Offshore Wind
GE Renewable Energy
US Offshore Market Perspective
Our Projects
Only OEM with projects in Europe, Asia and the Americas

**Block Island (30 MW)**
- 5 x Haliade 150-6MW (2016)

**Skipjack (120 MW)**
- 10 x Haliade-X (2022)

**Ocean Wind (1.1 GW)**
- ≈ 90 x Haliade-X (2024)

**Dogger Bank (3.6 GW)**
- ≈300 Haliade-X (starting 2023)

**Merkur (396 MW)**
- 66 x Haliade 6MW (2018)

**Xinghua Gulf (18 MW)**
- 3 x Haliade 150-6MW (2018)

**Ostend (6 MW)**
- 1 x Haliade 150-6MW (2016)

**Le Carnet (6 MW)**
- 1 x Haliade 150-6MW (2013)

**St. Nazaire (480 MW)**
- 80 x Haliade 150-6MW (2021)

**Osterild (6 MW)**
- 1 x Haliade 150-6MW (201)

**Rotterdam (12 MW)**
- 1 x Haliade-X 12 MW (2019)

**Installed capacity**: 474 MW | **Order backlog**: 5.3 GW (Haliade 6 MW + Haliade-X)
Haliade-X 12 MW...the world’s most powerful offshore turbine

- **12 MW** capacity
- **67 GWh** gross AEP
- **63%** capacity factor
- **220-meter** rotor
- **107-meter** long blades
- **248 meters** high
- **38,000 m²** swept area

One Haliade-X 12 MW turbine can power up to 16,000* European households and save up to 42,000 metric tons of CO₂, which is the equivalent of the emissions generated by 9,000 vehicles in one year.

* Based on wind conditions on a typical German North Sea site
** According to EPA Greenhouse gas equivalencies calculator
Haliade-X 12 MW blade comparison

Blades

Benefits of design
1. Hybrid carbon technology reduces weight of blade
2. 107m blade length yields high turbine capacity factor

Ø = 2.7 m
67 m
Onshore 3X

Ø = 3.3 m
73 m
Haliade 150-6MW

80 m
Airbus A380

Ø = 5.5 m
107 m
Haliade-X 12 MW

© 2018 General Electric Company - All rights reserved
Haliade-X 12 MW, Netherlands
The world’s most powerful wind turbine

**Developer:** Future Wind (JV - Pondera and SiF Holding)
**Demo Project:** 1 Haliade-X 12 MW
**Location:** Maasvlakte-Rotterdam (NL)
**Site:** on-shore for easy access during test activities
**Scope:** 5-years testing & 15-years full service O&M
Partnering with Ørsted to drive the growth of US Offshore Wind

**BLOCK ISLAND (30 MW)**
Off the coast of Rhode Island
Haliade 150-6 MW, commissioned 2016

**OCEAN WIND (1,100 MW)**
Off the coast of New Jersey
Haliade-X 12 MW, expected commissioning 2024

**SKIPJACK (120 MW)**
Off the coast of Maryland
Haliade-X 12 MW, expected commissioning 2022
United States Offshore Wind Market Drivers

- Population/electricity demand concentration along coasts: Highest in North-East
- Fuel volatility and distance to generation drives power prices
- Solid Wind Resource: Strongest in Northeast Coast 9-10 m/s
- Federal & State Agencies supporting development, leases, technology development
- Land constraint to onshore wind and solar renewable alternatives
- Mature European industry allows US market start w/Advanced Technology, experienced developers, established supply base
- State by State Legislation establish offshore targets and volumes in Maryland (2 GW), Massachusetts (3.2 GW), New Jersey (7.5 GW), New York (9 GW), Connecticut (2GW)
- States seeking coastal infrastructure and supply chain investments and jobs via local content / net economic benefit
- Offshore PPA’s at around 8 US cents /kWh

Source: BOEM
US Offshore Wind Market by the Numbers

Current U.S. offshore wind pipeline: 29 GW
- 30 MW of installed capacity at Block Island (GE)
- 12 MW in Construction in Virginia (research lease)
- >20 GW Capacity in development w/ site control (lease areas)
- 6.4 GW of capacity in permitting with offtake awarded
- 8-10 GW of Additional potential capacity in wind energy areas in NY, SC pending lease auctions
- 2,350 MW of potential capacity in unsolicited floating project applications (Pacific region)

20 GW in development by 2035
Market Development Challenges /Opportunities

• 70+ Bn to be invested in active projects, ports, vessels, local content
• Logistics: Northeast Coastal Infrastructure in need of development, upgrades to ports, supporting industries
• Installation: Vessel regulations (Jones Act) limit European Vessel Use and will require barges
• Service vessels and competencies: SOVs and CTVs needed as well as trainers and experienced personnel
• Local content / Net economic benefit formulas favor those who offer local investment, Jobs, local economic activity
• Local content: Nascent local supply chain needs visibility and volume to establish locally

French companies with specialized technology, know-how, experience, skills and willingness to invest, can secure business if they are willing to establish locally either solo or in a JV or partnership
Thank You!