Today I Learned About Wind and Solar Power

Description:

Wind and solar power are key tools in the climate change toolkit – but what are their strengths and weaknesses? Can they provide us with all the clean electricity we need? Students investigate wind and solar resources and electricity needs. Then, they research the growing field of energy storage and share their results with a key audience.

Skills & Objectives

SWBAT

- Explain why wind and solar power are important parts of a low-carbon future.
- Explain why energy storage is needed to harness the potential of wind and solar.

Skills

- Map reading and spatial analysis
- Research methods

Students Should Already Know That

- Electricity is produced through a variety of methods, including fossil fuel burning, wind, solar, hydroelectricity, and others.

Standards Alignment:
HS-ESS3-1 The availability of natural resources have influenced human activity.
HS-ESS3-2 Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria.
RST.11-12.2 Determine the central ideas or conclusions of a text.
RST.11-12.9 Synthesize information from a range of sources into a coherent understanding of a process, phenomenon, or concept.
Disciplinary Core Ideas:
ESS2.A Earth Materials and Systems
ESS3.C Human Impacts on Earth Systems
ETS1.B Developing Possible Solutions

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How To Use These Activities:

Pages with the circular "TILclimate Guide for Educators" logo and dark band across the top are intended for educators. Simpler pages without the dark band across the top are meant for students.

Each of the included activities is designed to be used as a standalone, in sequence, or integrated within other curriculum needs. A detailed table of contents, on the next page, explains what students will do in each activity.

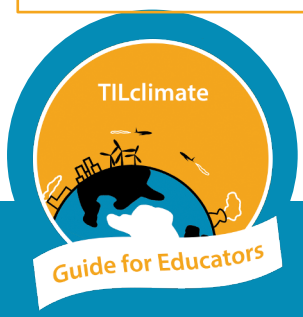
A Note About Printing/Materials

All student pages are designed to be printable in grayscale, including the maps on pages 3 and 4. Larger versions of these maps are included. A few copies of these pages could be printed color for students to share, or the image projected in the classroom.

The worksheets do not leave space for students to answer questions. Students may answer these questions in whatever form is the norm for your classroom – a notebook, online form, or something else. This allows you, the teacher, to define what you consider a complete answer.

On page 5, students are assigned four articles. Depending on time and your goals, students may read all four articles or individual students may each read one article and teach the other members of their group what they learned.

Podcasts in the Classroom: Throughout these Guides for Educators, we invite students to think about how they would share their learning with family and friends. One way to do this is to encourage your students to create their own podcasts - they're shareable, creative, and have multiple options for embedded assessment. We would love to hear any podcasts or see any other projects you or your students create! Email us at tilclimate@mit.edu, Tweet us @tilclimate, or tag us on Facebook @climateMIT.



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Detailed Table of Contents

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Season 2 Collection

Season 2 of TILclimate from MIT covers a series of interrelated energy subjects. The associated teacher guides are structured for maximum flexibility. Each episode's activities could be done as a whole class or as small-group work while other teams work on other topics and share back in a jigsaw. Some activities also can be enrichment or homework, and many as asynchronous assignments for remote work. Activities of similar length could also be set up as rotating stations, with a group discussion at the end of class.

- Introductory activities are quick (15-25 minutes) and require no internet.
- Dive Deeper activities are longer (30-60 minutes) and require internet access.

The City of the Future overall project is flexible in terms of time, space, and materials. It will be engaging whether students have completed all activities in the collection, or just one. If teams of students have been working on one topic each, the City of the Future process will help them share their learning with the rest of the class.

Wind, Solar, and Energy Storage

This Educator Guide includes a map investigation and a research project. Educators may pick and choose among the pieces of the Guide, as suits their class needs.
Parts of this Guide may align with the following topics:

- Physical science: Solar, wind, and energy storage technology.
- Life/environmental science: Impacts of fossil fuel use on climate change. Impacts of solar and wind technology on the environment.
- History/social science: Research methods.
- ELA/nonfiction: Research methods.

MIT Resources

We recommend the following as resources for your own better understanding of climate change or as depth for student investigations. Specific sections are listed below:

- Climate Science, Risk & Solutions, an interactive introduction to the basics of climate change. https://climateprimer.mit.edu/
  - Chapter 02 The greenhouse effect and us
  - Chapter 10 What can we do?
- MIT Climate Portal Explainers are one-page articles describing a variety of climate topics. https://climate.mit.edu/explainers
  - Renewable Energy
  - Energy Storage

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Wrap-Up Discussion Questions

- In areas with low wind and solar resources, what factors would help decide whether a solar or wind farm was worth building? (Consider local electricity needs.)
- What factors do you think influence where these wind and solar plants are built?
- Which energy storage technologies do you find the most promising? Why?
- What other forms of low-carbon electricity are part of the energy toolkit?
- What other questions do you have about wind, solar, and energy storage? How could you investigate these questions?

Climate Solutions

Climate solutions can be thought of as falling into four categories outlined below. Across all categories, solutions at the community, state or federal level are generally more impactful than individual actions. For example, policies that increase the nuclear, solar and wind mix in the electric grid are generally more effective at reducing climate pollution than asking homeowners to install solar panels. For more on talking about climate change in the classroom, see "How to Use This Guide".

- **Energy Shift**
  How do decision-makers make the switch from carbon-producing energy to carbon-neutral and carbon-negative energy?
- **Energy Efficiency**
  What products and technologies exist to increase energy efficiency, especially in heating and cooling buildings?
- **Adaptation**
  How can cities and towns adapt to the impacts of climate change?
- **Talk About It**
  Talking about climate change with friends and family can feel overwhelming. What is one thing you have learned that you could share to start a conversation?

What solutions are the most exciting in your classes? We would love to hear from you or your students! Images, video, or audio of student projects or questions are always welcome. Email us at tilclimate@mit.edu, Tweet us @tilclimate, or tag us on Facebook @climateMIT.