

Jen Banks

Wind Energy Project Coordinator

North Carolina Solar Center

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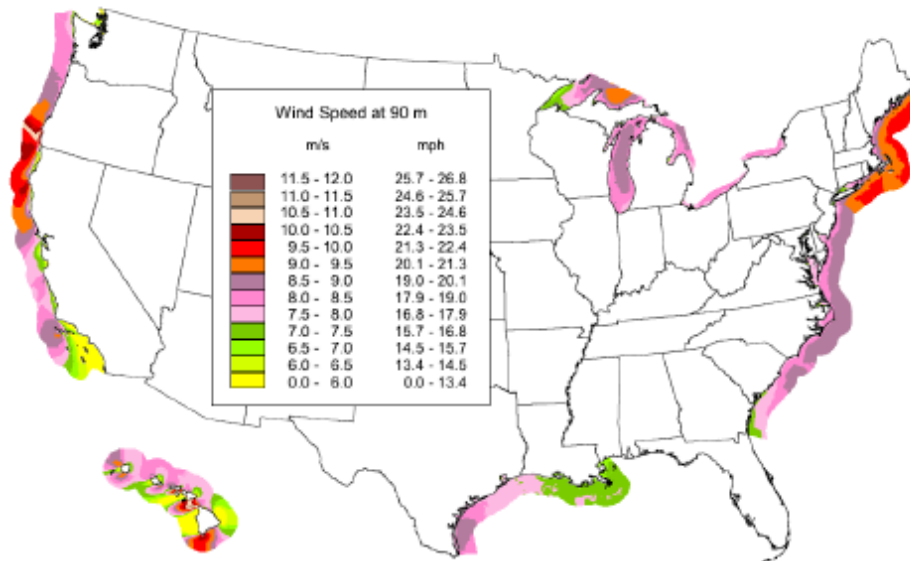
Mission Statement

to advance the use of renewable energy resources to ensure a sustainable economy that protects our natural environment, encourages energy independence, and lowers energy costs for consumers. The Center will safeguard this sustainable energy future through programs to educate the public, share research and technical expertise, guide industry's energy decisions, and shape government policy.



Offshore Wind Basics

U.S. Offshore Wind Resource at 90m



Source: NREL Assessment of offshore wind energy resources for the United States, 2010

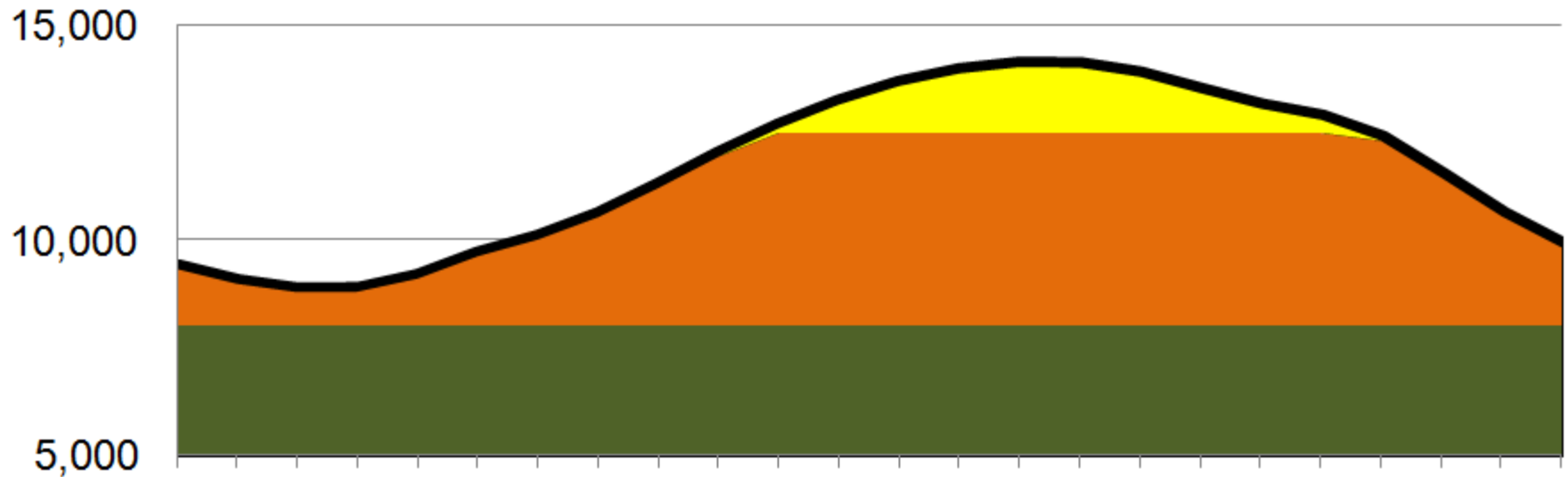
- First project – Vindeby in 1991
- ~3800 MW installed in Europe (end of 2011)
 - Avg turbine size installed in 2011: 3.6 MW
- No offshore wind in the US
- DOE goal for 54 GW by 2030
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- DOE goal for 54 GW by 2030
 - At a cost of 7 – 9 cents per kilowatt-hour
 - Interim goal: 10 GW by 2020 at cost of 10 – 13 cents per kilowatt-hour

Benefits of Offshore Wind

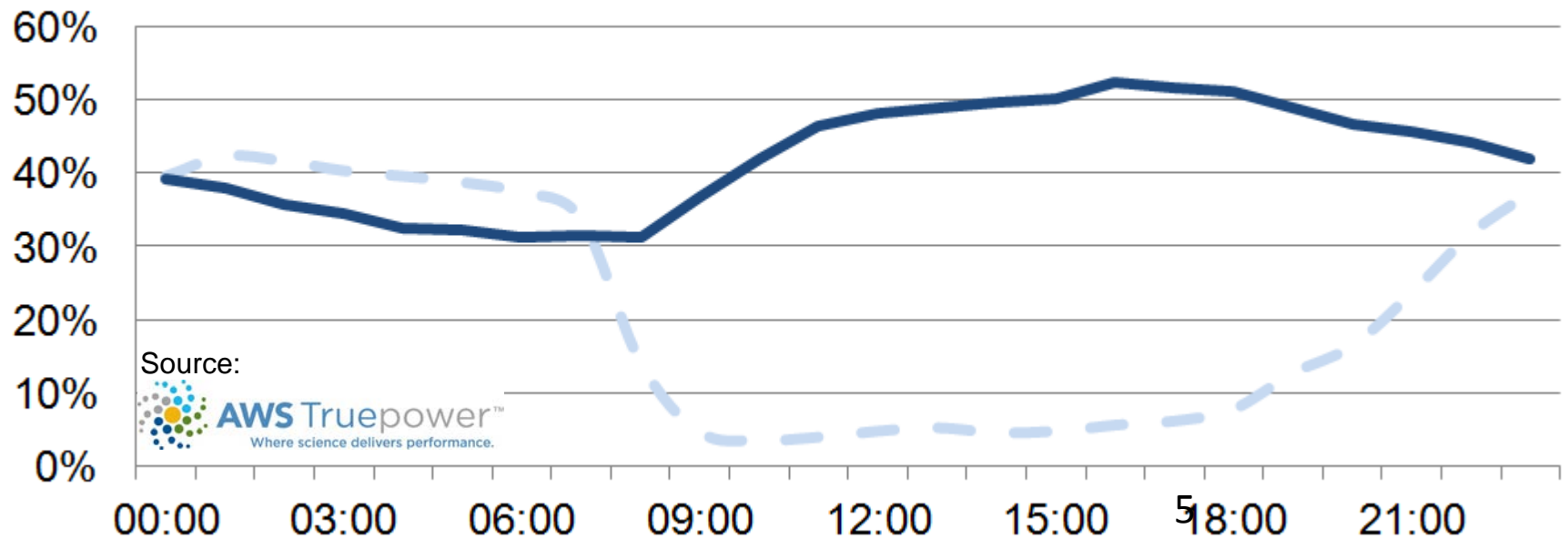
- Clean, stable priced generation
- Proximity to coastal load centers
- Stronger and steadier offshore winds
 - Coincide with daytime electricity demands
- Not constrained by onshore transportation limitations
 - Larger turbines can be installed
- Opportunity for coastal states to meet renewable energy targets
- Economic Development



Georgia Example - Summer Demand



Wind Output - 40 miles Offshore



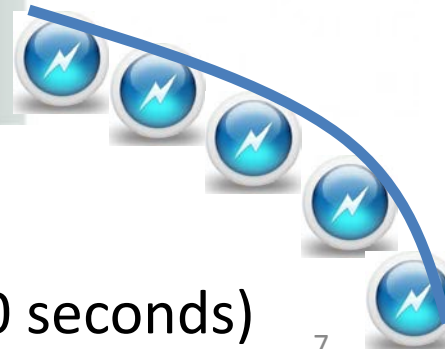
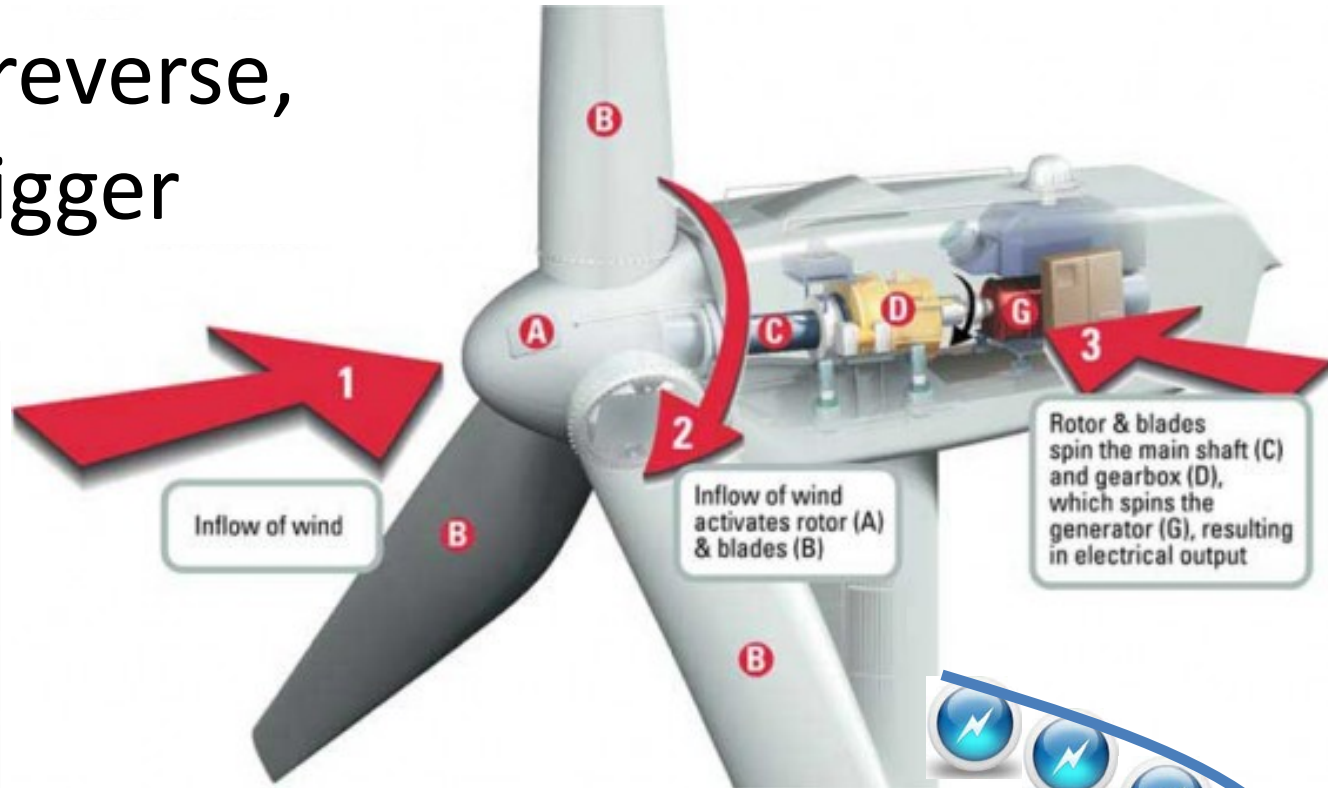
Offshore Wind Permitting

- **Federal Permitting Focus**

- › 4-2009: Final Rule for projects on the OCS
- › 5-2010: Creation of the Bureau of Ocean Energy Management, Regulation and Enforcement
- › 8-2010: DOE's *Creating an Offshore Wind Industry in the United States: A National Vision and Call to Action*
- › 11-2010: DOI's Smart from the Start Initiative
 - 2-2011: Wind Energy Areas announced
- › 2-2011: National Offshore Wind Strategy
- › 5-2011: 2nd notice of competitive interest eliminated
- › 9-2011: BOEMRE restructured into multiple agencies
 - › Bureau of Ocean Energy Management
 - › Bureau of Safety and Environmental Enforcement
 - › Office of Natural Resources Revenue

How Wind Turbines Work

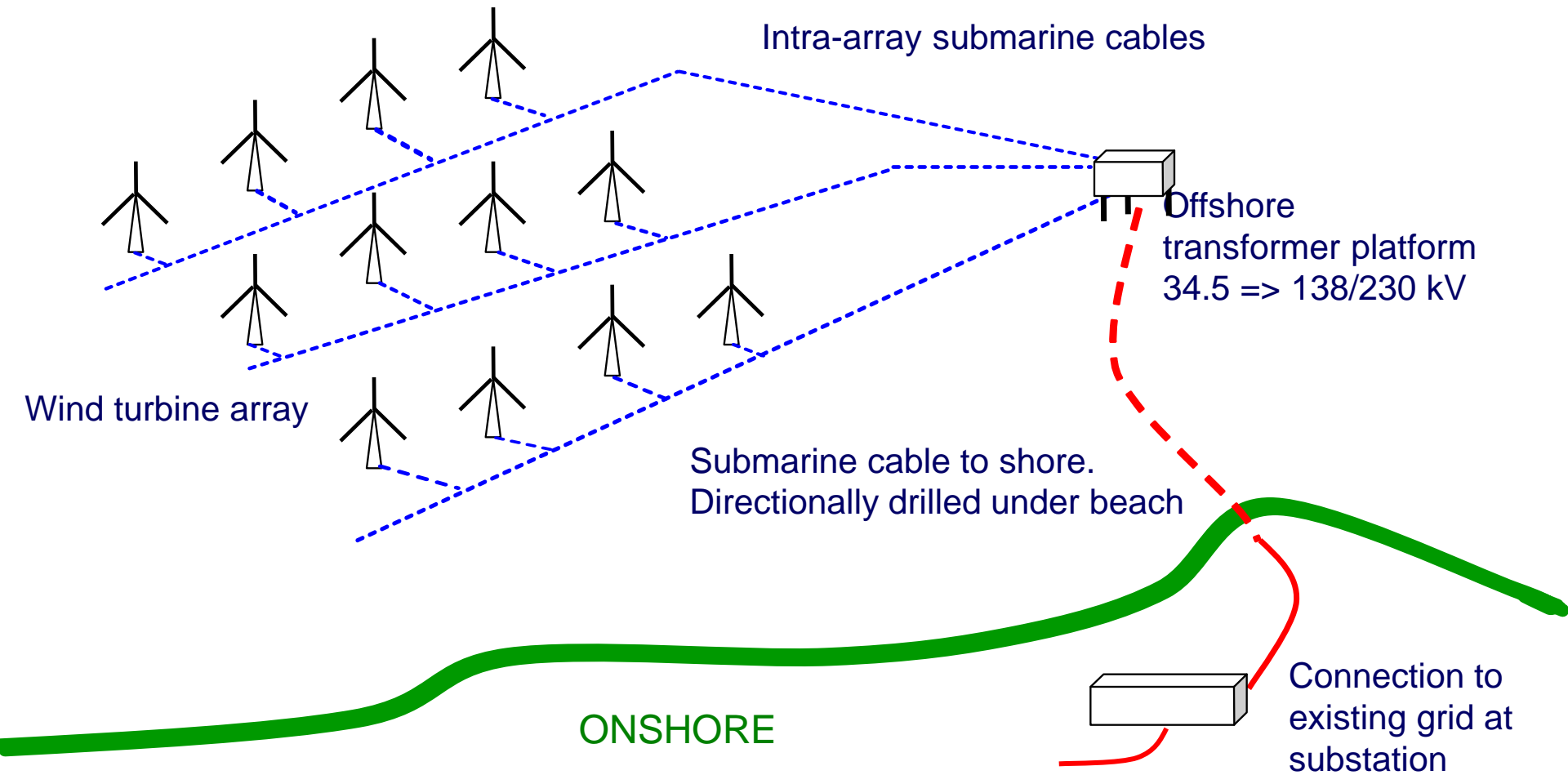
Like a fan in reverse,
but MUCH bigger
and slower.



6-8 RPM

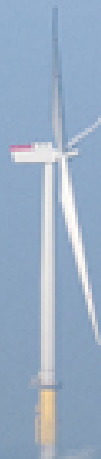
(one rotation every 7-10 seconds)

Offshore Wind Layout



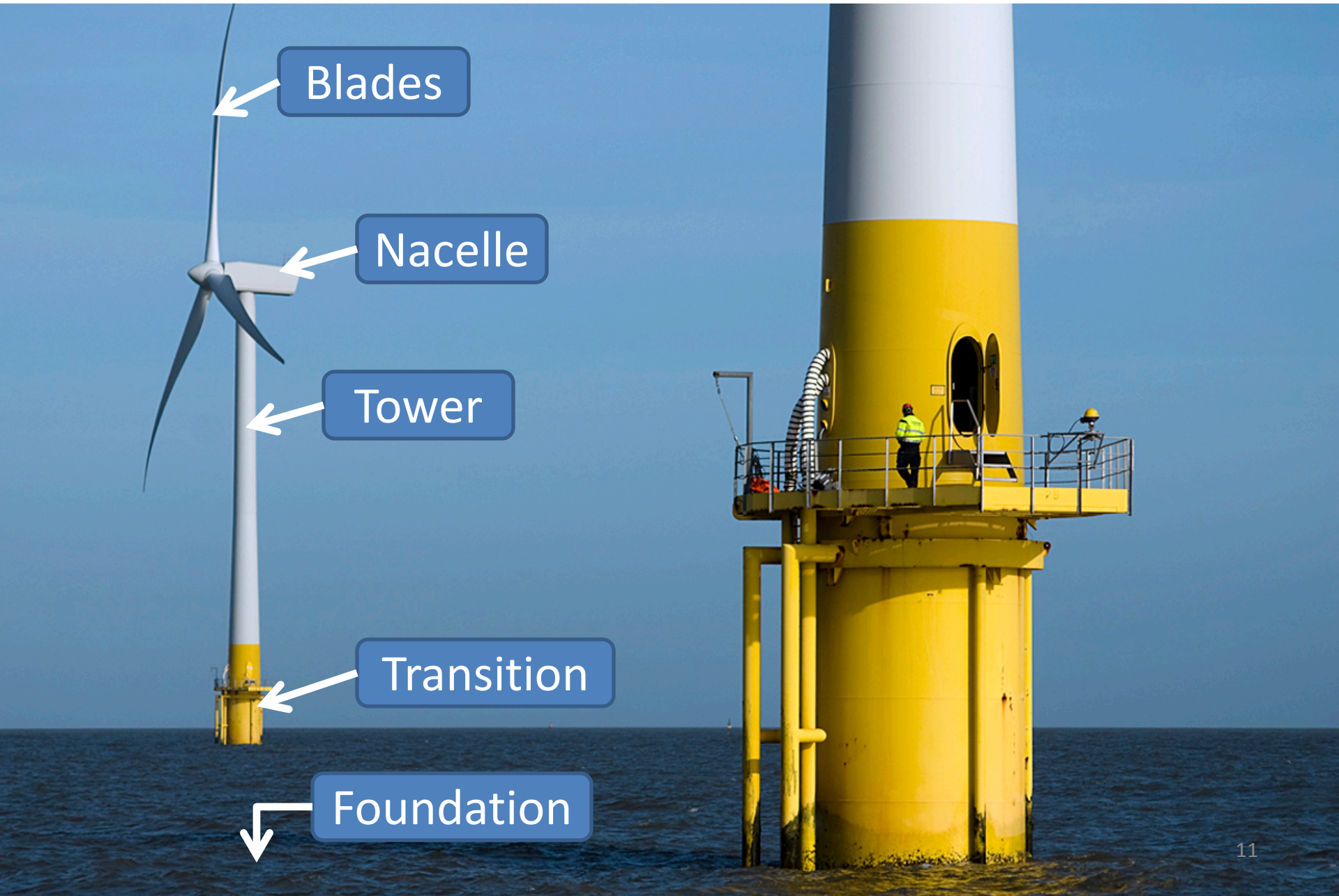


Sherringham Shoal Offshore Wind Farm

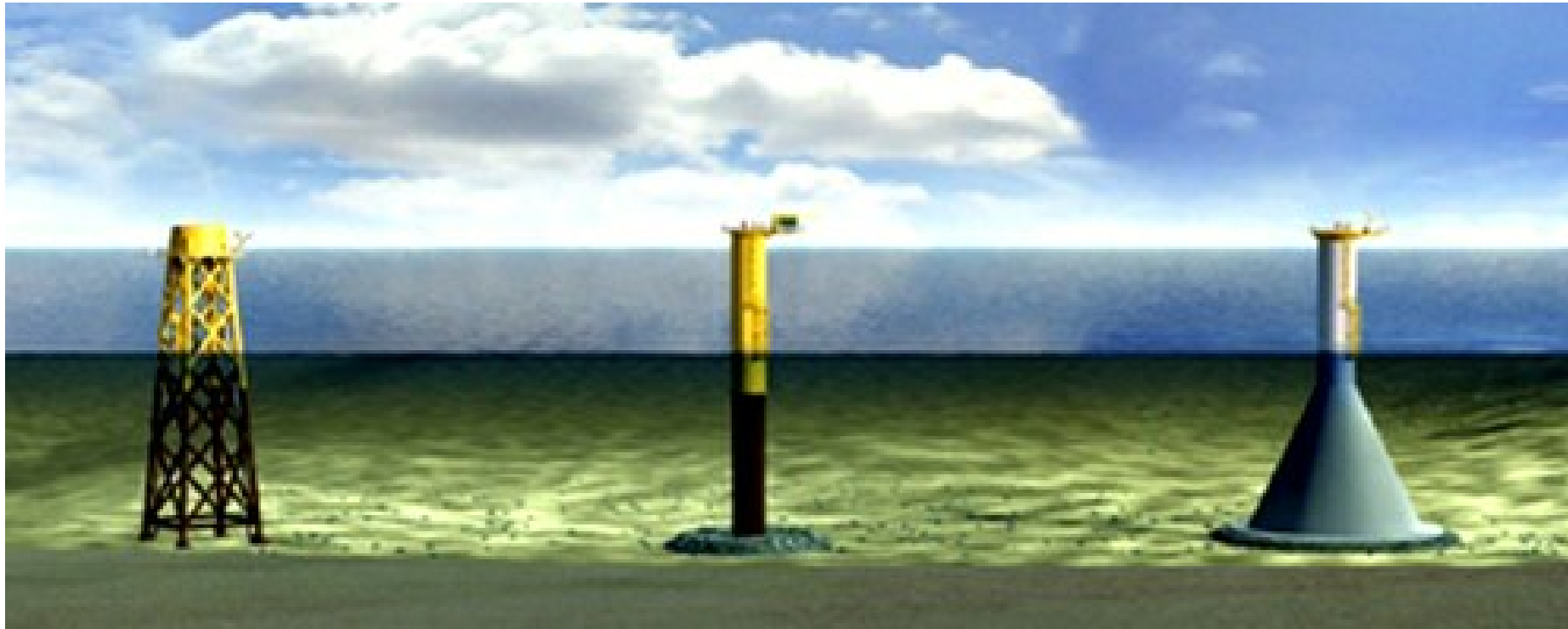


Substation at London Array Offshore Wind Farm

Major Components



Foundation Types



Jacket

Monopile

Gravity Base

Cable Comes Ashore Under Beach



Bore can emerge several thousand feet offshore



Pacific Orca, July 2012

Thank you!

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