services: Supporting services in disciplines such as finance, environmental monitoring & impact assessment, certification, licensing, testing, engineering, array design, project management, utilities'. Often takes place in service-based economies, including larger cities which focus on finance, IT, etc.

The symbols on the map relate to individual countries as a whole. The symbols do not specify where within a country the economic activity is likely to take place.

Data sources

- Examples of individual companies were sourced from interviews with developers, publicly-available information on European-funded projects and third-party websites.
- Where countries have industries and infrastructure which are clearly complementary to ocean energy, these are listed.
- Data on the distribution of wave and tidal resources is taken from a forthcoming Ocean Energy Europe Report on the global distribution of ocean energy resources.

Ocean Energy Europe

About Ocean Energy Europe

Ocean Energy Europe (OEE) is the largest network of ocean energy professionals in the world. Over 120 organisations, including Europe's leading utilities, industrialists and research institutes, trust OEE to represent the interests of Europe's ocean energy sector.

www.oceanenergy.eu

DATA COLLECTION SUPPORTED BY

ETIPOCEAN

European Technology & Innovation Platform for Ocean Energy

About the European Technology and Innovation Platform for Ocean Energy (ETIP Ocean)

ETIP Ocean is a recognised advisory body to the European Commission.

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www.etipocean.eu

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