



FLORES

Offshore Renewable Energies
partnership in the Pact for Skills

Educational Materials for the Offshore Renewable Energies

Secondary School Guidebook

Lesson 6: Tidal energy

6



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About this guidebook

Forward Looking at the Offshore Renewables (FLORES) will promote the core activity of the Large-scale partnership launching the Pact for Skills in the Offshore Renewable Energies (ORE) sector. FLORES will support the most committed stakeholders in the ORE, underpinning the success of the offshore renewable energy strategy with the stimulation of dedicated training offers. The partnership will promote the skilling process for the new jobs expected in the sector, estimated to account for between 20,000 and 54,000 new workers in the following five years and contribute to improve upskilling opportunities in the field of the actual ORE workforce.

FLORES prepared a set of educational materials for secondary school teacher presenting six topics:

- 1) introduction to offshore renewables;
- 2) wind energy;
- 3) solar energy;
- 4) ocean currents energy;
- 5) wave energy;
- 6) tidal energy.

For every lesson there is a guidebook and additional sources as well as a PowerPoint presentation aimed at developing practical Science, Technology, Engineering and Mathematics (STEM) experiences for secondary school students.

The objective of these educational materials is to empower teachers to introduce offshore renewable energy as a new topic and seamlessly integrate ocean literacy into their lessons. It is a «teach the teacher» resource that equips educators with the methodology required to independently craft lesson plans, while also providing them with a curated selection of existing resources.

This guidebook is aimed at students in secondary school, and the content can be adapted to younger and older students ranging from 12-18.

Project duration: January 2023 – December 2024 (24 months)

www.oreskills.eu

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Guidebook



Offshore renewable energies: tidal energy

This document is intended for secondary school teachers and serves as a guide for lessons introducing tidal energy as an energy source.



Duration: approx. 45 minutes

Lesson time can be extended with the use of additional materials provided under the scenario.



Target group: secondary school pupils



Learning objectives:

- ▶ To familiarise pupils with the definition of tidal energy.
- ▶ To explain how waves are created and how energy can be generated from it.
- ▶ To understand what the tidal energy technologies are.
- ▶ To learn about the advantages and disadvantages of using this type of energy.
- ▶ To familiarise with the barriers and drivers of tidal energy development.

Competencies and skills to be developed:

- ▶ Ability to define tidal energy.
- ▶ Ability to identify and compare technological solutions.
- ▶ Ability to present the advantages and disadvantages of tidal energy.
- ▶ Ability to transform information about tidal energy into logical and understandable conclusions.
- ▶ Ability to express opinions on the determinants of development of tidal energy.

Proposals for evaluating learning outcomes (elective):

- ▶ Evaluation of students through their activity in discussion and participation in group tasks.
- ▶ A short quiz to test students' understanding of tidal energy.

Including diversity and inclusive aspects in teaching:

- ▶ During the lesson, the teacher should pay attention to the different perspectives and approaches of the students towards tidal energy.
- ▶ Encourage open discussion and respect for different points of view.
- ▶ Enable students to conduct their own research and experiments to explore a topic according to their individual interests.
- ▶ Sensitivity to the needs of students with different religious beliefs, gender, disabilities, ensuring that they have equal opportunities to be included in the learning process.
- ▶ Recognize that your classroom may include students whose parents/family/close relatives/family friends work in the fossil fuels industry. It's vital to create a safe and inclusive space where they can freely learn, ask questions, and share their perspectives on renewable energies, fostering a richer and more holistic dialogue for all.

Lesson scenario:**Offshore renewable energies – tidal energy****Lesson objectives:**

- ▶ Familiarise students with the definition and functioning of different tidal energy technology solutions.
- ▶ Introducing tidal energy as a renewable energy source, along with its advantages and disadvantages.
- ▶ Understanding the key determinants of tidal energy development.

**Working methods:**

- ▶ Lecture
- ▶ Discussion
- ▶ Presentation
- ▶ Brainstorming

**Work format:**

- ▶ Individual
- ▶ Group work

**Teaching tools:**

- ▶ Multimedia projector
- ▶ Multimedia presentation
- ▶ Film
- ▶ Computer with Internet access
- ▶ Blackboard

Course of the lesson:**I. Introduction (10 minutes)**

- 1 Welcoming students and introducing the topic of the lesson.
- 2 The teacher asks students to repeat what offshore renewable energy sources they know.
- 3 The teacher discusses tides with the students. They are asked if they know how tides are formed and what are the ways they can be used.

II. Lecture with multimedia presentation (30 minutes)

- 1 The teacher presents the students table of content of the lesson. Then, she/he shows the students film: [What causes the tides?](#)
- 2 Clarification of the definition of the tidal energy/power.
- 3 Shows the map presenting tidal intensity across Earth.
- 4 The teacher asks the students how tidal energy can be generated. He asks everyone to imagine such a device. Pupils can draw it on a piece of paper or tell the teacher about it. They can also try to draw something together on the board.
- 5 Presentation and discussion of the technology.

- 6 Discussion on the benefits of using tidal energy. The teacher writes on one side of the board the benefits as indicated by the students.
- 7 Discussion on the disadvantages of using tidal energy. Teacher writes on the other side of the board the benefits as indicated by the students.
- 8 The teacher asks pupils to compare tidal energy with other renewable technologies already learned.
- 9 The teacher discusses the future of this technology with the students. He asks the pupils for their opinion on whether they think the technology is likely to develop.

III. Summary and conclusion (5 minutes)

- 1 A summary – a few take aways on the tidal energy.
- 2 Encourage students to explore the topic and seek other information on the subject.
- 3 Thanking students for participating in the lesson.

Comments on the Slides

Slide 4 - How the tides are formed?

- ▶ Energy is everywhere. It's in the sunlight. It's in the wind. It's in the ocean!
- ▶ Tidal energy is another form of renewable energy, that might be used. The energy for Earth's tides comes mostly from the moon's gravity and a little from the sun's gravity. The part of the ocean facing the moon bulges out. The part of the ocean on exactly the opposite side of Earth bulges out too. So as Earth turns, the ocean surface seems to rise and fall. Usually, there are two high tides and two low tides each day.
- ▶ As the water moves up and down we can capture some of this tidal energy. We can use tidal energy to provide electricity to our homes and companies. In some places we can use tidal energy instead of burning coal and oil, which contribute to global warming.

Video on slide 4: [What causes the tides?](#)

Slide 5 - What is tidal energy?

- ▶ Tidal energy is defined as the conversion of the movement of ocean water volumes into electrical energy through the use of various tidal systems.
- ▶ Cambridge Dictionary: "Tidal Power: power that comes from the movement of the tide (= the rise and fall of the ocean that happens twice every day) and that can be used especially for producing electricity"
- ▶ Tidal energy is potential energy created by tides, height changes in sea level that are caused by the gravitational pull of the sun and moon coupled with the rotation of the earth. Tides are complex, and most major bodies of water also have internal tidal systems.
- ▶ Tidal energy is powered by the natural rise and fall, or surge, of ocean tides and currents. While hydroelectricity refers to the use of dams to produce energy from water, tidal energy uses the ocean/sea's tides.
- ▶ Tidal energy is a renewable source of energy – why? Sources will never end, are for free, no pollutions during conversion.
- ▶ Tidal energy systems can extract either kinetic energy (energy caused by movement) from the moving water of rivers, tides and open ocean currents; or potential energy from the difference in height (or head) between high and low tides.
- ▶ Many coastal sites worldwide are being examined to see if they can be used to produce tidal) energy
- ▶ During the 20th century, engineers developed ways to use tidal movement to generate electricity in areas where there is a significant tidal range—the difference in area between high tide and low tide. All methods use special generators to convert tidal energy into electricity.
- ▶ The tide is renewable and relentless. Where the sun can energise photovoltaic panels for a variable handful of hours a day and the wind can blow turbines for days on end but equally disappear for extended periods without warning, the tide is near constant and entirely predictable (Geoffrey Chaucer said: "Time and tide wait for no man.).
- ▶ Estimates suggest, at the best locations, tidal energy could power a turbine for between 18 and 22 hours a day, every day.

Slide 6 - Tidal intensity across Earth

The map below shows the tidal energy patterns on the Earth's surface in the form of lines of force. The colours indicate where the tides are strongest. Areas coloured red indicate areas where the tides are strongest. Areas shown in blue are characterised by weaker tides.

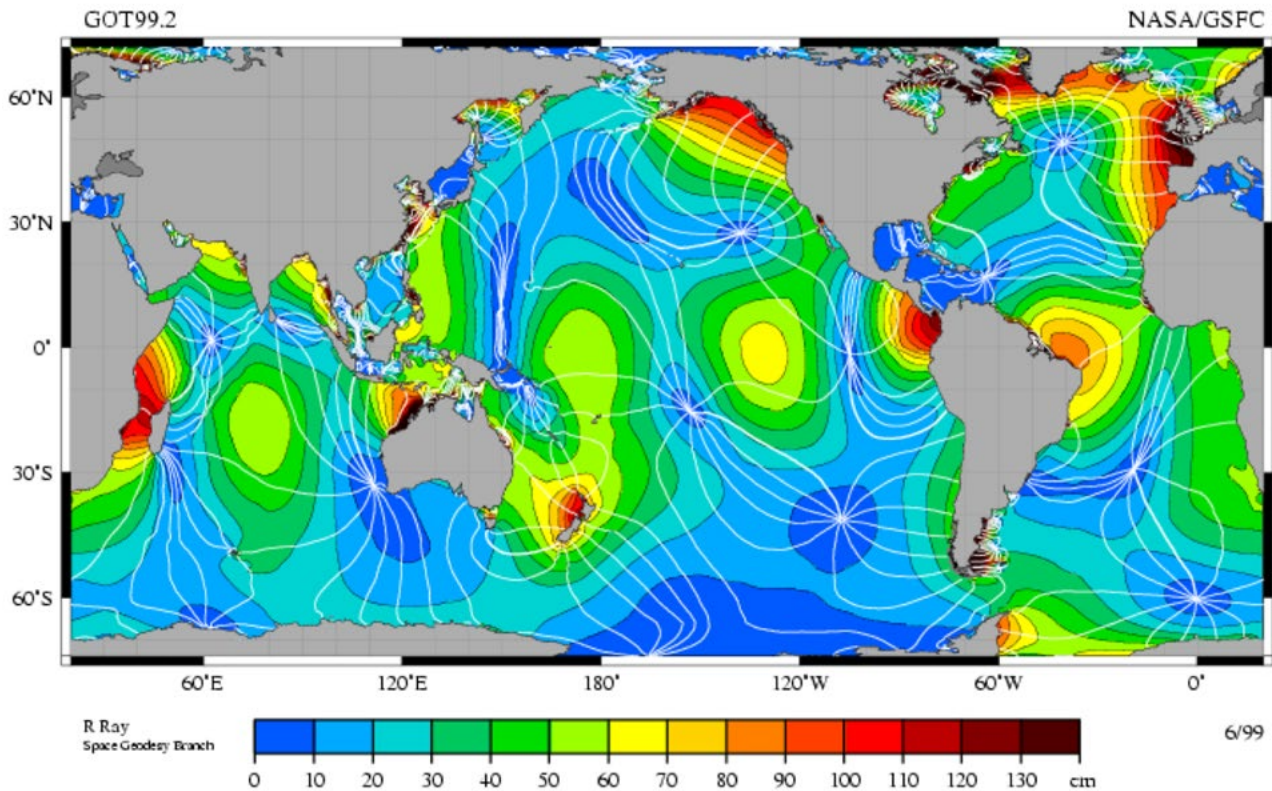


Fig.7. Tidal intensity across Earth

Slide 7/8 - Technology. How does it work?

Technologies for harnessing tidal energy are not very developed. Several concepts are currently being developed, which include:

- ▶ Barrage
- ▶ Turbines
- ▶ Kites
- ▶ Lagoons
- ▶ Fences

About tidal turbines:

- ▶ Tidal turbines can be fixed to the seabed, or float nearer the surface with moorings attached to the seafloor.
- ▶ The most common type of tidal energy technology is the horizontal-axis turbine. The rotors of a horizontal-axis turbine are turned by the tidal currents, much like a wind turbine's blades would be turned by the wind. However, because water is much denser (800 times denser) and more powerful than air, tidal turbines have to be much sturdier and heavier than wind turbines. This means that tidal turbines are much more expensive than wind turbines because of their added weight, though this is often offset with a great electrical output than wind turbines.
- ▶ Other designs include the vertical-axis turbine and the tidal kite. The vertical-axis turbines work under the same principles as horizontal-axis turbines, but are oriented vertically. A tidal kite is tethered to the seabed, and 'flies' through the water with a turbine attached below its 'wing' to generate power from the motion. Tidal kites can also be used effectively in areas with slower tidal flows.
- ▶ Other concepts are being developed, like fences or lagoons.
- ▶ A tidal lagoon is a body of ocean water that is partly enclosed by a natural or manmade barrier. The lagoons can be constructed with natural materials like rock. They would appear as a low breakwater (sea wall) at low tide, and be submerged at high tide. But the energy output from generators using tidal lagoons is likely to be low.
- ▶ A tidal fence is a type of tidal power system that has vertical axis turbines mounted in a fence or row placed on the sea bed, similar to tidal turbines.
- ▶ Water passing through the turbines generates electricity.

Examples of existing technologies:

- ▶ Tidal Barrage: The tidal power plant at the Rance River estuary in Brittany, France, uses a barrage. It was built in 1966 and is still functioning. The plant uses two sources of energy: tidal energy from the English Channel and river current energy from the Rance River.
- ▶ Tidal turbine: The world's first tidal power station was constructed in 2007 at Strangford Lough in Northern Ireland. The turbines are placed in a narrow strait between the Strangford Lough inlet and the Irish Sea. The tide can move at 4 meters (13 feet) per second across the strait.
- ▶ Tidal kite: Faroe Islands, North Atlantic - The two kites - with a five-metre (16ft) wingspan - move underwater in a figure-of-eight pattern, absorbing energy from the running tide. They are tethered to the fjord seabed by 40-metre metal cables.
- ▶ Tidal lagoon: There are no functioning examples yet. China is constructing a tidal lagoon power plant at the Yalu River, near its border with North Korea. A private company is also planning a small tidal lagoon power plant in Swansea Bay, Wales.
- ▶ Tidal fence: There are no functioning examples yet.

Film on slide 8 on tidal technology: https://youtu.be/6uo4qBx1_ZY

Slide 9 - Pros and cons.

What are the advantages of using tidal power?

- ▶ It is a renewable source of energy, which means that it will not run out. Why it is renewable? Tidal energy does not require any additional energy to make the tides go, as the tides are a natural result of the moon's gravity, and it releases no greenhouse gas emissions.

- ▶ Beyond being renewable, tidal energy requires much less space than other forms of renewable energy, such as wind, solar PV, and solar CSP. The advantage of this fact is that tidal energy can be employed by countries that lack land space while still taking up very little of the coastline.
- ▶ In addition, the tides are very predictable, much more so than wind, solar PV, or solar CSP, making it easier for engineers to design systems.
- ▶ The energy source is free once the device is built and installed.
- ▶ No fuel is needed and no waste or emissions are produced.

What are the disadvantages of using tidal power?

- ▶ Unfortunately, tidal energy can have some negative impacts on marine life. Some tidal systems emit electromagnetic emissions (EMFs), which can be harmful to marine life, migration patterns, and ocean patterns.
- ▶ Besides environmental impacts, tidal energy can also be expensive. Tidal energy production technology is not yet popular and therefore is not used often. It is only in the conceptual and testing phase...
- ▶ Tidal stream power is still under development – it could be 10 years before it is ready to be used on a large scale.

Slide 10 - What are the barriers and drivers of tidal energy production?

- ▶ Technological: New technology in turbines, like reversible ones that can generate power from ocean tides going in and out, will give us more energy.
- ▶ Ecological: The old way of using dams to harness tidal power can harm the environment, so we need to find better ways.
- ▶ Societal: When we use tidal power tech, it helps protect us from floods and makes our water cleaner, which is good for everyone.
- ▶ Industrial: The companies making small tidal power machines need to work together better, and big turbine companies are starting to join this new industry.
- ▶ Financial: The greatest barrier is the relatively high upfront costs. Most projects are supported through government funds or by technology developers themselves.
- ▶ Infrastructural: Sometimes, we can make a lot of electricity from wind out in the ocean, but we don't have the right power lines and stuff to bring it to where people live. In Europe, they're thinking about building a big power grid under the sea to fix this.
- ▶ Planning and licensing procedures: When we plan to use ocean energy, we have to be careful because people who live by the coast or do traditional sea activities might not like it. So, we need to have good rules and ways to listen to their worries when we decide how to use ocean energy.

Examples:

- 1 The first tidal energy power station was located in La Rance, France. A tidal barrage power station at La Rance in France has been operating since the 1960s, with 240 MW of capacity; its typical output is 0.5 terawatt-hour per year. [More](#)
- 2 The largest tidal power station in the world is the Sihwa Lake Tidal Power Station in South Korea, which generates 254 MW of electricity. Situated about 60 kilometers southwest of Seoul, the project utilizes a 12.5km long seawall set up in 1994 for flood control and agriculture. [More](#)

- 3 MeyGen Tidal Energy Project, located in the Inner Sound of the Pentland Firth off the north coast of Caithness, Scotland, is currently the world's biggest underwater tidal turbine power project under development. In April 2018, global power generation company Atlantis Resources had completed the construction of the Phase 1A project. The first phase of the project uses four 1.5 MW turbines with 16m rotor diameter turbines submerged on the seabed. Phase 1B involves the installation of four additional 1.5 MW turbines, while Phase 1C will add an additional 49 turbines with a combined capacity of 73.5 MW. Phases 2 and 3 of the MeyGen project will increase the overall capacity to 398 MW, with full operation expected in few years. The project is owned and run by Tidal Power Scotland Limited and Scottish Enterprise. The project received £1.5 million Scottish Government grant in 2020. [More](#)
- 4 Jiangxia Tidal Power Station (3,2 MW) is the fourth largest tidal power station in the world, located in Wuyantou, Wenling City, Zhejiang Province, China and is the only tidal power station in China. The current installed capacity is 3,200 kW and generates up to 6.5 GWh of power annually. The power station feeds the energy demand of small villages at a 20 km (12 mi) distance through a 35-kV transmission line. The maximum tidal range in the estuary is 8.39 m (27.5 ft). Now it is a Major National Historical and Cultural Sites in Zhejiang. [More](#)
- 5 Swansea Bay Tidal Lagoon project (320 MW), to be built at Swansea Bay in the UK, is the world's biggest tidal lagoon power project and will become the world's third-biggest tidal power project upon completion. The project was awarded a Development Consent Order in 2015, and the developer's estimated capital cost is £1.3bn. It will comprise 16 hydro turbines, a 9.5km breakwater wall, generating electricity for 155,000 homes for the next 120 years. Its major delivery partners include Atkins, General Electric, Andritz Hydro, Laing O'Rourke and Alun Griffiths Ltd. Swansea Bay Tidal Lagoon is already world-famous. The project has been presented to audiences across the globe, including to European Union energy ministers and at COP21, the 2015 Paris Climate Conference. [More](#)

Take aways:

- ▶ Many tidal energy technologies are not available on an industrial scale and, as a result, the contribution of tidal energy to global energy consumption is currently minimal. There are very few commercial tidal power plants in operation worldwide. However, there is great potential for its use, as much useful energy is contained in water flows.
- ▶ As its effects on the environment are mitigated, its output and prevalence can increase.
- ▶ Engineers are working to improve the technology of tidal energy generators to increase the amount of energy they produce, to decrease their impact on the environment, and to find a way to earn a profit for energy companies.
- ▶ There are several concepts and technologies for harnessing tidal energy, but they are not widespread. The most popular at present are horizontal turbines installed on the seabed, similar to those installed on land.

Sources:

- ▶ Kids fight climate change
<https://www.kidsfightclimatechange.org/solve/renewable-energy/tidal-energy>.
- ▶ Britannica
<https://www.britannica.com/science/tidal-power>
- ▶ The U.S. Energy Information Administration (EIA)
<https://www.eia.gov/energyexplained/hydropower/tidal-power.php>
- ▶ National Geographic
<https://education.nationalgeographic.org/resource/tidal-energy/>

- ▶ Real World Physics Problems
<https://www.real-world-physics-problems.com/tidal-energy-for-kids.html>
- ▶ Fun Kinds
<https://www.funkidslive.com/learn/energy-sources/tidal-energy-source-fact-file-2/>
- ▶ NASA
<https://climatekids.nasa.gov/tidal-energy/>
- ▶ Green Facts
<https://www.greenfacts.org/en/tidal-energy/index.htm#1>
- ▶ Energy Education
<https://energyeducation.ca>
- ▶ Ocean Energy Europe
<https://www.oceanenergy-europe.eu/ocean-energy/tidal-energy/>

QUIZ: Tidal energy

Guidelines: Adapt the quiz to your needs. You can use available apps, such as Kahoot, to create an online version or print and hand out to pupils.

Task 1: Mark whether the given sentence is true or false

1. There are a large number of installations around the world that use tides to produce energy.

☐ TRUE ☐ FALSE

Answer: False.

2. The moon plays a very important role in the formation of tides.

☐ TRUE ☐ FALSE

Answer: True.

3. Tidal energy is powered by the natural rise and fall, or surge, of ocean tides.

☐ TRUE ☐ FALSE

Answer: True.

4. Tidal energy is non-renewable source of energy.

☐ TRUE ☐ FALSE

Answer: False.

5. Air is denser than water.

☐ TRUE ☐ FALSE

Answer: False.

Task 2: Single-choice test. Mark the correct answer

1. What solution for tidal energy generation is shown in the picture aside?

☐ a. Tidal barrage
☐ b. Tidal kite
☐ c. Tidal turbine



Correct answer: c

2. One of the advantages of tidal power is?

☐ a. Well-known technology
☐ b. Low cost of equipment
☐ c. Predictability

Correct answer: c

3. Tidal energy has a major impact on marine life?

☐ a. Yes
☐ b. No

Correct answer: a

4. Do we have tidal energy installation somewhere in the world?

☐ a. Yes
☐ b. No

Correct answer: a

5. One of the disadvantages of tidal power is?

☐ a. Well-known technology
☐ b. High cost of equipment
☐ c. Don't need fuel

Correct answer: b

Additional sources



Useful webpages

- ▶ <https://impactful.ninja/tidal-energy-explained/>
- ▶ <https://nsci.ca/2019/11/19/tidal-energy-and-how-it-works/>
- ▶ <https://testbook.com/physics/tidal-energy>
- ▶ <https://www.solarreviews.com/blog/tidal-energy-pros-and-cons>
- ▶ <https://www.conserve-energy-future.com/tidalenergy.php>
- ▶ <https://earth.org/what-is-tidal-energy/>
- ▶ <https://www.perchenergy.com/blog/energy/tidal-power-explained-renewable-tidal-energy>
- ▶ https://energyeducation.ca/encyclopedia/Tidal_power
- ▶ <https://www.pnnl.gov/explainer-articles/tidal-energy>
- ▶ <https://www.careers360.com/premium/what-tidal-energy-its-principle-and-application>
- ▶ <https://www.ctc-n.org/technologies/tidal-energy>
- ▶ <https://www.alternative-energy-tutorials.com/tidal-energy/tidal-energy.html>
- ▶ <https://www.oceanenergy-europe.eu/ocean-energy/tidal-energy/>

YouTube films

- ▶ [Tidal Energy: How does it work? - YouTube](#)
- ▶ [Nova Scotia's tidal energy - YouTube](#)
- ▶ [What is Tidal Energy? - YouTube](#)
- ▶ ['World's most powerful' tidal turbine switched on - YouTube](#)
- ▶ [Tidal Power - YouTube](#)
- ▶ [Tidal Energy - YouTube](#)
- ▶ [Is tidal power a reliable form of clean energy? - YouTube](#)
- ▶ [How does Tidal energy work? - YouTube](#)
- ▶ [Tidal Energy Taking Hold In England - YouTube](#)
- ▶ [Tidal energy | Class 10 | Geography | ICSE Board | Home Revise - YouTube](#)
- ▶ https://www.youtube.com/watch?v=tcGEjzt_4is&t=188s
- ▶ <https://www.youtube.com/watch?v=9JxpJhWQXds>
- ▶ <https://www.youtube.com/watch?v=Wv3YZZ10rPU>
- ▶ <https://www.youtube.com/watch?v=QNBgaX-wCYA>

Reports

- ▶ <https://www.irena.org/publications/2014/Jun/Tidal-Energy>
- ▶ <https://ore.catapult.org.uk/wp-content/uploads/2022/10/Tidal-stream-cost-reduction-report-T3.4.1-v1.0-for-ICOE.pdf>

Additional resources for educators

How tides work

- ▶ <https://scijinks.gov/tides/>
- ▶ <https://ei.lehigh.edu/learners/energy/tidal2.html>
- ▶ https://www.researchgate.net/publication/340372849_Tidal_Turbine_Generators/figures?lo=1
- ▶ https://oceanservice.noaa.gov/education/tutorial_tides/tides07_cycles.html

More on tidal barrage

- ▶ [Tidal Power - Tidal Barrage](#)
- ▶ [Tidal barrage - Energy Education](#)
- ▶ [Tidal Barrage and Tidal Barrage Energy Devices \(alternative-energy-tutorials.com\)](#)

More on tidal turbines

- ▶ [Tidal stream generator - Energy Education](#)
- ▶ [Tidal Power - Tidal Stream Generator](#)

More on tidal lagoon concept

- ▶ [Tidal Lagoons: The Most Feasible Source of Tidal Energy \(stanford.edu\)](#)
- ▶ [Tidal Power - Tidal Lagoon](#)

More on tidal fence

- ▶ [Tidal Fence and Underwater Tidal Fence Turbines \(alternative-energy-tutorials.com\)](#)
- ▶ [Revolutionary tidal fence is set to trap the sea's power | Wave and tidal power | The Guardian](#)

More on tidal kites

- ▶ [The underwater 'kites' generating electricity as they move - BBC News](#)
- ▶ [Underwater Manta Kites for Tidal Power Harvesting - IEEE Spectrum](#)
- ▶ [Underwater 'kites' are tapping into the ocean's tidal energy potential - Create \(createdigital.org.au\)](#)
- ▶ [Using underwater kites to generate clean energy \(power-technology.com\)](#)
- ▶ [SKF bearings in Minesto's underwater kites](#)

Videos to explore the technology:

- ▶ <https://www.oceanenergy-europe.eu/ocean-energy/tidal-energy/>
- ▶ [GCSE Physics - Hydroelectricity and Tidal Barrage #13 - YouTube](#)
- ▶ [What is a tidal barrage? - YouTube](#)
- ▶ [How Barrage Tidal Power Generation Works \(EiM series\) - YouTube](#)
- ▶ [Journey to the heart of energy - How a marine turbine works - YouTube](#)
- ▶ [Ocean Energy - Tidal Current Turbine - YouTube](#)
- ▶ [World's most powerful tidal turbine: Orbital 02 - YouTube](#)

- ▶ [EET SeaUrchin Tidal Turbine Video - YouTube](#)
- ▶ [SR2000 Tidal Turbine 2018 2GWh - YouTube](#)
- ▶ [Tidal Lagoon Swansea Bay introduction - YouTube](#)
- ▶ [Tidal Lagoon Swansea Bay #TurnTheTide - YouTube](#)
- ▶ [How does a tidal lagoon power plant work - YouTube](#)
- ▶ [Tidal lagoon power plants and generating energy #shorts - YouTube](#)
- ▶ [An underwater kite built to harness tidal energy - YouTube](#)
- ▶ [DG500 – The Launch of a World's First Subsea Kite - YouTube](#)
- ▶ [Minesto Tidal Energy - YouTube](#)
- ▶ [Minesto reaches historic milestone – delivers first tidal energy to the Faroese grid - YouTube](#)

Examples

- ▶ [Tidal giants - the world's five biggest tidal power plants - Power Technology \(power-technology.com\)](#)
- ▶ [The world's 10 biggest tidal power projects | BusinessGreen Feature](#)
- ▶ [Profiling five of the biggest tidal power projects around the world \(nsenergybusiness.com\)](#)



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