

Offshore Wind Learning

Course Curriculum

1) Fundamentals

- a. Welcome
- b. Background and terminology
 - i. Why offshore wind?
 - ii. How we talk about renewable energy from offshore wind
 - iii. What are the key deployment stages
- c. What is an offshore wind farm?
 - i. Introducing the main parts of an offshore wind farm, starting offshore at the turbines and moving to the onshore substation.
 - ii. A sense of scale of the key components that are used and how they fit together to make an offshore wind farm.
- d. Offshore wind, past and future
 - i. Introducing the first offshore wind farm and the largest offshore wind farm.
 - ii. The processes through which offshore wind markets develop
 - iii. The last 15 years of offshore wind deployment, and the next 10 years
 - iv. A spatial understanding of the emerging and mature offshore wind markets
- e. Offshore wind power generation
 - i. Where the wind comes from and where it blows.
 - ii. How much power is in the wind, how we measure it and talk about it.
 - iii. How wind energy is captured by a wind turbine.

2) Development

- a. The environment
 - i. What is the environment (in relation to offshore wind).
 - ii. How can an offshore wind farm change the environment?
 - iii. How do we predict which changes to the environment might occur?

- b. Site selection
 - i. How we apply our knowledge of the environment to various offshore wind farm components.
 - ii. The different types of constraints and drivers for selecting a good offshore wind farm site.
 - iii. How targeted marine spatial planning and GIS support the process of site selection.
- c. Permitting
 - i. The permitting process for an offshore wind farm, including how the Environmental Impact Assessment (EIA) process works and the use of mitigation.
 - ii. The likely surveys undertaken to support EIA and some example types of potential impacts on receptors.
 - iii. How we conclude the process with a decision on whether a project can be built
- d. Stakeholder engagement
 - i. Who are the stakeholders in relation to offshore wind, the different stakeholder categories, how they are engaged, and what they do.
 - ii. The role of the public and public opinion
 - iii. Some real-life examples of challenges that involve stakeholder engagement.

3) Project design and engineering

- a. Project engineering
 - i. How the different schools of engineering combine in offshore wind
 - ii. The various stages of engineering input
 - iii. Electrical engineering in the electrical system
 - iv. How cost engineering drives decision making and why we make decisions as late as possible
- b. Project design (part 1)
 - i. The design of turbines, foundations and the electrical system in detail
 - ii. Onshore project design

- c. Project design (part 2)
 - i. The turbine layout
 - ii. Construction design and environmental management
- d. Technology development and innovation
 - i. Examples of innovation in offshore wind
 - ii. The benefits of standardisation vs innovation
 - iii. Areas where innovation is still a fundamental aspect of offshore wind.
- e. Floating wind
 - i. An overview of the scale and opportunity
 - ii. A comparison with fixed in terms of differences and similarities in design and development status
 - iii. The design and engineering of the key floating substructure solutions

4) Human resources

- a. The importance of health and safety
 - i. A history of offshore wind health and safety
 - ii. Why the concept of 'safe by design' is important
 - iii. H&S regulations and reporting
 - iv. An overview of what can go wrong
- b. H&S Role Play
 - i. An interactive roleplay where you have to make the decisions and deal with the consequences. What would you do?
- c. Job roles and careers
 - i. Where are all the jobs, a break-down of the 1,000,000
 - ii. What does working in offshore wind actually entail, with examples.
 - iii. How your skills fit in offshore wind.

5) Markets and frameworks

- a. Frameworks
 - i. What is required to enable an offshore wind farm to be built?
 - ii. Legislation, guidance, policy and regulation.
 - iii. What frameworks cover and why they are important

b. Markets

- i. What is an offshore wind market?
- ii. How markets are created and managed
- iii. Examples of different approaches globally

6) Supply chain and construction

a. Supply Chain

- i. Which companies and organisations sit in the offshore wind supply chain, including OEMs and balance of plant manufacturers
- ii. How we can categorise and talk about the supply chain.
- iii. How components are made and how the industry is scaling up to meet demand
- iv. How local content and global markets work together

b. Offshore Installation (Part 1)

- i. A high-level overview of what offshore installation involves and some of the key concepts.
- ii. A timeline of offshore construction activities from final investment decision (FID) through to operation.

c. Offshore Installation (Part 2)

- i. A look at the many specialist, and not so specialist, vessels involved in offshore construction
- ii. An overview of construction and assembly ports, and installation methodologies.

d. Onshore Installation

- i. An overview of the onshore works carried out during the construction phase.
- ii. An understanding of the supporting functions required for successful onshore works.

7) Commercial and finance

a. Commercial

- i. How much does an offshore wind farm cost and how costs are categorised.
- ii. All about the levelised cost of energy, how it is calculated and what influences it.

- iii. The contracting work to buy a wind farm and sell electricity.
- b. Contracts and procurement
 - i. How the industry buys components, for example turbines.
 - ii. How the industry sells the product, for example electricity.
- c. Finance
 - i. What finance is and how it affects an offshore wind farm.
 - ii. The process that leads to an investment in the construction and operation of a project.
 - iii. What financial modelling is and how it works.
 - iv. How risk relates to offshore wind.

8) Operations and end of life

- a. Operations
 - i. What is involved in operating and maintaining an offshore wind farm
 - ii. How much it costs and how operational projects are managed
 - iii. Why performance management is so important
- b. Maintenance
 - i. The different ways to maintain an offshore wind farm
 - ii. New technological approaches such as digital twins and robotics
 - iii. All about offshore work including two commonly used vessels and operations ports
- c. Decommissioning
 - i. What are the options when a project reaches the end of its life
 - ii. How offshore wind projects are decommissioned.
 - iii. What decommissioning growth looks like and how it fits with other industries.

A total of 8 modules and 28 lessons.

10 to 14 hours of study.

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