

TWIND

Twinning for an Offshore Wind Energy Partnership

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D2.5 – A compendium of joint research publications



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1 EXECUTIVE SUMMARY

Deliverable 2.5 "A compendium of joint research publications" is a report produced in the context of Task 5.2 "Joint publications" of Work Package 2 related to the Capacitation and Networking of the TWIND project.

The TWIND project is a collaborative effort between partners in the offshore wind sector in Portugal and Europe to work on topics of importance to the industry. The project has created a robust network through think-tank meetings, staff-exchange programs, identification of funding opportunities, and the preparation of joint publications. Although the project did not produce as many joint research publications as initially anticipated, it has been successful in creating a collaborative network in the offshore wind sector, which will continue to yield benefits for years to come.

In 2022, the project partners were able to produce one scientific paper as a result of a staff exchange program between WavEC and TU DELFT, which was published in open access. This successful collaboration highlights the importance of staff exchange programs and other collaborative initiatives in the field of offshore wind research. This paper is included in Annex 1.



2 INTRODUCTION

Deliverable 2.5 “A compendium of joint research publication” is produced in the scope of Task 5.2 “Joint publications” of Work Package (WP) 2 related to the Capacitation and Networking of the TWIND project.

The TWIND project has benefited greatly from the collaboration between the partners and the respective senior researchers. Through their collaborative work, the project has been able to deliver collaboration on topics of importance to the offshore wind sector in Portugal and Europe.

The project partners, who have collaborated in the past, leveraged the existing relationship to create a robust network. While WavEC had limited collaboration with other leading offshore wind counterparts, TWIND's WP2 implemented concrete actions to enhance networking between WavEC and these institutions. These actions included think-tank meetings, staff-exchange programs, the identification of funding opportunities, and the preparation of joint publications. The goal was to expand the range of opportunities beyond the consortium.

Despite the strong collaboration between the project partners and the respective senior researchers, it should be noted that the project was not able to produce as many joint research publications as initially anticipated (10 scientific papers). On the one hand, this was due to the nature of the project, with a clear focus on other collaboration actions rather than pure research actions. The ineligibility of research costs within the project made difficult to assign the required efforts to produce peer-reviewed publications, which consequently led to the favouring of other networking activities. On the other hand, this enabled a larger industrial focus and the development of critical S&T capacities within WavEC to support the development of the industry in Portugal, which is the more relevant given the recent developments within the country. WavEC is effectively in a leading position in supporting the development of the offshore wind auctions announced by the Government, strongly contributing to push the country and its R&D and supply chain organizations into a prominent position in the offshore wind sector in Europe and worldwide. In addition, the collaboration efforts put in place by TWIND have paved the way for future joint research publications and have created a solid foundation for continued collaboration in the offshore wind sector.

Furthermore, the staff exchange programs and think-tank meetings have allowed the project partners to develop a deeper understanding of each other's research areas, which laid the foundations for more targeted and effective research efforts in the future. Overall, the TWIND project has been successful in creating a collaborative network in the offshore wind sector, which will continue to yield benefits for years to come.



3 COLLABORATIVE ACTIONS

In 2022, the TWIND project partners were able to produce one scientific paper that was published in open access. This paper was the result of a staff exchange program that was implemented between WavEC and TU DELFT, where WavEC's early-stage researcher was sent to the latter with the aim of networking and receiving training on computational fluid dynamics (CFD) for wave-structure interactions with a floating support structure for floating wind.

During his time at TU DELFT, this WavEC researcher was able to establish important connections and learn new techniques in CFD, which helped him to expand his knowledge and expertise in the field. These new insights and relationships ultimately led to the development of a joint scientific paper that was published in 2022.

The paper, titled "CFD code comparison, verification and validation for decay tests of a FOWT semi-submersible floater", was authored by a team of researchers from both WavEC and TU DELFT, including Rentschler, P. Chandramouli, G. Vaz, A. Viré, and R.T. Gonçalves. It was published in the Journal of Ocean Engineering and Marine Energy, and it presents the results of a CFD code comparison study that was conducted to validate the performance of a semi-submersible floater for floating offshore wind turbines.

Overall, the successful collaboration between WavEC and TU DELFT highlights the importance of staff exchange programs and other collaborative initiatives in the field of offshore wind research. By working together and sharing knowledge and expertise, researchers can make important strides in the development of new technologies and solutions that will ultimately benefit the entire offshore wind industry.

Furthermore, the TWIND project website features a dedicated BLOG section that highlights key aspects from some of the staff exchanges that occurred. Although these exchanges did not result in joint scientific publications, they demonstrate the significance of collaborative actions between the partners of the TWIND project. The BLOG can be found on the TWIND project website at <https://twindproject.eu/blog/>.

The think-tank sessions were also a crucial initiative that fostered collaborative thinking among senior personnel of the partner organizations regarding key issues for the Portuguese offshore wind sector. Through the think-tank meetings, the most significant gaps in the Portuguese offshore wind industry were identified, and research targets were recommended to address these gaps. The new research targets will allow WavEC to expand its research scope and enhance its capacity within the offshore wind field. The think-tank sessions will result in brochures that will be publicly available.

The scientific paper produced in the aim of TWIND and the blog is included in Annex 1.



4 CONCLUSIONS

In conclusion, the TWIND project's Deliverable 2.5 "A compendium of joint research publications" showcases the collaboration between the TWIND partners. The project has successfully produced collaboration on topics of importance to the offshore wind sector in Portugal and Europe, highlighting the lead provided by Portugal in offshore wind R&D efforts. The actions implemented under Task 5.2 of WP2, such as think-tank meetings and staff exchange programs, have enhanced networking between WavEC and other leading offshore wind counterparts, creating a solid foundation for continued collaboration in the offshore wind sector.

Although the project did not produce as many joint research publications as initially anticipated, the collaborative efforts put in place by TWIND have paved the way for future joint research publications. The staff exchange programmes, and think-tank meetings have allowed the project partners to deepen their understanding of each other's research areas, leading to more targeted and effective research efforts in the future. The TWIND project has successfully created a collaborative network in the offshore wind sector, which will continue to yield benefits for years to come.

The collaboration between WavEC and TU DELFT resulted in the successful publication of a joint scientific paper that highlights the importance of staff exchange programs and other collaborative initiatives in the field of offshore wind research. The paper presents the results of a CFD code comparison study that was conducted to validate the performance of a semi-submersible floater for floating offshore wind turbines. This successful collaboration demonstrates the potential for joint research efforts in the future and the importance of sharing knowledge and expertise to advance the offshore wind industry.

Overall, the TWIND project has been successful in enhancing collaboration among its partners, expanding research scope, and paving the way for continued collaboration in the offshore wind sector. The TWIND project has set a strong example for future collaborative initiatives in the offshore wind sector, emphasizing the importance of networking and knowledge-sharing to advance the field.



5 ANNEX I

OPEN ACCESS PAPER: <https://doi.org/10.1007/s40722-022-00260-z>



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CFD code comparison, verification and validation for decay tests of a FOWT semi-submersible floater

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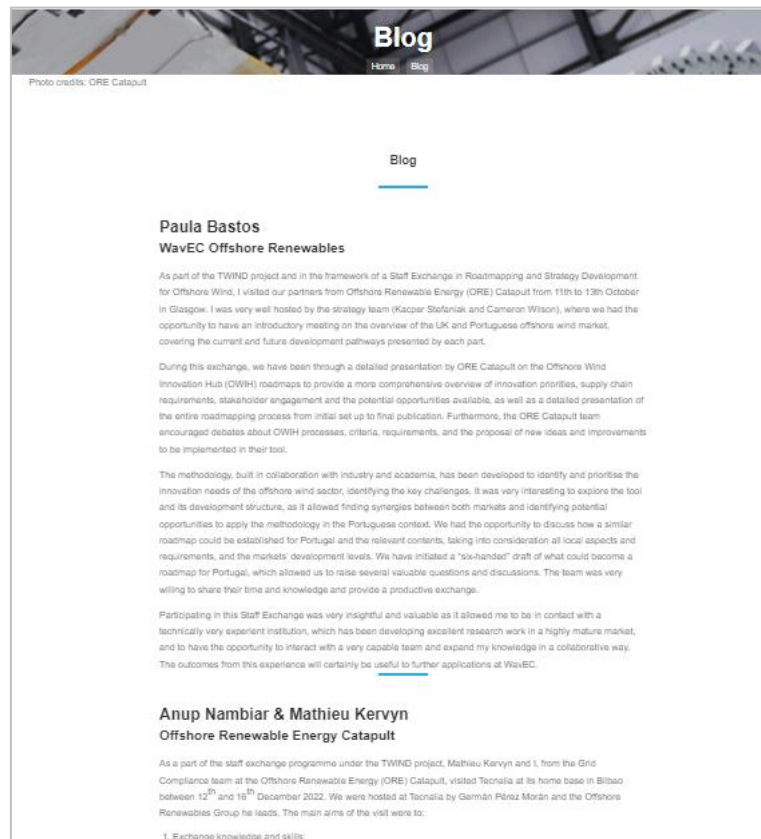
Abstract

With the advancement of high-performance computation capabilities in recent years, high-fidelity modelling tools such as computational fluid dynamics are becoming increasingly popular in the offshore renewable sector. To justify the credibility of the numerical simulations, thorough verification and validation is essential. In this work, preparatory heave decay tests for a freely floating single cylinder are modelled. Subsequently, the surge and sway decays of a linearly moored floating offshore wind turbine model of the OC₄ (Offshore Code Comparison Collaboration Continuation) phase II semi-submersible platform are simulated. Two different viscous-flow CFD codes are used: OpenFOAM (open-source), and ReFresco (community-based open-usage). Their results are compared against each other and with water tank experiments. For the single-cylinder decay simulations, it is found that the natural period is accurately modelled compared to the experimental results. Regarding the damping, both CFD codes are overly dissipative. Differences and their potential explanations become apparent in the analysis of the flow field data. Meanwhile, large numerical uncertainties especially in later oscillations make a distinct conclusion difficult. For the OC₄ semi-submersible decay simulations, a better agreement in damping can be achieved, however discrepancies in results are observed when restricting the degrees of freedom of the platform. Flow field data again reveals differences between the CFD codes. Meanwhile, through the

effort to use similar numerical settings and quantify the numerical uncertainties of the CFD simulations, this work represents a stepping stone towards fairer and more accurate comparison between CFD and experimental results.



TWIND BLOG: <https://twindproject.eu/blog/>



The screenshot shows a web browser view of the TWIND blog. At the top, there is a navigation bar with 'Home' and 'Blog' links. Below the navigation bar, the word 'Blog' is centered. The first article is by Paula Bastos, titled 'WavEC Offshore Renewables'. The second article is by Anup Nambiar & Mathieu Kervyn, titled 'Offshore Renewable Energy Catapult'.

Blog

Photo credits: ORE Catapult

Blog

Paula Bastos
WavEC Offshore Renewables

As part of the TWIND project and in the framework of a Staff Exchange in Roadmapping and Strategy Development for Offshore Wind, I visited our partners from Offshore Renewable Energy (ORE) Catapult from 11th to 13th October in Glasgow. I was very well hosted by the strategy team (Kacper Stefański and Cameron Wilson), where we had the opportunity to have an introductory meeting on the overview of the UK and Portuguese offshore wind market, covering the current and future development pathways presented by each part.

During this exchange, we have been through a detailed presentation by ORE Catapult on the Offshore Wind Innovation Hub (OWH) roadmaps to provide a more comprehensive overview of innovation priorities, supply chain requirements, stakeholder engagement and the potential opportunities available, as well as a detailed presentation of the entire roadmapping process from initial set up to final publication. Furthermore, the ORE Catapult team encouraged debates about OWH processes, criteria, requirements, and the proposal of new ideas and improvements to be implemented in their tool.

The methodology, built in collaboration with industry and academia, has been developed to identify and prioritise the innovation needs of the offshore wind sector, identifying the key challenges. It was very interesting to explore the tool and its development structure, as it allowed finding synergies between both markets and identifying potential opportunities to apply the methodology in the Portuguese context. We had the opportunity to discuss how a similar roadmap could be established for Portugal and the relevant contents, taking into consideration all local aspects and requirements, and the markets' development levels. We have initiated a "six-handed" draft of what could become a roadmap for Portugal, which allowed us to raise several valuable questions and discussions. The team was very willing to share their time and knowledge and provide a productive exchange.

Participating in this Staff Exchange was very insightful and valuable as it allowed me to be in contact with a technically very expert institution, which has been developing excellent research work in a highly mature market, and to have the opportunity to interact with a very capable team and expand my knowledge in a collaborative way. The outcomes from this experience will certainly be useful to further applications at WavEC.

Anup Nambiar & Mathieu Kervyn
Offshore Renewable Energy Catapult

As a part of the staff exchange programme under the TWIND project, Mathieu Kervyn and I, from the Grid Compliance team at the Offshore Renewable Energy (ORE) Catapult, visited Tecnalia at its home base in Bilbao between 12th and 15th December 2022. We were hosted at Tecnalia by Germán Pérez Morán and the Offshore Renewables Group he leads. The main aims of the visit were to:

1. Exchange knowledge and skills;

