

Today I Learned About Fossil Fuels

Description:

Fossil fuels are used throughout our world. Why are they called that, and where do they come from? What are the impacts of their extraction, distribution, and use? Fossil fuels are at the center of a lot of big questions. Students develop and answer their own specific, testable questions using a data visualization website.

Skills & Objectives

SWBAT

- Explain where coal, oil, and natural gas come from.
- Understand the differences between coal, oil, natural gas, and gasoline.
- Explain why fossil fuels are considered non-renewable.
- Understand the relationship between burning fossil fuels and climate change.
- Develop, refine, and answer a specific, measurable question with a given data-visualization tool.

Skills

- Asking and answering questions
- Data visualization and analysis
- Logical sequencing

Students Should Already Know That

- The burning of fossil fuels releases carbon dioxide into the atmosphere, where it acts like a blanket, trapping heat. A regular amount of carbon dioxide is needed to support life on Earth, but excessive carbon dioxide from fossil fuel use is trapping extra heat.

Standards Alignment:

HS-ESS3-3 Management of natural resources

HS-ETS1-1 Analyze a major global challenge

WHST.9-12.7 Conduct short research project to answer a self-generated question

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement

Disciplinary Core Ideas:

ESS3.D Human Impacts on Earth Systems

ETS1.A Defining and Delimiting an Engineering Problem



Today I Learned About Fossil Fuels

How To Use These Activities:



Pages with the circular “TILclimate Guide for Educators” logo 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, except for the optional example wind map on page 8. A few copies of this page 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.

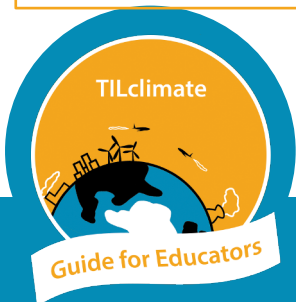
Answers to “The Story of...” Pages

Oil: H, F, B, C, A, I, E, D, J, G

Coal: G, E, C, A, H, D, B, I, F

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.

We encourage you to share this Guide under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.



Today I Learned About Fossil Fuels

Detailed Table of Contents

Page	Title	Description	Time (min)
	Podcast Episode	Students listen to TILclimate: TIL about fossil fuels, either as pre-class work at home or in the classroom. https://climate.mit.edu/podcasts/e2-til-about-fossil-fuels	10-15
1-4	The Story of Fossil Fuels	Students are introduced to various fossil fuels, and then rearrange the scrambled steps of the formation of oil & gas and coal.	10-20
5-6	Asking SMART Questions	Reading: Students are introduced to the SMART metric for designing testable, answerable questions.	5-10
7-8	SMART Question Example: Wind Power	Whole-class walkthrough: A step-by-step example developing and answering a SMART question based on the EIA's Wind Energy map.	10-15
9-10	Fossil Fuels: SMART Questions (internet required)	Using interactive maps from the Energy Information Administration, students design and answer their own SMART question about fossil fuels in the United States.	20-45+
11	SMART Question Rubric	A rubric for student or educator use to evaluate student questions before attempting to answer them.	n/a



Today I Learned About Fossil Fuels

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.

Fossil Fuels

This Educator Guide includes the story of fossil fuels and a process to develop testable questions. 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:

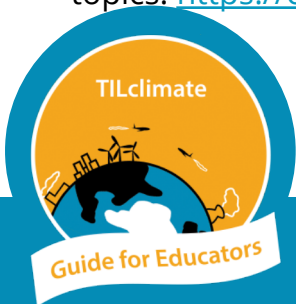
- Physical science: Distribution of natural resources
- Life/environmental science: Impacts of fossil fuel extraction, distribution, and use. Geologic history.
- History/social science: Policies regarding fossil fuels and other energy sources.
- ELA/literature: Connections to fictional works about fossil fuel extraction (coal mining, etc.) or future climate impacts.
- ELA/nonfiction: Clarifying and answering complex questions. 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>

Mining and Metals
Greenhouse Gases
Carbon Pricing



Today I Learned About Fossil Fuels

Wrap-Up Discussion Questions

- Why are fossil fuels considered non-renewable?
- Why are they called fossil fuels?
- What is the relationship between fossil fuels and climate change?
- What questions did you have while exploring the EIA website?
- What questions do you still have?
- What questions could you answer using the EIA website? What other information would you still need to answer your 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.

