



Harnessing Renewable Energies: Key Enablers for Low-Carbon FPSO Operations

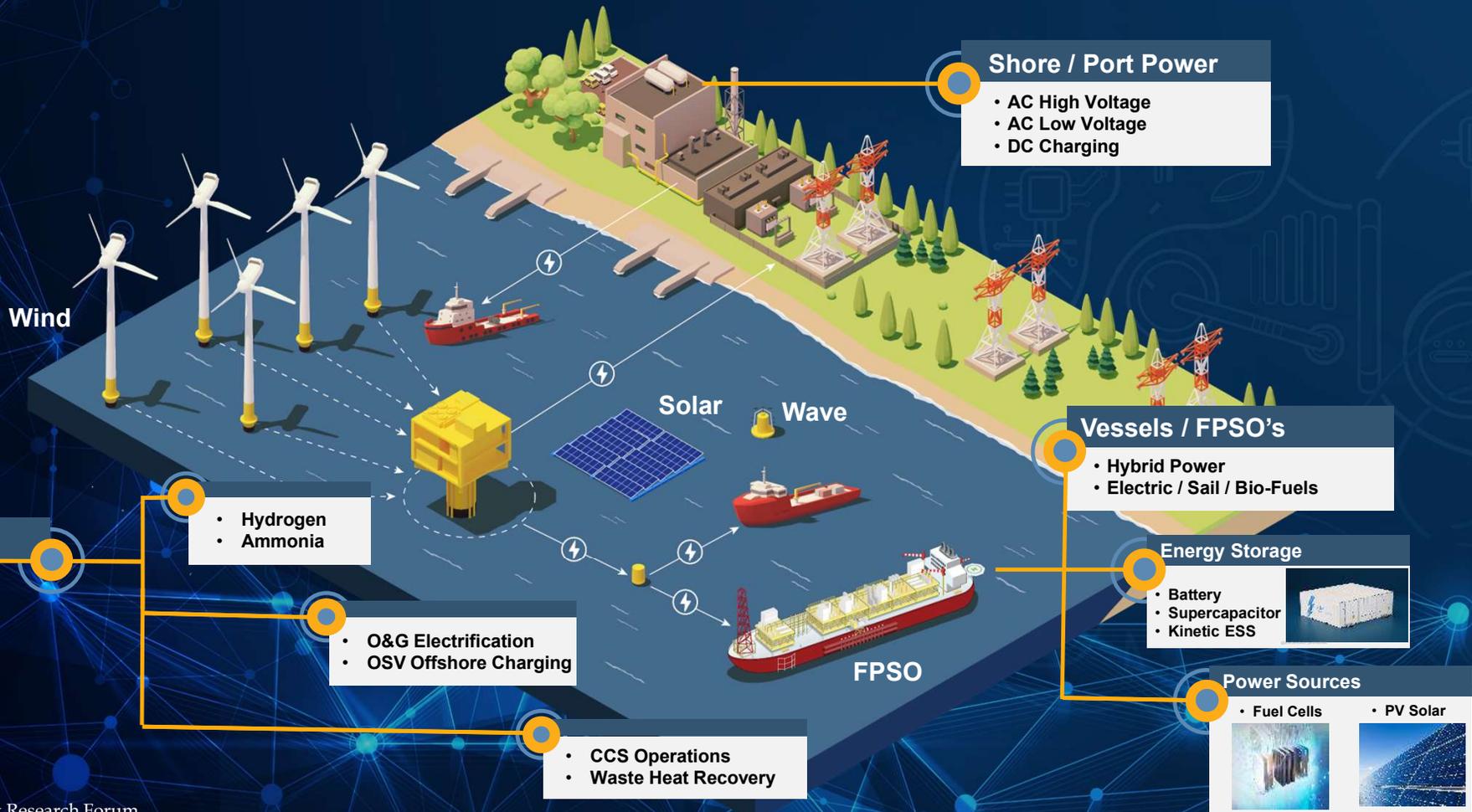
Presenter



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Renewables in FPSO Operations



How many silos are there?

- Wind
- Solar
- Wave
- FPSO
- Energy Storage
- Shore Power
- Alternative fuels
- Etc.

- All are supposed to work together for a common goal to reduce the carbon footprint from FPSO operations
- Renewable installations are normally considered to be of L2 exposure level
- FPSO's are considered L1

Consensus Standards for Offshore Renewables

IEC TC 88: Wind Energy Generation Systems

- Standardization in the field of wind energy generation systems including wind turbines, wind power plants onshore and offshore and interaction with the electrical system(s) to which energy is supplied.

IEC TC 114: Marine Energy – Wave, Tidal, and Other Water Current Converters

- The primary focus will be on Marine Energy Converters (MECs), to include the wide range of use cases and sizes of MECs using wave, tidal, ocean current, river current, and the wide range of outputs such as electrical or mechanical energy.
- Other conversion methods, systems and products are included such as Ocean Thermal Energy Conversion (OTEC).

ISO TC67 - Oil and Gas Industries Including Lower Carbon Energy

- Standardization in the field of offshore structures used in the oil & gas and lower carbon energy industries, which includes as it pertains to the substructure (for generation and substations) for:
 - Oil and gas
 - Offshore structures for use of **lower carbon/renewable energy production (e.g., wind, wave)**
 - Offshore CO₂, H₂, NH₃ storage

Using Floating Wind as an Example

Consensus-based Design Standards

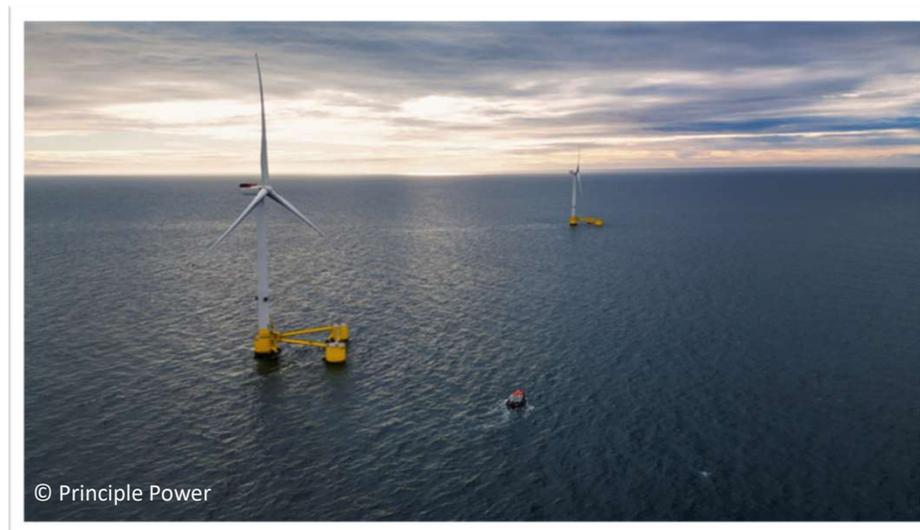
- IEC TC 88 / 614xx
- ISO TC 67 / 190xx
- API SC2 / RP2-xx
- ISO TC 8 / 29xxx

Regulations Local Authorities May Enforce

- IACS
- IMO

Non-consensus-based Initiatives

- WFO
- GWEC
- FLOWRA
- Oceanic Network



ISO TC67/SC7 - Offshore Structures

Scope:

- Standardization in the field of offshore structures used in the oil & gas and lower carbon energy industries, which includes as it pertains to the substructure (for generation and substations) for:
 - Oil and gas
 - **Offshore structures for use of lower carbon/renewable energy production (e.g., wind, wave)**
 - Offshore CO₂, H₂, NH₃ storage
 - Platform re-use in new locations and/or re-purposed
 - Installation and removal
 - Life extension

Not in Scope:

- Aspects of offshore structures subject to IMO [International Maritime Organization] requirements" which are covered by TC 8 (Ships and Marine Technology) and directly by IMO and Classification Societies or by IEC TC114 Marine energy - Wave, tidal, and other water current converters and TC88.



ISO TC8/SC4 - Outfitting and deck machinery

Scope: Standardization of design, construction and operation of equipment and technology for ship outfitting and deck machinery, including ship-to-shore interface, cargo systems and lifting gear etc. used in shipbuilding and the operation of ships in support of the requirements developed by the International Maritime Organization (IMO) and the needs of the world maritime industry.



NP Proposal from ISO TC 8: Floating Wind

- Ships and marine technology — Technical specification of structural plates for floating offshore wind turbines
 - This document covers the structural material weldable hot-rolled structural steel plates used in floating offshore wind turbine projects. It provides technical specifications for the selection and application of these materials.
- Ships and marine technology — Technical specification of structural welded tubulars for floating offshore wind turbines
 - This document covers the structural material welded tubulars used in floating offshore wind turbine projects. It provides technical specifications for the selection and application of these materials.
- How would the wind community benefit from there?
 - Currently, -3-2 references ISO 19904-1, which in turn references ISO 19902 for materials. It may be beneficial for everyone to maintain this arrangement.
 - Should this not be addressed by IEC TC 67?

International Maritime Organization

- Part of the United Nations – members are representative of individual governments
- Commercial and other interested organizations (IACS) have observer status
- Conventions must be adopted by individual Flag States within their national laws
- Classification Societies can be authorized to perform activities on the behalf of Flag States



Non-Consensus Wind Focused Initiatives



Summary

- There are many ways to reduce the carbon footprint of production units.
- Emission reduction from energy generation is well-known and often implemented through technologies like combined cycle gas turbines and carbon capture systems.
- Alternative fuels, hybrid vessels, and fully electric vessels have contributed to reducing emissions from supply vessels.
- Successfully integrating renewables into offshore production requires collaboration among all parties to establish an acceptable holistic risk profile for the facility.
- A likely first step towards renewable integration is the INTOG approach: generating renewable energy offshore, sending it onshore, and then redistributing it to production facilities.
- Advocacy and interest organizations can help bridge gaps between various consensus-based standards.

Contact Us



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Thank You
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