

NEW YORK OFFSHORE WIND TECHNICAL AND TRAINING WORKSHOP

Farmingdale State College | November 15, 2019



NYSERDA



Agenda

- 9:00** Welcome & Introduction
- 9:45** Industry Presentations (Project Developers and Dedicated Trainers)
- 10:45** Break
- 11:00** Industry Presentations (Component and Service Suppliers)
- 12:45** Lunch & Keynote Address
- 1:45** Workforce Development Panel
- 2:45** Breakout Networking
- 3:45** Closing Remarks

Welcome & Introduction

John S. Nader, President
FARMINGDALE STATE COLLEGE

Doreen Harris, Vice President of Large-Scale Renewables
NYSERDA



**OSW TECHNICAL AND
TRAINING WORKSHOP**

Industry Presentations

Russell Hill, Leader of Supply Chain Management Marine Operations
EQUINOR

Jennifer Garvey, Long Island Development Manager
ORSTED

Brian Walencik, Chair of GWO North America Committee
GLOBAL WIND ORGANISATION





Let's power New York's future together

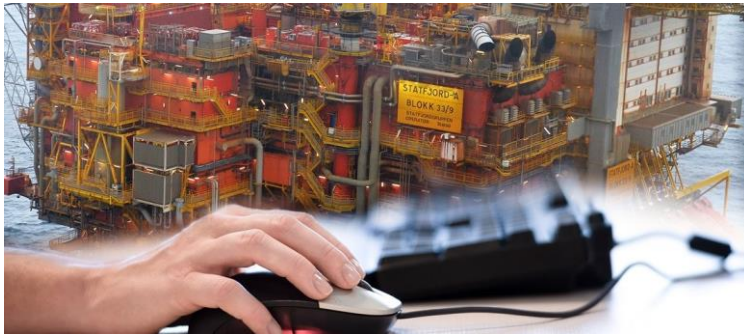


Russell Hill

Marine and Logistics Manager PfO | Equinor Wind US
NYS OSW Technical and Training Workshop 2019



Empire Wind: Understanding our process



Qualification process

- Competitive tendering
- Identification through regular supplier market analysis, and NYSERDA offshore wind supply chain database



Supplier Declaration

- Minimum standards for ethics, anti-corruption, sustainability, health and safety

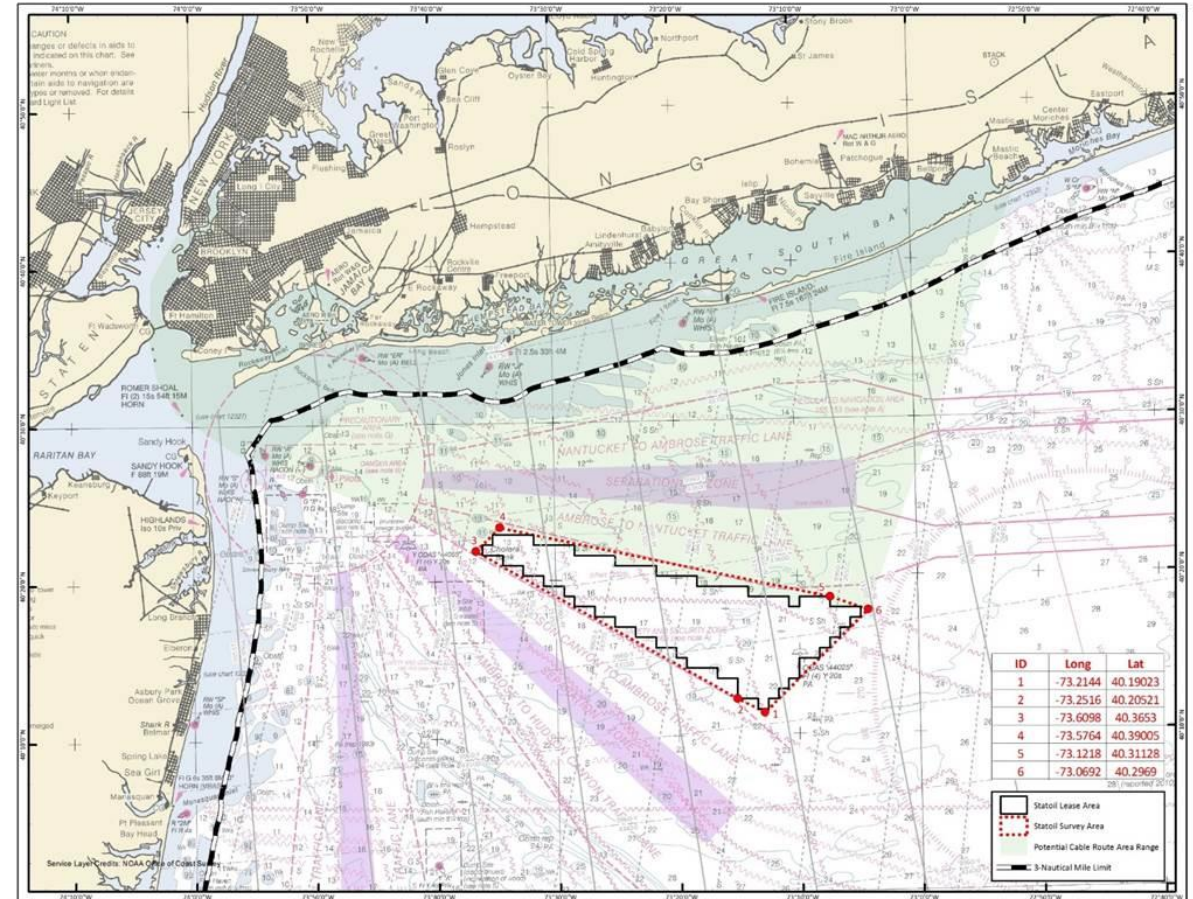


Safety, Security & Sustainability

- Safety & Security always comes first
- Ethical conduct is essential for sustainable business and we treat ethics as an integral part of our activities.

Empire Wind phase one: Key facts

- Won federal lease for offshore wind area in 2016
- Won award for 816 MW project 2019
- Foundations: Gravity-Based (Concrete)
- Proposed assembly port: New York City
- Proposed onshore interconnection: New York City
- Proposed O&M base: New York City
- Next generation turbines
- Water depth: 65 – 100 ft
- Construction period: 2023 - 2024
- Electricity Delivered to New York: 2024+
- Supporting New York State’s decarbonization goals
- Reduced CO₂ emissions of 1.6 million tons per year



Empire Wind: Jobs in siting and permitting

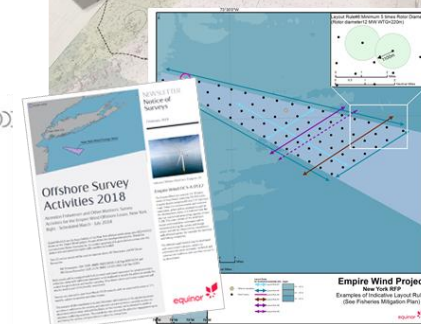
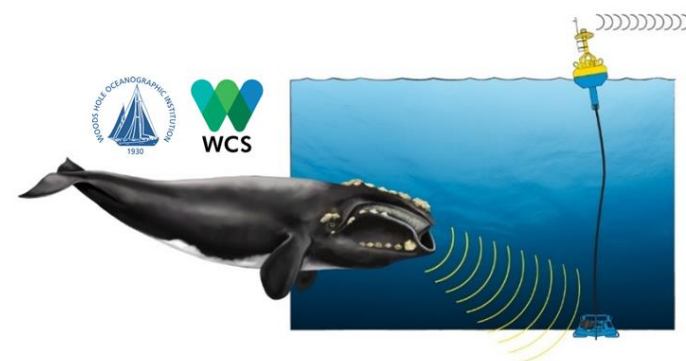
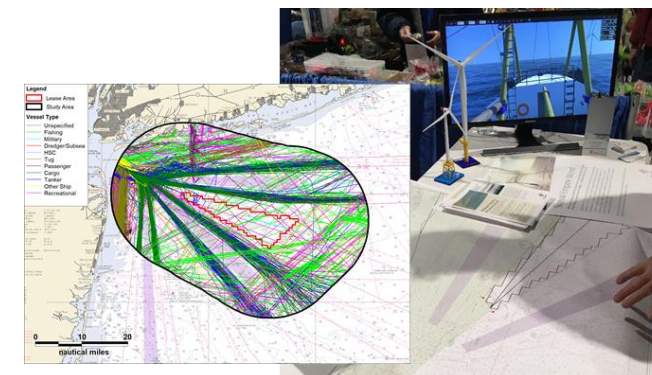
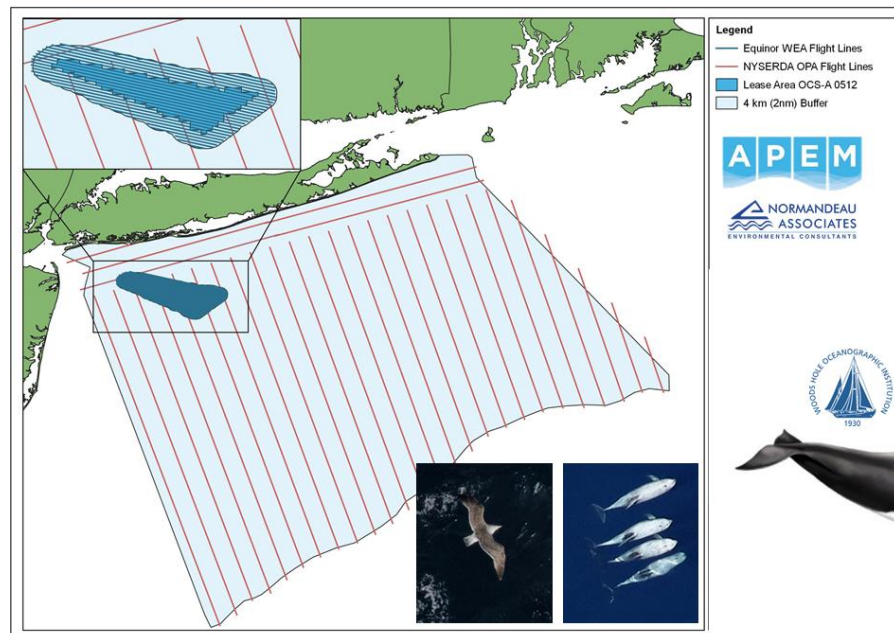
New York State

- Environmental and Fishing Mitigation Plans
- Article VII Process

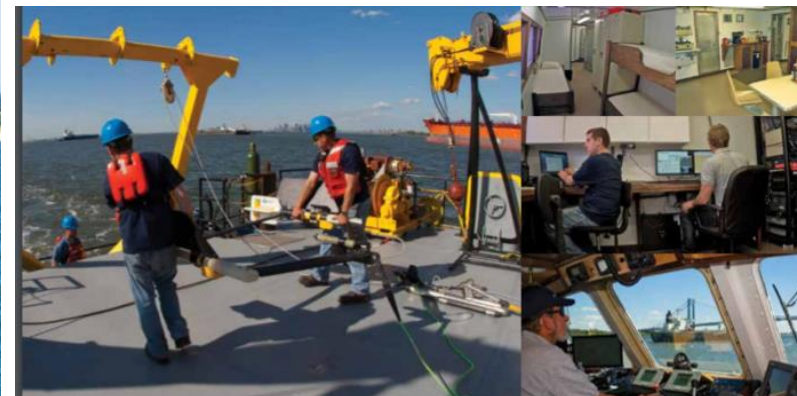


BOEM

- Site Assessment Plans (SAP)
- Construction and Operation Plan (COP)
- Environmental and Technical Review



Empire Wind: Jobs in siting and permitting



Project Manager / Lead Hydrographer

Alpine is currently searching for a Project Manager with a specialty in hydrography to be based in Norwood, NJ. The chosen individual will be a core member of our field operations team and as such must be willing to travel, both domestically and internationally. Candidate must be a U.S. citizen or have a valid working Visa.

[Read more](#)



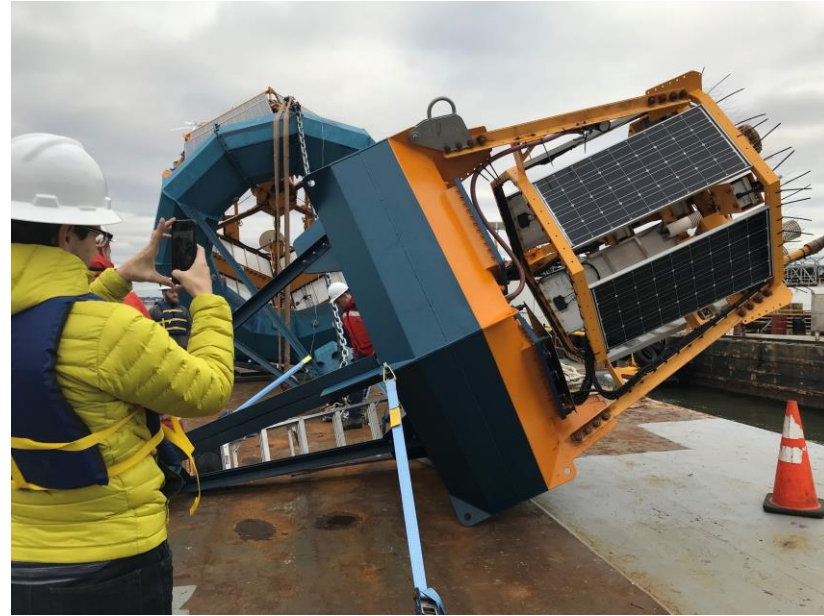
Field Project Manager/ Geophysical Party Chief

Alpine is currently searching for a Field Project Manager with a specialty in geophysics to be based in Norwood, NJ. The chosen individual will be a core member of our field operations team and as such must be willing to travel, both domestically and internationally. Candidate must be a U.S. citizen or have a valid working Visa.

[Read more](#)

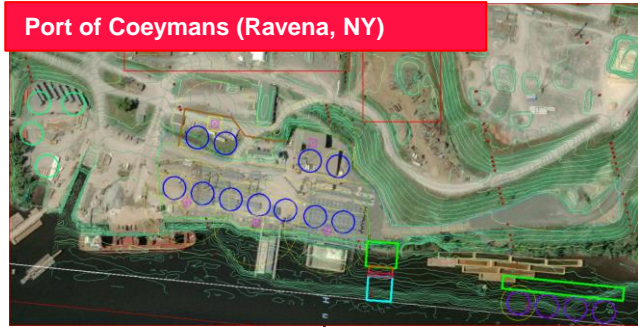


Empire Wind: Jobs in marine logistics

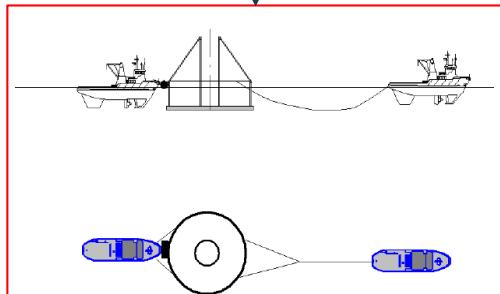
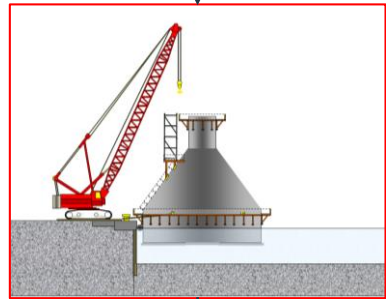


Empire Wind: Gravity-Based Structure (GBS) Foundation Fabrication

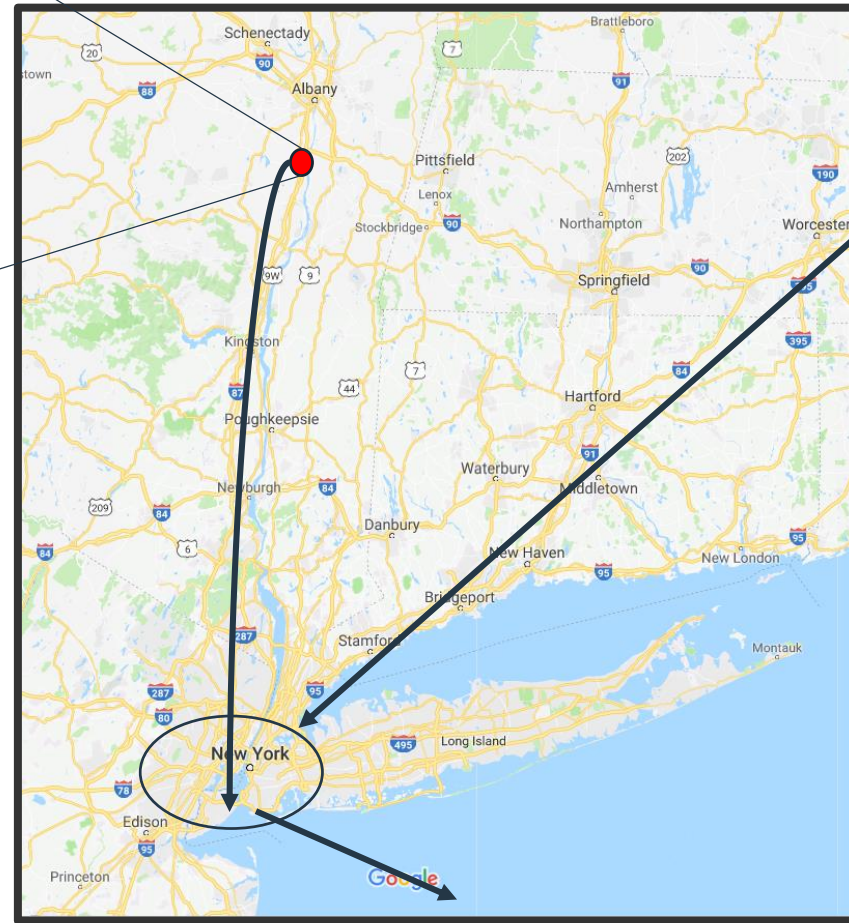
1. Fabrication at Port of Coeymans



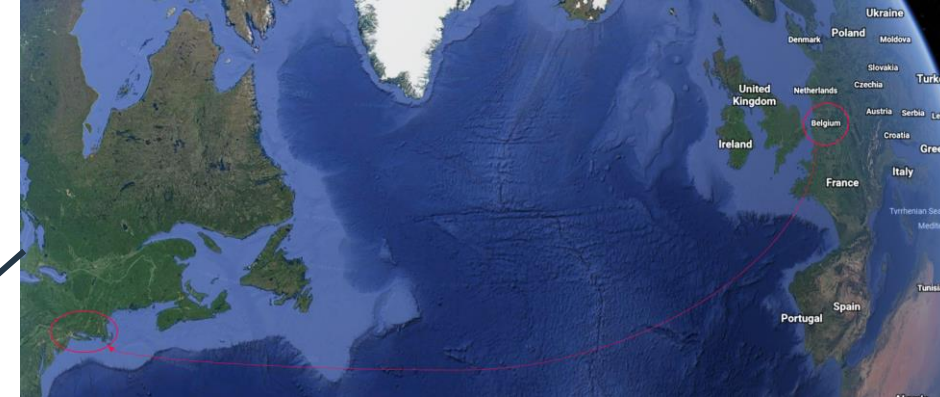
Port of Coeymans (Ravena, NY)



Tow out ~120nm, 30hr, @4knots

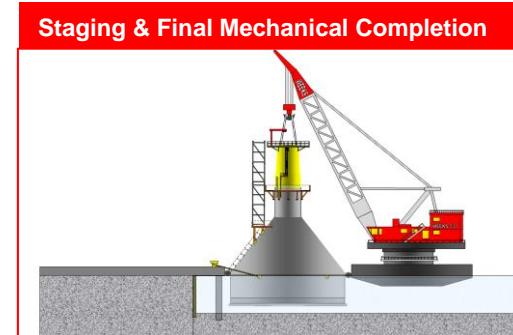


2. Assembly with Transition Piece

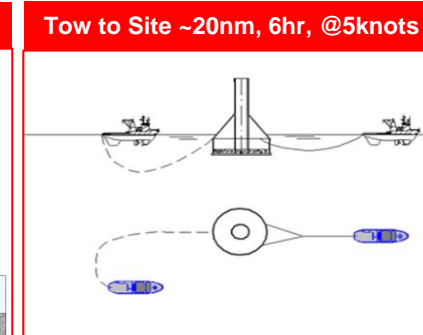


EU TP Manufacturing and transport to US, 2wks transport @10knots

3. Staging and Delivery to Site



Staging & Final Mechanical Completion



Tow to Site ~20nm, 6hr, @5knots



Empire Wind: GBS Foundations; Port of Coeymans, Hudson River

- Creating **thousands of jobs** during construction
- Upgrading a **manufacturing hub for concrete foundations**
- More than **\$60 million** in **port upgrades**
- **Vessel operators** to transport foundations to offshore wind area



Empire Wind: Assembly Port concept for Phase 1 (816MW)

- 65 acres for first project (40 square city blocks)
- Verrazano clearance must be managed
- Apx 220 full-time workers for 3 years for phase 1
- Additional jobs supporting assembly include vessel operators



Empire Wind: Construction of Interconnection System



Empire Wind: Operations and Maintenance (O&M) base in Brooklyn

- 7 acres minimum
- Direct labor: approx. 50-70 full-time jobs
- Indirect labor: additional suppliers and vessels working from base
- Warehouse for spare parts
- Must be dock-side for loading vessels
- Preferred options in New York City



Dudgeon O&M – East coast UK

Empire Wind: O&M technicians and Control Room



Empire wind: Commitment to Job Training and Partnerships

- Early coordination with **colleges and universities** funded by NY State to host osw job training: Farmingdale and SUNY Maritime
- Ongoing coordination with **labor unions** to ensure workforce readiness
- Commitment to communities hosting on-shore work for **local job training** programs
- Coordination with other developers to **prevent duplication** of resources
- Coordination with US federal agencies to **clarify safety training standards** and jurisdiction
- Coordination with turbine manufacturers (OEMs) to **ensure industry-wide standards** and set expectations
- Commitment to **funding job training** where and when needed
- Commitment to early workforce readiness with **general skills training**





Contact: Russell Hill
Marine and Logistics Manager PfO
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www.empirewind.com
Twitter: @EquinorWindUS

Sunrise Wind

A Joint Venture of Ørsted and Eversource



**NYSERDA Workforce &
Technology Conference**

November 15, 2019

Sunrise Wind is bringing unparalleled experience in developing offshore wind to New York



Offshore Wind Pioneer

Built the first offshore wind farm in the world, the first in the U.S. and developing the largest project portfolio in the country

Global Leadership

20+ years experience building offshore wind farms

Proven Expertise

25 successful offshore wind farms totalling 5.6GW capacity



Energy Leader

100+ year history of operation in Northeast
New England's largest energy company

Transmission Expertise

Premier electric transmission developer

Northeast Roots

Deep-rooted knowledge of the region's electrical system

Sunrise Wind Is Coming To New York

880 MW of Clean, Reliable Energy

Energy *Where* It's Needed

- Located 30+ miles over the horizon from Montauk, NY
- Output delivered over a new submarine export cable to Brookhaven, NY

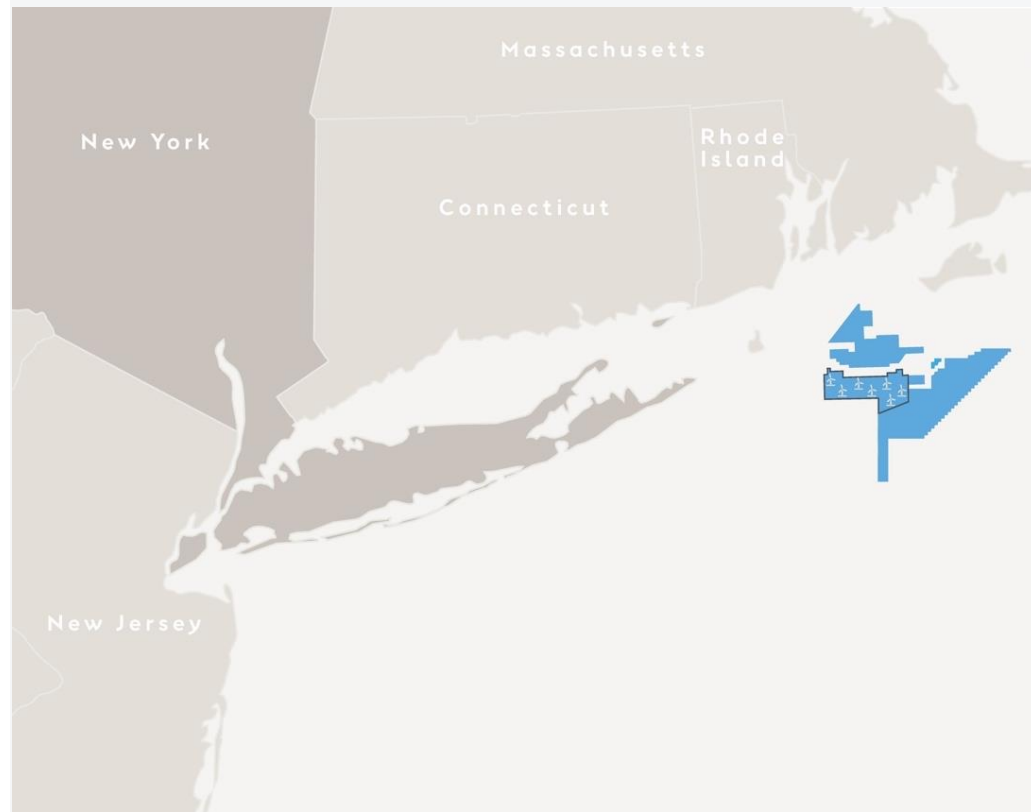
Energy *When* Its Needed

- Production beginning in 2024
- Supports New York's nation-leading clean energy mandate

Energy *For* New York

- 800 direct jobs
- 1,500-2,000 indirect jobs
- Committed to paying prevailing wages
- Project Labor Agreement(s)

Renewable energy for 500,000+ New Yorkers



Sunrise Wind Commitment to the Fishing and Environmental Communities



We will...



Promote the smart growth of the American offshore wind industry



Focus on maintaining access and navigation in and around our wind farms for all ocean users



Complete scientific research collaboratively with the fishing and environmental communities



Be accessible and available

Sunrise Wind Is Investing In Major Port Infrastructure Upgrades

\$10 Million New York Ports Infrastructure Development Fund

- Supporting major port infrastructure upgrades at multiple New York ports

Port Jefferson regional operations and maintenance hub

- Complementary use of the port that will not conflict with ferry service
- ~100 permanent, full-time jobs over the 25-year life of project and shorter-term construction jobs

Establishing key foundation component manufacturing facility at a port in the Capital Region



Sunrise Wind Is Investing In New Yorkers

Strategic Initiatives to Position NY for a New Industry

\$10 Million to fund the National Workforce Training Center

- Nation's first training facility dedicated to the U.S. offshore wind workforce
- Hosted by Suffolk County Community College, Long Island
- Innovative partnership between industry, academia, and labor

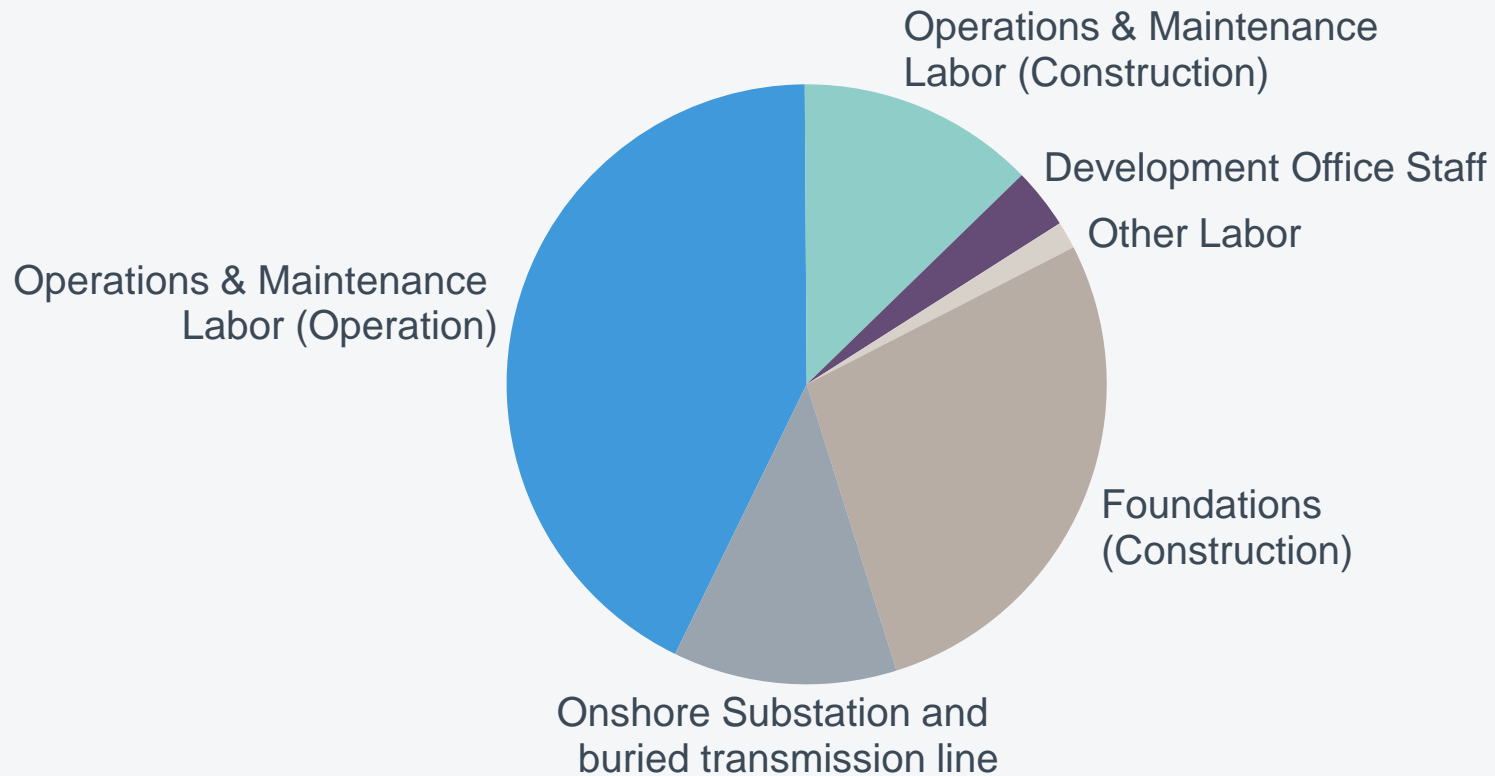
\$1 Million Upper Hudson Workforce Development Fund

- Targeted to advancing the skills of the workforce of the Upper Hudson and Capital Region
- Prepare region to be a hub of OSW fabrication and logistics



Sunrise Wind Is Investing In New Yorkers

The project will create more than 900 short and long term jobs*



Sunrise Wind – Onshore Substation and Transmission System

Product/Service Description - Photo



Product/Service Description

Onshore electrical substation receiving cable from offshore wind turbine generators and containing large electric components such as a shunt reactor, switchgear, transformers, and a shunt reactor. The onshore transmission line will be underground.

Technology Needs

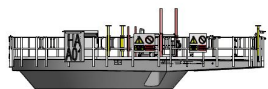
Will source substation “site landscape” products such as concrete and asphalt locally, plan to review local companies for ability to supply all other materials and construction office/trailer needs

Workforce Needs

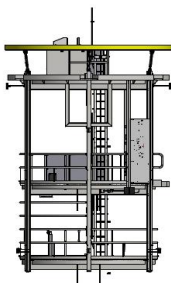
Will require construction labor in mechanical, civil, and electrical disciplines likely through local unions and Project Labor Agreements (PLAs)

Sunrise Wind – Installation of Secondary Steel comp.

Product/Service Description - Photo



EXTERNAL PLATFORM, 1 : 100



SUSPENDED INTERNAL PLATFORM, 1 : 100



ANODE CAGE, 1 : 100



Product/Service Description

Installation of Secondary Steel components.

- Items will be loaded from the quayside to a transport or installation vessel.
- Once in position offshore the vessel will either position itself alongside an installation vessel or the monopile.
- Components will be lifted from the deck to the monopile and installed in place with bolted connections.
- The foundation is complete when various completion works has been done (e.g. Installation of permanent equipment and platforms)

Technology Needs

Onshore:
Crane and handling equipment such as SPMT's

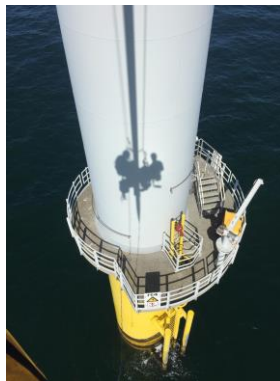
Offshore:
Handheld tools for bolting and completion works

Workforce Needs

- Riggers (both onshore and offshore)
- Stevedores
- Crane operators/equipment operators
- Supervisors

Sunrise Wind – Operations & Maintenance

Product/Service Description - Photo



Shore and offshore organisation that includes vessels, warehouse and office facilities.

Product/Service Description

The Operation & Maintenance base in New York State will be the location from where the daily operation will happen.

This include planning and coordination of service campaigns ensuring efficient and safe operation of the Wind Turbines. Also planning and coordination of needed manpower, vessels, PPE & spare parts will take place from the O&M base

The O&M base facilities requires harbor facilities accommodating the vessels from where the Wind Technicians will do the service and maintenance of the wind farm.

Technology Needs

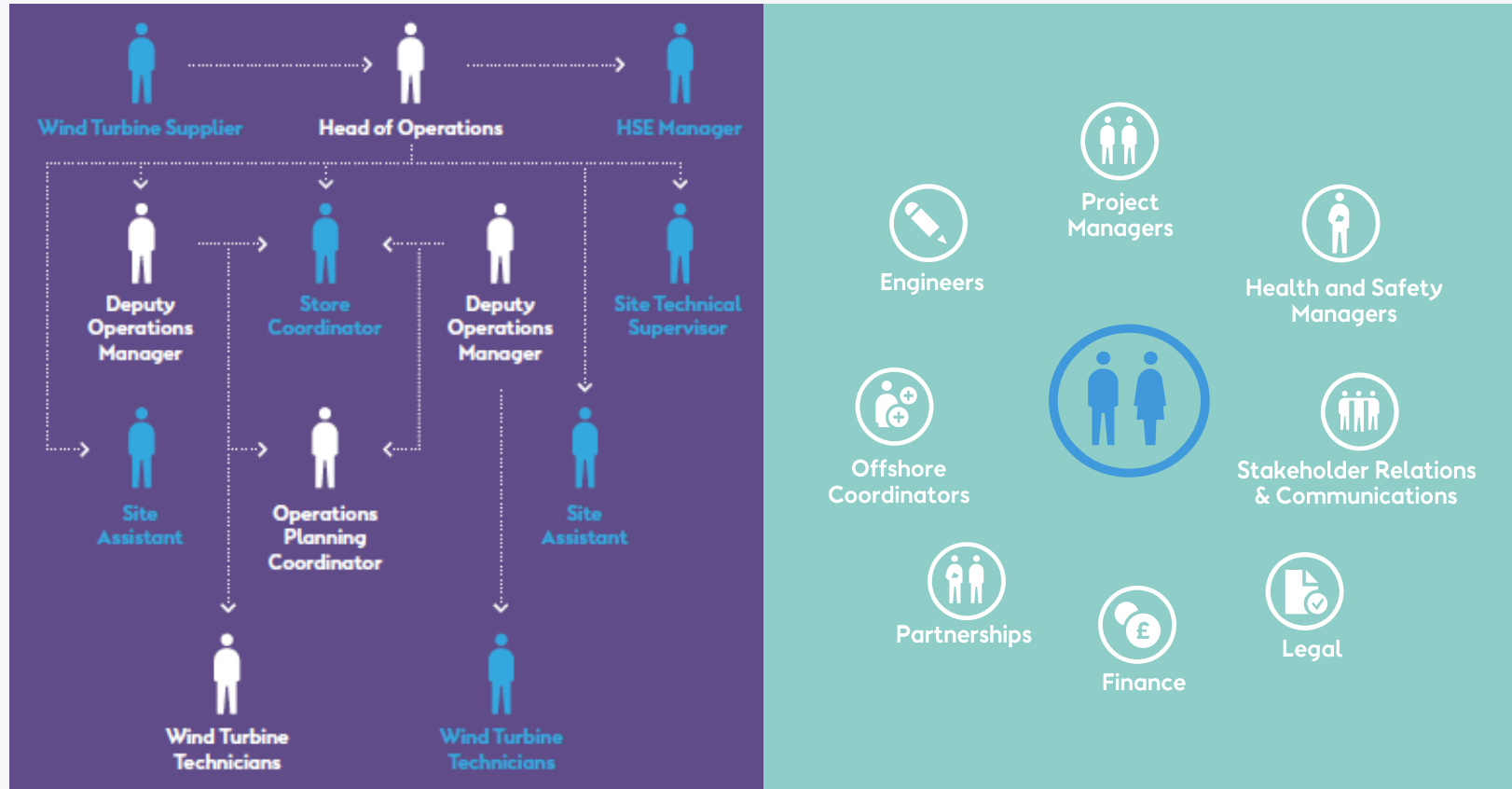
Vessels, safety equipment, telecommunication, Radios, tools, replacement components and consumables used during service of the wind farm.

PPE, workwear, office equipment, telecommunication, it equipment, consumables, cleaning etc. used for operation of the office location

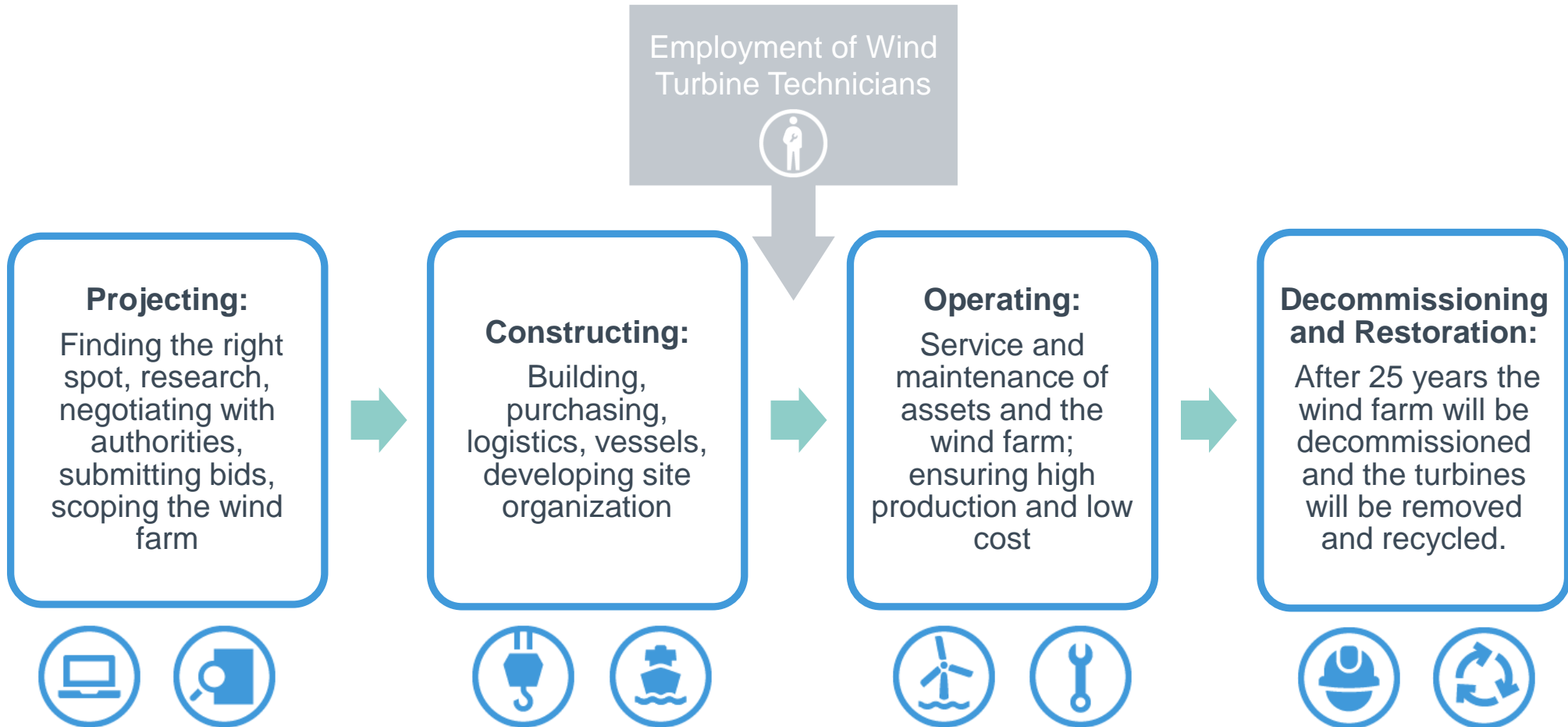
Workforce Needs

- Head of Operations, HSE Manager, Wind turbine Supplier, Deputy Operational Manager, Store Coordinator, Site Technical Supervisor, Site Assistant, Operations Planning Coordinator, Wind Turbine Technicians
- [A day as a Wind Technician](#)

Sunrise Wind - Operations & Maintenance - Workforce need



Sunrise Wind - Operations & Maintenance - Wind Farm Life Cycle



Which questions do we ask potential contractors?

- How does your company view the market potential based on facts and other “drivers” you find important?
- What do you wish to sell? Which products and services do you have that fit best with focus on your core?
- Who are your potential customers and who are their customers – how well do you know this business?
- Do you know the high-level specifications and requirements – can you comply or get there?
- What is your realistic lead-time?
- Which commercial structure can you create to be attractive and how?
- What do you need from Ørsted? Or your potential customer to offer the optimal package (HSE and TCO)?



Learn More | Contact Us

SunriseWindNY.Com
info@us.orsted.com

Orsted
EVERSOURCE



**Our mission: Strive for an injury-free work environment
in the wind turbine industry**



Brian Walencik
Chair, GWO North America Committee
GE Renewable Energy, EHS Leader – North America

In 2019, North America's leading wind companies joined within GWO to support standardized safety training



GE imagination at work



Value proposition

GWO collaborates to optimize the supply chain for **talent** in the wind industry by offering a growing **portfolio** of local and international standards for **safety training** while providing certification **transparency**.

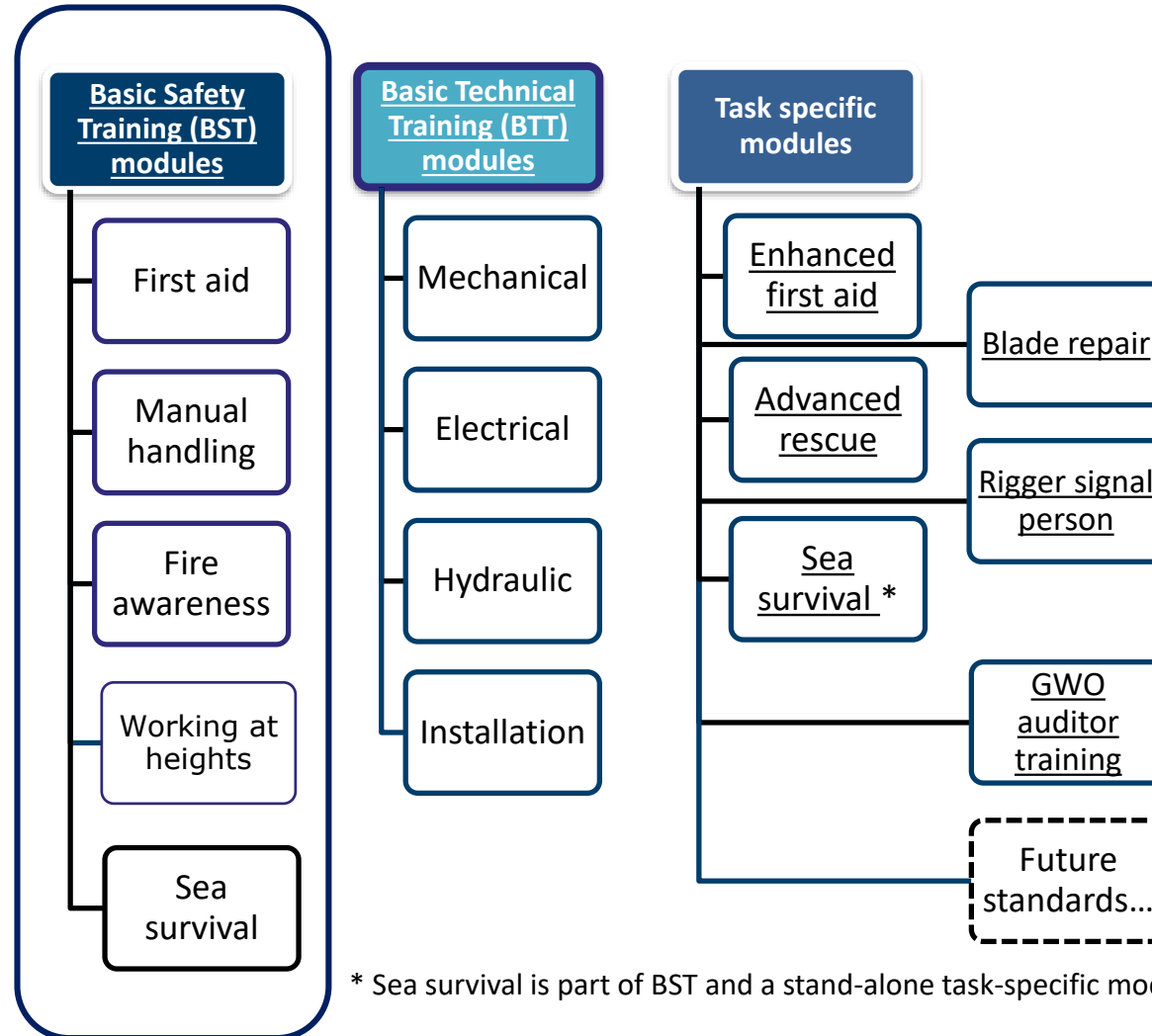


- *With GWO, you're getting the same training for technicians before they get to the location.*
- *It reduces the amount of time for training, while building a more qualified contractor base.*
- *Standardized training. You know what you're getting with increased safety comfort.*
- *The one I lean on most is standardization and the benefits to adapt to our culture with less training.*
- *Cost of poor quality, less risk, less damage, corrective maintenance – more qualified labor.*

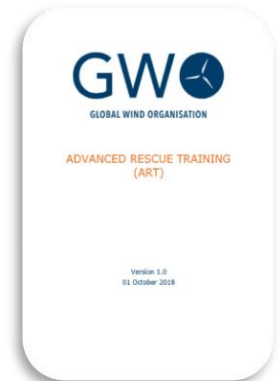
The Growing Portfolio of Standards

GWO portfolio

Partnering with industry leaders, GWO delivers a training portfolio that includes **Basic Safety, Basic Technical, Advanced Rescue, Enhanced First Aid, Blade Repair and Rigger Signal Person**. Training of technicians is verified easily through the **WINDA database**.



* Sea survival is part of BST and a stand-alone task-specific module



GWO benefits in North America

- **Safety** – Increase employee and contractor awareness regarding potential hazards and control measures to reduce incidents and injuries.
- **Productivity** – Lower cost of overall training while building a more qualified workforce.
- **Standardization** – Assure a base level of competence for technicians across the wind industry with verifiable certifications.





GWO Priorities in North America

1. Tailor standards for North America
2. Double the number of training providers and certification groups
 - Businesses, labor organizations, colleges / technical schools and training providers
3. Increase the number of GWO owner operators
4. Continue to grow WINDA certifications and build a qualified workforce for the wind turbine industry

Safety is Personal and Without Borders!

Industry Presentations

GE RENEWABLE ENERGY - OFFSHORE WIND

Derek Stilwell – Commercial Leader for North America

MHI VESTAS

Maria Ravn – Global Supply Chain US Lead

SIEMENS GAMESA

Martin Hansen – Head of Offshore Construction US

Michael Hughes – Head of AM Offshore Operations and Maintenance

AMERICAN BUREAU OF SHIPPING

Terrence Hickey – Director Offshore Business Development

DNV GL

Leslie Barbagallo – Director, Energy North America

GLOBAL MARINE GROUP

Joel Whitman – Executive Vice President, Global Offshore





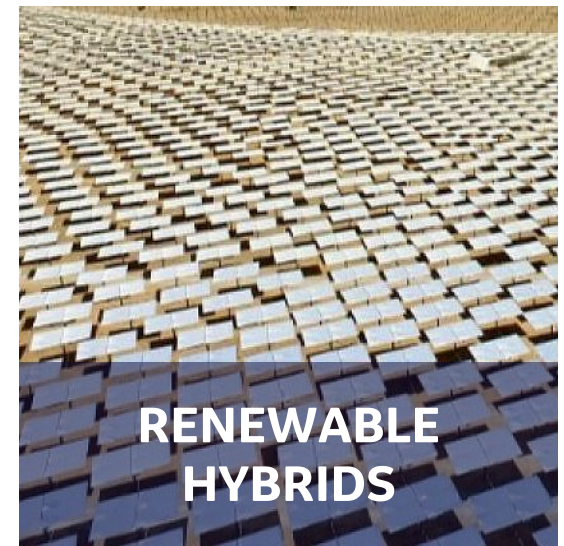
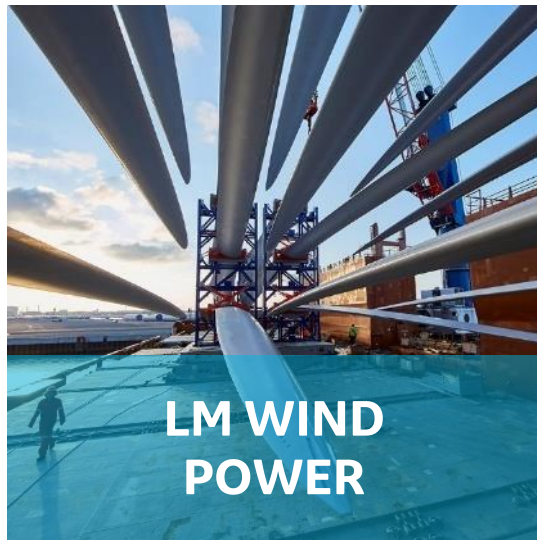
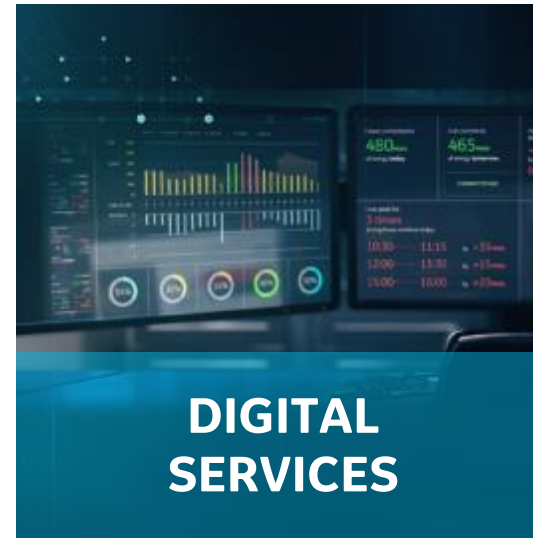
US Offshore Wind Workforce Development

November 21, 2019

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GE Renewable Energy

\$15B revenue • 40,000 employees



Broadest portfolio in the industry; gives us scale, scope and capability to fulfill our mission



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Blade production: LM Wind Power

- In operation since 1978
- Produced: +215,000 blades
- Corresponding to ~ 102 GW capacity
- Saving > 212 MM tons of CO₂/year
- 14,000+ employees
- 15 manufacturing facilities in 8 countries
- Supplier to 30 turbine OEMs



Vertical integration to accelerate LCOE ↓



Our Offshore Wind Footprint



Foxborough (MA) 

- Sales and tendering

Quonset (RI) 

- O&M (Block Island)



Beijing 

- Offices

Jieyang 

- Manufacturing site
(operational in 2021)

Guangzhou 

- Development Center
(operational in 2021)

EUROPE

Hamburg 

- Sales & tendering
- Project execution

Rotterdam 

- Haliade-X 12 MW prototype

Ostend 

- O&M (Osterild)

Cherbourg 

- Blades site (LM)

Saint-Nazaire 

- Manufacturing site

Le Carnet 

- Testing site

Nantes 

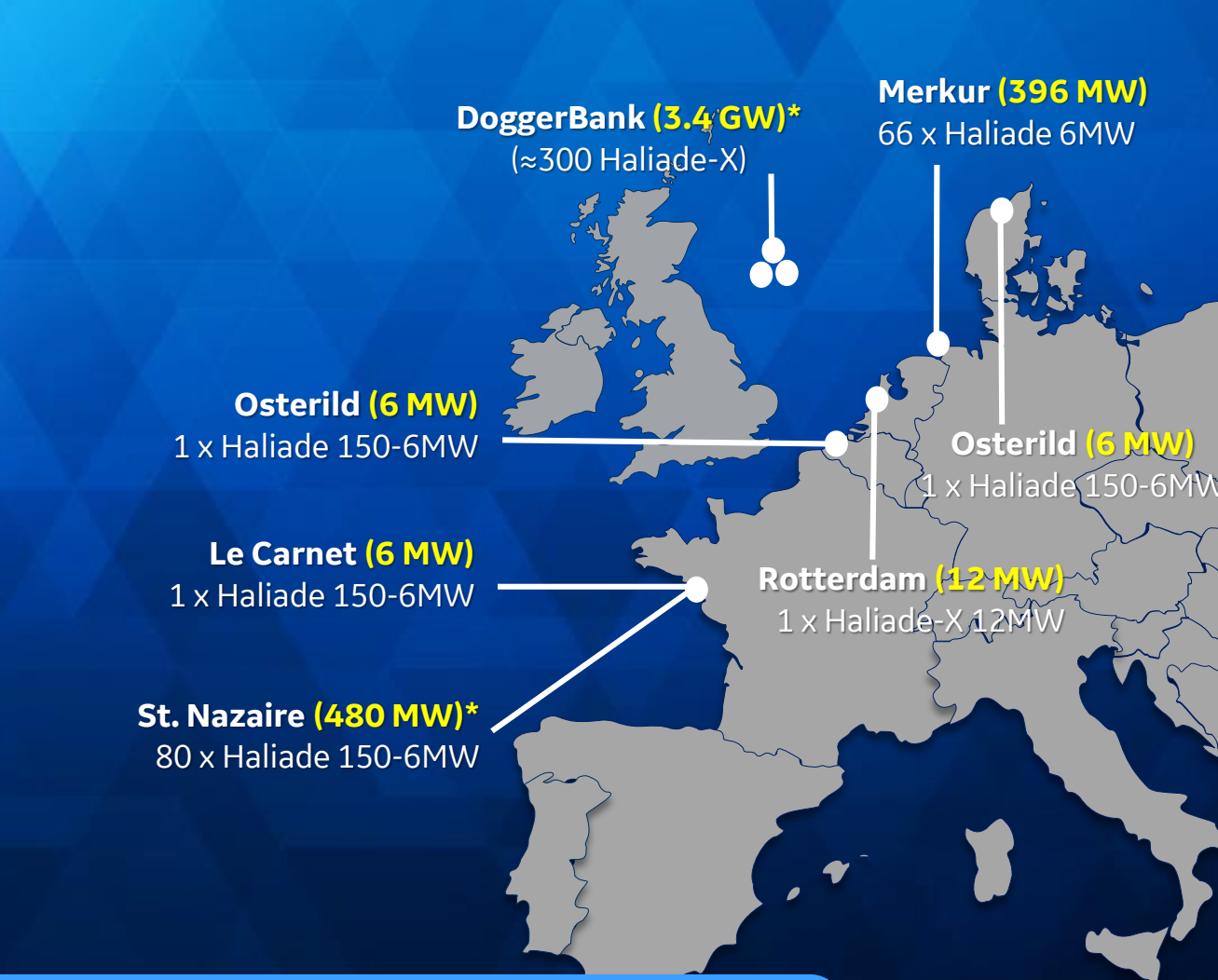
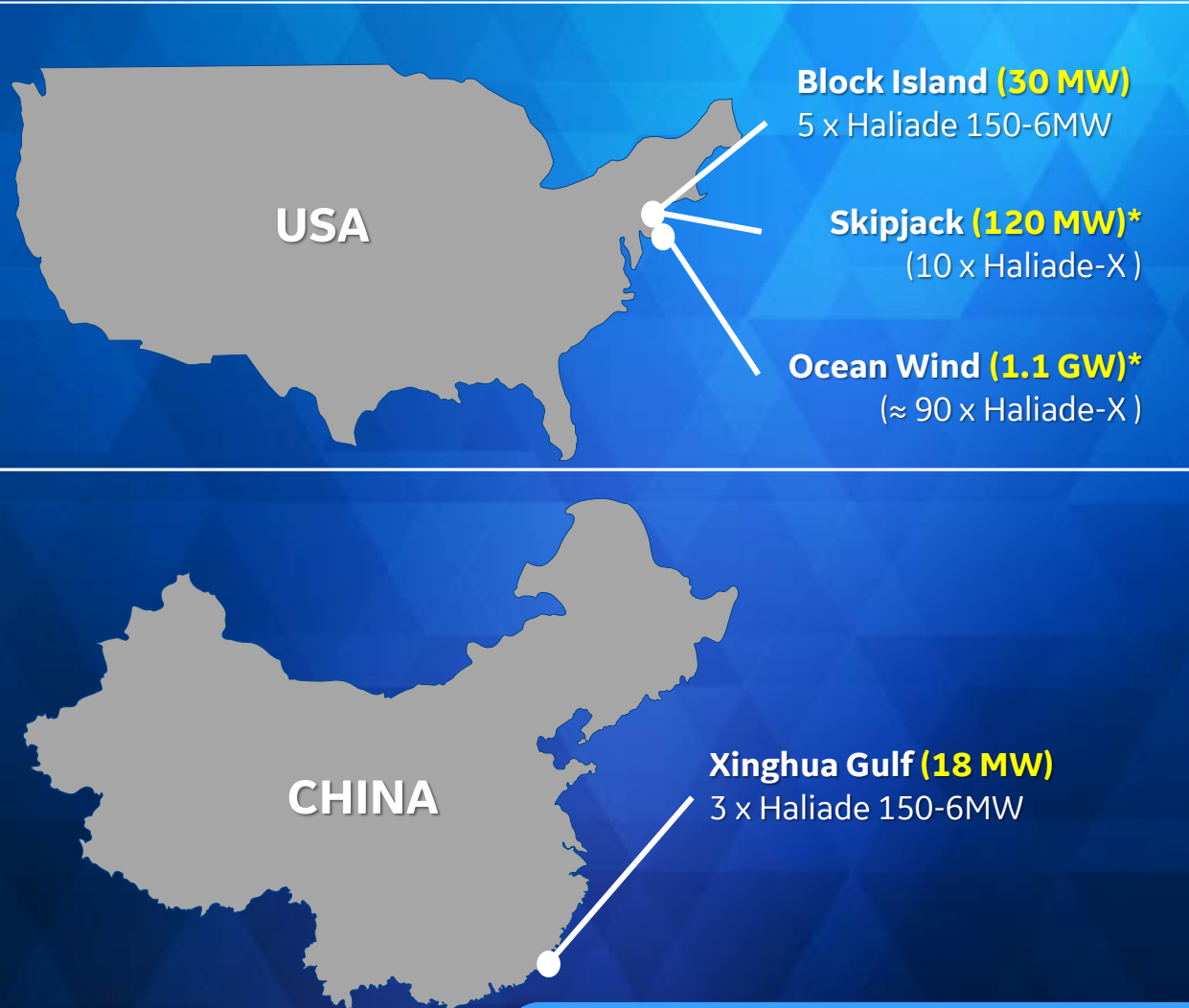
- Offshore HQ offices

Barcelona 

- Engineering
- R&D



Our Projects



We are the only offshore wind turbine OEM with projects in 3 continents

* order backlog



Block Island, USA

First US offshore wind farm

Developer: Deepwater Wind
Wind Farm:
US pilot wind farm with **5 HALIADE 150-6MW*** (30MW)
Off the coast of Rhode Island: **5km**
Water depth: **24m to 28m**
Foundations: Jacket type
Generating **125,000 MW/h annually**
1st offshore windfarm in the US



Safety is our #1 priority

In case of an emergency, please follow the guidelines indicated by the local GE representative.

Be sure to know where the emergency exits are located.

If you see something that could potentially generate a safety incident (i.e. objects on the floor), please let your local GE representative know.

Respect safety measures and remain vigilant.

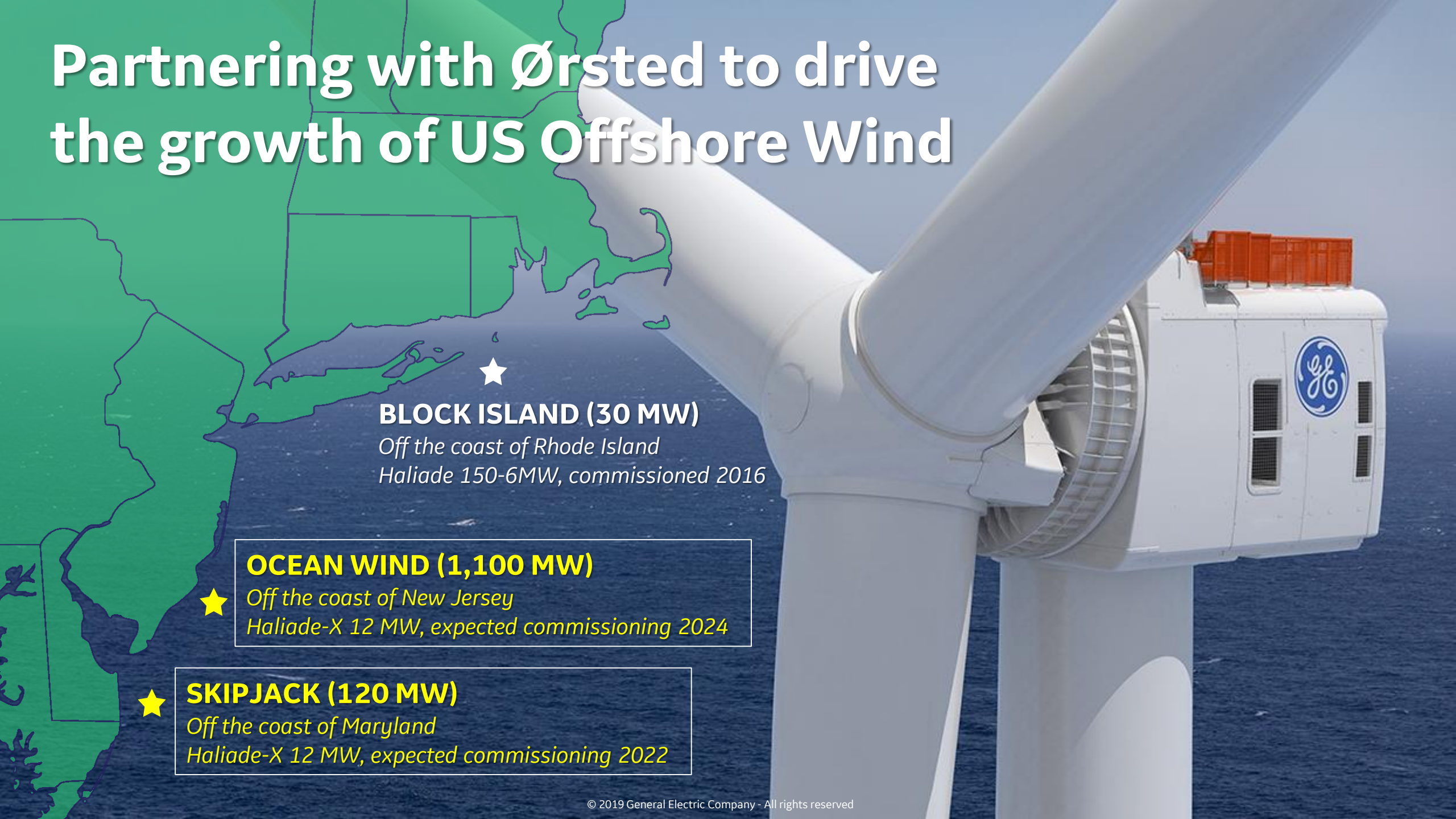


Offshore Work

- The major difference between onshore work and offshore work is the added safety training needed in sea survival.
- GWO is the universally accepted model in Europe and is expected to be the standard in the US



Partnering with Ørsted to drive the growth of US Offshore Wind



BLOCK ISLAND (30 MW)

*Off the coast of Rhode Island
Haliade 150-6MW, 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*

Haliade-X 12 MW



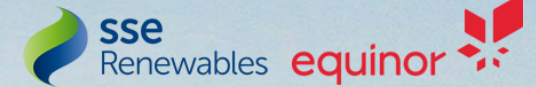
GE's Haliade-X wind turbine drives down offshore wind's **levelized cost of energy** with an industry leading **capacity factor, 12 MW generator** rating and **digital capabilities** to help our customers be successful in an increasingly competitive environment.



「HALIADE-X, THE WORLD'S MOST POWERFUL OFFSHORE WIND TURBINE, TO POWER THE WORLD'S LARGEST, OFFSHORE WIND FARM」

DOGGER BANK WIND FARMS

BY



Creyke Beck B ★ **Teesside A**
★ **Creyke Beck A**

*Each of the three projects will have an installed
capacity of 1.2GW totaling **3.6GW***



Haliade-X: POWER MEETS EFFICIENCY

GE's Largest, High Efficiency Offshore Turbine

Innovative Blade Design by LM Wind Power

Ideal for High to Medium Wind Speeds

NOMINAL CAPACITY

- 12 MW

CAPACITY FACTOR

- 60-64%

ANNUAL ENERGY PRODUCTION

- ~64GWh to ~67GWh

ROTOR DIAMETER

- 220 METERS

WIND CLASS

- IEC IB

DESIGN LIFE

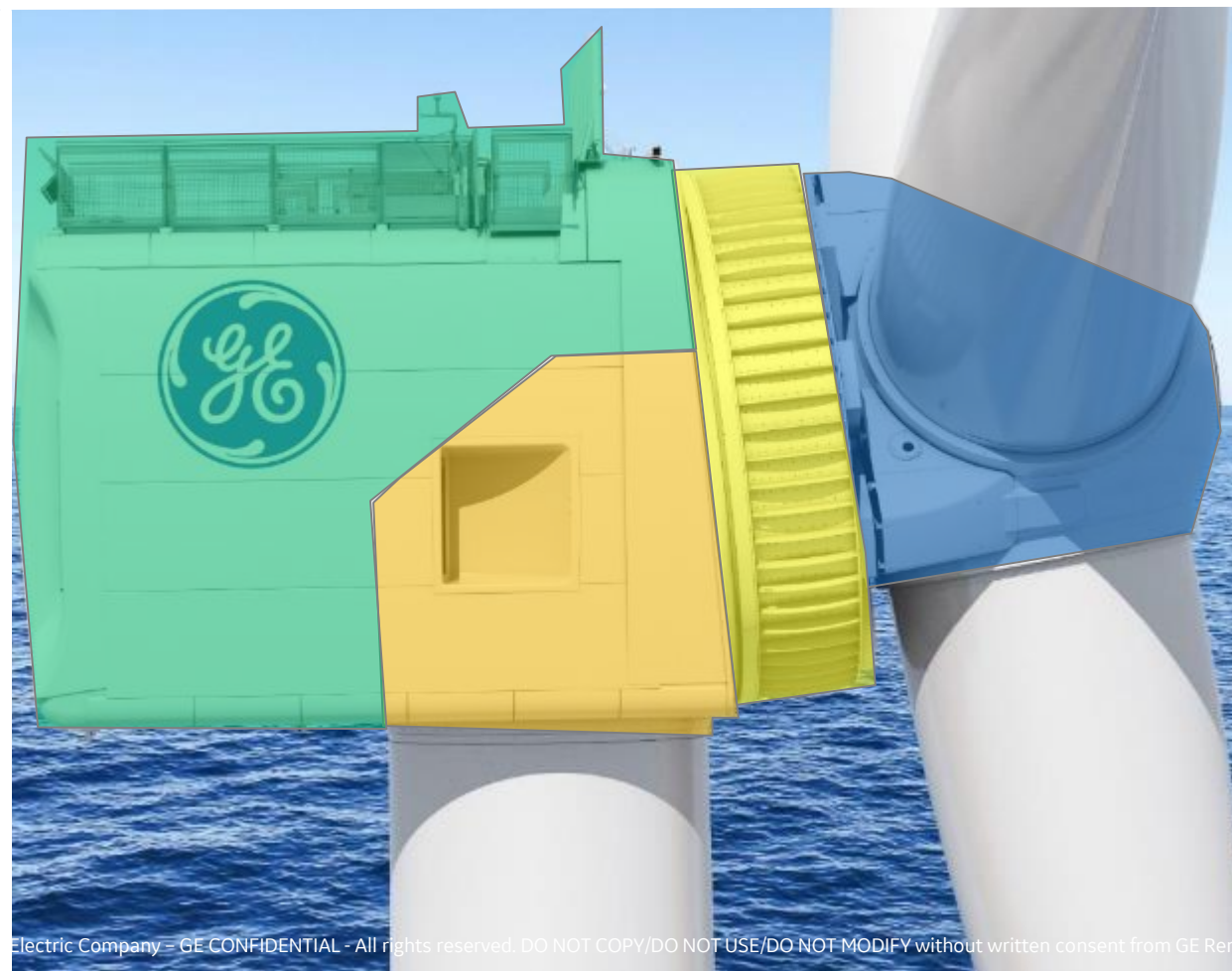
- 25 years & site specific life time ext.

HUB HEIGHTS

- 138 m

FREQUENCY

- 50 & 60 Hz



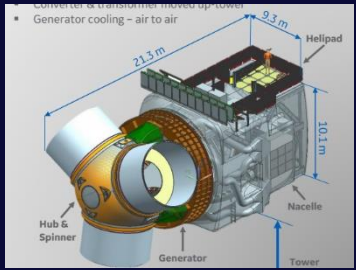
Design drivers:

- Design for **EHS and ergonomics**
- **Highest Capacity Factor for Lowest LCOE**
- **Modular design** on proven **technology** for a simple, reliable & flexible assembly
- Flexibility inside the **plant and the global supply chain**
- **Standardization** to drive continuous improvement
- **Independent testing** of modules & full validation/commissioning in manufacturing plant
- **Simple interfaces** to avoid complex tooling & simple installation



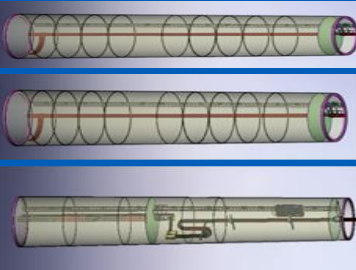
Haliade-X Components

Nacelle



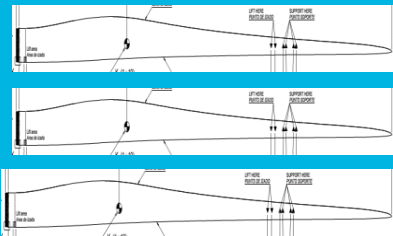
- Assembled on its transport frame. Full power conversion integrated and tested before ex-works (generator + converter + transformer)
- Dimensions 22m x 10m x 11m. 727t = 685+42 frame. 772t in lifting configuration
- Ex-works from GE factory St. Nazaire / France

Tower



- 3 sections « empty tubes » with all internals (ladder, cable lift, HV and auxiliary cables, Air cond.)
- All sections transported horizontal
- Length 27+41+43,6= 111m. Diameter 8m +2m for T1 extensions. Weight 315+290+232 => 844t when assembled
- Manufacturing site to be confirmed on a project basis

Blades



- Length 108m and COG at 30m from root. Diameter at root 5m. 61t excluding transport frame
- Delivered flat in transport frames stackable in 3 layers
- Ex-works from LM factory Cherbourg / France



Onshore Work

GE Employees

- Project Management
- Quality Inspectors
- Commissioning Technicians
- Installation Technicians
- O&M Technicians

3rd Parties

- Commissioning technicians
- Installation Technicians
- HV Technicians
- Crane Operators
- O&M Technicians

Offshore Work

GE Employees

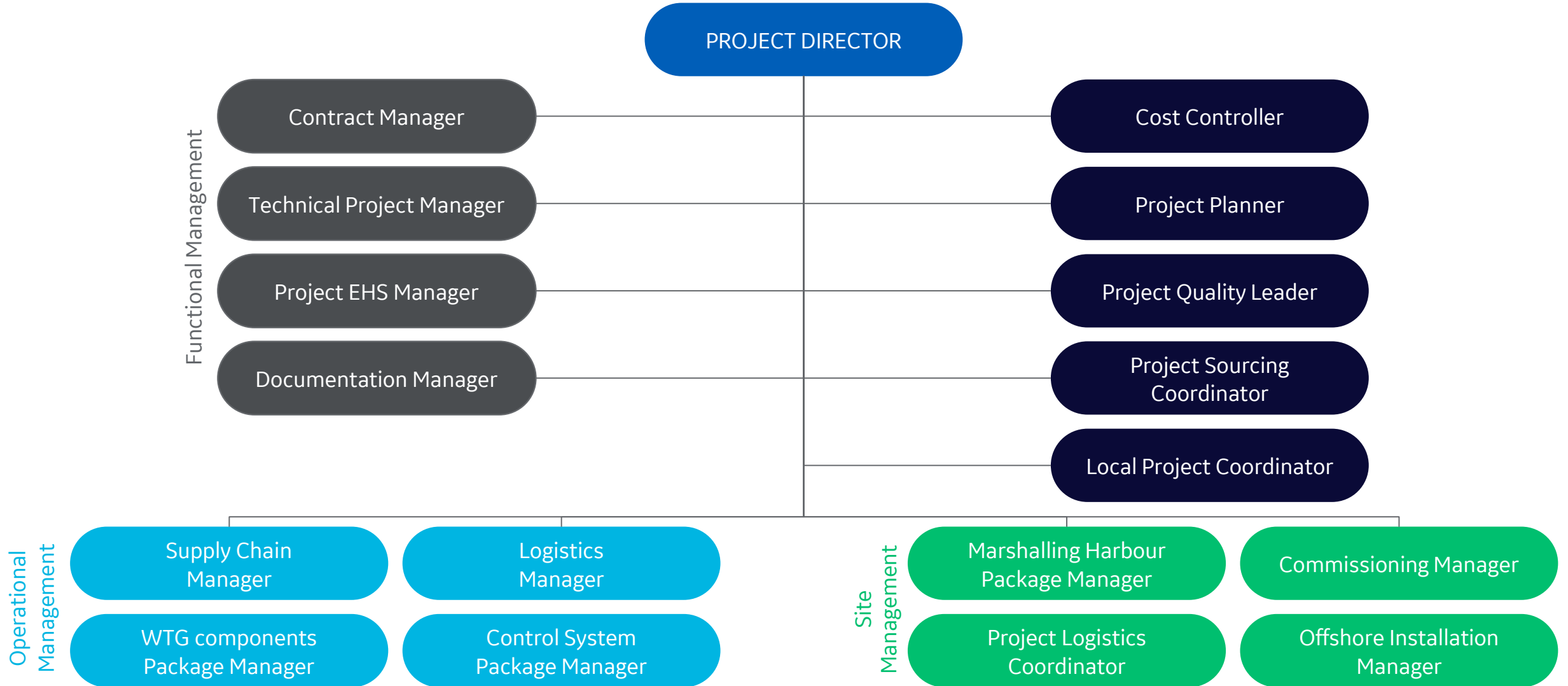
- Project Management
- Quality Inspectors
- Commissioning Technicians
- Installation Technicians
- O&M Technicians

3rd Parties

- HV Technicians
- Rope Access Technicians
- Installation Technicians
- Vessel Operators
- Crane Operators
- O&M Technicians



Standard project organization



GE Training

- GE provides GE employees with specific training on our technology
- This would include turbine specific troubleshooting (mechanical, electrical, hydraulic), schematics, SCADA
- We can also provide this training to our vendors at a cost



What we expect from our contractors and new employees

- GWO safety training (sea survival if working offshore) – GE will sponsor for GE employees
- Ability to understand electrical schematic drawings
- Degree and or technical certification in wind energy or electrical/electronic/mechanical field
- Welding certifications if job requires
- Heavy equipment training if job requires
- Preferred to have previous wind (O&M, installation, commission) experience with offshore a plus



Gaps for Workforce Development

- GWO safety training (BST) and a opportunity for GWO technical training (BTT)
- Certificate or training programs for electrical schematics
- Degree, technical certification, and apprenticeship programs in wind energy or electrical/electronic/ mechanical field
- Welding certificate, training and apprenticeship programs
- Heavy equipment training and apprenticeship programs
- Partner to have internship programs for students in wind energy field





MHI Vestas Offshore Wind

MHI Vestas- Established in 2014 on decades of experience

Delivering affordable offshore wind power

- A joint venture between two **industry leaders**: Vestas Wind Systems A/S (50%) and Mitsubishi Heavy Industries Ltd (50%)
- Founded 1 April 2014, now employing **~3,000 employees**
- Sole focus on **offshore wind**
- Our business is to **design, manufacture, install and service wind turbines**
- Our approach is truly **collaborative** – we aim to create strong partnerships with customers, suppliers and other stakeholders in the industry

MVOW global footprint – our offices, manufacturing & assembly facilities

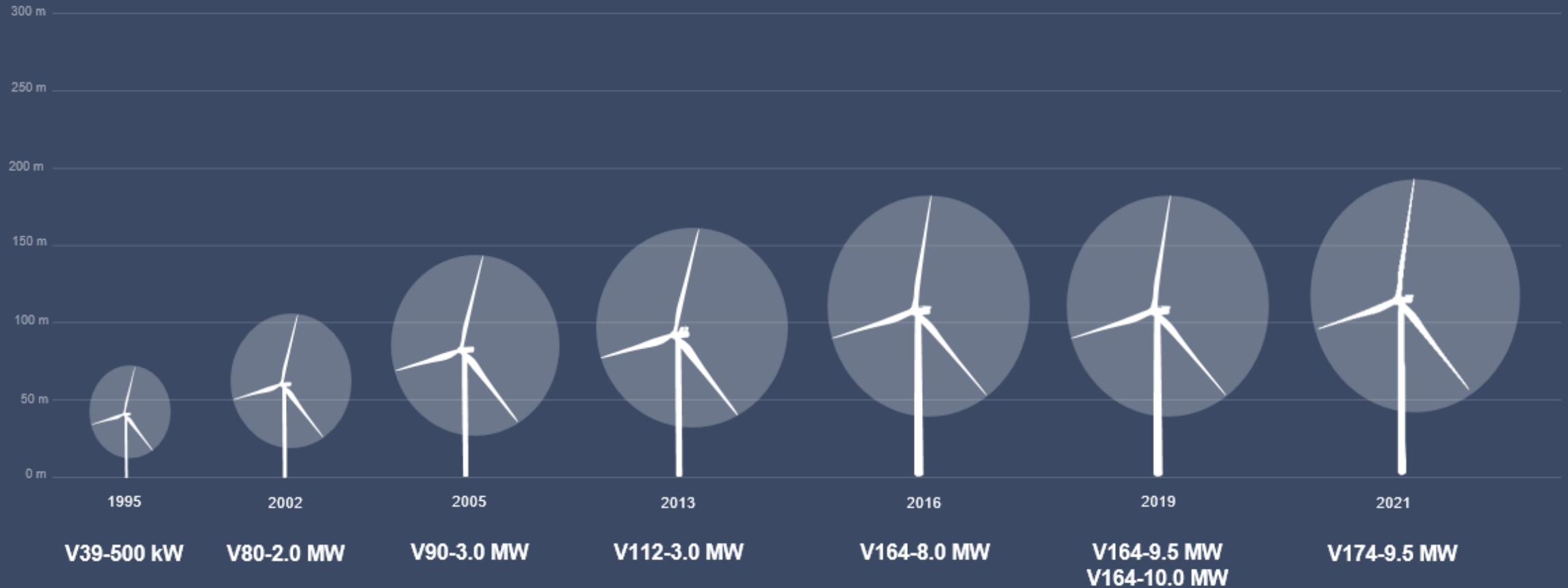


OFFICE location

MANUFACTURING / ASSEMBLY facility

Innovation and performance improvement.

From an on-shore turbine to a purpose build offshore turbine



Dimensions of the V164-9.5 MW™ and V164-10.0 MW™

Larger swept area than the London Eye

Dimensions

Swept area	21,124 m ²
Power	9.5 MW / 10.0 MW
Blade length	80 m
Approx. hub height	105 m
Rotor diameter	164 m
Approx. tip height	187 m
Weight (excl. tower)	~ 500 t

V164-9.5 MW / V164-10.0 MW
Swept Area 21,124m²

London Eye
Swept Area 11,310m²



Technician profiles

Responsibilities & tasks:

The Offshore Service Technicians in MHI Vestas Offshore Wind are working in teams of 2 or 3 on Offshore Wind Farms in the Netherlands, managed daily by the site Supervisor. The task includes routine checks, maintenance of the electrical and mechanical systems, and significant component replacement on our offshore wind turbines. The work schedule will include a weekend callout rotation, depending on the weather. For this site we do not work in rotation, meaning that you go

home daily.

Main responsibilities:

- Execute maintenance of electrical and mechanical systems as directed by Supervisor.
- Maintaining and upgrading installation activities
- Carrying out a diversity of check-ups, repairs and replacement activities of turbine components
- Responsible for a frictionless operation of our turbines and use of our systems like Condition Monitoring / Remote Control
- Creating follow-up orders
- Registration of time and material consumption
- Compliance to MHI Vestas's and client's procedures, processes, policies and instruction, including Health and Safety.

Professional competences:

- Completed electrical or mechanical degree from a technical school/college/university and/or completed an apprenticeship
- Professional experience (electrical or mechanical) and preferably offshore and/or with high voltage (preferably gained over a 2 year period)
- Accepted qualifications are: MBO Level 3 or 4, preference for electrotechnics, hydraulics or mechanical engineering
- Computer literacy: good knowledge of MS Office
- Full driving license

Personal skills:

- Dutch speaking preferable, or English speaking, further good English skills in reading / writing,
- High level of safety awareness
- Comfortable working offshore and at heights, coping with the respective challenges this brings
- Flexible
- Reliable
- Problem solving skills
- Team player
- You recognize your own limitations and are willing to seek help when needed

Join us on our journey towards a greener future

Do you have experience with operation and maintenance of mechanical or electrical systems? Are you safety-minded, ambitious, and have a positive attitude? Do you have experience working with offshore wind turbines?

Tasks & responsibilities: You will

...be based on a Service Operation Vessel (home port of Fraserburgh) and Working on a 2 week on 2 weeks off rotation.

Your main responsibilities will be:

- Compliance to MHI Vestas' Health and Safety Management system
- Maintenance & Service of electrical and mechanical systems
- Maintaining and upgrading installation activities
- Carrying out a diversity of check-ups, repairs and replacement activities of turbine components
- Trouble shooting of electrical and mechanical systems and fault diagnosis
- Responsible for a frictionless operation of our turbines and use of our systems like Condition Monitoring/Remote Control
- Creating follow-up orders
- Registration of time and material consumption in SAP/Microsoft Dynamics AX

Skills & experience: Our new colleague...

...has completed an electrical or mechanical degree or completed an apprenticeship. You have professional experience with electrical or mechanical systems. Preferably you have worked in the offshore industry. As a person, you are highly safety-minded and comfortable working offshore and at heights. You are flexible and willing to travel to other sites when required, both internationally and within the UK. Equally important is to be mature and reliable with a high technical drive. We expect you to have good problem-solving skills, but it is also important that you are a team player and willing to seek help when needed.

Further qualifications needed:

- Accepted qualifications: NVQ L4, HNC/HND in Mech/Elec/Marine, C&G full technological certificate/diploma, Master's in electrical/Mechanical Engineering
- Good English skills both oral and in writing
- Basic knowledge of Microsoft Office
- Full driver's license

Let's move the horizon.



Roles and Training Requirements

Preassembly, Installation and O&M

NYSERDA

Agenda



1

Offshore SGRE roles in preassembly, installation and O&M

2

Offshore SGRE technician training requirements

3

Offshore Procurement requirement

SGRE have a focus in 3 distinct areas

Onshore Pre Assembly

Complex lifting operations assembly of tower sections and final onshore commissioning of Nacelles.



Offshore Installation & Completion

Tower Installation, Nacelle and Blade mounting offshore and final testing of nacelle for turbine test run



Operation & Maintenance

Operation and maintenance services aimed at maintaining high generation and asset integrity throughout the lifecycle



Wind Turbine Installation – Offshore Installation & Completion – Support Roles

<p>Offshore Installation & Completion</p>	<p>Tower Installation, offshore nacelle and blade mounting and final commissioning in preparation for test run and handover to customer and the service team</p>	
<p>Construction PM</p>	<ul style="list-style-type: none"> • Overall responsible for the construction site , the safety and well being of the workforce and commercial performance of the project • Key interface with owner/customer 	<p>Site Manager</p>
<ul style="list-style-type: none"> • Responsible for the safe execution of projects on site, delivery of project within time frame and budget whilst maintaining customer relationship and satisfaction 		
<p>Construction engineering</p>	<ul style="list-style-type: none"> • Overall responsible for the engineering and construction of quayside equipment and sea fastening. • ground-bearing requirements and wind loading capabilities 	<p>Installation Lead & Foreman:</p>
<ul style="list-style-type: none"> • Installation – preparation, erection and installation. • Completion – mechanical, electrical completion, commissioning & troubleshooting • Lifting - all lifting plans offshore. 		
<p>High Voltage engineer</p>	<ul style="list-style-type: none"> • Overall responsible for HV operations • Develop and maintain HV operational procedures • extended scope (switching responsibility) 	<p>Safety/quality</p>
<ul style="list-style-type: none"> • Supports the project manager in the delivery of the quality management plan manages the safe system of work and , ensures installation meets internal and customer quality KPI's 		

Wind Turbine Installation – Onshore Preassembly – Support Roles

Preassembly

Main tasks is to prepare nacelles for loadout, as well as preparation/erection of towers or tower segments including mechanical and electrical completion.



Site Manager

- Overall responsible for the delivery of the project, including project planning, staff management, financial reporting and customer relationship

Installation Lead

- Responsible for the day to day operations, has a holistic overview of the operation and is the key interface between the different functions

Foreman

- Performs, supervises, trains and ensures safety within preparation and erection of major components acts as key contact between area of supervision and the installation lead

Logistics

- Responsible for the overall management of the supply chain ensuring parts, tools and consumables are available on time. On site management of inventory

Safety & Quality

- Overall governance of the safe system of work during pre assembly, contractor management and safety and quality support for the workforce and customer

Wind Turbine Installation – Onshore Preassembly – Technician Roles

Pre-Assembly Technician – Erection

- Performs and ensures safety during component offloading and during lifting operations on the preassembly site especially on SGRE specific lifting devices.

Nacelle Technician Pre-Assembly

- Tech - Assists competent technician in nacelle testing and pre-commissioning activities.
- Competent Tech – Performs and oversees the nacelle preparations and pre-commissioning.

Pre-Assembly Technician – Electrical

- Supervises and management of work flows for turbine testing, pre-commissioning and final onshore electrical completion of nacelles. (Portions maybe moved to Offshore)

Metal & Blade Paint Technician

- Performs metal paint repairs of steel structures as well as minor blade repairs also performs final preparation of blades for installation.

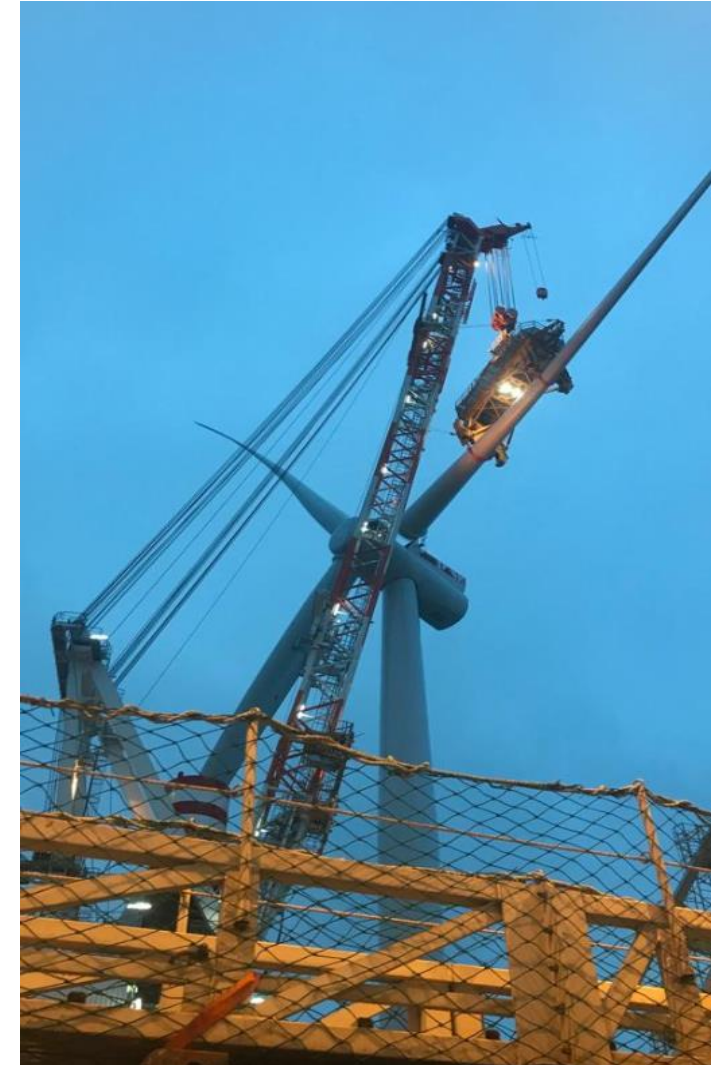
Blade Repair Technician

- Specialist in structural blade and surface repairs and can lead teams of MBPT technicians.



Wind Turbine Installation – Offshore Installation – Technician Roles

Technical Supervisor	<ul style="list-style-type: none"> • Technical support to all technicians, planning input and technical documentation creation, development of workforce competence and site point of contact for all technical issues
Lifting User /Super User	<ul style="list-style-type: none"> • Perform installation lifting operations, has specialized training for complex lifting operation of blades, towers and nacelles – Janett Yoke
Tower Technician – Installation	<ul style="list-style-type: none"> • <u>Tech</u> - Assists competent technician during installation in prepping the TP for tower landing, mechanical completion and snagging works. • <u>Competent Tech</u> - Prepares TP and components for installation and leads a small team of Tower Technicians.
Tower Technician - Completion	<ul style="list-style-type: none"> • <u>Tech</u> - Assist in the mechanical and electrical completion works, commissioning activities and troubleshooting turbine faults • <u>Competent Tech</u> - Leads the team for final completion activities in WTG. Troubleshoots and repairs mechanical, electrical or system defects in preparation for turbine test run.
High Voltage Technician	<ul style="list-style-type: none"> • Installation and testing of HV cabling, switchgear and transformer. Troubleshooting and replacement of HV equipment and can perform switching operations



Wind Turbine Installation – Operations and Maintenance – Support Roles

Service & Maintenance

Delivery of planned and unplanned work to ensure high generation and integrity of the wind turbines in the wind farm



Operations Manager

- Responsible for multiple windfarms and commercial responsible for project profit margins.

Site Manager

- Customer interface and overall responsible for the Health and Safety, delivery of contractual obligations and development of the workforce

Senior Technician

- Operational and technical lead for the shift, day to day operations are orchestrated by the senior technician.

Operations Coordinator

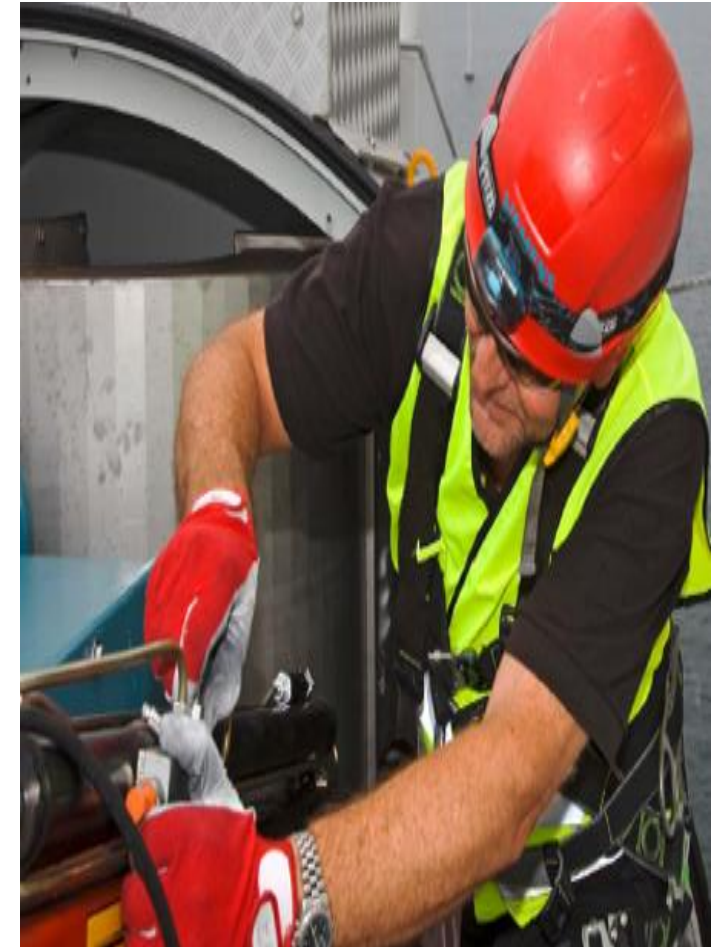
- Scheduling of short-term plan, daily reporting and process adherence, closure of work orders site administration

Stock Keeper

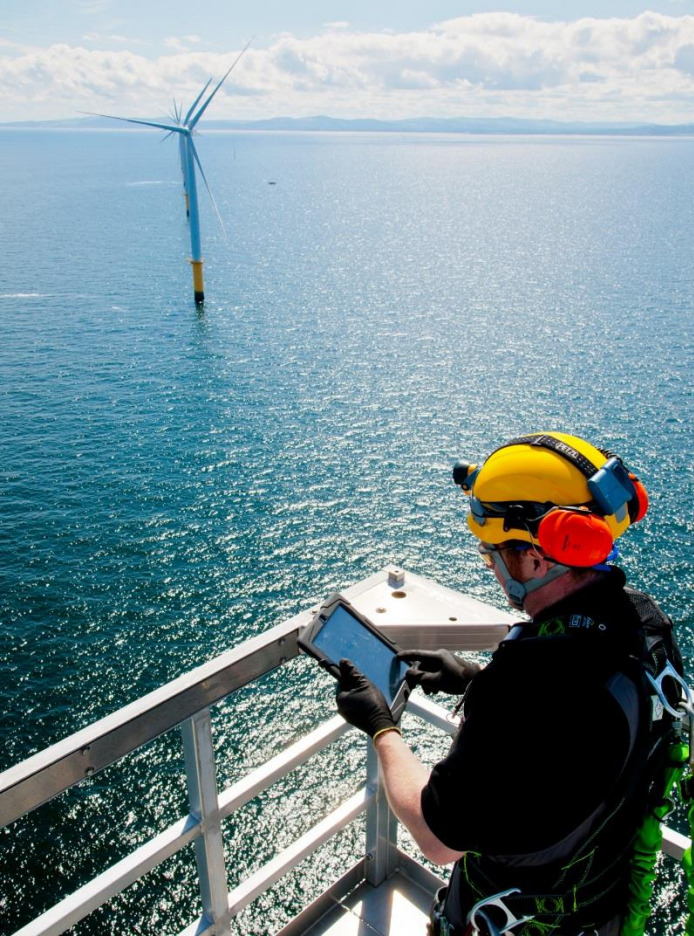
- Supply chain governance, management of site inventory, tooling calibration, parts ordering and escalation

Wind Turbine Installation – Operations & Maintenance – Technician Roles

Offshore Technician	Entry level technician who has attended basic engineering, generic wind turbine training, OSHA and organization safety training. Assists Maintenance Technicians and Troubleshooters in the execution of planned and unplanned works.
Maintenance Technician	Competent person in performing scheduled maintenance who provides OJT to technicians in performing service. Leads maintenance team and may also assist in unplanned works
Trouble Shoot Technician	Authorised to troubleshoot mechanical, electrical and control system defects. Has advanced experience on turbine platform and may act as an assessor for development of workforce
Advanced Technician	Works with special projects and remote diagnostic tools to support the early rectification of WTG defect Has a broader operational understanding of the project and is in development to be a Senior Tech



Agenda



- 1 Offshore SGRE roles in preassembly, installation and O&M
- 2 Offshore SGRE technician training requirements
- 3 Offshore Procurement requirement

Basic Training Requirements



GWO Basic Safety Training

First Aid SE-P-50010	Manual Handling SE-P-50020	Fire Awareness SE-P-50030	Working at Heights SE-P-50040	*Sea Survival SE-P-50050
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GWO Technical Training

GWO Mechanical SE-P-50410	GWO Electrical SE-P-50420	GWO Hydraulic SE-P-50430
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Task Specific Requirements

HUET SE-P-04700	GWO ART	GWO EFA
Task Specific Requirements as needed		

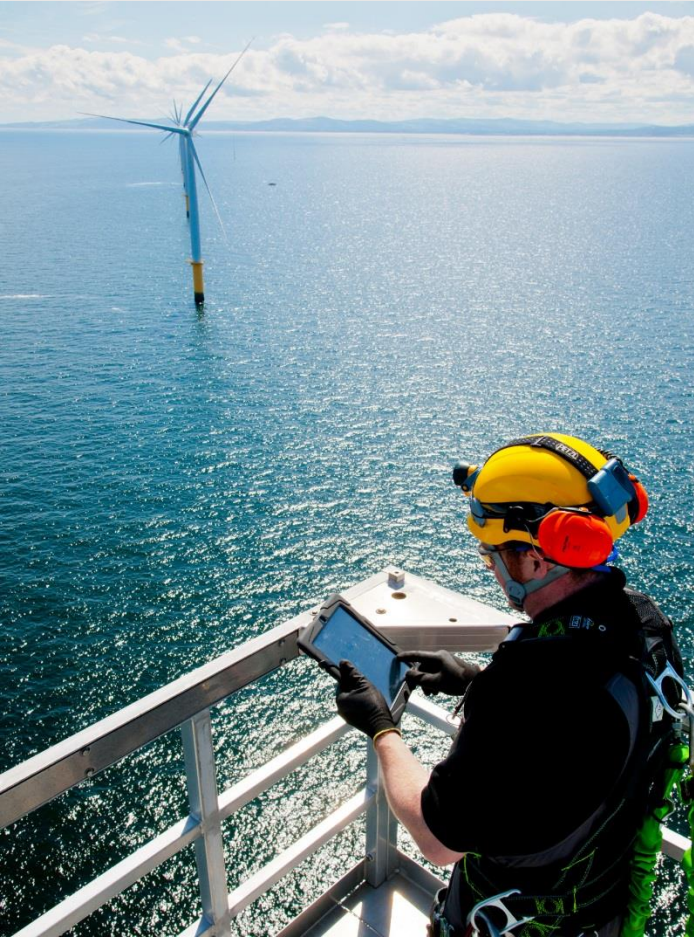
Siemens Gamesa Technical Training

Tech. Safety Awar. SE-P-50510	Documentation Tr. SE-P-50520+25	Bolt Tightening SE-P-50530+35	Hand Tool Awaren. SE-P-50550+55	LOTO Aware. ST SE-P-50560+65	Cable Training SE-P-50570+75	Slinger Banksman SE-P-21300*	Gen. Elec. Awar. SE-P-85400
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Basic trade Education

Electrician Low & High voltage	Painter Steel and fiber	Plumber	Craftsmen	Ironworkers
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Agenda



1

Offshore SGRE roles in preassembly, installation and O&M

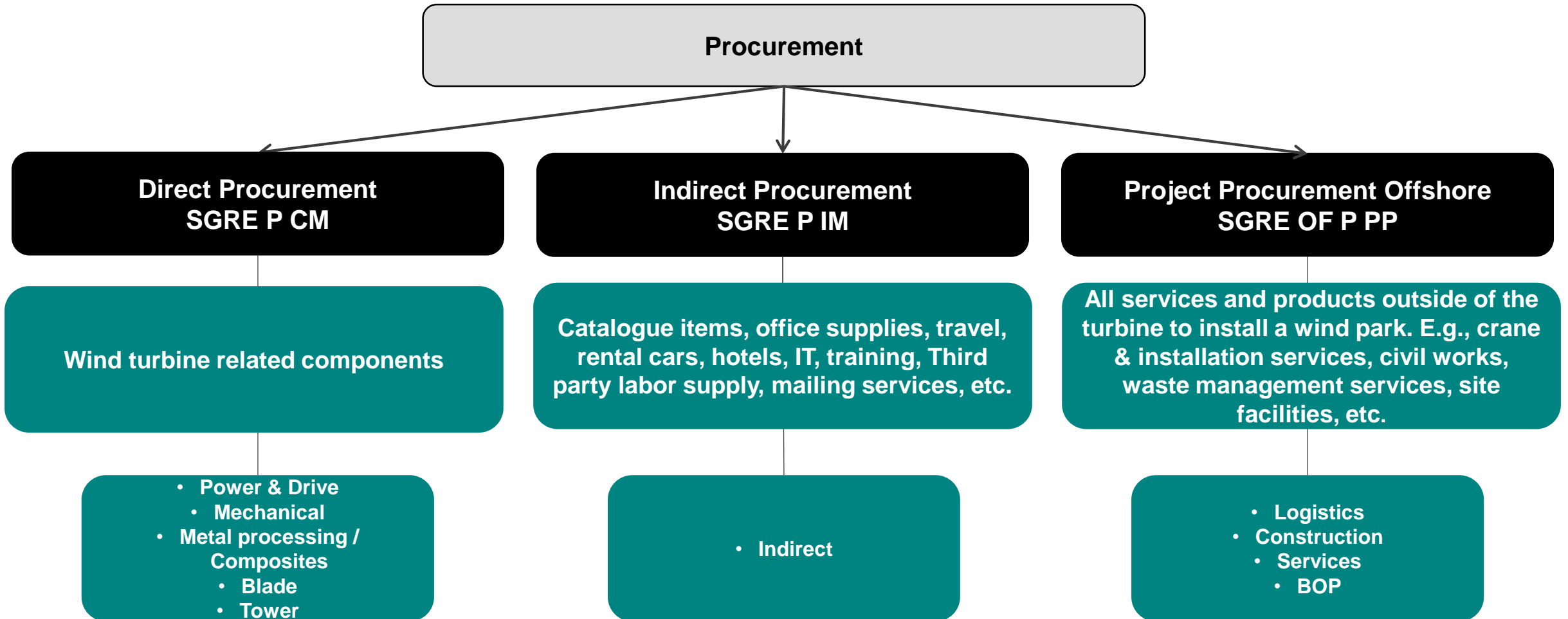
2

Offshore SGRE technician training requirements

3

Offshore Procurement requirement

Overall Procurement organization and sub-units within SGRE Offshore



Offshore Overview – Some Examples (1/4)

Sea Transport

- Sea transport of main components (tower sections, nacelles, blades) from port of manufacturing to port of pre-assembly
- Provision of vessels, bunker, stevedores and agents
- Activities before and during preassembly activities



Cranes

- Provision of equipment and personnel for transport and lifting activities at pre-assembly port
- Transport of main components (tower sections, nacelles, blades) at pre-assembly port
- Lifting & Stacking of tower sections for pre-assembly on quayside



Crew Transfer Vessels

- Provision of CTV charter for the transfer of technicians, tools and equipment supporting offshore operations.
- Includes provision of vessel crew, maintenance and fuel.
- For activities spanning installation, O&M and major component repair/exchange.



Offshore Overview – Some Examples (2/4)

Ports

- Provision of preassembly ports suitable for inbound logistics, storage, preassembly and installation vessel loading
- Ensure heavy duty and well prepared storage and quays
- Ensure suitable swift and easy setup for Installation vessels



Quay-side Equipment

- Provision of equipment for quayside and vessel including sea-fastening like compact tower frames & bolts
- Sourcing of turnkey providers for fabrications; including the production of quayside equipment and sea-fastening as well as related mobilization and demobilization services



Manpower – Field Services

- Provision Third Party Labour providers and labour for Offshore service activities
- HV techs, statutory inspectors, site related labour,
- Provision of project certifications



Operations and Maintenance Overview – Some Examples (3/4)

O&M Facilities

- Design, construct and manage service base facilities to support O&M activities and potential helicopter operations.
- Quayside improvements to support offshore mobilization such as port side cranes and pontoons.
- Waste management and bunkering activities



Vessels and Logistics

- Crew Transfer Vessels
- Service Operation Vessels (SOVs)
- Jack Up Vessels
- Helicopters
- Marine and Aviation Coordination



Manpower – Field Services

- Supplemental workforce to our O&M organization
- Specialized workforce such as rope access and high voltage
- Specialized consultants – port survey, engineering studies, etc.
- Training providers - GWO certified programs





Questions?



Importance of a Properly Educated Work Force

Lars Samuelsson/ Terrence Hickey | 15 November 2019
NYSERDA Offshore Wind Technology and Training Workshop



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Agenda

- ABS Overview
- ABS Internal Training
- ABS External Training
- Experience from first Offshore Wind Farm in US Waters

What is ABS?

- **ABS Mission**

The mission of ABS is to serve the public interest as well as the needs of our members and clients by promoting the security of life and property and preserving the natural environment

- Founded in 1862 by 9 US marine insurance companies
- 'Not-For-Profit' Marine Classification Society
- No owners/shareholders, ABS Board of Directors are appointed from its Membership
- ABS Members are the owners, operators, designers and builders of ships, offshore units and associated equipment
- ABS as a class society represents industry and helps develop standards related to;
 - Design
 - Construction
 - Operational maintenance

ABS

- ABS has over 200 offices spread out in 70 countries
- A consistent training program is needed to achieve consistent delivery but more important, to keep our employees and the vessels we visit SAFE
- Safety record:
 - Over 3 years (1130 days) without LTI for ABS
 - Over 4 years (1580 days) without LTI for ABS Group
- We achieved this goal by a rigorous training program, from the time our employees enter the door until they exit

Sample Related Experience



Deepwater Wind Block Island - ABS Group serves as the CVA for the first offshore wind farm in the US, Deepwater Wind Block Island in Rhode Island.

Hexicon AB - ABS Group was contracted to provide full Project Certification for a novel floating platform offshore wind farm being developed by Hexicon at an offshore site in Scotland.

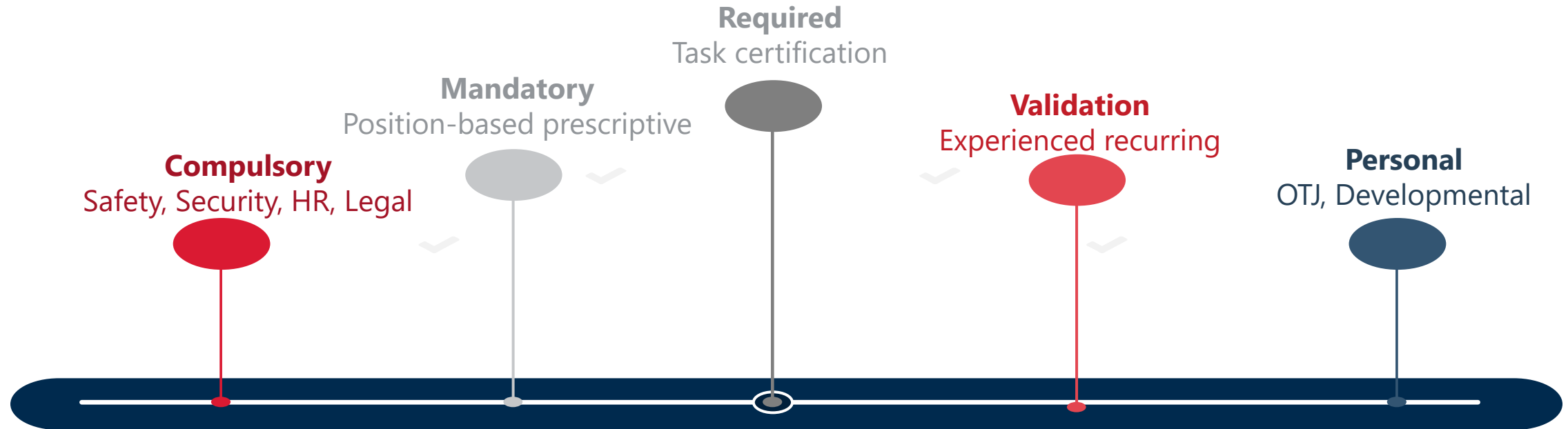
Nordsee One and Nordsee Ost – Germany - Provided manufacturing inspections, coating inspections, and related quality assurance services. Since August 2017 we have provided rotor blade manufacturing verification and component certification services for new rotor blades for Nordsee Ost.

Ørsted Hornsea One and Borkum Riffgrund - UK and Germany - Project Certification services to Ørsted on the world's first 1 GW offshore wind farm (Hornsea One) being built in the UK. Our scope is focused on manufacturing certification of the four (4) offshore substations (OSS) including the jacket substructures. The same certification service is provided for the German offshore wind farm called "Borkum Riffgrund 02".

CVA Services - US Gulf of Mexico O&G

- ABS has provided CVA services to the construction, installation, and operations of 53 platforms in the US GoM

ABS Training Paths



ABS surveyors and engineers complete training through 5 paths:

Compulsory: typically web-based courses to meet corporate requirements.

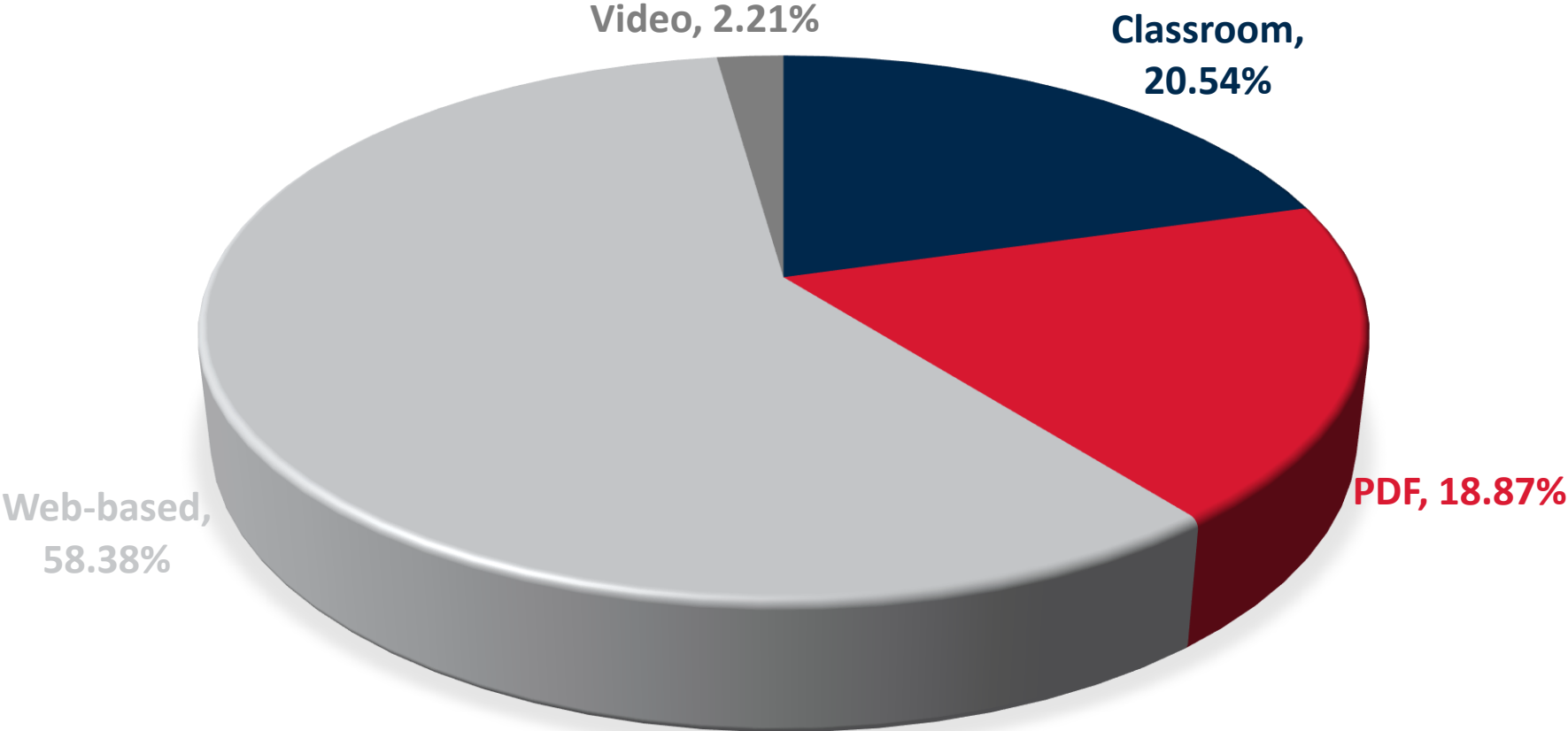
Mandatory: prescribed technical training based on an employee's role.

Required: programs that must be completed to achieve certification to a task.

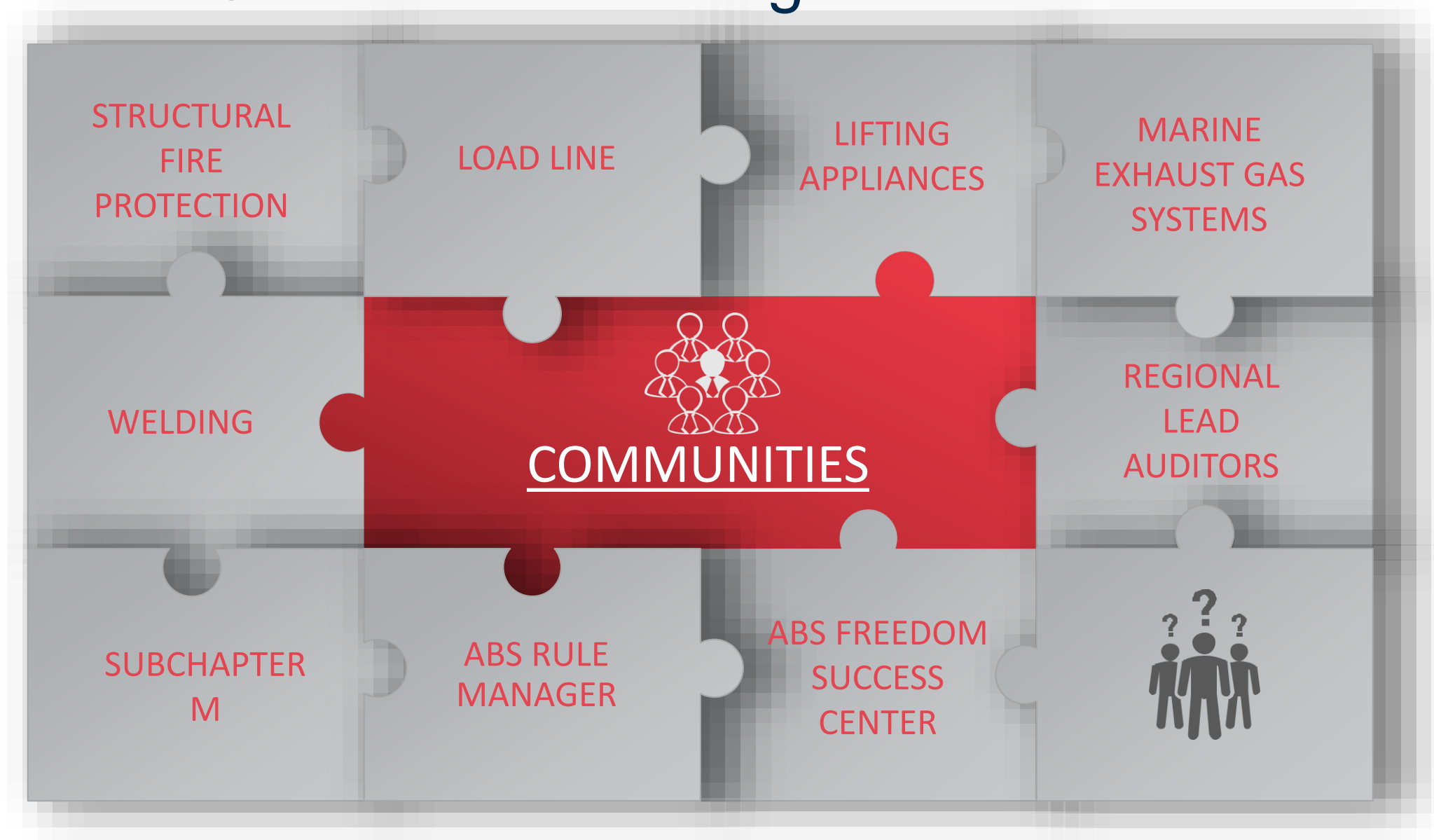
Validation: recurring programs reinforcing skills for experienced surveyors, auditors and engineers.

Personal: on the job and developmental training to meet personal needs and growth.

Blend of Training



Tools for Continuous Training

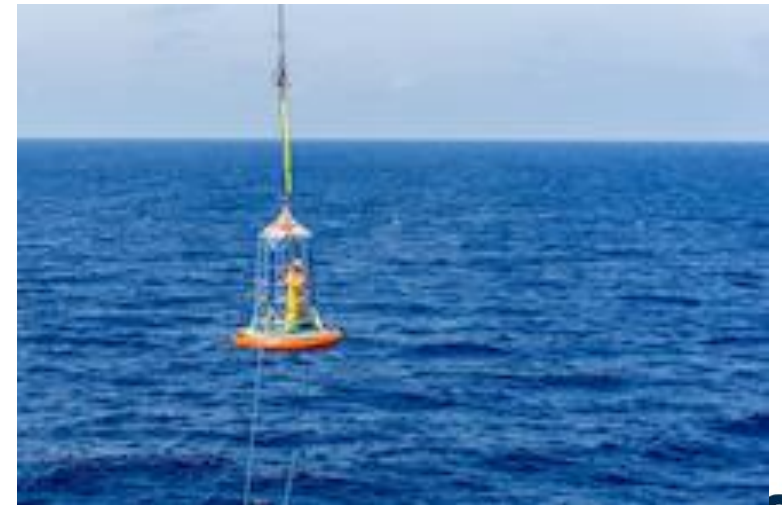


Examples of ABS External Training

- The ABS Academy offers a variety of training courses to external customers
- ABS Academy can create specific training based on our clients' needs
- Example of available courses;
 - Behavior-Based Safety - Awareness & Implementation
 - Marine Crisis Management & Emergency Response
 - Management of Change
 - Maritime Risk Assessment
 - Risk Assessment Implementation
 - Incident Investigation Root Cause Analysis

Lessons Learned from the only US Offshore Wind Installation

- Operating close to shore is different from working offshore and the original team had limited experience with weather and sea state normally encountered during Offshore operations
- Procedures and practices applied on-shore are not directly transferable to offshore
- Equipment needed is different
- Personnel and equipment moves needs special considerations
- Communications and emergency response times need to thoroughly understood by shore side and onsite personnel



Summary

- To develop a work force, it is important to have a clear goals and a defined path of education
- Tools for a consistent education path lays the foundation for a safe and efficient work force
- Learn from experience of other, establish a vehicle to capture good practices and what not to do



Thank You

www.eagle.org



US OFFSHORE WIND INDUSTRY: SEEKING PROBLEM SOLVERS

November 15, 2019

DNV GL Services for Off-Shore Wind

85 YRS
Electrical
engineering



45 YRS
Offshore
Oil and Gas



150 YRS
Shipping &
Ports



35 YRS
Wind Power

Extensive global advisory experience in offshore wind

TA to 25 lenders & 2 GW of offshore wind

2017-18: DNV GL supported 25 lenders, 20 of whom are new to offshore wind, as Lenders Technical Advisor for 2 GW of offshore wind in Europe

Managing issues during construction

DNV GL has significant experience in working with the developers and lenders to manage issues during construction, enabling projects to reach financial close

Technical Expertise

In-house experts in technical disciplines needed to support SAPs, COPs, and associated state and federal permits as well as significant stakeholder relationships

Owners Engineer

Significant experience with US lease area evaluations, US State RFP bid support, and European construction and operations contracts (Beatrice, East Anglia One, Nearth Gaoithe, and Inch Cape)

>90%

Played a role in the majority of the world's offshore wind projects

>20 GW

offshore wind resource assessment studies

>50 GW

Owner's Engineer and Due Diligence services

Advisory offshore wind services

Pre-Development Support and Site Investigation

- Strategy development and strategic advice
- Market assessment
- Preliminary wind speed and energy assessment
- Feasibility studies
- GIS mapping
- Site constraints identification
- CAPEX and OPEX cost estimation
- Preliminary foundation sizing
- Turbine market review
- Regional point of interconnection review

Project Planning and Design

- Lidar specification and management
- Layout optimization
- Wind resource and energy yield assessment
- Turbine summary
- Interconnection analysis
- Economic benefit plan
- RFP bid support

Project Permitting Support

- Lease area characterization
- SAP and COP preparation and technical studies
- NEPA support
- Visual simulations
- Navigational risk assessment
- Decommissioning studies

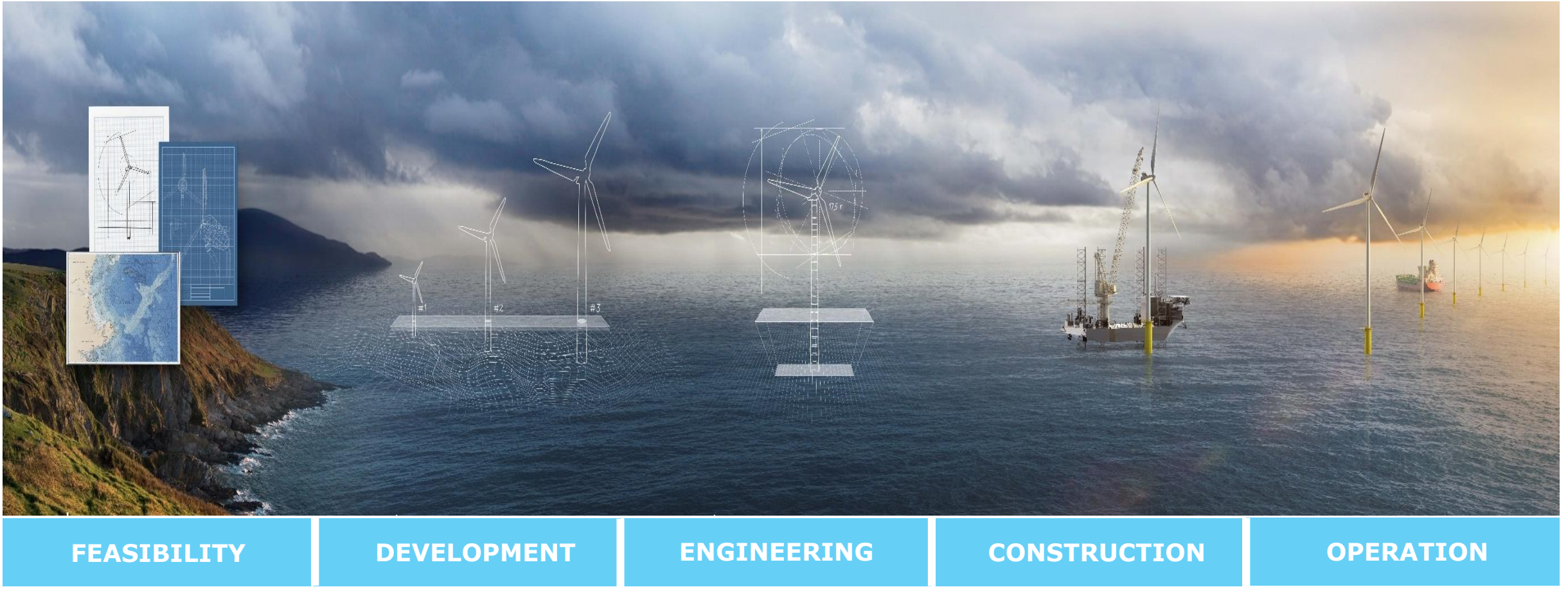
Project Financing Support

- Owner's engineer
- Owner's representative
- Comprehensive energy assessment
- Engineering design review
- Tax equity due diligence
- Lender due diligence
- Turbine design review
- Energy yield assessment

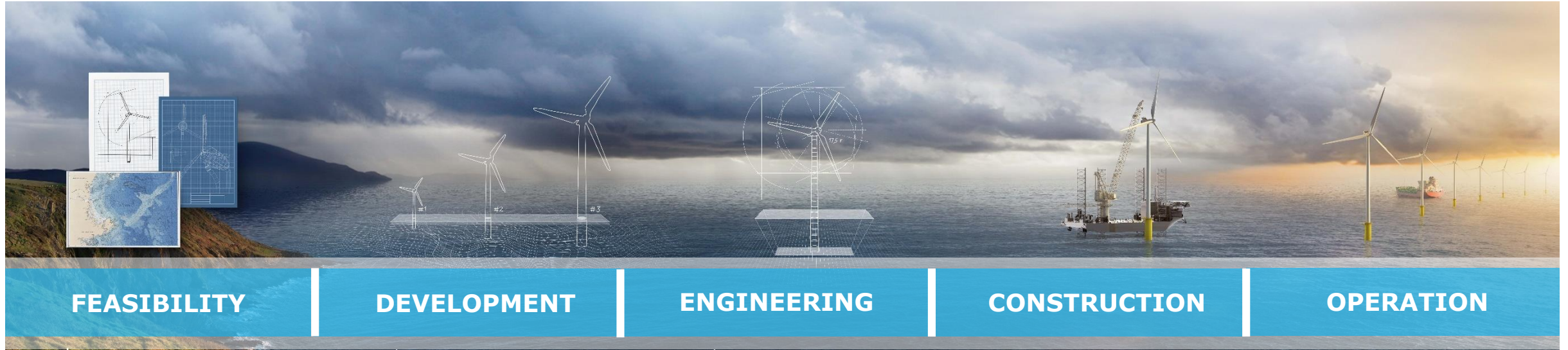
Construction and Marine Operations

- Installation monitoring
- On-site inspections
- Compliance management
- Power performance testing

Workforce Needs throughout the Project Lifecycle



Typical offshore wind project lifecycle from feasibility to operations



FEASIBILITY

DEVELOPMENT

ENGINEERING

CONSTRUCTION

OPERATION

Permitting, environmental, stakeholder liaison

Site & concept selection

Project optimisation

Tender support

Construction monitoring

Operations & maintenance

Technology evaluation

Technical due diligence

Wind mapping

Measurements

Energy assessment

Operational assessment

Market intelligence

Cost modelling

Market forecasts

Digitalisation, Software & training

Project management

Marine warranty

Inspections

Technology certification

Project certification

Installation vessel classification

Operation & maintenance vessel classification

Wind Resource Assessment and Metocean Studies

From desktop to field

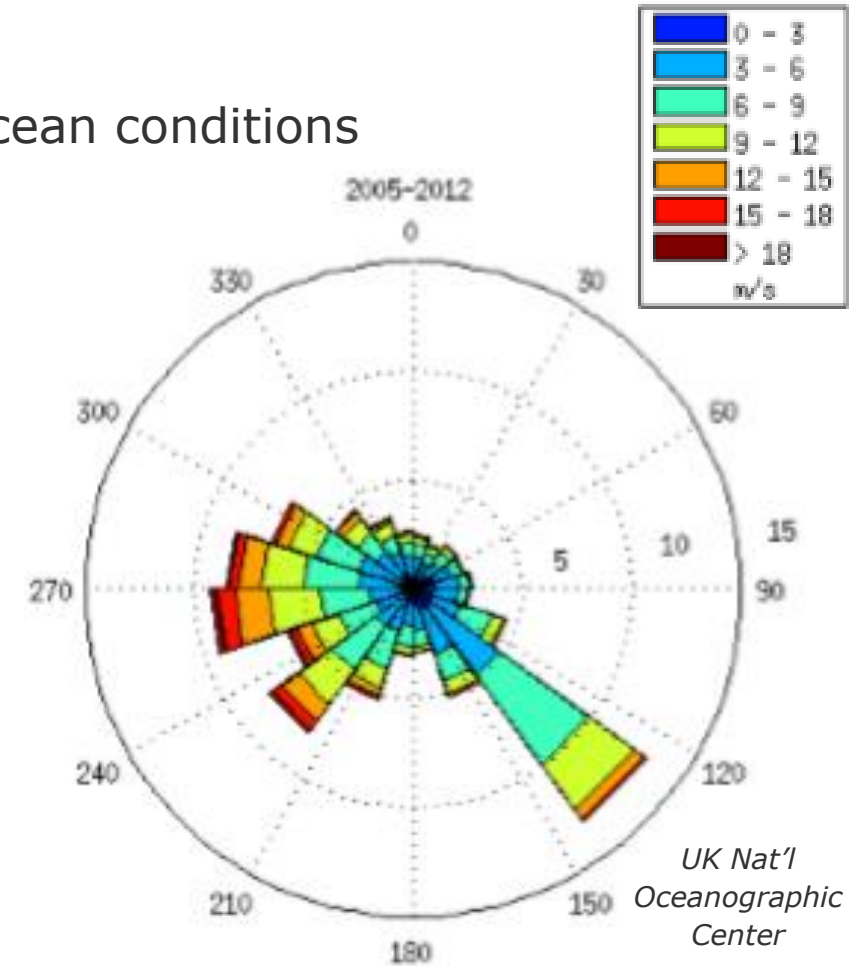
- For developers, financiers: **forecasts of energy** generation
- For design engineers: **metocean studies** of physical weather/ocean conditions



NYSERDA Data: <https://oswbuoysny.resourcepanorama.dnvgl.com/>

Expertise Needed

- Meteorologists, engineers, oceanographers
- Data analysts, programmers, modelers
- Remote sensing expertise
- Oceanographic equipment supplier
- Offshore deployment contractor and technicians

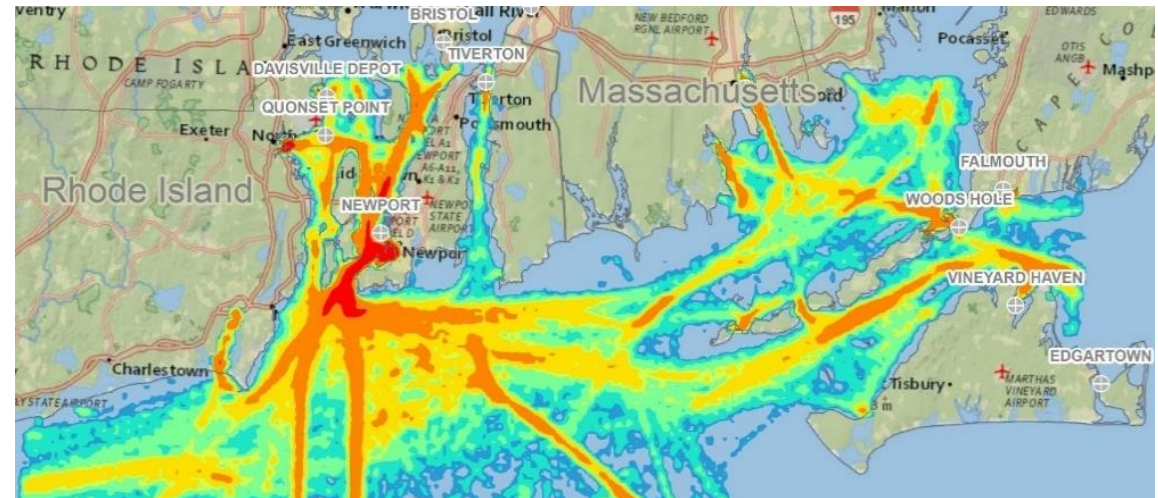


OSW Permitting Support

- Complex, requiring **specialty surveys & studies**:
 - Underwater **acoustic assessments**, construction compliance **monitoring**
 - **Navigation risk** assessment
 - **Wildlife** studies
 - **Visual simulations**, impact assessments

Expertise Needed

- Scientists (biologists, acousticians, data scientists)
- Engineers (mechanical, electrical)
- GIS analysts
- Computer programmers



Owners' Engineering & Technical Due Diligence

▪ Owners' Engineering

- **Feasibility** studies (turbines, foundation technology)
- Preliminary **foundation** sizing and cost analysis
- **Interconnection** analysis

▪ Due Diligence

- **Audience**: lenders, investors, JV partners, etc.
- **Evaluation**: design, construction, permitting, operations, financial models, etc.

Expertise Needed

- All previous expertise areas
- Engineers (mechanical, civil, structural, ocean, naval architects, electrical, etc.)
- Surveyors



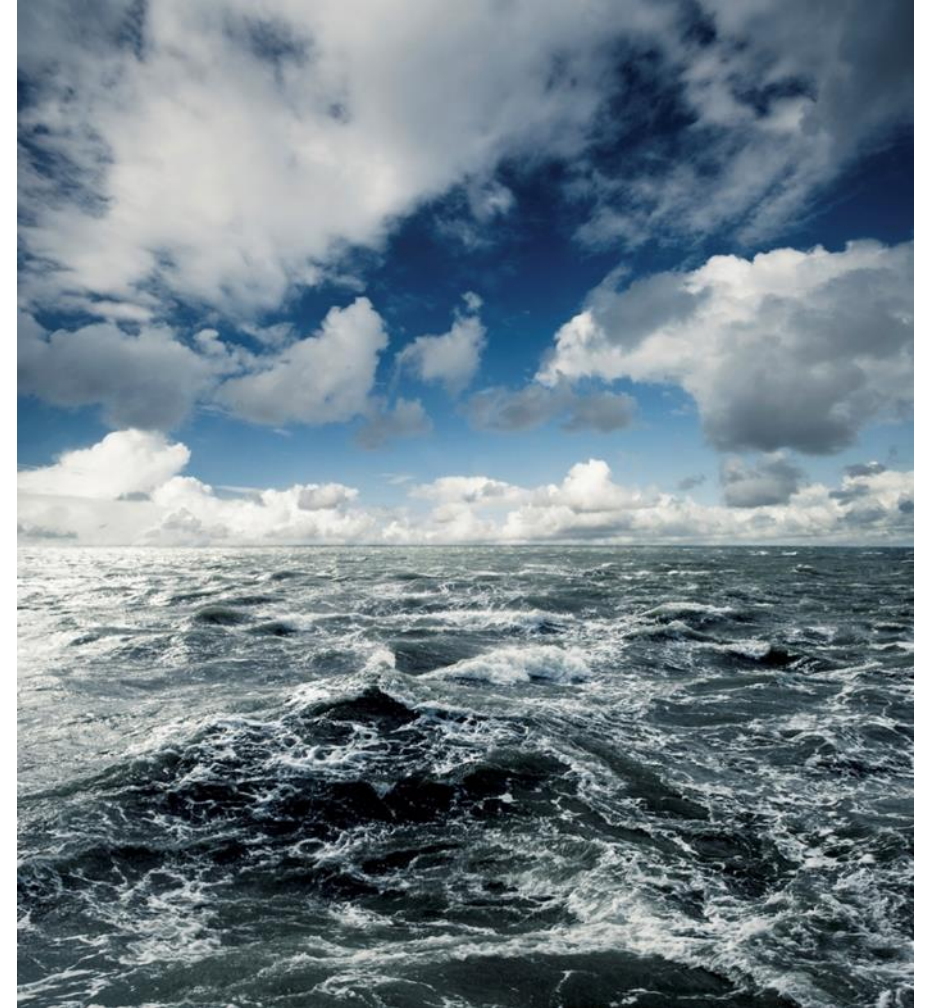
Certified Verification Agent (CVA) Services

Third Party Project Certification:

- CVA affirms OSW facility meets industry standards, satisfies **BOEM regulations**
- CVA must demonstrate
 - **Technical capabilities** of the primary staff
 - Previous **experience** verifying **offshore** energy facilities
 - Previous experience with **BOEM** requirements

Expertise Needed

- Engineers: civil (geotechnical and structural), electrical, mechanical, ocean, naval architects
- Aerospace



Marine Surveyor Services

■ Marine operation and warranty

- Independent **verification** of marine operations for investors, lenders, insurers
- Make reasonable endeavors to ensure:
 - **risks** are within acceptable levels
 - industry **best practices** are used

■ Phases:

- Desktop document review
- Site attendance
- Certificate of Approval



Expertise Needed

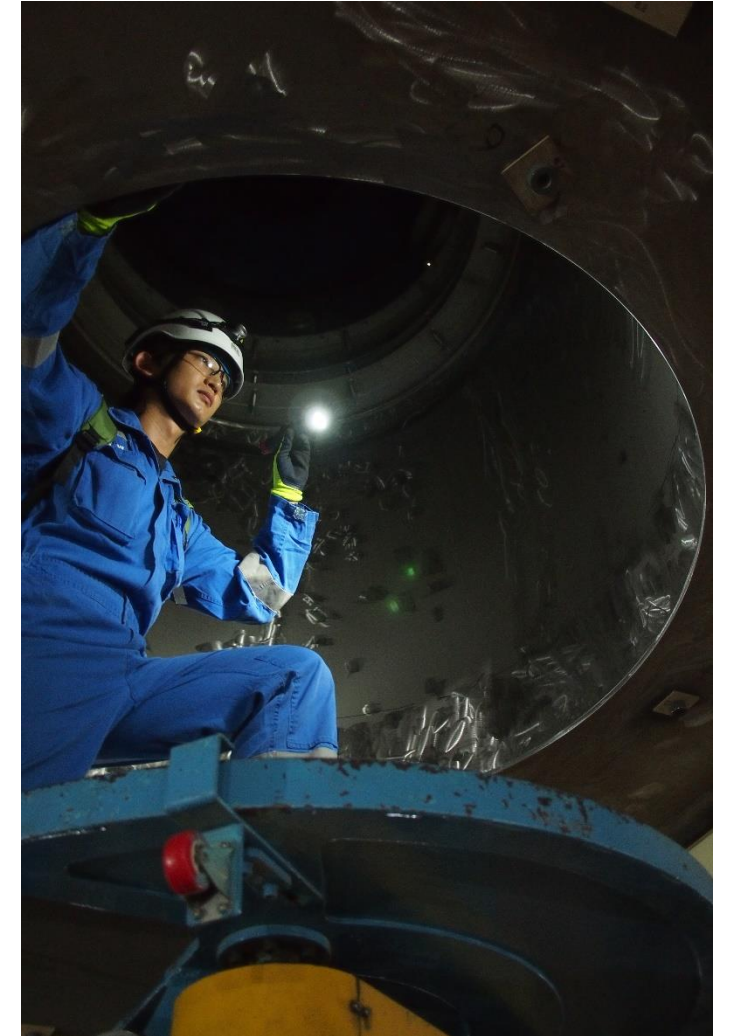
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|--|---|
| <ul style="list-style-type: none">• Naval architects• Master mariners• Marine engineers• Hydrographers• Meteorologists | <ul style="list-style-type: none">• Civil engineers - geotechnical• Civil engineers - structural• Marine insurance experts• Marine legal experts |
|--|---|

Vessel Classification (Maritime)

- **Class** assigned upon review of the design and surveys during construction, verifying compliance with Rules of the Society
- Active in the **full lifecycle** of a maritime vessel:
 - Pre-contract with the shipowner
 - Newbuilding with the shipyard and equipment manufacturers
 - Ships-in-Operation ensuring continued compliance of safety

Expertise Needed

- | | |
|---|--|
| <ul style="list-style-type: none">• Naval architects• Marine engineers• Surveyors• Quality control professionals | <ul style="list-style-type: none">• Mechanical engineers• Electrical engineers• Experienced Mariners |
|---|--|



Partners in Training – Specialized Training

- **Standard courses:** Open enrollment or inhouse training
- **Customized training:** in cooperation with academic institutions or conferences

DNV GL Energy Academy Examples

Ports and Offshore Wind



Offshore Wind; Wind Turbine Technology



DNV GL Maritime Academy Examples

Post-Grad Diploma in Maritime Safety & Security



Basics of Classification; Surveys & Certificates



Discussion

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SAFER, SMARTER, GREENER

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Offshore Wind Technical and Training Workshop

11.15.19

GLOBAL MARINE | GROUP



Fibre-optic cable solutions to the telecommunications and oil & gas markets

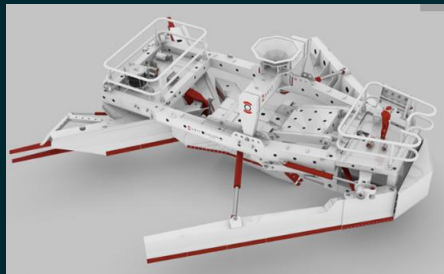
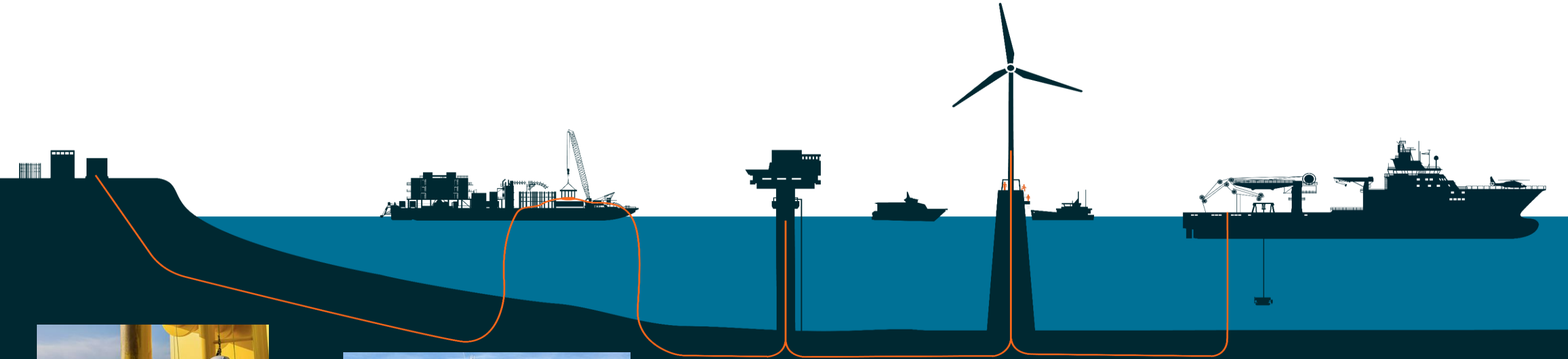


Topside, splash zone and subsea engineering services to the offshore renewables and utilities market



Cable installation, repair and trenching services to the offshore renewables, utilities and oil & gas markets

Offshore Renewables Services



Cable Installation



Product/Service Description

Working the back deck of a cable vessel to perform the installation and burial of:

- Medium voltage cables in the array field
- High voltage cables from the substation back to shore

Technology Needs

- Cable Protection
- Cable Storage
- Cable
- Jointing kits
- Work class and Inspection class ROV's
- Cable burial Plough(s)
- Cable handling equipment

Workforce Needs

A Cable Ship will have 30-40 people on board to work the back deck

Example work structure:

- 24 hour operations: 2 shifts
- Two weeks on board/at sea

There are a range of tasks/roles which require specific certifications to perform.

- Training is a combination of GWO and specific cable handling

Cable Maintenance



Product/Service Description

Mobilizing survey assets to perform mandated inspections of installed cables

Mobilize cable vessel capable of repairing/replacing damaged cables

Operations of a Cable Depot for Spares & related equipment

Technology Needs

- Spare Cable
- Cable storage depot
- Joining kits
- Work class and Inspection class ROV's
- Survey Vessel
- Cable maintenance vessel/barge
- Cable handling equipment

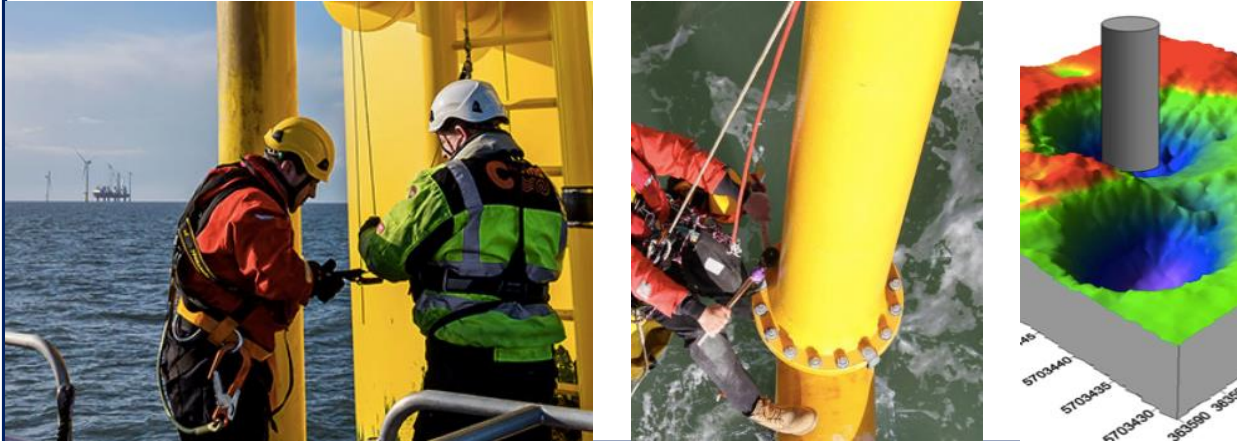
Workforce Needs

Subsea survey data gathering, analysis, reporting and data management

Management of depot to ensure spares/equipment are within warranty and prepared for use at any time.

Repair vessel mobilization/operations to complete the cable repair or replacement

Technical Services



Product/Service Description

- WTG Inspections & Maintenance
- Blade Repair
- Corrosion Protection
- Mandatory Inspections – Topside
- Mandatory Inspections – Subsea
- Topside - BOP

Workforce Needs

- Site managers, administrators, supervisors, project and operations managers
- Technicians for installation, commissioning, service & troubleshooting
- Turbine technicians delivering servicing, inspections and change-outs
- Rope access blade technicians
- Confined space technicians
- Rigging, lifting & working at height
- Electrical, mechanical and fabrication technicians
- Lifting supervisors & foremen

- Riggers and slingers
- Store personnel
- Multi-skilled Technicians (MST)
- Paint and blasting technicians
- Tower team supervisors
- Offshore installation and onshore managers
- Back-office engineering support
- Site RQHSE representatives

Crew Transfer



Product/Service Description

Operating fast, reliable workboats to transport technicians and equipment quickly, safely and comfortably to and from sites – in the widest possible range of weather conditions.

Amphibious rescue & support vessels for nearshore or tidal support

Scale is key: (Cwind had over 51,000 crew transfers completed in 2017 all without incident)

Technology Needs

CTV's able to operate in 2.5 meter significant plus wave heights

Port Operations

Logistics/site management

Fleet Maintenance

Workforce Needs

Experienced and qualified skippers and crew

- (3 per vessel per shift)

Training School



Product/Service Description

Industry standard and custom GWO accredited courses from basic safety training to advanced upskilling programs for specialists.

- GWO Basic Safety Training 4 Day Refresher
- GWO Fire Awareness / Fire Awareness Refresher
- GWO First Aid Refresher
- Core Safety Training
- GWO Sea Survival/Sea Survival Refresher
- GWO Basic Technical Training (BTT)
- GWO Basic Safety Training 6 Day Full
- GWO Working at Height & Rescue

Technology Needs

Training facilities & mobile capabilities
 Tower and confined space simulator
 Sea survival simulator
 Harnesses and related equipment

Workforce Needs

Certified Trainers
 Training Business Operations



For more information contact:

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Global Marine Group
Boston, MA.

joel.whitman@globalmarine.group

Lunch & Keynote Address

Laura Curran, County Executive
NASSAU COUNTY, LONG ISLAND



**OSW TECHNICAL AND
TRAINING WORKSHOP**

Workforce Development Panel

Moderator **Matthew Vestal**, Technical Advisor
NYSERDA

Panelists **Matthew Aracich**, President
BUILDING AND CONSTRUCTION TRADES COUNCIL OF NASSAU AND SUFFOLK COUNTIES

Marjaneh Issapour, Director
RENEWABLE ENERGY AND SUSTAINABILITY CENTER, FARMINGDALE STATE COLLEGE

Ross Gould, Energy Sector Program Manager
WORKFORCE DEVELOPMENT INSTITUTE



**OSW TECHNICAL AND
TRAINING WORKSHOP**

Closing Remarks & Thank You

NYSERDA Offshore Wind

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**OSW TECHNICAL AND
TRAINING WORKSHOP**