

Today I Learned About Recycling

Description:

We often hear about the “Three Rs” of environmental solutions, but how does recycling help climate change? Students engage in a design challenge, research recycling in their own community, and investigate US municipal solid waste data.

Skills & Objectives

SWBAT

- Brainstorm and investigate solutions beyond ‘just recycle more’.
- Explain the link between recycling and climate change.
- Understand where recycling in their own community goes.

Skills

- Design Process
- Communication
- Graph and data reading

Students Should Already Know That

- When we burn fossil fuels like coal, oil, and natural gas to make new materials, we release carbon dioxide into the atmosphere. This carbon dioxide acts like a blanket, trapping heat, and the trapped heat is warming our Earth and ocean, causing dramatic changes to weather, droughts, and heat.

Standards Alignment:

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-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question or solve a problem.

SL.11-12.5 Make strategic use of digital in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Disciplinary Core Ideas:

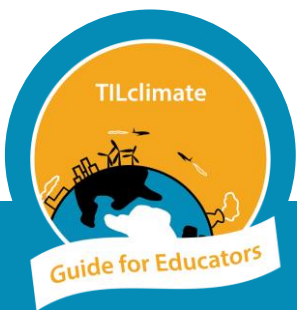
ESS2.D Weather and Climate

ESS3.C Human Impacts on Earth Systems

ESS3.D Global Climate Change

ETS1.A Defining and Delimiting an Engineering Problem

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

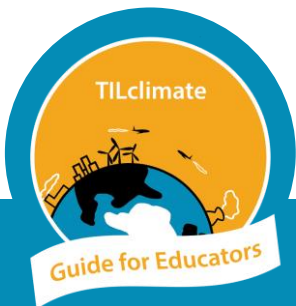
All student pages are designed to be printable in grayscale.

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.

A Note On Timing

- The Communication Challenge may be stretched or reduced as needed to fit class requirements. A shorter challenge could be done in 1-2 class periods.
- The Recycling Investigation will take very little in-class time but will take time outside of class for students to find and ask the relevant people. Depending on initial answers, they may need to pursue the question up a chain of responsibility.
- The Solid Waste Data activity can be shorter with simpler questions, or longer with more complex questions, depending on the needs of the educator.

Share with us! 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

Page	Title	Description	Time (min)
	Podcast Episode	Students listen to TILclimate: TIL about recycling, either as pre-class work at home or in the classroom. https://climate.mit.edu/podcasts/til-about-recycling	10-15
1-2	Recycling Problems and Solutions	While listening to the podcast, students identify recycling problems and solutions. They then learn two different ways to sort solutions.	30+*
3-4	Solutions Sorting Information	Information on the Zero Waste Hierarchy and sorting solutions into three categories. (Used for multiple activities.)	n/a
5	Recycling Solutions Worksheet	If students are not going to listen to the podcast episode, or if they need more practice sorting solutions, this worksheet may be used.	10
6-8	Communication Challenge: Recycling	Students identify recycling problems and brainstorm solutions. Then they choose, propose, and share their solutions.	45+*
9	Recycling Investigation (internet may be required)	Students choose a place in their lives that offers recycling and investigate where that recycling goes and what happens to it.	In-class: 10-15 Home: Variable*
10	Solid Waste Data (internet required)	Students brainstorm questions about Municipal Solid Waste and use EPA data to answer their questions.	20-45+*

*See **A Note on Timing**, previous page.



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Recycling and Solid Waste

This Educator Guide includes a design challenge, an in-person investigation, and a data investigation. 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: Materials science, the engineering design process.
- Life/environmental science: Impacts of solid waste disposal and processing.
- History/social science: Civic engagement on recycling and municipal solid waste.
- ELA/nonfiction: Reading, writing, and communicating scientific and engineering ideas.

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 10
- MIT Climate Portal Explainers are one-page articles describing a variety of climate topics. New Explainers are posted monthly. <https://climate.mit.edu/explainers>
 - Net Zero Emissions
 - Climate Justice
 - Cities and Climate Change
 - Mining and Metals
- MIT professors can answer your and your students' questions about climate change! Submit your questions or see other answers at <https://climate.mit.edu/ask-mit-climate>



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Wrap-Up Discussion Questions

- Beyond simply encouraging individuals to recycle more, what other solutions will reduce the amount of energy that goes in to producing and disposing of materials?
- What have you heard about recycling? What questions do you have?
- Where does your recycling go?
- According to the podcast, where are the biggest energy and cost savings in recycling?
- What other benefits or impacts could come from reducing our waste?

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.

