

SDG14 Future of the Ocean

MM3: Offshore Renewable Energy



Micro-Module 3: Offshore Renewable Energy

Research and Development

Lesson 11: The Future of Offshore Wind

Subjects: Climate Action and Sustainable Development, Design, English, Engineering Science

7 AFFORDABLE AND CLEAN ENERGY



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



13 CLIMATE ACTION



Lesson Title and Summary: The Future of Offshore Wind

This lesson introduces learners to the concept of a super-grid, a vast interconnected electricity network spanning countries – which is the future of offshore wind. They watch videos explaining the super-grid's importance for harnessing offshore wind energy and enabling cross-border electricity trading. Afterward, they complete a worksheet to comprehend technical challenges, differences from national systems, and Ireland's potential benefits. In a group discussion, learners share their answers, enhancing understanding. The lesson aims to foster awareness of offshore wind's potential, the role of super-grids in energy distribution, and their significance in international electricity trade.

Vocabulary: Supergrid, Interconnected Network, Cross-border Electricity Trading, Energy Distribution, Development Plan

In this lesson, the learner will:

- Watch informative videos about the concept of a super-grid, its role in offshore wind energy, and its potential impact on cross-border electricity trading.
- Engage with a worksheet designed to help them understand the technical challenges involved in adopting widespread offshore wind energy and the key differences between traditional national electricity systems and super-grids.
- Through a group discussion, learners will consolidate their understanding by sharing their responses to the worksheet questions, contributing to a collective exploration of the topic.

Materials

- Worksheet: The Super-grid
- Internet access
- Pen, Paper
- Whiteboard

MM3: Offshore Renewable Energy

L11 The Future of Offshore Wind



ACTIVITY INSTRUCTIONS

Activity 1: Understanding the super-grid (25 mins)

1. Watch the video Module 2: 2050 Supergrid [3:55 mins] describing the super-grid, which is the giant, interconnected electricity network of the future. It will be an EU-wide network that will harness our offshore wind and allow us to trade all forms of electricity across our borders.
2. After watching the video, complete the questions in the worksheet: The Super-Grid part 1 in small groups.
3. Watch the video Ireland's opportunity to transform Europe into a "supergrid" in 300 seconds | Pat Cox [5:10 mins] describing the super-grid technology being developed by Supernode, a Dublin-based company.
4. After watching the video, complete the questions in the worksheet: The Super-Grid part 2 in small groups.
5. Share both part 1 and 2 as a class discussion.

Activity 2: Complete worksheet (25 mins)

1. Divide the learners into groups of 2. Have learners complete the worksheet: The Super-Grid part 3.
2. Have a class discussion.
3. From this discussion, make a list of terms and concepts that learners didn't understand in the videos and offer learners the opportunity to look these up online to deepen their learning.

REFLECTIVE EXERCISE: 3-2-1

- Three things they feel they have learnt from the exercise
- Two things they found most interesting and would like to explore more
- One – their opinion they have about the site / exercises

Use Post-its or a Mentimeter survey - [mentimeter.com](https://www.mentimeter.com) to gather reflections

MM3: Offshore Renewable Energy

L11 The Future of Offshore Wind



EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter class, shorten the amount of time spent on the group activity discussing the answers to the questions.

Extension: For a longer class, watch the additional videos in the media box. Have learners explore the government report on Ireland's offshore renewable energy development plan. Based on these have learners decide:

1. What are the pros and cons of the government's plan?
2. What would they suggest the government do?

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Module 2: 2050 Supergrid [3:55 mins] https://www.youtube.com/watch?v=SQWzyNVhpVU&ab_channel=MainstreamRenewablePower

Ireland's opportunity to transform Europe into a "supergrid" in 300 seconds | Pat Cox [5:10 mins] https://www.youtube.com/watch?v=_a0sxscVA28&ab_channel=TheRDS

Government Report: Ireland's offshore renewable energy development plan. <https://www.gov.ie/en/publication/71e36-offshore-renewable-energy-development-plan-ii-oredp-ii/>

'Supergrid Super Solution' by Eddie O'Connor and Kevin O'Sullivan - Limerick Launch [2:35 mins] https://www.youtube.com/watch?v=rXdFL-OD8Yk&t=152s&ab_channel=SuperNodeLtd

'Supergrid Super Solution' by Eddie O'Connor and Kevin O'Sullivan - Limerick Launch V2 [1:50 mins] https://www.youtube.com/watch?v=rdsnl6e49bl&ab_channel=SuperNodeLtd

Local Trip / Expertise / Additional Work and Assessments

Look into whether a local councilor or academic could come and talk to the class about Ireland's offshore renewable energy development plan. Prepare interview questions for them.



Part 1

After watching the video, answer the following questions:

What is a super-grid?

What are the benefits of a super-grid?

Will the EU share wind energy that is generated or will each country produce / use their own?

What are supernodes?

Where will supernodes be built?

What voltages do supernodes use? What does each voltage do?

What is the process of bringing energy to the consumer?

MM3: L11 WS THE SUPER GRID



When is the super-grid supposed to be created / implemented? Do you think this is soon enough? Do you think it is feasible?

Part 2

After watching the video, answer the following questions:

Who is Pat Cox? What is his view on climate change and the government's actions?

What does he think the government needs to do?

What is Supernode? What do they do?

What is their main technological challenge?

What are they developing?

What are superconductors?

MM3: L11 WS THE SUPER GRID



Why are superconductor cables beneficial?

What challenges do they talk about?

What do they think Ireland's role in wind energy could be?

What do they hope to do by 2030?

What is the Gore Street Energy Storage Fund?

What are the strengths of renewables they mentioned?

What are the weaknesses of renewables they mentioned?

MM3: L11 WS THE SUPER GRID



Part 3

After watching the two videos about the super-grid, answer the following questions:

What are the biggest technical challenges to the adoption of widespread offshore wind energy? (For example, the wind isn't always blowing where we need the energy, and so we need a fast and efficient way of transporting it).

Currently, most electricity systems (i.e. the cables that transport electricity from the generator to people's homes and businesses) are developed and operated at a national level (country by country). How does a super-grid differ from this?

What potential does Ireland have when it comes to the idea of a super-grid? How can we participate and how might we benefit?

Can a super-grid help with exporting and importing electricity to and from other countries?

What words or concepts did you not understand in these videos?
