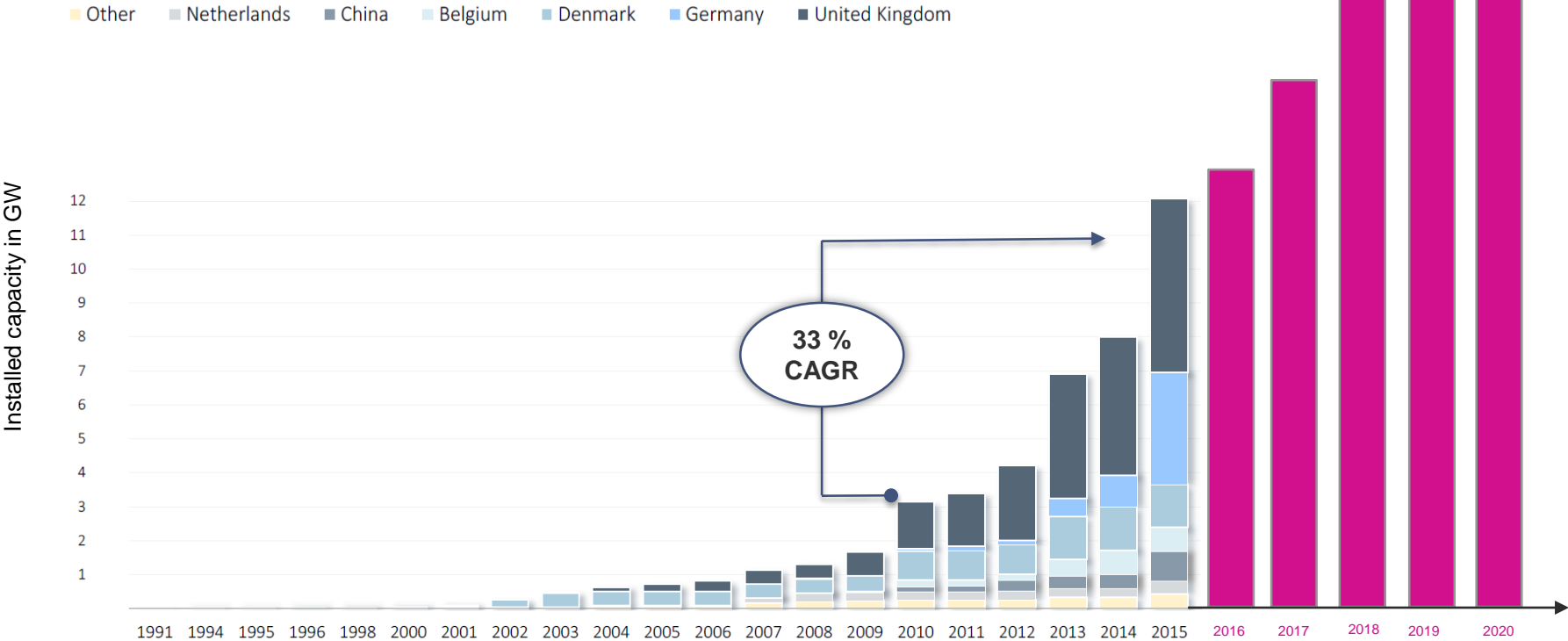


# Growth in offshore wind

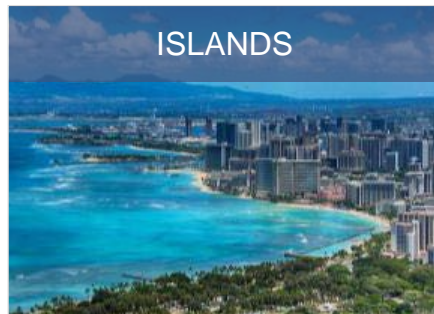


# The potential of floating wind



- Virtually unlimited resources
- Site flexibility
- Standardized foundations
- Inshore assembly of WTG
- Environmental benefits

# Floating wind markets



## Why offshore wind?

- Security of supply
- Limited space
- Sustainability

- Transmission
- Electrification
- Limited space

- Cost of alternatives
- Security of supply
- Limited space

- Emission taxes
- Cost of fuels
- License to operate

# The Hywind Scotland pilot park



- **Investing around NOK 2 billion**
- **60-70% cost reduction** from the Hywind Demo project in Norway
- **Powering ~20,000 UK homes**
- **Installed capacity: 30 MW**
- **Water depth: 95-120 m**
- **Avg. wind speed: 10.1 m/s**
- **Area: ~4 km<sup>2</sup>**
- **Average wave height: 1.8 m**
- **Export cable length: Ca. 30 km**
- **Operational base: Peterhead**
- **Start power production: 2017**

# Main Contractors



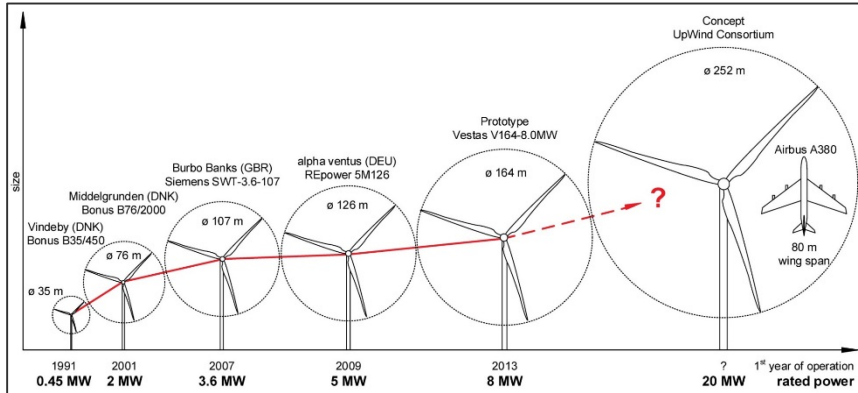
# Learning from Hywind Scotland

- Demonstrate concept with upscaled and optimized design, and in a park configuration
- Currently in construction - on track to start power production by end 2017
- Important learnings from design, fabrication, installation and operation



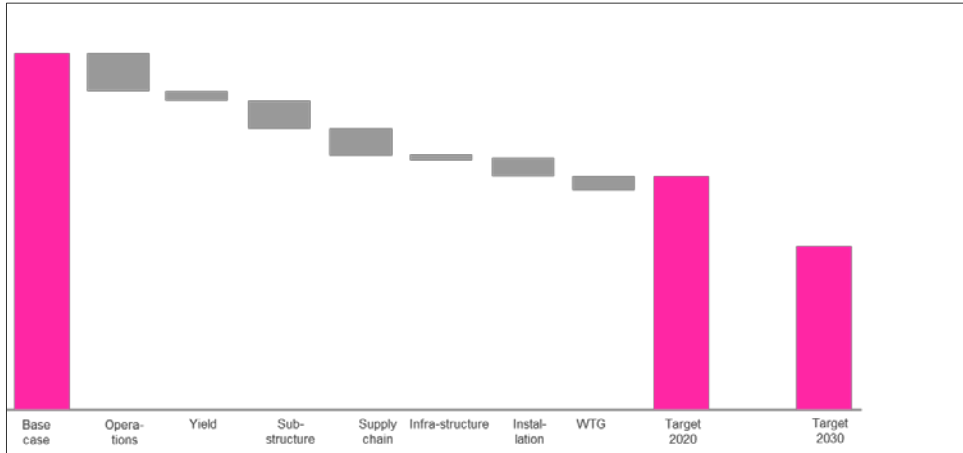
# Taking the next step – technology development

- Technology needs to be sufficiently demonstrated and de-risked to be bankable
- Testing and data collection & analysis on multiple units for a longer duration
- Concept need to be scalable to 10-20MW turbines
- Further design optimization and more efficient installation and O&M methods



# Taking the next step – cost reductions

- Cost reductions of 40-50% by 2030 is considered a realistic target
- Technology development and optimization / industrialization and standardization
- Potential for further standardization and better wind sites compared with bottom-fixed





# Summary

- The Hywind concept is proven, and will be further demonstrated on Hywind Scotland
- Floating wind has a large potential, and development of new project opportunities is ongoing
- Cost and technology challenges can be overcome by close cooperation with industry

