

# Final report

## 1.1 Project details

<b>Project title</b>	Handbook of Ocean Wave Energy
<b>Project identification (program abbrev. and file)</b>	EUDP 2015-I
<b>Name of the programme which has funded the project</b>	Wave Energy
<b>Project managing company/institution (name and address)</b>	Aalborg University Dept. of Civil Engineering
<b>Project partners</b>	None
<b>CVR</b> (central business register)	29 10 23 84
<b>Date for submission</b>	31-08-2017

## 1.2 Short description of project objective and results

This project has involve the preparation and publishing of an open-access book giving a clear overview of all the main technical and commercial aspects that are involved with the development of wave energy converters. The book has been written by selected experts in the field, in order to ensure the highest standards of the content and for it to be useful for a broad audience, from developers, to investors.

The project has resulted in the publication of the book:

[Pecher, AFS & Kofoed, JP \(eds\) 2017, \*Handbook of Ocean Wave Energy\*. vol. 7, Springer. Ocean Engineering & Oceanography , vol. 7, Ocean Engineering & Oceanography \(electronic\), vol. 7, DOI: 10.1007/978-3-319-39889-1](#)

A hardcopy of the book has been sent to Hanne Thomassen. Furthermore, the book is freely available (thanks to this project) for download as eBook at

<https://link.springer.com/book/10.1007%2F978-3-319-39889-1>

where hardcopies are also available for purchase (currently at a price of €24.99).

Currently, a total of 31.800 combined downloads across all individual chapters (10 in total) has been made since the publication of the first version of the book in dec. 2016. This corresponds to roughly 3.000 full downloads of the book. The monthly download rate seems currently to be stable at around 3.000 chapter downloads, corresponding to roughly 300 full downloads pr. month of the book.

### In Danish:

Indeværende projekt involverer udarbejdelse og udgivelse af en open-access bog, der giver et klart overblik over alle væsentlige tekniske og kommercielle aspekter involveret i udviklingen af bølgeenergi konverteringsenheder. Bogen er skrevet af udvalgte eksperter inden for

området for at sikre højst mulig standard og for at gøre bogen anvendelig for et bredt publikum fra udviklere til investorer.

Projektet har resulteret i publikation af bogen:

[Pecher, AFS & Kofoed, JP \(eds\) 2017, \*Handbook of Ocean Wave Energy\*. vol. 7, Springer. Ocean Engineering & Oceanography , vol. 7, Ocean Engineering & Oceanography \(electronic\), vol. 7, DOI: 10.1007/978-3-319-39889-1](#)

Der er blevet sendt et eksemplar af bogen til Hanne Thomassen. Desuden er bogen gratis tilgængelig (takke være projektet) som e-bog til download på:

<https://link.springer.com/book/10.1007%2F978-3-319-39889-1>

hvor der også kan købes en hardcopy af bogen (nuværende pris €24,99).

Siden publikationen af den første version af bogen i december 2016 (indtil afrapportering, efterår 2017) er der på nuværende tidspunkt foretaget i alt 31.800 samlede downloads af alle individuelle kapitler (10 i alt). Dette svarer til ca. 3.000 fulde downloads af bogen. Den månedlige download-rate ser ud til at være stabil på ca. 3.000 kapitel-downloads svarende til ca. 300 fulde downloads af bogen.

### **1.3 Executive summary**

Wave energy has the potential to produce a significant amount of renewable energy in Denmark, Europe and globally, and this in the long run at a comparable price as of offshore wind turbines. Thereby, it has the potential to be a significant contributor the Danish (European and global) renewable energy mix. Renewable energy, including wave energy, has many advantages. Besides creating domestic jobs and reducing fossil fuel emissions, it will also make Denmark less dependent on foreign energy import and give Denmark more control on their energy prices. However, in order to make wave energy becoming reality and to have a sector that stands on its own, some significant efforts are still required from its different stakeholders: public entities, private investors, developers, etc.

This handbook aims to present the wave energy sector in a more clear and transparent way to all of these stakeholders, in order for them to understand each other better and thereby to increase collaboration. The book will present clear overviews of all technical and economic matters, with a strong emphasis on the following topics:

- What are the essential features that a WEC technology must contain to be economically viable (meaning cost-effective, reliable, efficient and maintainable).
- How to evaluate the potential of a WEC technology, in terms of cost and power production at different locations and stages of development. How to evaluate if the further development of the technology is justifiable towards the investors.
- What are the optimal development strategies of WEC. Which aspects of the technology need to be optimised at which point in its development.
- What has to be expected in terms of time and financial requirements to bring a technology to commercialisation?

It is difficult to find and have a very good overview of all these matters, as they are based on a combination of different and specific fields of expertise. Moreover, a lot of these topics are based on strong insights in the sector and thereby require expert visions. This book will therefore be written by selected experts in each respective field, in a way that makes it understandable by all stakeholders. Moreover, the handbook will be freely accessible and thereby provide a strong basis for all interested people in the field.

A total of 8 experts have contributed to writing the book (and this free of charge!). The costs covered by the current project are all related to the coordination, formatting and publishing

of the book (as a freely available eBook or hardcopy at an affordable price). Therefore, this project has enabled the last crucial effort combining all the hard and valuable work that has been done by all the collaborators, into a published book.

#### **1.4 Project objectives**

The objective of this project has been the preparation and publishing of an open-access book giving a clear overview of all the main technical and commercial aspects that are involved with the development of wave energy converters.

#### **1.5 Project results and dissemination of results**

The project has resulted in the publishing of the book

[Pecher, AFS & Kofoed, JP \(eds\) 2017, \*Handbook of Ocean Wave Energy\*. vol. 7, Springer. Ocean Engineering & Oceanography , vol. 7, Ocean Engineering & Oceanography \(electronic\), vol. 7, DOI: \[10.1007/978-3-319-39889-1\]\(#\)](#)

A hardcopy of the book has been sent to Hanne Thomassen. Furthermore, the book is freely available (thanks to this project) for download as eBook at

<https://link.springer.com/book/10.1007%2F978-3-319-39889-1>

where hardcopies are also available for purchase (currently at a price of €24.99).

The process of getting the book published took a lot longer than initially expected. The first final draft of the book was handed to the publisher in Feb. 2016. From there on, small revisions were made, especially to figures, and publisher was finalizing the print of the book. The final print of the book was finally available from publisher (and placed online) Dec. 2016. This published version of the book unfortunately still had a few minor errors, and an erratum ([https://link.springer.com/chapter/10.1007%2F978-3-319-39889-1\\_11](https://link.springer.com/chapter/10.1007%2F978-3-319-39889-1_11)) was made and the final updated version of the book was made available in March, 2017.

#### **1.6 Utilization of project results**

The book has been very well received in the ocean wave energy community, which is also witnessed by the download figures. Currently, a total of 31.800 combined downloads across all individual chapters (10 in total) has been made since the publication of the first version of the book in dec. 2016. This corresponds to roughly 3.000 full downloads of the book. The monthly download rate seems currently to be stable at around 3.000 chapter downloads, corresponding to roughly 300 full downloads pr. month of the book.

#### **1.7 Project conclusion and perspective**

The project has successfully been concluded with the final publication of the book. It has been very well received and been downloaded more than 3.000 times, and it seems the download rate has stabilized around ~300 downloads a month.

The book is actively being used by its authors (and probably others as well), e.g. in connection with educational activities. As an example hereof, a PhD course on Numerical and experimental modelling and control of Wave Energy Converters organized by AAU and held at Mære, UCC, Ireland during the first week of September 2017, will be using the book as the main reference for the course. See more regarding this course at the webpage:

<http://www.waveenergy.civil.aau.dk/phdcourses/>

It is the expectation that the book will be an important reference for the authors and the sector in the years to come.

#### **Annex**

Relevant links

eBook available at:

<https://link.springer.com/book/10.1007%2F978-3-319-39889-1>

Book page at VBN (AAU research portal):

[http://vbn.aau.dk/en/publications/handbook-of-ocean-wave-energy\(838004a2-3bcf-44e8-908d-151711b9da31\).html](http://vbn.aau.dk/en/publications/handbook-of-ocean-wave-energy(838004a2-3bcf-44e8-908d-151711b9da31).html)

Download metrics for the book:

<http://www.bookmetrix.com/detail/book/c253245f-be1b-431f-8280-9d89e532a333#downloads>