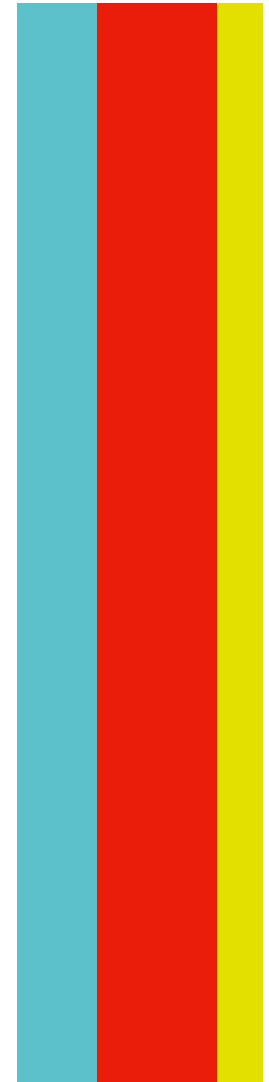


Holger Matthiesen  
23rd of May, 2019

# Offshore Windfarm Arkona - Milestones and Outlook

Offshore Wind Power Workshop, 23rd of May 2019

Hafenclub Hamburg

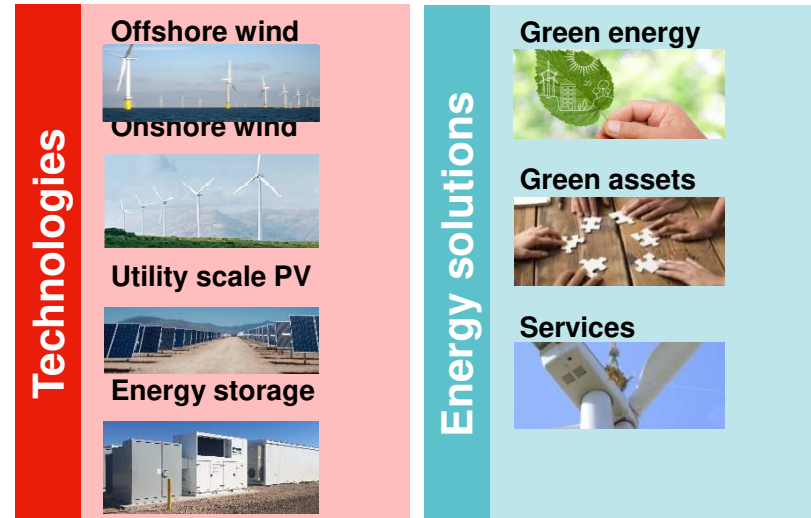
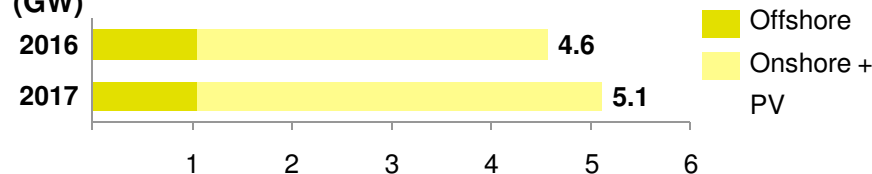


# Renewables at a glance

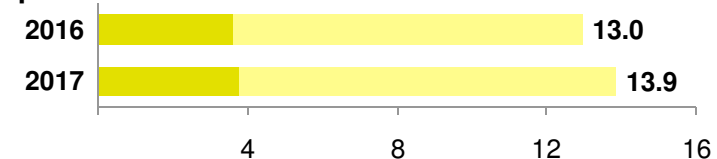
## What we do

- We are among the largest renewable energy players in our core markets (Europe and US)
- Our strategic focus is to grow at scale in onshore wind, leverage our existing options in offshore wind, rise from boutique to industrial with a Capex-light solar business, and grow the utility-scale energy storage business
- We are one of the global leaders in developing, constructing, operating and owning utility-scale renewable projects
- We provide third-party services<sup>1</sup> to our clients with an owner's eye
- We holistically manage the commercial and technical risks and partner with investors on existing assets and projects under development, allowing us to maximize value
- We have successfully realized ~ 8 GW of renewable energy projects since inception in 2008
- 1,300 E.ON employees work in Renewables

## Owned capacity<sup>2</sup> (GW)



## TWh produced<sup>2</sup>



1. Operations & Maintenance, Asset Management and Energy Management via our "E.ON Energy Services" department

2. Pro rata

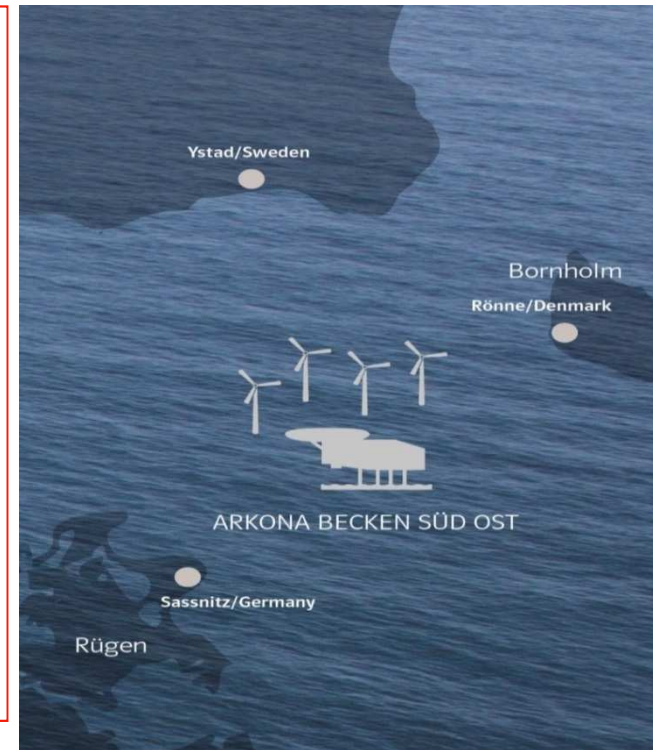
# Arkona



ARKONA

## Arkona – Project Overview

- **Location:** Baltic Sea, Exclusive Economic Zone Germany
- **Distance to shore:** app. 35 km
- **Water depth:** 23–37 m
- **Capacity:** 385 MW
- **Technology:** Siemens 60 x 6.0 MW-154 PB HWRT, DT LEP
- **Foundation:** Monopiles + Transition Piece
- **Investment:** 1,2 billion EUR
- **Construction and Operations port:** Port Mukran (Sassnitz/Germany)



## Arkona – Shareholders

- Arkona is a project owned 50% by E.ON and 50% by Equinor.
- E.ON has already constructed 8 major offshore wind projects.
- Equinor has long experience in offshore oil and gas and is currently constructing 3 major offshore wind projects.
- E.ON Climate & Renewables Services has the responsibility for constructing and operating the wind farm on behalf of the joint venture.

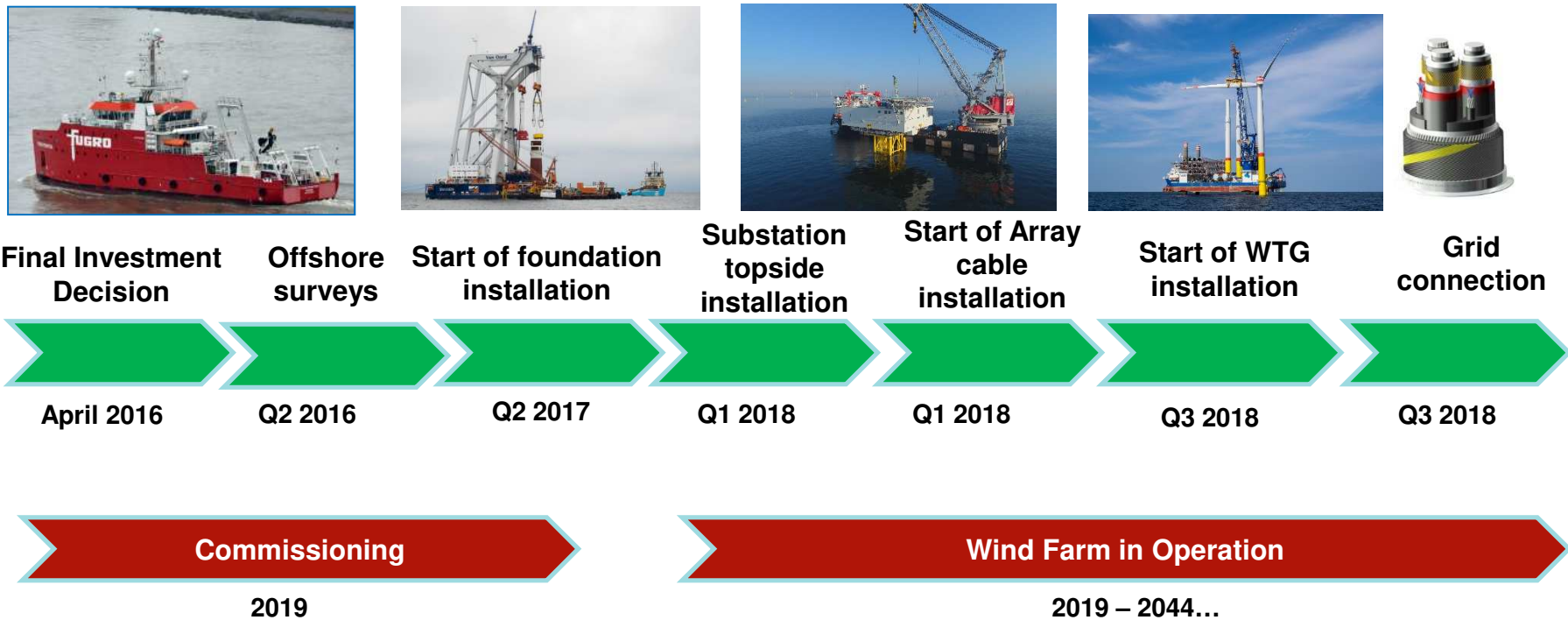




## Arkona – Safety first



# ARKONA - Project Schedule



## Arkona: Value added in the region

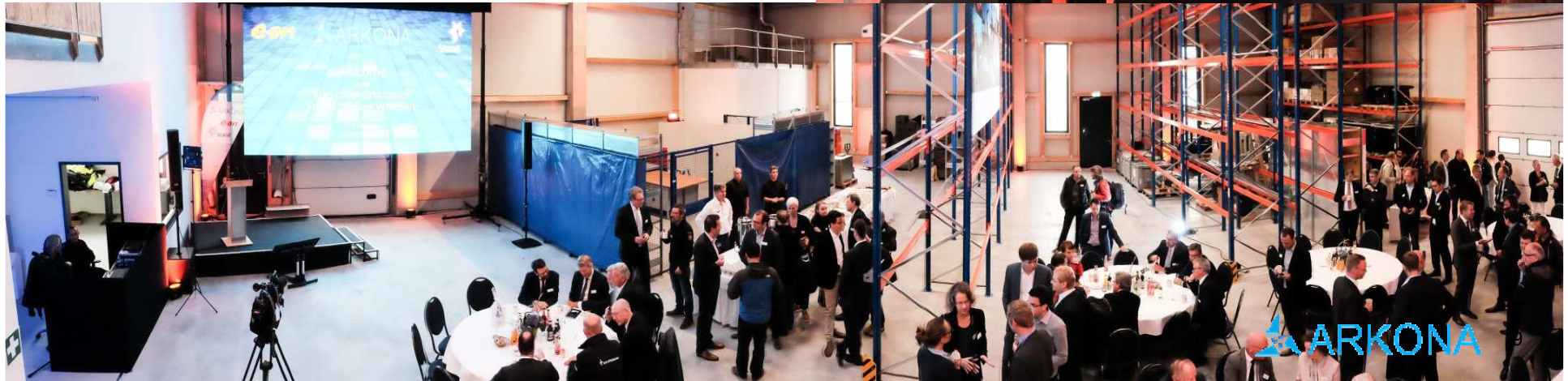
- More than **100 Million Euro** have directly been **invested in M-V.**, in Rostock, Schwerin, Sassnitz
- **160 local and regional companies participated in the E.ON Supplier Day in Rostock.**
- **Upto 400 workers have been employed during construction phase.**
- **Operation office building and base port** for the next 25 years in **Port Mukran**
- **50 direct and 100 indirect new jobs have been created locally in Sassnitz**
- **Cooperations** have been formed in logistics, maritime industry, environmental and lab analysis, weather service, technical equipment, accomodation, catering, etc.





# Arkona – Start of construction

**Sassnitz-Mukran, 22.09.2017**



## Innovation – Wind Turbine Foundation – TSA corrosion protection



**German Renewables Award for offshore wind project Arkona**

**November 2017**

Arkona got the Innovation of the Year 2017, the German Renewables Award, for a newly developed process. It protects steel foundations of offshore wind turbines from corrosion.

Advantages of the Thermal Spray Aluminium TSA:

Reduction of the environmental impact.

Cost reduction for the construction of offshore wind farms.

**Arkona is the first project to install all monopiles using the environmentally friendly corrosion protection technology.**



## Foundations – Installation of monopiles

**Start of MP Installation:** Beginning of September 2017

**Finalisation of MP Installation:** Mid of November 2017

**Baseport Rostock:** Loading into the water

**Transport to construction site:** Being pulled by tug boats





# Noise mitigation



## Foundation – Installation Transition Pieces



- TPs on the Bladt site at Port Mukran, ready for load out.



## Innovation – Floating Transition Piece Installation

Advantage of floating TP installation:

- More efficient installation time which is double as fast as the traditional (fixed) jack up installation time.
- The project faced additional challenges due to the positioning of the vessel and the wave movements.



## Array Cable Supply



## Array Cable – Installation



- Cable installation vessel Stemat Spirit.
- May 2018.



- Vos Stone
- Cable installation into the transition piece.
- Finalization of cable installation end of May 2018.



## Offshore Substation – Workshop



## Electrical Offshore Substation – Construction Topsite



- Block 202 (right) und Block 204 (left).
- 204 is being lifted to his position on the barge (12.07.2017).



## Electrical Offshore Substation – Construction Jacket



- Jacket under construction at STX France.



- Jacket ready for sail out, February 2018.

# Electrical Offshore Substation

- Substation Launching Ceremony with international guests, performed under the helicopter deck of the substation, 01.03.2018 in St. Nazaire, France.



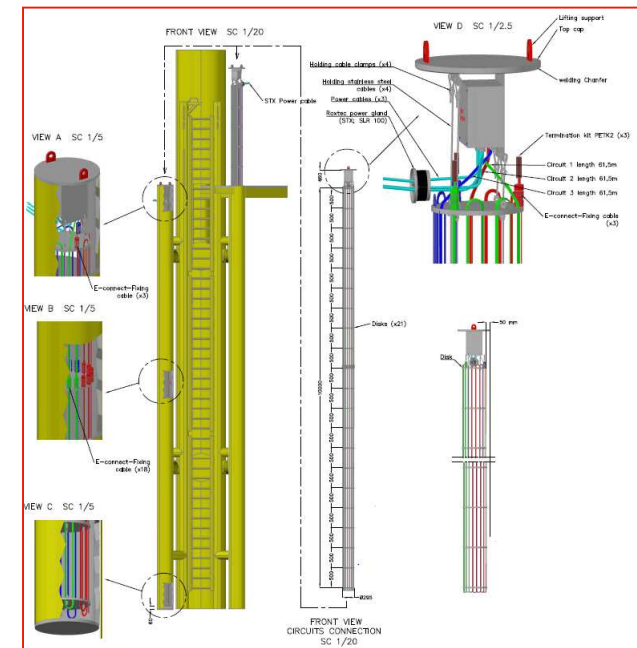
## Electrical Offshore Substation – Transport

- Two high-sea tugs transported the jacket foundation and the platform to Germany from mid-March 2018.
- The voyage took about two weeks.



# Innovation – Heated Offshore Substation Boatlanding

- The fender and the ladder of one of the boat landings of the substation are electrically heated in case of icing.
- Control with SCADA connection.
- This improves the availability of the substation during the winter period.
- First time of installation in an offshore wind project.





# Electrical Offshore Substation – Installation

- Heavy Lift Vessel (HLV) MS „Oleg Strashnov“
- Jacket und Topside Installation
- April 2018





## Wind turbine – Delivery of type Siemens 6.0-154



- Storage of turbines in Port Mukran
- Blades: 75m / 26t
- Tower: 87m / 422t
- Nacelle: 20 x 8m / 340t

## Wind turbine – Installation

MV „Sea Challenger“ : installation of nacelles



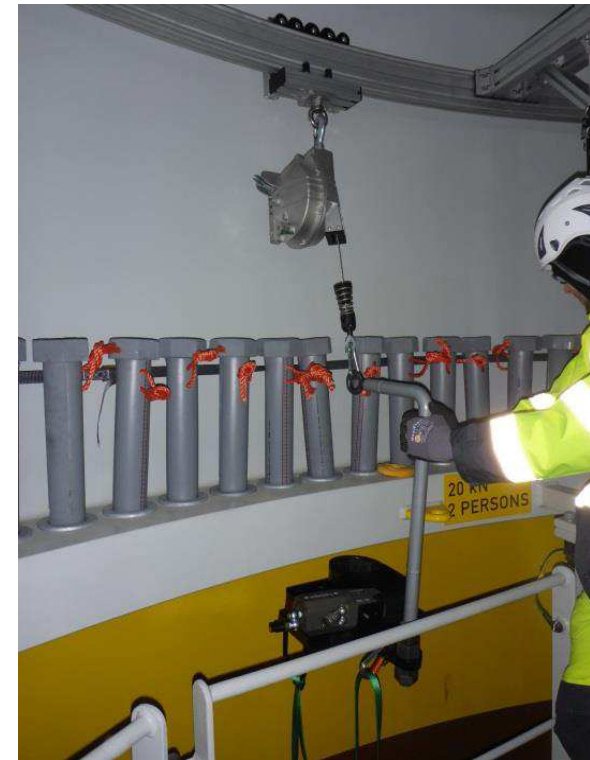
MV „Sea Challenger“ : installation of blades



# Innovation – Bolted flange connection

Target:

- Increase of safety standards due to less necessity of offshore works.
- Time and cost minimisation due to minimisation of the bolt tensioning procedures.





## Arkona Projekt Team



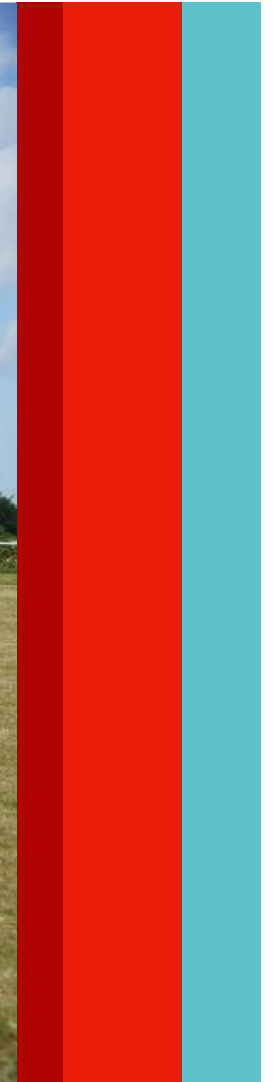
## Arkona – Inauguration ceremony 16. April 2019



**Arkona Offshore Opening Event**  
<https://youtu.be/nWFS55ZSYwg>

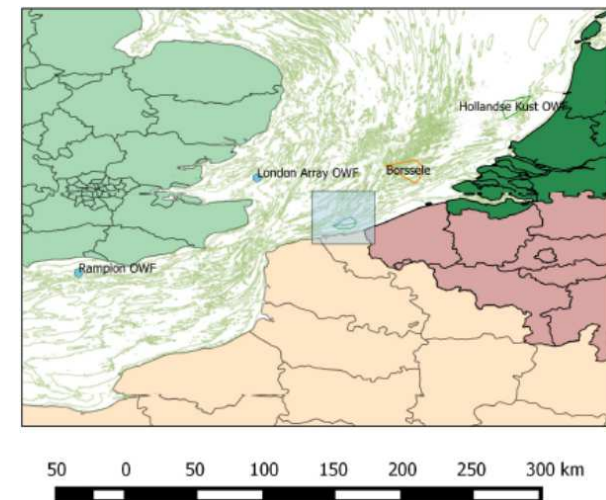


# Outlook



## E.ON Offshore in France

- France is an attractive market as they have defined the target of operating upto 5GW Offshore Wind until 2028.
- After formal confirmation by the French government, EC&R officially joins the consortium Dunkerque Eoliennes en Mer (Dunkirk wind turbines at sea).
- The joint venture, now consisting of energy companies ENGIE from France, EDPR from Portugal and EC&R, is targeting for building and operating the offshore windfarm Dunkirk with a capacity of 600MW.



## E.ON Offshore in Japan

- Together with Kyuden Mirai Energy, we signed a cooperation agreement to jointly develop offshore wind projects in Japan.
- Kyuden Mirai Energy is a leading developer of the Hibiki-nada Offshore Wind Farm Project in Kyushu and in parallel is studying opportunities for new offshore wind projects throughout Japan.







Thank you!

*e-on*

14.09.2017 32  
ARKONA 32