

"Our offshore activities largely depend on our ability to deliver reliable wind farms and to cut the cost of energy. We believe that a close partnership with the shipbuilding industry and the steel sector is crucial. This is why we are actively participating in the establishment of the Lindoe Offshore Renewables Center at the Lindø site".

*Anders Søe-Jensen, President, Vestas Offshore A/S*

## 3 x 20 = green growth

Europe has committed itself. 20-20-20 targets are ambitious and absolutely necessary if we are to protect our climate. However, we will not achieve these targets unless we focus intensely on green energy from the blue ocean.

With the 20-20-20 strategy, Europe can become the world's leading region in the field of shrewd green growth for the 21st century. All we need to do is stick to the targets.

Imagine that a third of all the EU's electricity can be produced by renewable energy sources by 2020. This is the EU commission's estimate. Wind power stations alone will account for 12% of the production and a large part of this will be produced offshore. In round figures, 10,000 turbines must be established at sea over the next 10 years!

This is huge, and our goal is twofold: to protect the climate and to end our dependence on fossil fuels. This could be no less than a technological and industrial quantum leap: A new green industrial revolution for the 21st century. Our ability to industrialize and produce electricity from wind power at sea, at depths of 30-50 meters, will be of crucial importance.

We do not have this capacity today, however, and it will require new and targeted efforts in knowledge generation, innovation, and testing. Denmark's new center for offshore renewable energy will play a significant role in this. The aim of the center is to build a bridge between research and industry, and to ensure the link that is required for developing and industrializing the next generation of offshore wind turbines.

The Lindoe Offshore Renewables Center will play a crucial role in ensuring a completely new, green perspective on industry with advanced, new technology and the creation of millions of new jobs – and cheap, new green energy!

*Poul Nyrup Rasmussen, Chairman, Lindoe Offshore Renewables Center*

## LORC is...

...founded by the biggest players in the industry of offshore green energy.

### The board of LORC:

Chairman: **Poul Nyrup Rasmussen**, former Prime Minister of Denmark

Vice Chairman: **Jesper Øhlenschläger**, CEO, Skykon A/S

**Lars-Erik Brenøe**, Executive Vice President, A.P. Møller - Mærsk A/S, Chairman, Odense Steel Shipyard

**Jørgen Mads Clausen**, Chairman, Wave Star A/S

**Anders Eldrup**, CEO, DONG Energy A/S

**Niels Møller Jensen**, Director, Head of Technology and Procurement, Vattenfall Vindkraft A/S

**Siemens Wind Power A/S**

**Jens Oddershede**, President, Syddansk Universitet

**Anders Søe-Jensen**, President, Vestas Offshore A/S

Observer: **Jan Hylleberg**, CEO, Vindmølleindustrien



## Lindoe Offshore Renewables Center

- Reducing the Cost of Energy with Industrialization



"We have done it before and we can do it again - investing in the development of a green industry. The green offshore industry is the key to that initiative Europe is in so dire a need for: the creation of millions of jobs, a burgeoning industrial sector and a better climate as a bonus"

*Poul Nyrup Rasmussen, former Prime Minister of Denmark and Chairman of the Lindoe Offshore Renewables Center*

### Lindoe Offshore Renewables Center

Kystvejen 100  
5330 munkebo

Telefon: +45 70 230 430

E-mail: [lorc@lorc.dk](mailto:lorc@lorc.dk)



"Years of experience have transformed the Lindø shipyard into a world-class center for the treatment of steel. Lindø's know-how in the field of, e.g., welding, is incomparable. Due to the shipyard's unique potential for transport on-site, lifting capacity, and debarkation, Lindø is an obvious location for the green offshore industry, with LORC as the dynamic focal point".

*Lars-Erik Brenøe, Executive Vice President, A.P. Møller - Mærsk A/S,  
Chairman, Odense Steel Shipyard*



## Harvesting of offshore green energy

**LORC** is Denmark's leading center focusing on the research, test, and demonstration of technology related to the harvesting of offshore green energy. LORC lays the bridge from university spin-outs to global blue chip companies, SMEs, and start-ups – from research to actual production, from the test bench to actually providing consumers with low cost green energy.

**LORC** aims at repeating the industrial adventure of renewable energy from onshore turbines by referring to the offshore industry as unique. Generating offshore renewable energy is not a simple question of adapting onshore turbines to offshore conditions or transferring experiences from the oil and gas industry. Offshore Green Energy is a unique business – LORC accelerates its development.

**LORC** offers 1:1 testing and world-class research and development. LORC's staff of engineers can be hired to carry out activities for companies. In addition, LORC participates in co-financed research and development projects. Regardless of whether the activity is development related to production, transport, installation, or operations and maintenance, the goal is always the same: a lower cost of energy.

**LORC** is located at the heart of the A.P. Møller-Mærsk A/S owned Lindøe Industrial Park, with an ideal location close to the main sailing route between the North Sea and the Baltic Sea. This well-known shipyard has ideal facilities and unique opportunities for 1:1 scale testing and demonstration.

**LORC** has a dynamic and close co-operation with the companies that have started the production of offshore green technology at Lindø and stands at the center of the shipyard's turn-around to a leading European center for offshore green energy.



## Facilities at Lindø



### Transportation:

- 1,100 t transportation capacity, 5 self-propelled modular transporters with a connection possibility, 3 terminal tractors/Sisu transporters (70t), 4 loaders (6 t), multiple beds. The site has its own harbor with a depth of 7.5 m.



### Steel Structure Production:

- Offloading of steel: 1 tower crane, 90 t, 150 m quay side
- Steel plate inventory management: 4 x 20 t magnetic cranes, capacity 50,000 t steel
- Blasting and priming: Blasting machine, Priming machine, breadth of plates 3.2 m, capacity 150,000 t/year
- Cutting and milling: 23 cranes of 0.5 to 22 t (11 magnetic, 10 hook, 1 vacuum, and 1 service), 20,000 m<sup>2</sup>, 2 profile cutting robots, 8 cutting machines and length of plates 16 m
- Assembly: 20 cranes of 1 to 700 t, 60,000 m<sup>2</sup> in total
- Surface treatment: 8 cabins of 34 \* 34 m = 9,000 m<sup>2</sup>, painting and sandblasting equipment, dry ice blasting
- Outfitting shops: 2 cranes of 60 t, 3,000 m<sup>2</sup> indoor facility
- 100,000 m<sup>2</sup> + potentially 120,000 m<sup>2</sup> more



### Component production:

- +20 cranes of max. 5 t, 5,000 m<sup>2</sup>, welding machinery, bending machinery



### Pipe production:

- 5,000 m<sup>2</sup>, welding machinery, bending machinery, diameter 1 m, length 6 m



### Dock facilities:

- 1 gantry crane of 1,000 t, 3 tower cranes of 100 t, 1 tower crane of 50 t, 8 m in dock 3

## Research, testing, and demonstrations

The Lindøe Offshore Renewables Center conducts 1:1 testing and performance trials/demonstrations of products and processes for companies. The center develops concepts, products, and processes for,

and in collaboration with, authorities and companies in contract-based innovation projects, development projects, and classic research projects.

## Industrialization

Industrialization is central in achieving the goal of manufacturing, installing, and operating approximately 10,000 turbines offshore by 2020. Industrialization is one of the core

competences of the Lindøe Offshore Renewables Center, Denmark's leading center for the testing and demonstration of technology harvesting renewable energy offshore.

## Partners

The Lindøe Offshore Renewables center works with the world's leading companies and scientists in the field of offshore wind power. Companies such as Vestas Wind Systems A/S, Siemens Windpower A/S, DONG Energy A/S, Skykon A/S, and Vatten-

fall Vindkraft A/S and research institutions such as Risø, the Technical University of Denmark, Aalborg University, and the University of Southern Denmark are some of the active participants.