

ABS Floating Offshore Wind

Anton Janssens | May, 2024



Who and What is ABS?

- **Our Mission:** 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.
- **Our Vision:** Safety drives us. We are global innovators turning tools and practices into practical solutions to support the industries we serve.

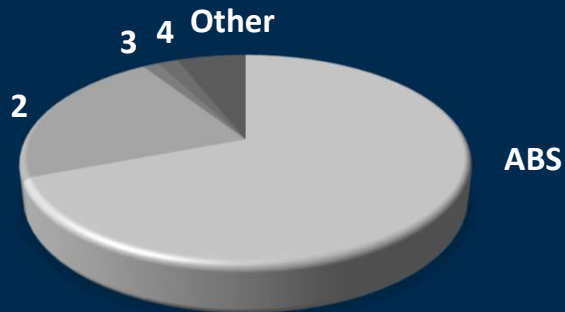
- Founded in 1862 by 9 U.S. marine insurance companies.
- ‘Not-For-Profit’ Marine Classification Society.
- No owners/shareholders, ABS Board of Directors are appointed from its Membership.
- ABS Members are the owners, operators, designers and builders of ships, offshore units and associated equipment.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

Global Network – 200 Offices in 70 Countries

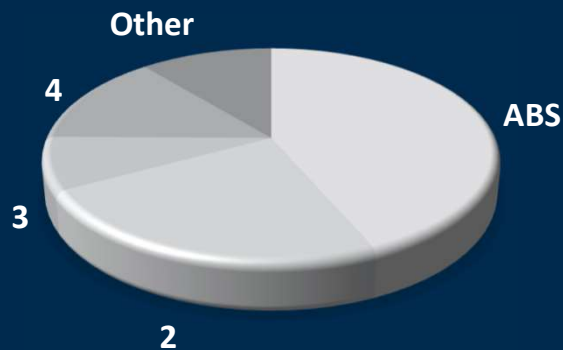


Offshore Experience

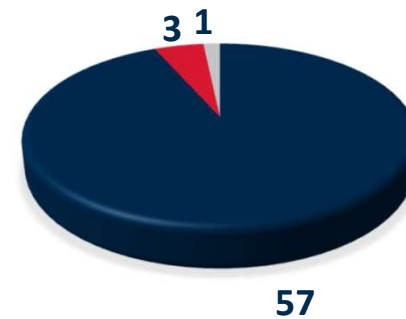
>500 CLASSED DRILLING UNITS



>180 CLASSED PRODUCTION UNITS



CVA on the US OCS Experience



Floating Wind Experience

- We certified the first ever SEMI based FOWT
- We have classed close to 80 MW of Floating Wind
- We have experience from reviews of many different type of concepts



ABS OSW Heritage – Class and Certification

2012

ABS Certified first semisubmersible Offshore Wind Turbine
— *WindFloat I*



2015

ABS FEED Verification of first US concrete Floating Wind Turbine
— *Aqua Ventus I*



2016

ABS Certified first US Fixed Offshore Wind Farm
— *Block Island*



2019

ABS Classed world's largest Floating Wind Turbine
— *WindFloat Atlantic*



2021

ABS Classed the largest Floating Wind Farm
— *Kincardine*



2015

ABS Classed *Seajacks Scylla*, the largest WTIV when delivered in 2015.



2020

Windserve Odyssey is the first ABS-Classed Jones Act CTV.



2022

ABS Classed the first Taiwan-built offshore installation vessel *Green Jade*.



2024

First Jones Act compliant Rock Installation Vessel will be built to ABS Class.



2025

First Jones Act compliant WTIV, Dominion Energy's *Charybdis*, will be built to ABS Class.



2026

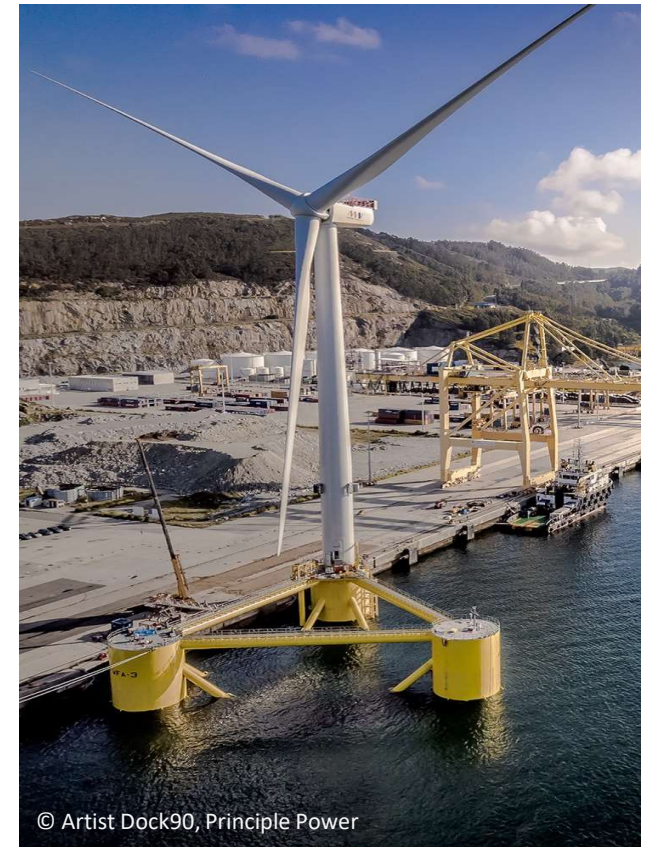
First Jones Act compliant SOV will be built to ABS Class.



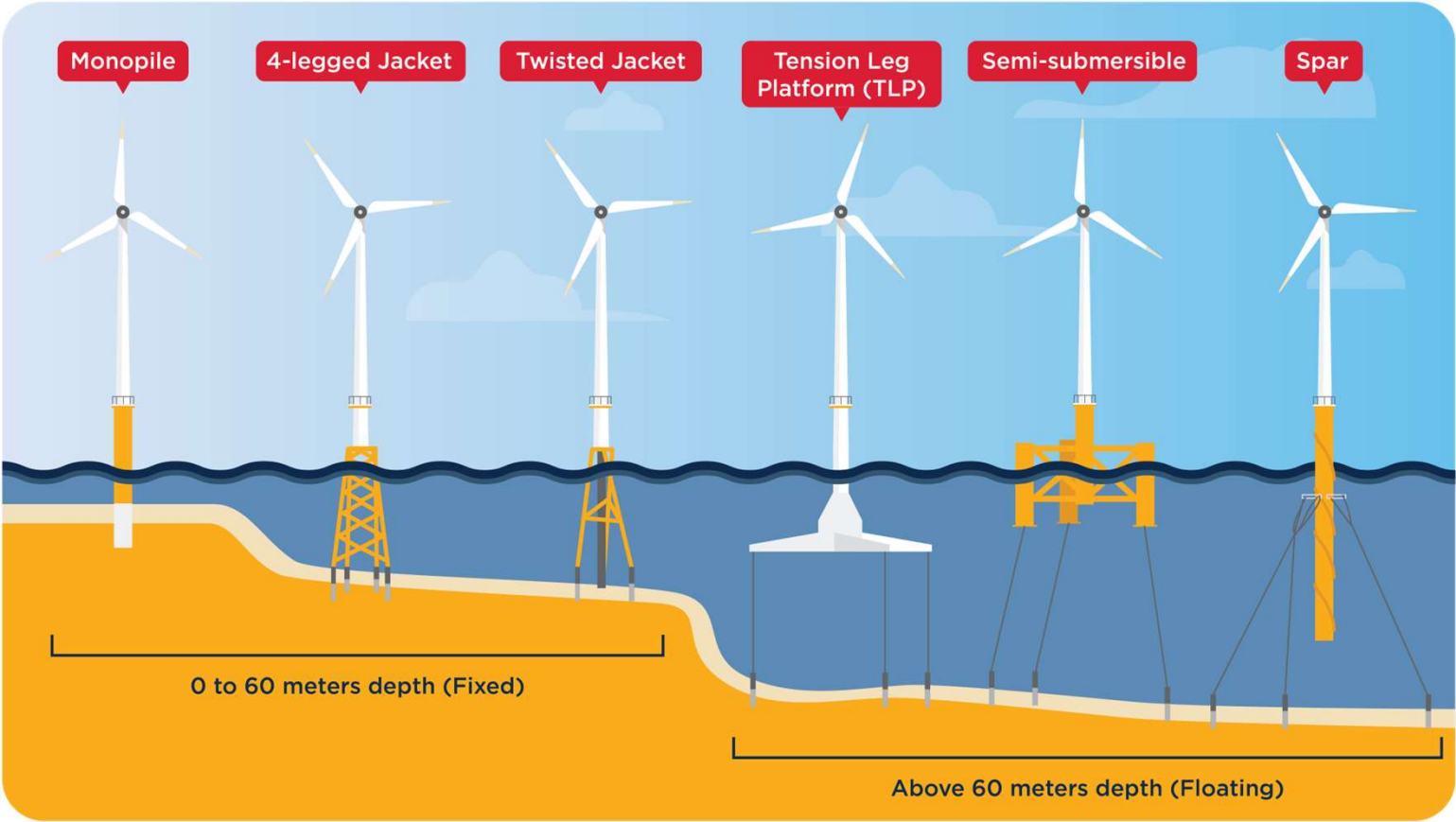
Completed numerous Approval in Principle (AIP's) verifying FOWT Concepts for TLP's, Semi's & Spar's

ABS Experience of Installed Offshore Floating Wind

- **WindFloat 1 (Worlds First Large-Scale SEMI FOWT)**
 - Installed in 2012 offshore Portugal
 - Relocated to Scotland in 2018
 - ABS Certified Design, Fabrication, Installation, Recommissioning and Relocation
- **WindFloat Atlantic (Largest Floating WTG 8.4MW)**
 - Designed, fabricated and installed for compliance with the [ABS Guide for Building and Classing Floating Offshore Wind Turbines](#)
 - ⚡ A1 , Offshore Wind Turbine Installation (Floating), FL(25) 2044, 20km Offshore Viana do Castelo, UWILD
- **Kincardine (Largest Floating Windfarm 50MW)**
 - Designed, fabricated and installed for compliance with the [ABS Guide for Building and Classing Floating Offshore Wind Turbines](#)
 - ⚡ A1 , Offshore Wind Turbine Installation (Floating), FL(25) 2045, (location), UWILD



Offshore Wind Turbine Types



Early Engagement with ABS

Preliminary Planning and Advice (PPA)

- ABS personnel will discuss the design item in question and provide input as to the potential conformance with the design standards and other agreed requirements

Workshops/HAZID/HAZOP

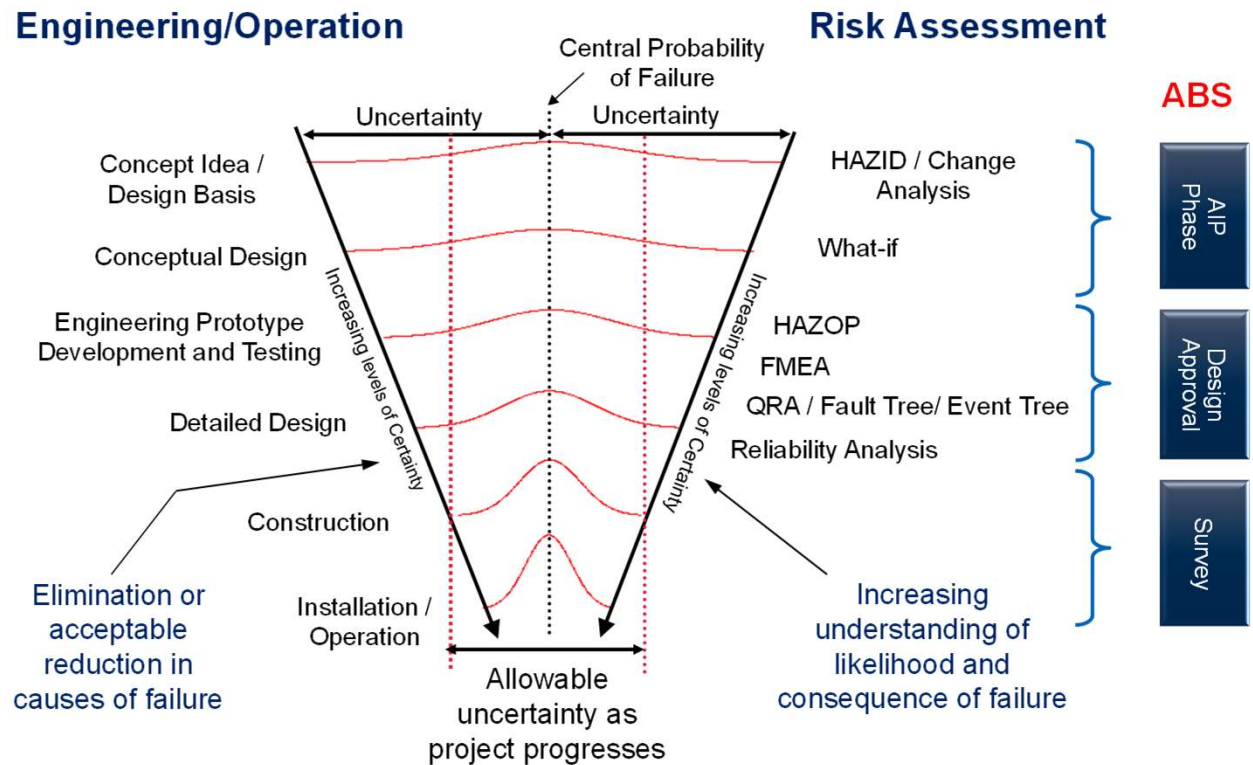
- To detect any issues in an early stage and have a register of what should be addressed in the more detailed phases of a project

Approval in Principle (AIP)

- ABS will perform design review of significant design documents to verify the feasibility of the concept

New Technology Qualification (NTQ)

- ABS will perform a systematic and consistent evaluation of new technologies as they mature from a concept through confirmation of operational integrity



Preliminary Planning and Advice (PPA)

- PPA is an optional service that begins early in the project and may extend well into detailed design.
- Examples of items that can be addressed in a PPA are:
 - Resolution of technical queries
 - Review of specific design solutions
 - Rule Interpretations and application
 - Review of design basis
 - Review of preliminary plans
 - Meeting / HAZID attendance
- The PPA services will be performed under the same unit ID as the following services, i.e. any issues that have been discussed and resolved during the PPA phase can be easily found and referenced in the more detailed phases.

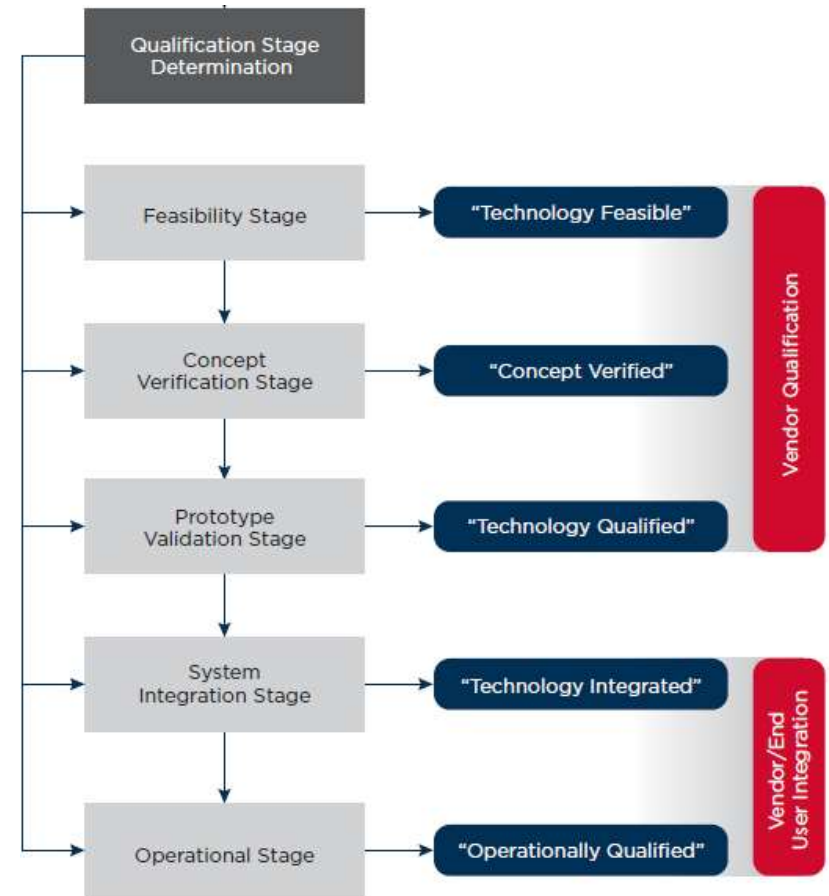
Approval in Principle (AIP)

- Traditionally, an AIP design review is conducted for a new or novel concept with no previous experience in the environment being proposed with the intent to verify the feasibility of the design. The process is less formal than the NTQ process and the scope can be customized to each individual project.
- The deliverables are;
 - AIP letter attesting to feasibility of design and approval in principle granted as class issues are concerned, allowing project to move into next approval phase
 - Approval Road Map, outlining list of submittals and conditions to be satisfied (as identified in this phase) to achieve full class approval
 - Approval in Principle Certificate
- More details regarding this service can be found in the [ABS Guidance Notes on Review and Approval of Novel Concepts.](#)

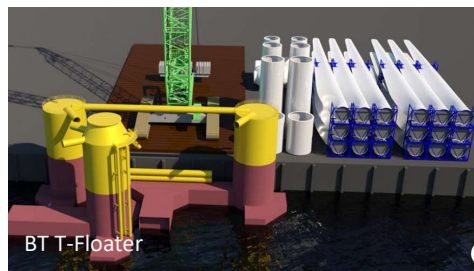
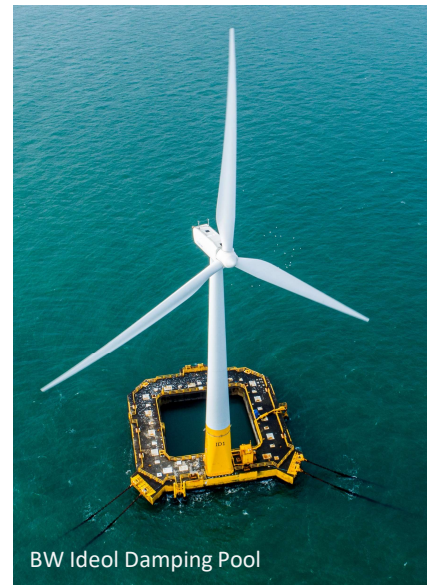
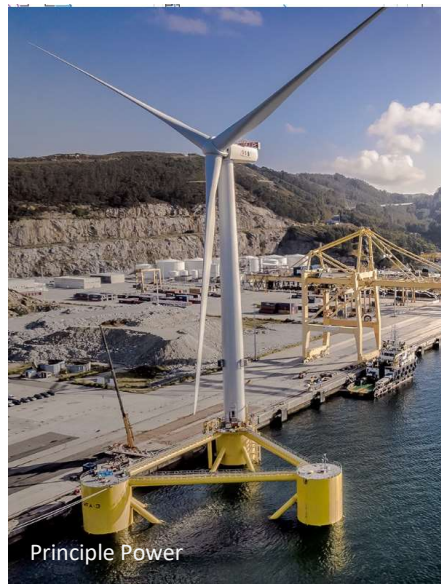
New Technology Qualification (NTQ)

- The [ABS Guidance Notes on Qualifying New Technologies](#) outlines an approach for qualification of new technologies to confirm their ability to perform intended functions in accordance with defined performance requirements.
- Upon satisfactory completion of each of the steps, ABS will issue a statement of maturity.

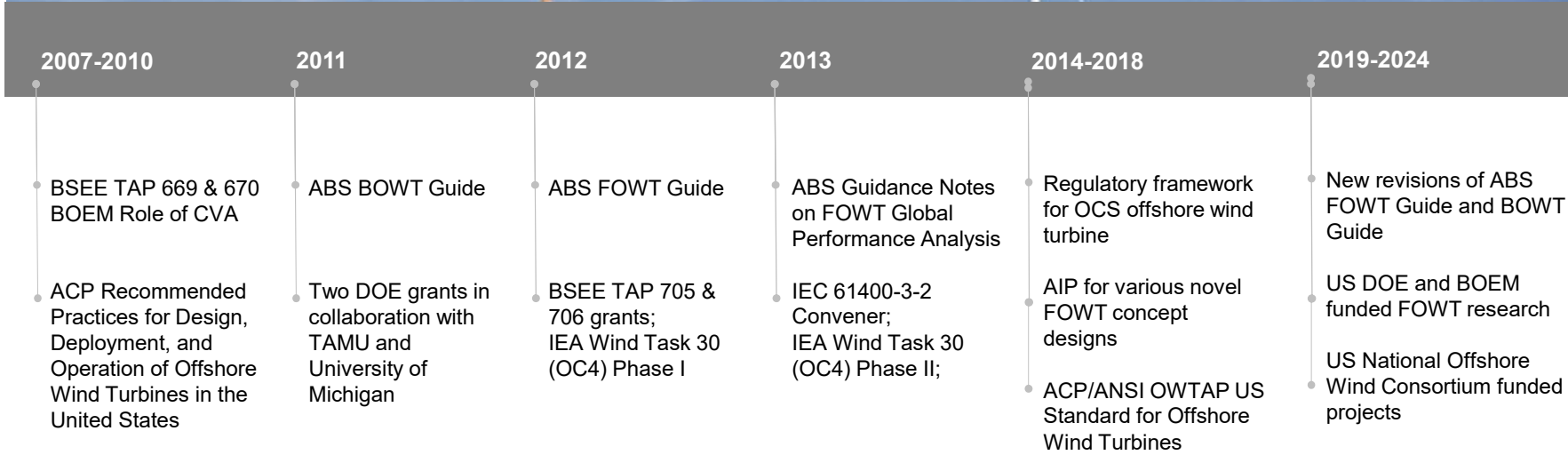
ABS Qualification Stage	API RP 17N/Q TRL	US DoD TRLs	ISO 16290 TRLs
Feasibility	0	1	1
	1	2	2
Concept Verification	2	3	3
		4	4
Prototype Validation	3	5	5
	4	6	6
System Integration	5	7	7
	6	8	8
Operational	7	9	9



Concepts ABS been involved with

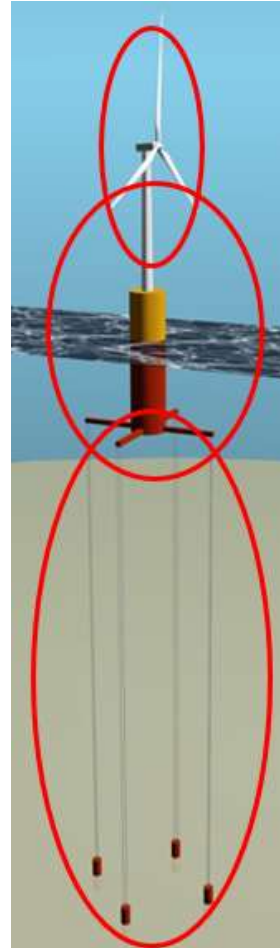
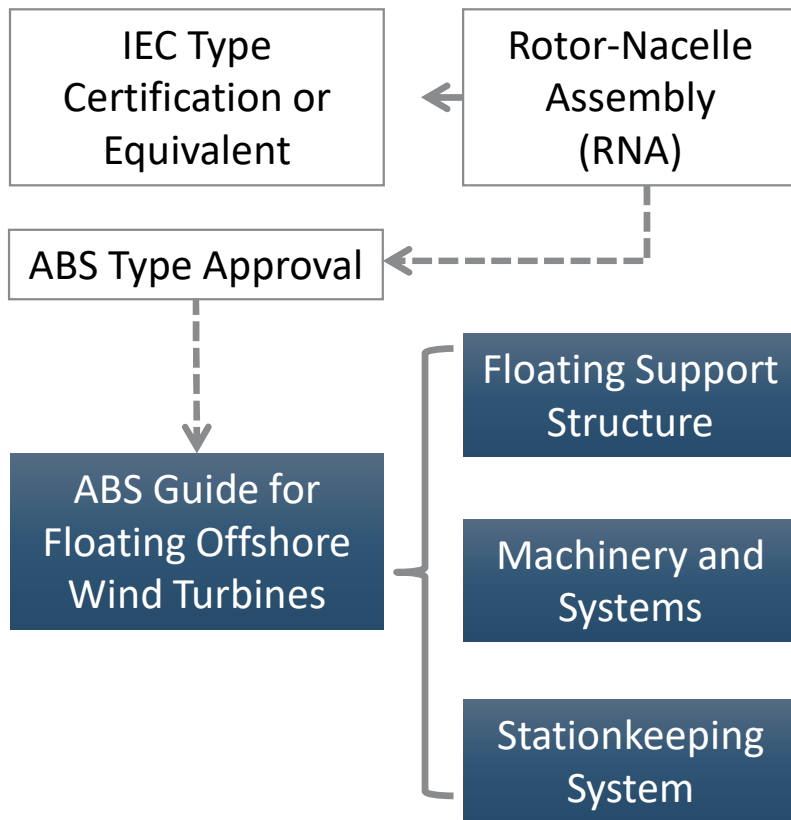


ABS Offshore Wind Research & Development



ABS Developing an OSW Technical Committee to improve Standards, Safety and reduce LCOE

ABS Guidance Notes for FOWT



- Integrated Load Analysis(ILA)
- Global response parameters
- Environmental load calculation
- Global motion analysis
- Air gap analysis
- Mooring strength analysis
- Mooring fatigue analysis



What is different from Class, as we know it - Design

- Exposure level aligned with the safety margins for land-based wind turbines
- Lower return period – 50 years
- Reduced safety factors
- Reduced mooring requirements
- Reduced stability requirements



What is different from Class, as we know it - Survey

Multiple identical subject to the same environment units with a lower risk profile than traditional offshore units

- Reduced survey during fabrication
- Reduced survey during installation
- Risk based inspection during operations aligned with the maintenance schedule of the turbines
- Reduced physical attendance utilizing remote and drone-based techniques



OSW Certification Options

IECRE OD-502

- Project Certification may be needed for insurance and finance
- The risk profile of the installation is dependent on the Basis of Design only
- **Important not to mix and match standards to reduce conflicting requirements**

Class

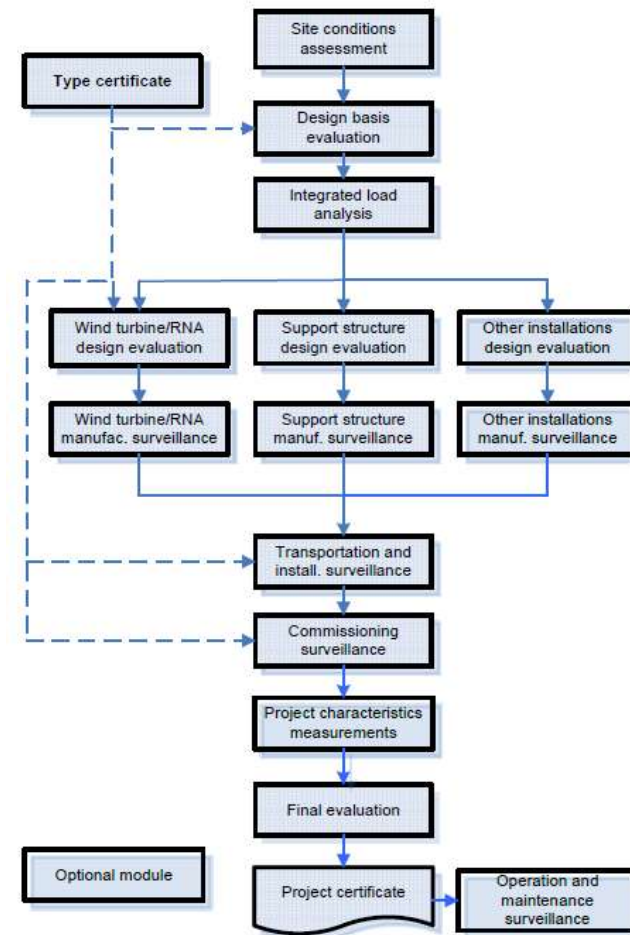
- **Class can be part of the Project Certification**
- Class does not address;
 - Inter array cable
 - Export cable
 - Inspection of WTG
- Substations can have own Classification for compliance with ABS OSS Guide
- Class can be seen as another layer to de-risk the installation with **consistent set of requirements**
- Class may be beneficial to reduce insurance and interest rates

Flag

- **The level of statutory requirements varies from country to country**
- For Kincardine, ABS issued a total of 7 certificates on behalf of Marshall Island Flag
- ABS has delegated authority to act as a Recognized Organization on behalf of more than 120 governments.

IECRE Project Certification per OD-502

- Project Certification based on Design Basis approach
- During fabrication, the inspection/audit activities **focus on quality system implemented during manufacturing and evaluate that the quality system is appropriate.**
- **The Certification Body will tailor a scope of work for inspection activities.** The exact scope should be defined during the project design basis phase.
- Operation and maintenance inspections shall be carried out at **regular intervals based on an agreement between applicant and Certification Body.**

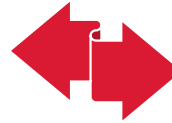


ABS FOWT Class, IECRE Project Certification & CVA

ABS Class

**ABS FOWT Guide
compatible with IEC 61400-3-2**

Full Engineering Plan Review	Survey of Fabrication, Installation & Commissioning	Periodic Survey during life-cycle operations
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IECRE Project Certification

**Design Basis
approved by the Certification Body**

Site Assessment Load Analysis Evaluation & Design Evaluation	Inspection of Manufacture, Transportation, Installation, Commissioning	Operation and Maintenance Inspection at regular intervals (Optional)
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Additional support from ABS Class

- Approve-in-Principle (AIP)
- New Technology Qualification (NTQ)
- Vendor/Product Qualification
- Condition-Based Class Program
- Cyber Safety, Digital Solutions, etc.

Class can work as a cornerstone in the project certification scheme

Design – Class and Certification Summary



Classification

Statutory Review

Full Engineering Plan Review

Substations Substructures

Certificate for all units

Review Similarities

Design
Fabrication
Commissioning
Installation

Certification

Design Basis Review

Array & Export Cables

WTG

Conformity Statement



Certification of Offshore Wind Globally

Legal Requirement	Informal Requirement	Under Development	No Requirement
Denmark	Belgium	Australia	Brazil
Germany	★ France	Norway	China
Japan	Ireland	Portugal	Italy
Poland	United Kingdom	South Korea	
Taiwan	Vietnam	Spain	
The Netherlands			
United States			

★ = Informal Requirements in place but Legal Requirements under development

Vessels – Global and US

Jones Act Compliant



Charybdis WTIV
First Jones Act Wind Turbine Installation Vessel
12MW+, 2,200-T Crane
ABS Class Selected



ECO SOV
First Jones Act SOV Customized for US Market
ABS Class Selected



WindServe Odyssey CTV
First ABS-Classed Jones Act Crew Transfer Vessel

Global

Approval-in-Principle (AIPs)

ABS has also provided AIPs for a series of wind support vessels from European and Asian designers



Seajacks Scylla WTIV
Largest WTIV when delivered in 2015
ABS Class Selected



Green Jade WTIV
First Taiwan-built DP3 heavy lift & installation vessel
ABS Class Selected



Maersk WTIV and Feeder Concept – Maersk WTIV combined with Eco tugs and barges
ABS Class Selected

Offshore Wind Rules and Guides

- *ABS Requirements for Offshore Substations and Electrical Service Platforms*
- *ABS Guide for Floating Offshore Wind Turbines*
- *ABS Guide for Bottom-Founded Offshore Wind Turbines*
- *ABS Guide for Building and Classing Windfarm Support Vessels*
- *Guidance Notes on Global Performance and Integrated Load Analysis for FOWT*
- *ABS Fatigue Assessment of Offshore Structures*
- *ABS Requirements for Position Mooring systems*
- *ABS Requirements for the Certification of Offshore Mooring Chain*



Life-Cycle of a Wind Farm

Project Planning



Design and Fabrication



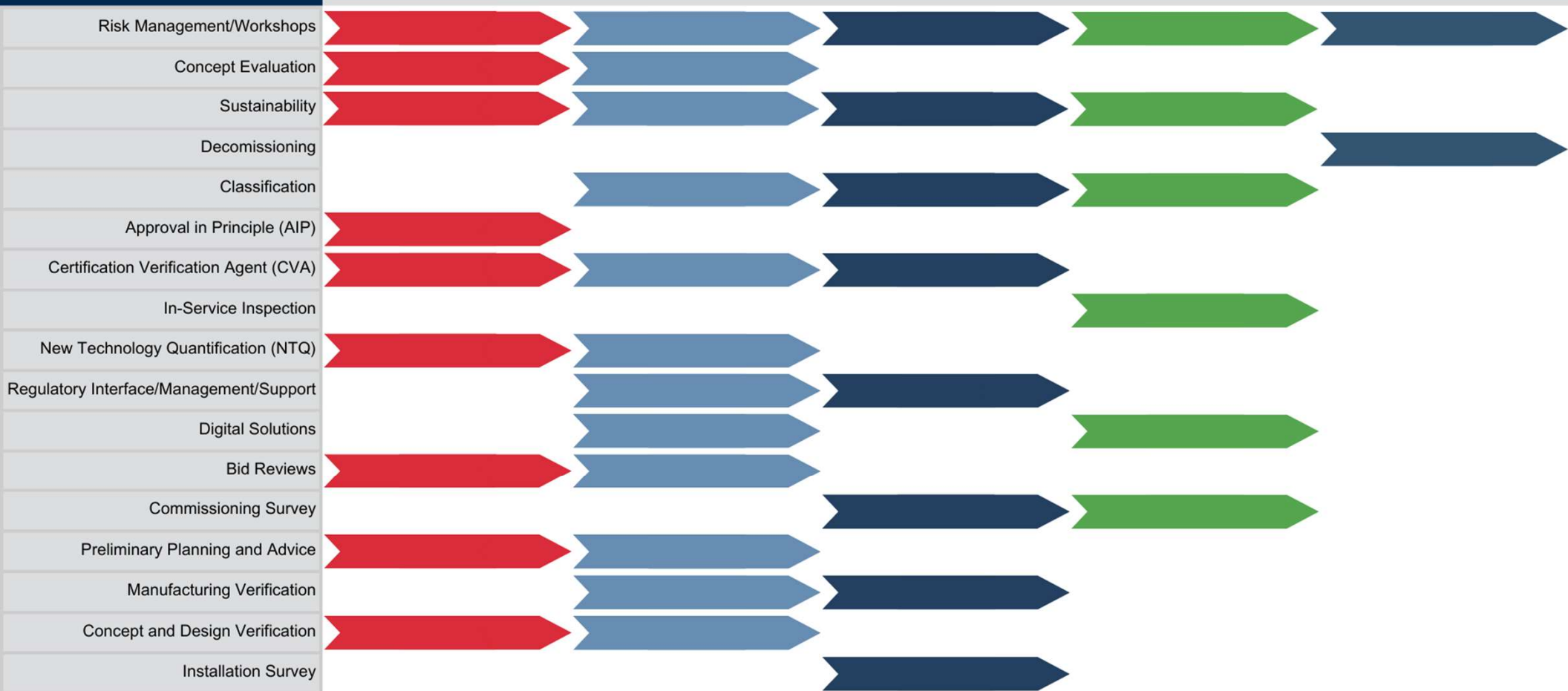
Installation



Operation and Maintenance



Dismantling



Thank You

www.eagle.org

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