

Muinín Catalyst STEAM Education for Sustainable Development and Futures Literacy

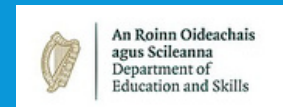
SDG14 The Future Of The Ocean



Programme Phase1: Research and Development

Micro-Module 3: Offshore Renewable Energy Century

Subject Areas: Climate Action and Sustainable Development, Design, English, Enterprise, Science



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MM3: Offshore Renewable Energy



Micro-Module 3: Offshore Renewable Energy

Research and Development

Module Overview

**Subject Areas: Climate
Action and Sustainable
Development, Design,
English, Enterprise, Science**

7 AFFORDABLE AND
CLEAN ENERGY



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



11 SUSTAINABLE CITIES
AND COMMUNITIES



13 CLIMATE
ACTION



Micro-module Summary: Offshore Renewable Energy

In the Offshore Renewable Energy module, learners begin to discover the critical role of renewable energy, with a particular focus on offshore wind in combating climate change. The module is designed to equip learners with a comprehensive understanding of various aspects related to offshore wind energy and its broader environmental and societal implications.

Learners will gain a holistic understanding of renewable energy's significance, its engineering aspects, environmental considerations, and the broader societal context. By cultivating teamwork, creativity, and a sense of responsibility, learners will be well-prepared to contribute to a sustainable and cleaner future for the planet.

In this Module, the learner will:

- Understand the importance of renewable energy, especially offshore wind, in fighting climate change.
- Discover the basics of engineering design and how it relates to building offshore wind turbine foundations.
- Learn about the environment and marine life and why we must protect them in our offshore wind adventures.
- Work as a team and make new friends while collaborating on projects.
- Use creativity and critical thinking to solve challenges faced in the world of renewable energy.
- Explore how wind turbines connect with nature and our communities.
- Learn how we can all play a role in creating a sustainable and cleaner world for everyone.

Materials

- Lesson plans
- Accompanying resources
- Optional assessments
- Internet Access required

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MM3: Offshore Renewable Energy



Offshore Renewable Energy

Lesson 1: Introduction to Wind Energy and Sustainability

This lesson plan introduces learners to renewable energy, focusing on wind power's environmental impact and advantages. By the end of the lesson, learners are primed with the foundational knowledge necessary to embark on an exploration of wind energy's intricacies and its broader implications.

Resources: Yes / No Worksheet

Lesson 2: Analyze Maps Related to Onshore Wind Farms

In this lesson, learners engage with interactive online maps displaying wind turbine generation capacity. This lesson fosters digital navigation, data interpretation, and analytical skills in understanding wind energy's geographical distribution and impact.

Resources: Onshore Wind Farms Worksheet, Teacher's Notes

Lesson 3: Exploring Offshore Wind Farms

In this engaging lesson, learners virtually explore the world of wind energy through three videos. They begin with a tour of Arbuckle Wind Farm, gaining insight from the Operations Manager's drive-through. After exploring a number of professions Learners craft 'day-in-the-life' diaries for construction workers, considering elements like weather, safety, turbine size, and the offshore environment.

Resources: Day-In-The-Life Worksheet

Lesson 4: Protecting Our Ocean Friends

In this lesson, the topic of offshore wind's impact on marine life is explored. After a video, a whole-class discussion encourages learners to share their viewpoints on offshore wind, influenced by the video, and debate its pros and cons. The discussion aims to foster critical thinking while capturing the exchange on a visual platform.

Resources: Offshore Wind Farms and Animal Life Worksheet

Lesson 5: Classroom Debate on Onshore vs. Offshore Wind

In this lesson, learners engage in a debate comparing offshore and onshore wind energy. The lesson begins with a brief introduction to the debate topic, with Learners conducting individual research identify the pros and cons of each type of wind energy. The facilitated debate where teams present their viewpoints using the synthesised information to encourage critical thinking, research skills, and collaborative discussion on renewable energy sources.

Resources: Debate Questions Worksheet

Lesson 6: Building Strong Foundations 1

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In this lesson, learners engage in a comprehensive exploration of foundations and their significance across various structures. The lesson starts with an introductory video on foundation concepts and functions, leading to a whole-class discussion. The lesson concludes with a hands-on activity where learners create tall, stable towers to solidify their understanding of strong shapes and foundations.

Resources: Foundations and Their Functions Worksheet

Lesson 7: Building Strong Foundations 2

Building on the last lesson, the focus shifts to wind turbine foundations through a brief video, followed by brainstorming, concluding with a brief brainstorm and 2D prototype of a strong offshore wind turbine which will be built on in the next lesson.

Resources: Foundation Design Worksheet

Lesson 8: Learners Design Wind Turbine Foundations

In this lesson, learners become offshore wind turbine engineers who design and construct strong and stable foundations for wind turbines at sea. Working in small groups, they are provided with materials to create their turbine foundations. The learners are challenged to think critically about stability, the weight of the turbine, the depth in the sand that their foundation will be buried, and the ability to withstand waves and strong winds.

Resources: Turbine Foundation Options Worksheet

Lesson 9: Learners Test Wind Turbine Foundations

In this lesson, learners will test the foundations they built in the previous lesson in a simulated sea environment using a large plastic crate filled with water and sand. Working in small groups, the learners are challenged to think critically about stability, the weight of the turbine, the depth in the sand that their foundation will be buried, and the ability to withstand waves and strong winds.

Resources: Teacher's Notes

Lesson 10: Teamwork and Problem Solving

In this lesson, learners engage in a practical activity to select suitable sites for a wind farm through online research. Divided into teams, they explore the Marine Atlas Tool on the Marine Institute's website to identify potential locations for a wind farm. They consider factors like water depth, wind speeds, fishing patterns, and challenges such as shipwrecks. To conclude, teams present their selections to the class, providing justifications for their choices. This activity encourages hands-on learning about renewable energy and marine environments.

Resources: Site Selection Worksheet

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Lesson 11: 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. 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.

Resources: The Super-Grid Worksheet

Lesson 12: Offshore Wind in the Community

In this lesson, two engaging activities explore the benefits of wind farms within communities. In Activity 1, learners watch a series of brief videos showcasing testimonials from various communities benefiting from wind farms, Activity 2 follows, prompting learners to create posters advocating the advantages of wind farms for public display. The lesson aims to deepen learners' understanding of renewable energy's positive impact and develop their communication skills through poster creation.

Module development and expertise: Dr. Jennifer Keenahan, University College Dublin, Assistant Professor, School of Civil Engineering

Using the Resources:

If you wish to use these resources, we can offer an induction and online support throughout the module to help you plan integration into your projects and timetable. To register for this option, please contact us e:hello@futurefocus21c.com

For more information on the resources please visit www.muinincatalyst.com

Setting up an online learning environment for the lessons on this module:

Our lessons integrate the use of virtual learning environments. To ensure seamless use of our lessons, a module should be setup on your school's virtual learning environment such as Teams, Google Classroom, etc. Learners are encouraged to upload documents to share with their peers. You can also use Google Sites or Microsoft Sway to encourage learners to present their work over the year - this can easily be set up to reflect the aims of TY and provide a showcase for their work as well

Setting up a Canva Education account:

As our lessons integrate design, our lessons also refer to Canva. Educators and schools are able to open a free Canva for Education account by registering here: <https://www.canva.com/education/>

Canva for Education provides primary and secondary school teachers and students with premium features and templates. You can then also set up lessons and invite your learners to the class.

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