

Today I Learned About Everyday Travel

Description:

The future of transportation includes multiple modes and ways of thinking about how we get around. Students learn about Complete Streets, tackle urban street design, and design their own transit system for an imaginary city.

Skills & Objectives

SWBAT

- Describe different modes of transportation
- Understand that there are design solutions to make streets safer and more accessible.
- Explain a case study related to transportation and mobility.

Skills

- Reading case studies
- Interpreting design suggestions
- Communication

Students Should Already Know That

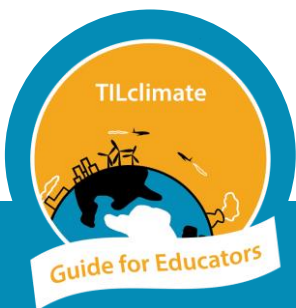
- Gas- and diesel-powered vehicles release carbon dioxide, which acts like a heat-trapping blanket in the atmosphere. Trapped heat is changing Earth's climate, leading to increased extreme weather, heat waves, and flooding.

Standards Alignment:

HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints
HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems.
WHST.9-12.1 Write arguments focused on discipline-specific content
SL.11-12.5 Make strategic use of digital media in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Disciplinary Core Ideas:

ESS2.D Weather and Climate
ESS3.A Natural Resources
ESS3.C Human Impacts on Earth Systems
ETS1.C Optimizing the Design Solution



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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.

Lacking internet, a random map for the Design a Transit System activity could be printed ahead of time, and students could work on paper.

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.

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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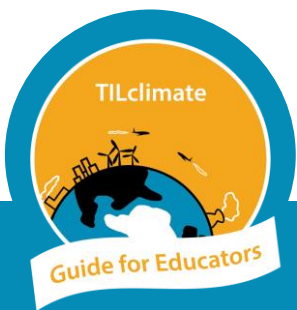
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Detailed Table of Contents

Page	Title	Description	Time (min)
	Podcast Episode	Students listen to TILclimate: TIL about transportation of the future, either as pre-class work at home or in the classroom. https://climate.mit.edu/podcasts/til-about-everyday-travel	10-15
1	Mobility and Transport (internet required)	Students read case studies about transportation solutions around the world, and then think-pair-share with a classmate to learn about transferable lessons.	20-30
2	Complete Streets (internet required)	Students learn about the US Complete Streets program and street design solutions. In groups, they choose a street or intersection in their community that needs an upgrade and design a proposal for a Complete Street.	30-45+
4	Design a Transit System (internet required to generate a map)	Combining what they have learned about transportation and street design, students design a multi-modal transit system for a randomly-generated imaginary city.	30-45+
5	Transit Modes	Definitions of transit modes.	n/a



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Multi-Modal Transit

This Educator Guide includes two design activities and a case study 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:

- Life/environmental science: Impacts of urban design and sprawl on ecosystems.
- History/social science: History of city and transit planning, social impacts of transit accessibility.
- ELA/literature: Connections to transit-related stories.
- ELA/nonfiction: Communicating about complex issues.

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 08
 - 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>
 - Climate Justice
 - Climate-Resilient Infrastructure
 - Cities and Climate Change



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Wrap-Up Discussion Questions

- What challenges or lessons learned did your case studies have in common? How could this solution be applied in another place?
- What most excites you about the projects you learned about?
- For your chosen design element – what problems does it solve? Most of the ideas solve more than one challenge, such as slowing traffic and creating public outdoor space.
- If you wanted to propose your solution to decision-makers in your community, who would they be? How could you find out if your city/town, county, or state already has a Complete Streets policy in place?
- What factors did you consider when designing your own transit system?

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?

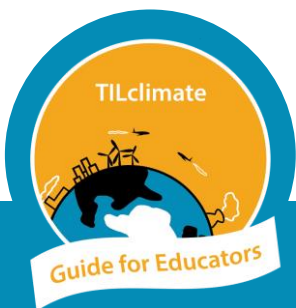
•Adaptation

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.



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“Fundamentally, it needs to start with a real true assessment of what are the needs, what are the travel patterns in a city and what are the different solutions and which ones make the most sense? Really, really good transit systems work for people and people want to take them.

*Dr. Joanna Moody, World Bank Transport Global Knowledge and Expertise Unit
TILclimate podcast: Today I Learned About Everyday Travel*

Mobility and Transport Around the World

Transportation solutions don't look the same everywhere. Weather, street design, distances traveled, and city layout all affect which kinds of transit works best in any given area. The best designs fit a city's existing travel patterns, but make them more accessible, reliable, and safe while reducing carbon dioxide and other pollution from cars, trucks, buses, and trains.

Case studies are stories about one specific solution to a problem. Since each location's situation is different, case studies are not meant to be a blueprint for another place, but present a story about one possible way to see a challenge and meet it.

Learn, Think, Pair, Share

1. Visit <https://use.metropolis.org/case-studies> and click **Search for Case Studies**.
2. In the **Select topics** menu, select *Mobility and Transport* and click **Show Results**.
3. Make sure **Case studies** is selected at the top of the page.
4. Choose one case study of interest to you. You may look for a country you have a connection to, an image that leaps out to you, or some other factor to help you choose.
5. Read the case study, paying particular attention to the *Barriers and challenges* and *Lessons learned and transferability* portions.
6. In your own words, briefly describe the story – what challenge did they solve, and how was it successful?
7. Pair up with a classmate. Tell each other your stories.

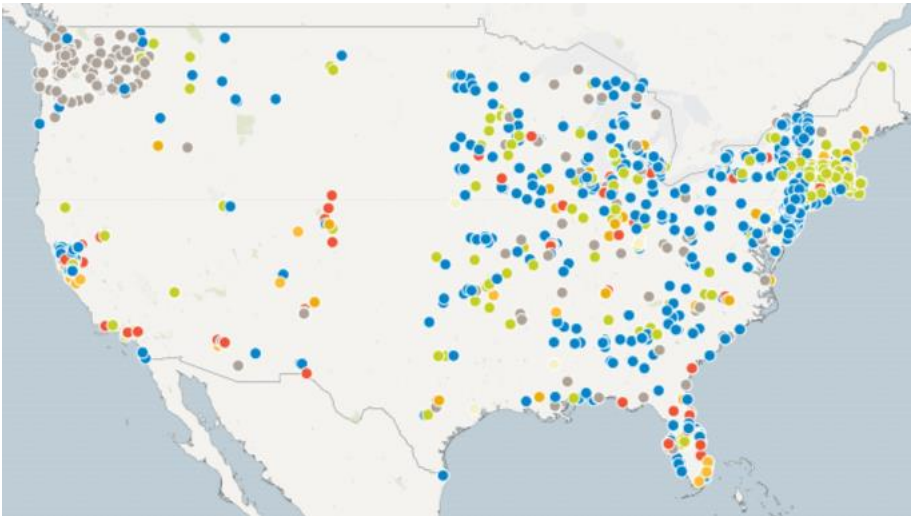
Discuss:

- What transportation problem did the project seek to solve?
- What challenges or lessons learned did your case studies have in common?
- How could this solution be applied in another place?
- What most excites you about the projects you learned about?

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“Allocating our space on our streets better is a low-cost, near-term, within-our-jurisdiction way of really starting to change our different travel modes, to the most sustainable, the most socially responsible choice.”

*Dr. Joanna Moody, World Bank Transport Global Knowledge and Expertise Unit
TILclimate podcast: Today I Learned About Everyday Travel*



Jurisdictions with Complete Streets Policies, Laws, and Resolutions, 2022

Complete Streets

According to the US Department of Transportation, a *Complete Street* policy ensures “the safe and adequate accommodation of all users of the transportation system, including pedestrians, bicyclists, public transportation users, children, older individuals, individuals with disabilities, motorists, and freight vehicles.”¹ Cities, towns, counties, and tribal lands in all US states have established Complete Street policies, including more than 1,300 cities and towns and 36 states and territories.² These policies define rules for how streets, intersections, and public areas are designed, adapted, and upgraded.

Many streets, especially in suburban business and downtown districts, were designed for car use, with less attention paid to pedestrians, bicyclists, buses, and other modes of transportation. This often leads to unsafe road crossings for pedestrians, dangerous or absent bicycle routes, and poor traffic flows. The Complete Streets model is a framework to help communities decide how they would like their streets to be designed – and safer for all.

Map of Complete Streets policies <https://completestreets.carto.com/>

¹ US Department of Transportation, Federal Highway Administration, Moving to a Complete Streets Design Model: A Report to Congress on Opportunities and Challenges, March 2022 <https://highways.dot.gov/>

² Complete Streets Policy Adoption, 2020 <https://smartgrowthamerica.org/wp-content/uploads/2021/09/CS-policies-2000-2020.pdf>

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The Complete Streets model is not a one-size-fits-all approach. Every neighborhood, intersection, and street has different needs, layouts, and uses that affect what choices make the most sense. In your group, you will consider street types and design elements to make a proposal to improve a street in your community.

Design Your Own Complete Street

Discuss with your group – is there a street or intersection in your community that could use an upgrade? Perhaps a place where cars drive too quickly and crossing the street is unsafe, or a downtown area that doesn't feel welcoming to people on foot or wheels. Look at a map and agree together on an area you would like to redesign.

1. Visit <https://nacto.org/publication/urban-street-design-guide/streets/> and read through the descriptions of kinds of streets. Which kind of street is your chosen area?
2. Click on the description to read some of the recommendations for that street type.
3. As a group, choose 2-3 recommendations that most appeal to you, and assign one recommendation to each member or pair of members in your group.
4. Create a proposal to suggest your chosen design element. Your proposal could take the form of a poster, presentation, video, or other format. Who is your audience for your proposal? Make sure that your project is in a format that would make the most sense to your chosen audience.

For some design elements, such as shifting lanes, parklets, or public space, there are temporary measures that can “try out” a new design before it is made permanent. Check these strategies out by using the **Guide Navigation** dropdown menu and choosing *Interim Design Strategies*.

Discussion

Each group should present their proposals to the rest of the class. Then, discuss:

- What are the main challenges that were identified for streets in our community?
- Which solutions are the most exciting? Why?
- For your chosen design element – what problems does it solve? Most of the ideas solve more than one challenge, such as slowing traffic and creating public outdoor space.
- If you wanted to propose your solution to decision-makers in your community, who would they be? How could you find out if your city/town, county, or state already has a Complete Streets policy in place?

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“What really impacts travel behavior is the quality of options. And for many people, public transit just doesn't exist as an option, or is of such poor quality that it's really not a meaningful choice.”

*Dr. Joanna Moody, World Bank Transport Global Knowledge and Expertise Unit
TILclimate podcast: Today I Learned About Everyday Travel*

Design a Transit System

As Dr. Moody says in the podcast episode, transportation choices impact behavior. Telling people they should walk, ride a bike, or take the bus only works if the things they need are within walking distance, there are safe places to ride their bike, and the bus goes where they need to go reliably.

Transit planners look at where people live, work, play, and shop to design transportation systems that move people around most efficiently. They also consider what kinds of transit options make the most sense for the location.

Today, you are going to be transit planners for an imaginary city. Your goal is to design a transit system such that most people in the city do not need to use a car to meet their daily needs.

Design Your City

1. Visit <https://inkwellideas.com/free-tools/random-city-map-generator/>
2. In the box on the left side of the page, choose a population density (*low, medium, or high*) for each of three neighborhoods (**East, West, and South**). A mix of density types will create a more interesting city.
3. Under **Join**, choose whether your neighborhoods are on the same landmass or separated by a body of water. *No Join* means all three neighborhoods will be separated by a river. *East-West, East-South, and West-South* will separate two neighborhoods from the third. *All* will keep all three neighborhoods connected.
4. Click **Refresh** to see your city. Each time you click **Refresh**, a new city with the same parameters will be generated. There is no way to go back to a previous city.
5. Screenshot your city and print it or save the image to look at on a screen.
6. With your group, decide what each of the building types on the map will represent. Consider places your residents may live, get food and necessities, go to work and school, and relax and have fun. Mark these on your map.
7. Using the transportation types on the next page, design a transit plan for your city that best connects residents to the places they need to go. You do not need to use all transportation modes.

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Types of Transportation

The US Department of Transportation defines the following transit modes (number of trips in 2019):¹



Buses can be powered by gas, diesel, or electricity. Buses may run in dedicated lanes (Rapid Bus Transit) or share the road with cars and trucks. (4.4 billion)



Heavy Rail trains are electric trains that run on dedicated rail lines that no other mode of transit crosses. Subway systems are generally heavy rail. (3.8 billion)



Commuter Rail trains may be electric, gas, or diesel and link rural and suburban communities to cities. They share space with other modes. (506 million)



Light Rail trains run short one-to-two-car electric trains on shared or dedicated spaces, often on roads. (479 million)



Demand Response includes cars or vans that do not operate on a fixed route but respond to calls from passengers, such as taxis or rideshare. (110 million)



Ferryboats are boats that operate on a fixed schedule and route along and across rivers, harbors, and ocean routes. (85.1 million)



Vanpools are vans or small buses that operate on a fixed route and schedule, using roadways. (34.5 million)

Also consider non-vehicle modes:



Walking is made safer with well-maintained sidewalks, clear street crossings, and dedicated non-vehicle routes such as rail trails and pedestrian bridges.



Accessibility for wheelchair users, walker and cane users, and kids in strollers requires safe, easy access to sidewalks, businesses, and transit options.



Biking is made safer with clearly-defined bike lanes with separate signal systems. Lanes that are not shared with cars are safest. Bikesharing programs and secure bike storage should also be considered.

¹ US Department of Transportation National Transit Summaries and Trends 2019. https://www.transit.dot.gov/sites/fta.dot.gov/files/2022-01/2019-NTST-1-2_0.pdf. 2019 data used to avoid effects of the coronavirus pandemic. Images from The Noun Project by Curve, AVAM, romzicon, Kaylen Yul Lee, The Icon Z, Moose Icons, Sakchai Ruankam, and Muzzammil