TWIND

Twinning for an Offshore Wind Energy Partnership

Call identifier: H2020-WIDESPREAD-2018-2020

D2.1 - A project plan for funding applications

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Lead beneficiary	TECNALIA
Authors List	Jose Luis Villate
Due date	30/09/2019
Completion date	30/09/2019

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Document History

Issue Date	Version	Changes Made / Reason for this Issue
16/09/2019	V1	First Draft by Jose Luis Villate (TECNALIA) with inputs from WavEC about funding opportunities in Portugal
23/09/2019	V2	Second draft with inputs from WavEC and OREC plus Conclusions and Recommendations by TECNALIA.
27/09/2019	V3	Third draft version with case studies from TUDelft, inputs from WavEC about funding options in Portugal and the Executive Summary added by TECNALIA.
30/09/2019	V4	Quality review by José Cândido (WavEC)
30/09/2019	Final	Final version to be submitted

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

INDEX

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

1 EXECUTIVE SUMMARY

The TWIND project has the main objective of creating a network of excellence that will dynamize a pool of specialized research professionals and trainees in the domain of offshore wind energy to support an emerging industry in Portugal in the context of a governmental Industrial Strategy (EI-ERO) with the aim of developing the country's offshore wind potential.

This objective is being fulfilled through a set of strategic activities well-structured throughout the project including specific training programmes, short-term scientific meetings, long-term staff visits, networking meetings, attendance to relevant conferences, knowledge transfer workshops and an annual event. These networking activities and exchange of knowledge will stimulate research activities that impact the economy and the society. The implementation of research activities in Portugal will require the access to public funding by WavEC and other Portuguese organisations.

This report, entitled "*A project plan for funding applications*", provides an overview of funding opportunities in Portugal (at national and European levels). The report defines firstly different types of funding, depending on the degree of technology development, and then funding opportunities in Portugal are explained matching them with the types of funding.

The main conclusion is that there is a wide range of funding opportunities in Portugal coming from National and European R&D programmes[1]. Additional support to attract investments and support entrepreneurs could help accelerating offshore wind deployment in Portugal. Specific support to skill development would be also beneficial.

After analysing several R&D funded projects on offshore wind in countries such as Spain, the UK and The Netherlands, the report recommends an active collaboration with funding agencies in the definition of future funding programmes. For that purpose, the preparation of a strategic agenda to support R&D projects specifically on offshore wind in Portugal, potentially led by WavEC in collaboration with other Portuguese stakeholders and aligned with the European Strategic Research and Innovation Agenda[2] published by ETIP Wind in 2018, would be instrumental.

[1] This report collects funding opportunities available at the time it was prepared (September 2019). Further options are likely to emerge or changes in the current ones can be introduced by the funding organisations. Detailed information on updates, informative sessions, etc., aligned with TWIND's objectives, will be included in the project website

[2] https://etipwind.eu/wp-content/uploads/2018-Strategic-Research-Innovation-Agenda.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

2 INTRODUCTION

2.1 PURPOSE AND SCOPE OF THE DELIVERABLE

The purpose of this report "*A project plan for funding applications*" is to provide an overview of funding opportunities in Portugal (at national and European levels) which will enable delivery of R&D projects identified further on during the TWIND project (Task 2.3), among others.

The report defines firstly different types of funding, depending on the degree of technology development and then funding opportunities in Portugal are explained matching them with the types of funding. Finally, the report analyses the availability of funding opportunities in Portugal with recommendations of how to access them, based on the experience in Spain, the UK and The Netherlands, which is presented in the form of case studies.

2.2 PROJECT SUMMARY

2.2.1 Short description

TWIND is a European Commission Horizon 2020 funded project with a total budget of 796 thousand Euros. Its main objective is to create a network of excellence that will dynamize a pool of specialized research professionals and trainees in the domain of offshore wind energy to support an emerging industry in Portugal in a field with a very strong anticipated growth and no dedicated training curriculum.

2.2.2. Overall description

The Portuguese Government has approved the Industrial Strategy for Ocean Renewable Energies (EI-ERO) with the aim of developing the country's offshore wind potential. According to EI-ERO, offshore renewable energies have the potential to supply 25% of the electricity consumed annually in Portugal and create a new export chain in these new technologies. The government envisages that potential exports in this field could increase up to ten times the current employment in the active sectors, with the greatest potential for exports seen in the development of the floating wind technology.

The overall objective of TWIND is to create a network of excellence that will dynamize a pool of specialized research professionals and trainers in the domain of offshore wind energy to support an emerging industry in Portugal in a field with a very strong anticipated growth and no dedicated existing training curriculum. WavEC will be the pivot research institution of the low performing Member State (Portugal) coordinating efforts with internationally-leading counterparts at the EU level (Spain, United Kingdom and The Netherlands) and enhancing its excellence and innovation capacity through the exchange of knowledge with these leading research organizations. The combining capabilities of partners will open the grounds to exploit existing research results and invest in developing more knowledge.

These objectives will be fulfilled through a set of strategic activities well-structured throughout the project including specific training programmes on thematic topics, short-term scientific meetings, long-term staff visits, networking meetings, attendance to relevant conferences in the field, knowledge transfer workshops with stakeholders and an annual event. The networking activities and exchange of knowledge will stimulate research activities and highly qualified services that impact the economy and the society, thus benefitting not only WavEC and the partner organisations, but in general Portugal.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

3 FUNDING MECHANISMS

3.1 Introduction

Research, Development and Innovation can be supported by different types of funding depending on the progress of the technology. In this report, the Technology Readiness Level (TRL) approach is used to define the degree of development of one specific technology. The European Commission adopts the following definition of TRLs for H2020 projects:

- TRL 1 – basic principles observed
- TRL 2 – technology concept formulated
- TRL 3 – experimental proof of concept
- TRL 4 – technology validated in lab
- TRL 5 – technology validated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space)

A more detailed definition for renewable energy technologies (including wind energy) can be found in the report *Technology Readiness Level: Guidance Principles for Renewable Energy technologies* published by the European Commission in November 2017[3].

Figure 1 shows a summary of the types of funding which are briefly explained in the following sections of this chapter.

[3] https://publications.europa.eu/en/publication-detail/-/publication/d5d8e9c8-e6d3-11e7-9749-01aa75ed71a1/language-en/format-PDF/source-61073523

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

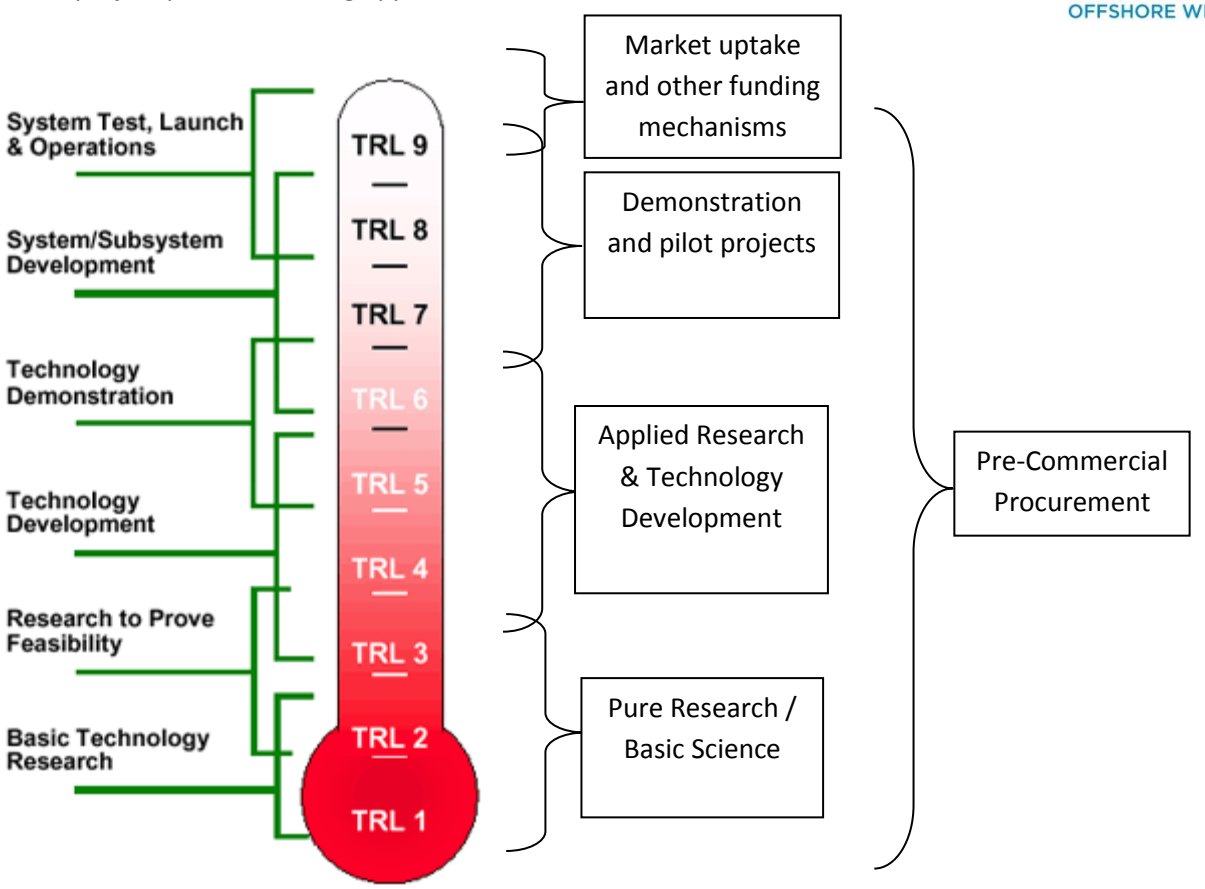


Figure 1. TRL scale and funding mechanisms

3.2 Pure Research / Basic science

Pure research (or basic science) funding opportunities usually support the initial stages of developing new concepts or technology solutions. In terms of TRLs, this type of funding is typically used to observe basic principles (**TRL1**), formulate the concept of a new technology (**TRL2**) up to the experimentation of a proof of concept of the technology (**TRL3**).

Beneficiaries of this kind of funding can be any type of organisation but typically it is used by universities and other research organisations. The level of funding is usually high (it could even cover 100% of the expenses) and provided by public bodies.

3.3 Applied Research & Technology Development

Applied Research and Technology Development funding opportunities usually support medium stages of new technologies mainly focused on validation and demonstration purposes. In terms of TRLs, this class of funding is typically used to validate the technology in laboratories (**TRL4**) or in relevant environments (**TRL5**) up to the demonstration in relevant environments (**TRL6**). The frontier of this type of funding is not always clear and there are funding mechanisms supporting TRL5, TRL6 and TRL7 with similar instruments.

Beneficiaries of this kind of funding can be any type of organisation but typically it is used by technology centres, SMEs and start-ups. The level of funding is usually medium-high (higher than 50%) and provided by public bodies but it requires supplementary in-house or private funding.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

3.4 Demonstration & Pilot projects

Demonstration & Pilot projects funding opportunities usually support high stages reaching quasi commercial technologies. In terms of TRLs, this type of funding is typically used to demonstrate prototypes in operational environments (**TRL7**), to complete and qualify the system (**TRL8**) up to proving the actual system in operational environments (**TRL9**). As above mentioned, the frontier of this type of funding is not always clear and there are funding mechanisms supporting TRL5, TRL6 and TRL7 with similar instruments.

Beneficiaries of this kind of funding can be any type of organisation but typically it is used by private companies (large and SMEs) in collaboration with technology centres. The level of funding is usually medium-low (less than 50%) and provided by public bodies (supplemented by in-house or private funding) or by public-private partnerships.

3.5 Pre-Commercial Procurement (PCP)

Pre-Commercial Procurement (**PCP**) is the procurement of research and development of new innovative solutions before they are commercially available. PCP involves different suppliers competing through different phases of development. The risks and benefits are shared between the procurers and the suppliers under market conditions. It can cover the whole range of TRLs (from solution ideation to final commercial product). Conditions for access might be different depending on the purchaser but typically PCP covers 100% of the costs, though the purchaser usually retains some intellectual property rights, and can be applied by any type of organisation.

The European Commission has implemented a PCP programme[4].

3.6 Innovation for commercial technologies

Once a technology achieves the highest level of development (TRL9), it might require additional support to be adapted for a specific market or a different location/country or to be improved to incorporate additional functionalities (this is currently common for example to incorporate digital connectivity to existing products).

Beneficiaries of this class of funding can be any type of organisation but typically it is used by start-ups and SMEs. The level of funding is usually low (less than 25%) and provided by public bodies (supplemented by in-house or private funding) or by public-private partnerships.

3.7 Other funding mechanisms

Research and Technology Development funding can coexist with other funding mechanisms which can be complemented by a company to set up a new business or reinforce an existing one. These funding mechanisms are typically used when the technology is in high TRLs, although not necessarily exclusively in such situations. These mechanisms include:

- **Market uptake**: used when a technology is close to a commercial stage for dissemination of benefits, market campaigns, replication in other sectors, etc.
- **Support to investments:** a growing business such as offshore wind might require new investment (new manufacturing plants, new test infrastructures, new services providers, etc..).

[4] https://ec.europa.eu/digital-single-market/en/pre-commercial-procurement

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

This support might be different depending on if it is for local companies to make investments in its own country or it is used to attract investments from other countries.

- **Support to entrepreneurs and start-ups**: entrepreneurs and start-ups can usually have access to the different funding mechanisms explained in the previous sections. However, they can find additional opportunities to start a new business, open an office, hire people, collaborate with experts, subcontract services, etc.
- **Skill development training**: the deployment of a new sector such as offshore wind always requires skilled professionals and researches. Specific funding mechanisms can be used to train young people or to change the career or professionals from other sectors.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

4 AVAILABLE FUNDING OPTIONS IN PORTUGAL

In this section the funding programmes are divided into 3 categories:

- National
- European
- Other

The following list provides a summary on some of the programmes with potential interest to researchers and industry innovators working in the **marine energy sector**.

4.1 NATIONAL FUNDING

National funding schemes have different types of beneficiaries depending on the conditions laid down in each specific programme.

4.1.1 FUNDO AZUL

FUNDO AZUL (Blue fund)[5] was created by the Portuguese Government in 2016, as a financial incentive mechanism to:

- Boost the development of the economic activities of ocean-based industries.
- Support scientific and technological research.
- Encourage protection and monitoring of the marine environment.
- Increase maritime safety.

4.1.2 PORTUGAL 2020

Portugal 2020[6] is a partnership agreement between Portugal and the European Commission, bringing together five European Structural and Investment Funds which define the programming principles that ensure the economic, social and territorial development policy to promote Portugal between 2014 and 2020. These programming principles are aligned with the EUROPE 2020 STRATEGY.

Portugal 2020's programming and implementation is organized into four thematic areas:

- Competitiveness and Internationalization.
- Social Inclusion and Employment.
- Human capital.
- Sustainability and Resource Efficiency.
- Moving towards a low carbon economy.

4.1.3 COMPETE 2020

COMPETE 2020 (Competitiveness and Internationalization Operational Program)[7] was created by the Portuguese Government in 2014, to become a reference institution in granting incentives by promoting the consolidation of competitive advantages.

[5] https://www.dgpm.mm.gov.pt/fundo-azul
[6] https://www.portugal2020.pt/
[7] https://www.compete2020.gov.pt/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

They offer 4 types of funding mechanisms:

- Incentives (SI).
- Collective Action Support System (SIAC).
- Support System for Scientific and Technological Research (SAICT).
- Transport Infrastructures Support Scheme (RAIT).

4.1.4 FCT

FCT Fundação para a Ciência e a Tecnologia (Science and Technology Foundation)[8] is the Portuguese public agency that supports science, technology and innovation, in all scientific domains, under responsibility of the Ministry for Science, Technology and Higher Education.

FCT supports the scientific community in Portugal through a range of funding schemes, tailored for individual scientists, research teams or R&D centres.

Scientists from all nationalities, and in any research area, may apply to FCT for funding.

4.2 EUROPEAN FUNDING

4.2.1 Horizon 2020 (H2020)

The main European funding mechanism for R&D is Horizon 2020. It is the biggest EU Research and Innovation programme to date with nearly €80 billion of funding available over 7 years (2014 to 2020)[9]. Horizon 2020 is divided into 3 priorities, namely i) excellent science, ii) industrial leadership and iii) societal challenges, each with different sub-programmes as shown below:

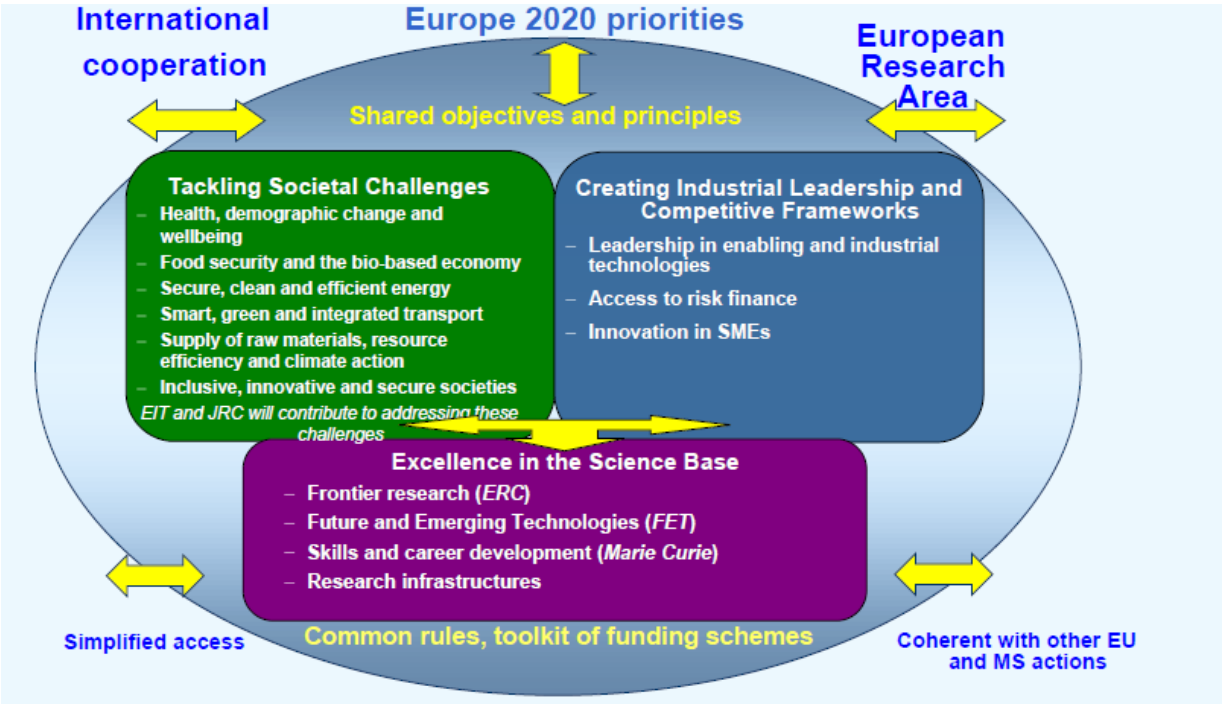


Figure 2. Horizon 2020 Structure

[8] https://www.fct.pt/index.phtml.en
[9] https://ec.europa.eu/programmes/horizon2020/en

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Offshore Wind is specifically covered by the societal challenge "Secure, clean and efficient energy". Under this wide societal challenge, periodical funding calls are published with more specific challenges to address. The last H2020 call under this societal challenge has been recently launched and two specific topics on offshore wind are open for receiving proposals. The first one is mainly focused on basic research (low-medium TRLs) while the second one is for demonstration projects (medium-high TRLs):

LC-SC3-RES-31-2020: Offshore wind basic science and balance of plant

Specific Challenge: The contribution of offshore wind power to the energy mix is expected to increase significantly by 2030. Better knowledge of basic wind energy science and related areas contributes to the cost reductions required to achieve that goal.

Scope: Proposals are expected to address one or more of the following research areas for offshore wind which have been identified in the SET-Plan Implementation Plan100:

- Atmospheric multi-scale flow modelling (from meso-scale to wind farm flows);

- Understanding and modelling key uncertainties and physical phenomena of offshore wind energy design and operation (e.g. fluid-structure, soil-structure and electro-mechanical interaction, large motion prediction, turbulence, wave modelling, mooring line behaviour);

- High performance computing and digitalisation (e.g. data processing, machine learning and data analytics methods for implementation in data -driven design, digital twins and control and monitoring for O&M);

- Development and validation of models of structural damage and degradation for offshore wind turbines and/or for their components as functions of loads and environment;

- Numerical and test methods for accurate assessment of system and component reliability when introducing new materials and technologies;

- Other offshore balance of plant aspects related to the manufacturing, construction, installation and/or decommissioning of large-scale wind turbines.

While offshore wind must be the cornerstone of the proposal addressing any bullet point above, onshore wind may also be covered when synergies may be exploited from including both. This is just a possibility and not a requirement.

'Materials science', which is also mentioned in the SET-Plan Implementation Plan, is outside the scope of this topic, but is addressed under topic LC-NMBP-31-2020.

*The proposals are expected to bring new technologies/models/methods to **TRL 4-5**.*

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 4 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals should lower the Levelized Cost of Energy (LCOE); those addressing any of the first four bullet points above should also aim to increase the market value of wind power101

Type of Action: Research and Innovation action

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

LC-SC3-RES-19-2020: Demonstration of innovative technologies for floating wind farms

Specific Challenge: The first commercial-scale floating wind farm has recently come into operation and other floating wind farms initiatives are ongoing. Floating wind farms have significant potential but further efforts are needed to drive the costs down and to fully commercialise and industrialise the technology.

Scope: Proposals will focus on the demonstration of floating offshore wind innovations (such as blades, floaters, moorings, electrical subsystems and cabling, monitoring systems, and/or integrated systems, including whole wind turbines specifically conceived for floating offshore), in view of scaling-up power rating to >10 MW. Different sea and weather conditions shall be considered. Proposals shall improve industrial design and manufacturing processes, installation methods and operation & maintenance.

*Proposals are expected to bring the technology(ies) to **TRL 6-8**.*

The Commission considers that proposals requesting a contribution from the EU of up to 25 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Decrease the Levelized cost of Energy (LCOE) and environmental impacts while increasing market value of floating wind power109. ,

Type of Action: Innovation action

Offshore wind projects can also receive funding from more horizontal programmes under the other two priorities (Industrial Leadership and Excellence Science) of H2020:

- Industrial Leadership includes the **InnovFin** programme[10] which covers a wide range of loans, guarantees and equity-type funding, which can be tailored to innovators' needs. Innovations can come from SMEs, large companies or research institutions.
- Under the Industrial Leadership as well, SMEs and start-ups can find funding support by means of the **EIC Accelerator Pilot[11].** This programme supports close-to-market activities, including feasibility assessment purposes, grants for demonstration purposes, equity, business coach and a wide range of other business acceleration services.
- Excellence Science has programmes for basic research, such as **Future Emerging Technologies**, support of **Research Infrastructures** and the **Marie Skłodowska-Curie Actions**[12] for skills and career development.

4.2.2 ERA-NET Cofund

The goal of ERA-NET schemes is to promote cooperation among scientific research funding agencies, ministries and/or research institutes (as programme managers) of European Union Member States as well as associated and third countries. ERA-NETs ultimately aim at reversing the ongoing fragmentation of the European Research Area (ERA) by improving the coherence and coordination of national and regional research programmes, and fostering transnational collaboration among researchers.

[10] https://www.eib.org/en/products/blending/innovfin/index.htm
[11] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/eic-accelerator-pilot
[12] https://ec.europa.eu/research/mariecurieactions/node_en

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Although ERA-NETs' coordination is supported by the European Commission, funding of research projects is covered by each participating country.

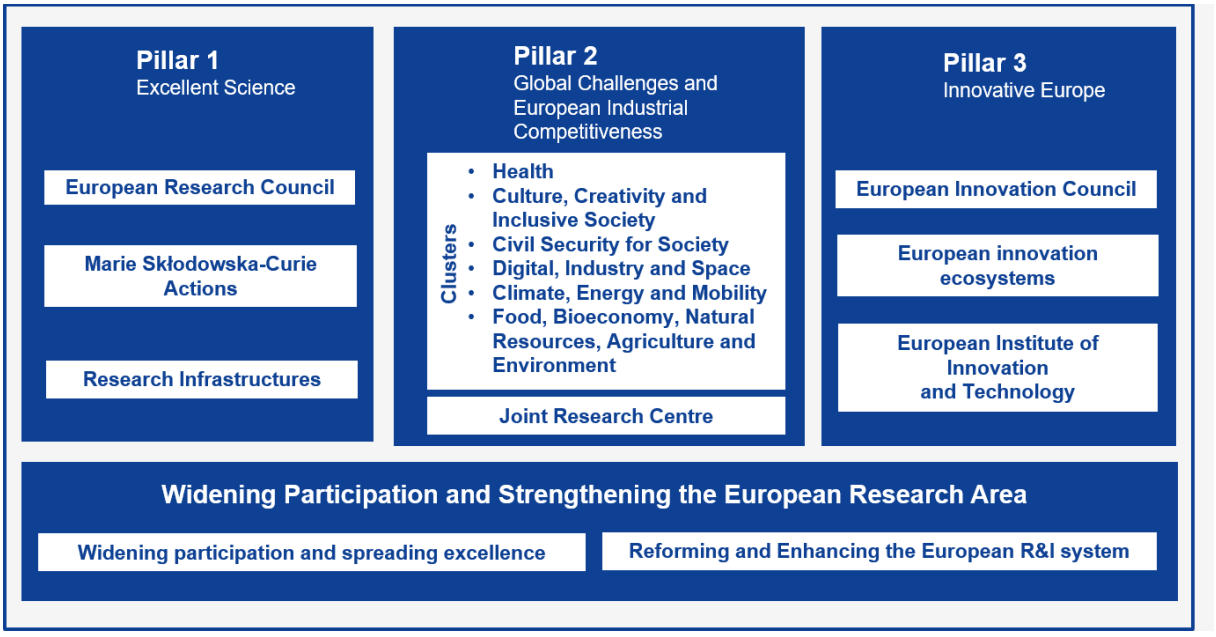
Most of these ERA-NETs are of specific thematic scope. E.g. the Ocean Energy ERA-NET Cofund[13], designed to support Collaborative Innovation in the Ocean Energy Sector, is an initiative of eight national and regional government agencies from six European countries, which has received funding from the European Union under the Horizon 2020 Programme for Research and Innovation. The participating countries/regions are: the Basque Country, Brittany, Ireland, Pays de la Loire, Portugal, Scotland, Spain and Sweden.

The aim is to coordinate support for research and development in ocean energy, to encourage collaborative projects that tackle some of the key challenges identified for the sector as it progresses towards commercialization.

Key objectives are to maintain and grow Europe's world leading position in ocean energy, to help bring innovative low carbon energy solutions closer to commercial deployment, drive down the levelised cost of energy (LCoE), create growth and jobs and reduce the environmental impact of the energy system.

4.2.3 Horizon Europe

Horizon 2020 is now close to finish, but the European Commission is already working on a new framework programme, entitled **Horizon Europe**. It is an ambitious €100 billion research and innovation programme to succeed Horizon 2020[14] with three similar pillars "Excellent Science", "Global Challenges and European Industrial Competitiveness" and "Innovative Europe". It is expected that Horizon Europe will be officially launched in January 2021.



[13] https://www.oceancofund.eu/
[14] https://ec.europa.eu/info/horizon-europe-next-research-and-innovation-framework-programme_en

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Figure 3. Preliminary structure of Horizon Europe

4.2.4 Other European Programmes

The European Commission has other programmes to support R&D outside Horizon 2020. Related to marine renewables, the **European Maritime and Fisheries Fund (EMFF)**[15] (2014-2020) is one of the five European Structural and Investment (ESI) Funds which complement each other and seek to promote a growth and job-based recovery in Europe. Among others, this fund supports coastal communities in diversifying their economies and finances projects that create new jobs and improve quality of life along European coasts. The EC has proposed a new fund to invest in the maritime economy for the next long-term EU budget 2021-2027[16].

Offshore wind projects can also be funded by **EUROGIA2020**[17], since it supports and promotes international partnerships developing innovative projects in low-carbon energy technologies. EUROGIA2020 is a cluster of the EUREKA network, a decentralized intergovernmental initiative started in 1985 to enhance European competitiveness by supporting businesses, research centers and universities that take part in trans-national projects. EUROGIA2020 addresses all innovative energy technologies that will i) reduce the carbon footprint of energy production and use and ii) develop new technologies for energy such as solar, **wind,** biomass, geothermal, energy efficiency, etc.

EIT InnoEnergy[18] provides additional funding opportunities. InnoEnergy advocates sustainability as more than a mean to lower emissions, by envisaging sustainability as an industry that's commercially viable, endlessly innovative, and highly competitive. InnoEnergy thus supports sustainable energy innovations which provide industry with risk free, pioneering new technologies that reduce energy costs, increase system performance, decrease greenhouse gas (GHG) emissions, create jobs, and increase competitiveness.

4.3 OTHER FUNDING OPTIONS

Different institutions and private companies offer other types of funding options (loans, equity, guarantees, collaboration programmes, etc), such as:

- EIB (European Investment Bank)[19]
- For Small and Medium enterprises:
  - IAPMEI Agência para a Competitividade e Inovação (Competitiveness and Innovation Agency)[20]
- For start-ups:
  - EDP Starter[21]
  - Acciona I'MNOVATION[22]

[15] https://ec.europa.eu/fisheries/cfp/emff_en
[16] https://europa.eu/rapid/press-release_IP-18-4104_en.htm
[17] http://www.eurogia.com/
[18] https://www.innoenergy.com/
[19] https://www.eib.org/en/
[20] https://financiamento.iapmei.pt/inicio/home
[21] https://www.edpstarter.com/
[22] https://www.imnovation.com/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

4.4 GENERAL INFORMATION

Other sources that provide information for developing projects in Portugal are:

- Fórum Oceano (Association of Maritime Economy)[23]
- APREN (the Portuguese Renewable Energy Association)[24]

5 MATCHING OF FUNDING NEEDS AND FUNDING OPTIONS IN PORTUGAL

The development of a whole wind energy sector in Portugal will require a wide range of funding opportunities. Ideally, Portuguese research organisations and industrial companies (including start-ups, SMEs and large companies) should have access to all the funding mechanisms described in chapter 3. The following table summarises the availability of funding options, identified in chapter 4:

Funding Mechanism	**Available in Portugal**	
	Portugal	Europe
Pure research / Basic Science (low TRLs)	Fundo Azul Portugal 2020 COMPETE 2020 FCT	H2020 – Future Emerging Technologies
Applied Research & Technology Development (medium TRLs)	Fundo Azul Portugal 2020 COMPETE 2020 FCT	H2020 - Secure, clean and efficient energy EUROGIA2020
Demonstration & Pilot projects (high TRLs)	Fundo Azul Portugal 2020 COMPETE 2020 FCT	EMFF EUROGIA2020 InnovFin EIC Accelerator Pilot
Pre-Commercial Procurement (PCP)	Fundo Azul Portugal 2020 COMPETE 2020	InnovFin
Innovation for commercial technologies	Fundo Azul Portugal 2020 COMPETE 2020 FCT	InnoEnergy EIC Accelerator Pilot
Market uptake	Fundo Azul Portugal 2020 COMPETE 2020	InnoEnergy EIC Accelerator Pilot
Support to investments	Fundo Azul Portugal 2020 COMPETE 2020	
Support to entrepreneurs and start-ups	Fundo Azul Portugal 2020 COMPETE 2020	InnoEnergy EIC Accelerator Pilot
Skill development training	FCT	H2020 Marie Skłodowska-Curie Actions

[23] http://www.forumoceano.pt/p92-concursos-abertos-e-programas-de-financiamento-pt
[24] https://www.apren.pt/

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The table in Chapter 5 shows that there are funding opportunities in Portugal (National or European) for the different stages of research and technology development, including market uptake for near commercial technologies.

The main gaps that were identified respect to the lack of schemes specifically dedicated to the support to investment, as well as to supporting start-ups and other entrepreneurs in the field of offshore wind energy. Existing funding schemes for that purpose seem to be too diluted across and even prioritizing other sectors. Portugal is showing signs of re-emerging from a context of economic crisis, and there are signs of political willingness to reinvest in the ocean sector, aiming at fostering the export of products and services of significant added value to the global market, boosting the development of a value chain grounded on a highly qualified workforce, increasing the current employment in the active sectors, and ultimately revitalizing a dormant ocean-based industry and existing infrastructures in the country. In this framework, it is desirable and expected that policies to foster the investment in offshore wind may surface in the coming years.

This report collects funding opportunities available at the time it was prepared (September 2019). Further options are likely to emerge or changes in the current ones can be introduced by the funding organisations. Detailed information on updates, informative sessions, etc., aligned with TWIND's objectives, will be included in the project website.

6.2 RECOMMENDATIONS

As mentioned in the previous section, this report only contains information available at the time it was prepared, so the first recommendation is the **continuous screening** of new funding opportunities, in particular from the new Horizon Europe programme.

Attendance to **information days** on funding programmes, industrial **workshops** and offshore wind **conferences**, subscription to **EC notifications**, participation in offshore wind **committees or interest groups** and if possible **direct interaction with public funding organisations**, in particular the respective National Contact Points in Portugal, are crucial to stay updated on funding opportunities.

When looking for R&D funding opportunities, **understanding the programme conditions** is very important in particular regarding the application in terms of technology development stage (sometimes the funding programme specifies the expected TRL to entry and exit the project). A typical mistake is trying to fund a low TRL technology with programmes looking at more mature technologies or the other way around.

Another typical mistake is **misunderstanding the goal of the funding programme** adapting it to our objectives. Once the funding programme is public we should not readapt it or reinterpret it to our needs. Rather the opposite, we should adapt our project idea to the conditions of the programmme. In case of doubt, the **contrast with the public funding agency** can be very useful.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

The moment to adapt the conditions of the funding programme to our need is when it is under preparation and it is not published yet. Funding agencies usually allow suggestions and inputs to draft versions of the programmes during its preparation. For that purpose, the **participation in expert groups** such as the EERA JP Wind or **lobby organisations** such as WindEurope is recommended. In case of Portuguese funding agencies, the identification of this type of groups is also recommended.

The next graph tries to summaries the message of trying to bring the funding programme to our needs when it is still under preparation and, on the contrary, moving/adapting our project objectives to the funding programme goals once it is published.

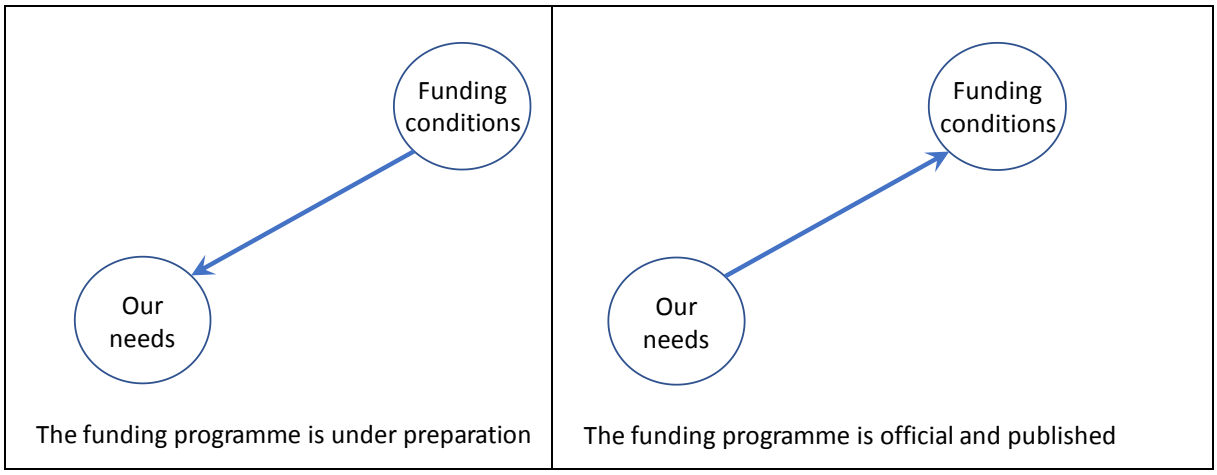


Figure 4. Basic approach to align our project with a funding opportunity

When possible, an **active contribution with suggestions of new funding options** is recommended rather than a reactive position waiting for requesting feedback from funding agencies. For that purpose, the preparation of a **strategic agenda to support R&D projects on offshore wind** in Portugal would be instrumental. WavEC could potentially lead this action in collaboration with other Portuguese stakeholders and aligned with the European Strategic Research and Innovation Agenda[25] published by ETIP Wind in 2018.

6.3 CASE STUDIES

This section includes some examples of R&D projects on offshore wind funded by public programmes in Spain, the UK, the Netherlands and Portugal, which can be used to inspire R&D projects to be promoted by WavEC with both National and European scopes.

Examples from Spain

ROMEO

[25] https://etipwind.eu/wp-content/uploads/2018-Strategic-Research-Innovation-Agenda.pdf

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Reliable OM decision tools and strategies for high LCoE reduction on offshore wind

Funding Programme: **Horizon 2020**, under the call topic Low Carbon Energy LCE- 13-2016

Total Budget: 16.4 million euros, of which 10 million are financed by the EU

Type of Funding: Applied Research + Demonstration (according to the project call, the proposals were expected to bring the technology from TRL 5 to TRL 7)

Project Objectives: to develop a platform for the analysis and management of the data obtained from the offshore wind power generation plants during their operation and use the data collected in the design of strategies that enable the operation and maintenance of the wind farms to be improved.

Duration: five years (started on 1st June 2017)

Beneficiaries: 12 recognised and experienced key players from 6 different EU member states and 1 associated country led by IBERDROLA RENOVABLES ENERGÍA. The consortium includes large companies (Electricité De France, Adwen, Siemens Gamesa, RAMBOLL, IBM Research – Zurich, INDRA, BACHMANN Monitoring,), SMEs (LAULAGUN Bearings, UPTIME Engineering and ZABALA Innovation Consulting) and a prestigious university (University of Strathclyde, Glasgow).

Impact (how the project helps offshore wind in Spain): The main impact of the project is the reduction of wind energy LCoE by means of optimising O&M. This impact is for whole Europe, but the project is helping a Spanish company, such as Iberdrola, to be more competitive in an international market.

SATH: New twin floating platform for offshore wind turbines

Funding Programme: **Horizon 2020, SME Instrument**

Total Budget: 1.902.337,5 €

Type of Funding: Applied Research + Demonstration (around TRL6)

Project Objectives: to build and deploy a 1:6 prototype of its SATH (Swinging Around Twin Hull) design for a 24-month offshore testing programme to de-risk a 2MW demonstrator, known as DemoSATH, in Q3 2020.

Duration: 24 months

Beneficiaries: SAITEC Offshore

Impact (how the project helps offshore wind in Spain): The project will allow to make progress in the technology development of a Spanish innovative solution for floating wind.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Desarrollo de un aerogenerador flotante para su demostración a escala real en BiMEP

Funding Programme: **HAZITEK (Basque regional funding programme)**

Total Budget: 3,2 M€ (40% funded by the HAZITEK programme)

Type of Funding: Applied Research (around TRL5)

Project Objectives: The main objective of the project is the development of design engineering and the construction strategy of a full-scale floating wind turbine.

Duration: 2 years (July 2017 – June 2019)

Beneficiaries: Nautilus Floating Solutions, Ormazabal, Iberdrola, NEM Solutions, Astilleros de Murueta, Erreka, Nervion Industries, HWS Concrete Towers, Navacel, UniportBilbao, Vicinay, CT Ingenieros, Cluster de Energía y Foro Marítimo Vasco

Impact (how the project helps offshore wind in Spain): The project proposes a horizon of cost reduction in the medium term so that the floating offshore wind reaches an LCoE (Levelized Cost of Energy) that allows it to compete with other sources of renewable generation. The consortium, a group of Basque companies led by a technology developer (Nautilus Floating Solutions) will improve its competitive position.

Examples from UK

Multi-Platfrom Inspection, Maintenance and Repair in Extreme Environments (MIMRee)

Funding Programme: **InnovateUK**

Total Budget: £4.2 million

Type of Funding: Applied Research + Demonstration

Project Objectives: The project combines expertise from the fields of robotics, non-destructive testing, artificial intelligence, space mission planning, marine and aerial engineering and nanobiotechnology. It aims to prove that offshore wind operations and maintenance missions can be conducted by autonomous vessels, aerial vehicles and crawling robots.

Duration: 2 Years

Beneficiaries: ORE Catapult, Thales, The Royal College of Art, Royal Holloway, University of Bristol, University of Manchester, Plant Integrity Ltd, Wootzano Ltd.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Impact (how the project supports offshore wind in the UK): The main impact of the project is to reduce LCOE and de-risk O&M by replacing human operations with robotic systems.

Advanced integrated control of large-scale Wind Power Plants and Wind Turbines (**TOTAL CONTROL**)

Funding Programme: H2020-LCE-2016-2017

Total Budget: €4.87 million

Type of Funding: Applied Research + Demonstration

Project Objectives: The project aims to develop control strategies to maximise the life-cycle of wind power plants. These strategies will be validated through field tests.

Duration: 4 years

Beneficiaries: DTU, KU Leven, Sintef, DNV-GL, Vattnefall, Siemens Gamesa, Equinor, ORE Catapult

Impact (how the project supports offshore wind in the UK): Increasing the reliability and lifetime while decreasing operation and maintenance costs, hence creating new business opportunities; reducing the failure rate and therefore resulting in less operation in maintenance

Examples in The Netherlands

Excellence in Uncertainty Reduction of Offshore wind Systems (EUROS)

Funding Programme: Dutch NWO Perspective programme

Total Budget: 3.4MEuros

Type of Funding: Public-private collaboration

Project Objectives: The main goal is to reduce uncertainties in offshore wind that cause over-conservative safety factors in design, and similarly to improve the efficiency in installation and maintenance logistics by applying the most advanced planning and costing models. Cost reduction is essential for further large scale introduction of offshore wind energy. For the Netherlands alone, a cost reduction of 1% already amounts to 180 million euro for investments foreseen in the National Energy Agreement.

Duration: 5 years

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Beneficiaries: TU Delft, TU/e, Wageningen University, CWI, ECN part of TNO, Deltares, KNMI, DNV-GL, Eneco, Fugro, IHC, Heerema Marine Contractors, Van Oord, Systems Navigator

Impact (how the project supports offshore wind in the country): The project develops tools and models that can be used as add-ons to existing design and planning software. In addition to the involvement of several industry players, this ensures rapid market implementation.

Aerodynamic blade improvements and boosting by add-ons (ABIBA)

Funding Programme: Dutch TKI Hernieuwbare Energie

Total Budget: 1.225 MEuros

Type of Funding: Dutch innovation in top sector renewable energy (offshore wind)

Project Objectives: To increase the performance of offshore wind turbines and lower the LCOE by developing and demonstrating innovative add-ons.

Duration: 3 years

Beneficiaries: TU Delft, 2B-Energy, FlowChange

Impact (how the project supports offshore wind in the country): The project uses numerical techniques, small-scale experiments and full-scale measurements to assess the effects of add-ons on a 2-blade wind turbine specifically designed to operate offshore. The small consortium involves a Dutch wind turbine manufacturer and a blade designer, which ensures direct impact on the development of offshore wind in the Netherlands.

Airborne wind energy: system modelling, control and optimisation

Funding Programme: H2020 MSCA ITN

Total Budget: 3MEuros

Type of Funding: Innovative Training Network

Project Objectives: This doctoral training network aims at further developing a novel concept of wind energy device: airborne wind energy (AWE), and train early-stage researchers to this new field. The idea of AWE is to replace the most efficient part of a conventional wind turbine by a fast flying efficiency kite.

Duration: 4 years

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Beneficiaries: TU Delft, University of Limerick, Technical University of Munich, KU Leuven, University of Freiburg, Ampyx Power, Xsens Technologies, EnerKite

Impact (how the project supports offshore wind in the country): Develop the skills of 14 doctoral students to work in wind energy at a European level.

Examples in Portugal

WINDFLOAT ATLANTIC

25 MW Offshore windfarm in Portugal[26]

Funding Programmes: The European Investment Bank (EIB) has granted in October 2018 a EUR 60 million loan, that will finance the floating wind farm with the support of the InnovFin Energy Demonstration Project facility, which is funded under the EU's current research and innovation programme Horizon 2020. In addition, the project will receive EUR 29.9 million from the EU's NER300 programme, and up to EUR 6 million from the Government of Portugal, through the Portuguese Carbon Fund.

Total Budget: 139 million €.

Project Objectives: The development of offshore wind energy supports EU and national targets for renewable energy generation and contributes to security of energy supply and environmental objectives.

Installation of the first turbine: July 2019

Beneficiaries: Windplus S.A., a subsidiary of EDP Renováveis (79.4%), Repsol S.A. (19.4%) and Principle Power Inc. (1.2%).

Impact: It´s the largest turbine ever to be installed on a floating platform. The cutting-edge technology from Principle Power, enables the installation of floating platforms in deep waters that were previously inaccessible, and where abundant wind resources can be harnessed.

[26] https://www.edp.com/en/windfloat

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

7 ANNEX I. LIST OF ABBREVIATIONS

EC - European Commission

EERA JP Wind - European Energy Research Alliance, Joint Programme on Wind Energy

ETIP Wind – European Technology and Innovation Platform on Wind Energy

H2020 - Horizon 2020

IAPMEI - Agência para a Competitividade e Inovação (Competitiveness and Innovation Agency)

LCoE – Levelised Cost of Energy

O&M – Operation and Maintenance

PCP - Pre-Commercial Procurement

R&D - Research & Development

SME – Small and Medium Enterprise

TRL – Technology Readiness Level

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631