

# America's Big Year of Climate Action

## Description:

Three major federal bills were signed into law in 2021 and 2022, which together make up the largest investment in addressing climate change in US history. Students explore the differences and interactions of the three laws, investigate local impacts, and design their own climate-related bill.

## Skills & Objectives

### SWBAT

- Explain key differences between the climate-related provisions of the Inflation Reduction, the Infrastructure Investment and Jobs, and the CHIPS and Science Acts
- Understand the concepts of “carrots” and “sticks” in government action

### Skills

- Reading and discussing public-facing government documents
- Systems thinking
- Critical thinking

### Students Should Already Know That

- Basic understanding of the ability of governments to effect change in industry and individuals' lives through legislation.

#### Standards Alignment:

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.

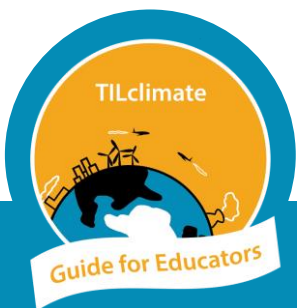
WHST.9-12.1 Write arguments focused on discipline-specific content.

ELA.SL.9-12.1 Initiate and participate effectively in a range of collaborative discussions

ELA.SL.9-12.2 Integrate multiple sources of information presented in diverse formats and media

#### Disciplinary Core Ideas:

ESS3.D Global Climate Change



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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.

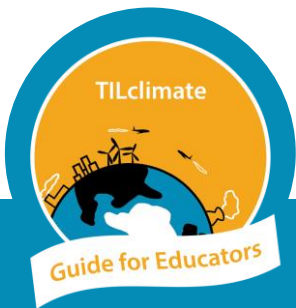
Each of the included activities is designed to be used as a standalone, in sequence, or integrated within other curriculum needs. A detailed table of contents, on the next page, explains what students will do in each activity.

## 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.

**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](mailto:tilclimate@mit.edu), tweet us @tilclimate, or tag us on Facebook @climateMIT.



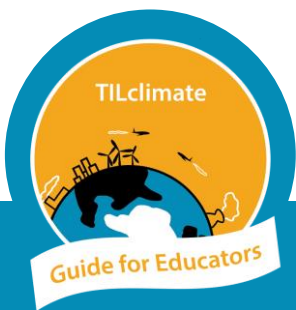
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# America's Big Year of Climate Action

## Detailed Table of Contents

Page	Title	Description	Time (min)
	Podcast Episode	Students listen to TILclimate: America's Big Year of Climate Action, either as pre-class work at home or in the classroom. <a href="https://climate.mit.edu/podcasts/americas-big-year-climate-action">https://climate.mit.edu/podcasts/americas-big-year-climate-action</a>	10-15
1-5	Expert Panel	Groups of students become "mini-experts" on each of the three laws discussed in the podcast episode. Then, they re-assort to draw a group mind map linking them.	30+
6-8	Think Locally, Make System-Wide Connections	Students read fact sheets for state-level impacts of the legislation, and then build systems-thinking maps to investigate connections.	30+
9-12	Design Your Own Climate Bill	Step-by-step guidance to develop and explain a simple bill aiming to affect one aspect of climate change.	30+



# America's Big Year of Climate Action

## Climate Legislation

This Educator Guide includes multiple investigations into three key pieces of climate-related legislation. Educators may pick and choose among the pieces of the Guide, as suits their class needs.

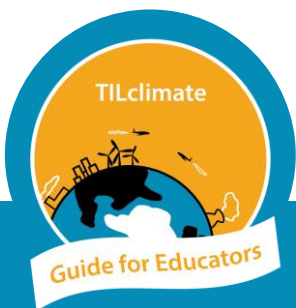
Parts of this Guide may align with the following topics:

- History/social science: Civics, legislation, government, economics.
- ELA/nonfiction: Speaking and listening on 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 10 What can we do?
- MIT Climate Portal Explainers are one-page articles describing a variety of climate topics. New Explainers are posted monthly. <https://climate.mit.edu/explainers>
  - Greenhouse Gases
  - Carbon Pricing
  - Climate Targets
  - Investing and Climate Change
  - Climate Justice
  - Climate-Resilient Infrastructure
- 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>



# America's Big Year of Climate Action

## Wrap-Up Discussion Questions

- Which tools did legislators use to incentivize their chosen impacts through these laws?
- Which parts of these laws sound the most interesting to you?
- What have you heard about these laws in the news or at home?
- What are some other ways that governments can slow or adapt to climate change?

## 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](mailto:tilclimate@mit.edu), Tweet us @tilclimate, or tag us on Facebook @climateMIT.



# America's Big Year of Climate Action

"We're all part of making this transition happen. This is a transformational moment. It sounds technical and it sounds caught up in legislation and dollars and tax credits. But in the end, we're moving toward a different place."

*Dr. Liz Reynolds, MIT Department of Urban Studies and Planning  
TILclimate podcast: Today I Learned About America's Big Year of Climate Action*

## Three Bills, Many Impacts

The three pieces of legislation discussed in the podcast episode all tackle climate change along with a wide array of other issues. They focus on different aspects of the US economy and political system and use different incentive structures.

Each team in your class will become a "mini expert panel" on one of these three laws. You will teach the rest of the class about your law, and then work together to understand how they intersect.

1. **Research:** On the following page, follow the directions to find summaries of your law. Work with your group to understand the law, using the questions provided and any other research methods you may need.
2. **Teach:** Use the instructions in the "Share" portion of the next page to develop a plan to teach your classmates about your law. Be prepared to learn about the other two laws, as well.
3. **Connect:** Reassort into groups that each have at least one representative from each "mini expert panel" Use the mind map exercise to draw connections.

# Expert Panel: Inflation Reduction Act

## Read All About It

Large federal bills often number into the thousands of pages. Luckily, legislative aides and others write summaries that explain the major parts of any larger bill. In the case of the Inflation Reduction Act of 2022 (IRA), the White House produced fact sheets for each state.

1. Choose two states in different regions of the US. By choosing different regions, you might see differences in the focus of the law in each state. For example, a desert state and an ocean state may have different needs.
2. Visit <https://climate.mit.edu/ed/IRAFactSheets><sup>1</sup>
3. Read the fact sheets for the two states chosen.

## Discuss

In your group, discuss the two fact sheets until you feel that all members understand them well enough to describe the basic ideas. Then, consider:

- What differences did you notice between the two states? What similarities?
- What kinds of projects is the IRA designed to support?
- Does this law use more “carrots” (funding, tax rebates, tax cuts, etc.) or “sticks” (regulation, requirements, taxes, etc.)?
- What problem(s) for the United States is this law meant to address?
- Which parts of the summaries do you think are the most interesting or challenging?
- What questions do you still have?

## Share

Your job now is to help the rest of your class understand the basics of this law. As you discuss how to teach your classmates, consider:

- What are three main takeaways you think are the most important?
- Are there any fun or useful ways to remember them? (Graphics, songs, catchphrases, memes, etc.)
- Who will be most impacted by this law?

<sup>1</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/17/state-fact-sheets-how-the-inflation-reduction-act-lowers-energy-costs-create-jobs-and-tackles-climate-change-across-america/>

# Expert Panel: Infrastructure Investment and Jobs Act

## Read All About It

Large federal bills often number into the thousands of pages. Luckily, legislative aides and others write summaries that explain the major parts of any larger bill. In the case of the Infrastructure Investment and Jobs Act of 2021, the White House produced fact sheets for each state.

1. Choose two states in different regions of the US. By choosing different regions, you might see differences in the focus of the law in each state. For example, a desert state and an ocean state may have different needs.
2. Visit <https://climate.mit.edu/ed/InfraFactSheets><sup>1</sup>
3. Read the fact sheets for the two states chosen.

## Discuss

In your group, discuss the two fact sheets until you feel that all members understand them well enough to describe the basic ideas. Then, consider:

- What differences did you notice between the two states? What similarities?
- What kinds of projects is the Infrastructure Law designed to support?
- Does this law use more “carrots” (funding, tax rebates, tax cuts, etc.) or “sticks” (regulation, requirements, taxes, etc.)?
- What problem(s) for the United States is this law meant to address?
- Which parts of the summaries do you find the most interesting or challenging?
- What questions do you still have?

## Share

Your job now is to help the rest of your class understand the basics of this law. As you discuss how to teach your classmates, consider:

- What are three main takeaways you think are the most important?
- Are there any fun or useful ways to remember them? (Graphics, songs, catchphrases, memes, etc.)
- Who will be most impacted by this law?

<sup>1</sup> <https://www.whitehouse.gov/build/resources/state-fact-sheets/>



# Expert Panel: CHIPS and Science Act

## Read All About It

Large federal bills often number into the thousands of pages. Luckily, legislative aides and others write summaries that explain the major parts of any larger bill. In the case of the CHIPS and Science Act of 2022, the White House produced a summary.

1. Visit <https://climate.mit.edu/ed/CHIPSSummary><sup>1</sup>
2. Read the summary.

## Discuss

In your group, discuss the summary until you feel that all members understand it well enough to describe the basic ideas. Then, consider:

- What kinds of projects are the CHIPS and Science Act designed to support?
- Does this law use more “carrots” (funding, tax rebates, tax cuts, etc.) or “sticks” (regulation, requirements, taxes, etc.)?
- Which parts of the summary do you think are the most interesting or challenging?
- What problem(s) for the United States is this law meant to address?
- What questions do you still have?

## Share

Your job now is to help the rest of your class understand the basics of this law. As you discuss how to teach your classmates, consider:

- What are three main takeaways you think are the most important?
- Are there any fun or useful ways to remember them? (Graphics, songs, catchphrases, memes, etc.)
- Who will be most impacted by this law?

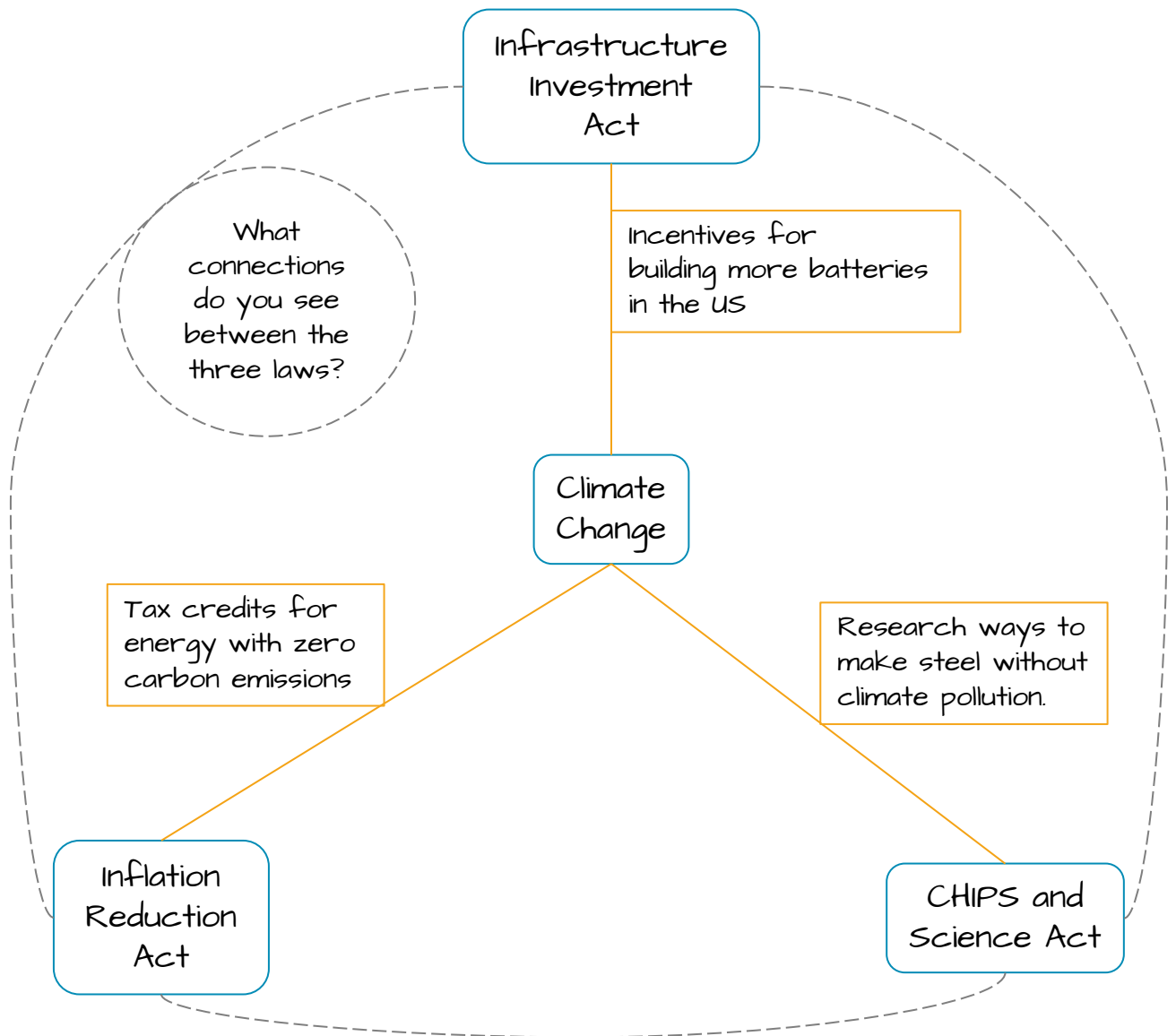
<sup>1</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/>

# Three Laws: Mind Map

## Map the Connections

Reassort your groups so that each group has at least one “expert” on each of the three laws.

1. On a large piece of paper, whiteboard, digital whiteboard, or other collaborative platform, write the names of the three laws around the phrase “Climate Change”
2. Draw lines connecting these concepts and write the connection on the line. You may draw as many lines as you can think of. We’ve started with connections from the podcast episode.



# America's Big Year of Climate Action

"It is really easy for companies to use a tax credit to make an investment in a state and create benefits for that state and for that community."

*Dr. Liz Reynolds, MIT Department of Urban Studies and Planning  
TILclimate podcast: Today I Learned About America's Big Year of Climate Action*

## Think Locally

The Infrastructure Investment and Jobs, Inflation Reduction, and CHIPS and Science Acts are federal laws, but many parts of these laws have direct impacts on individual states. You can focus on the predicted influences in your state and make connections to local issues.

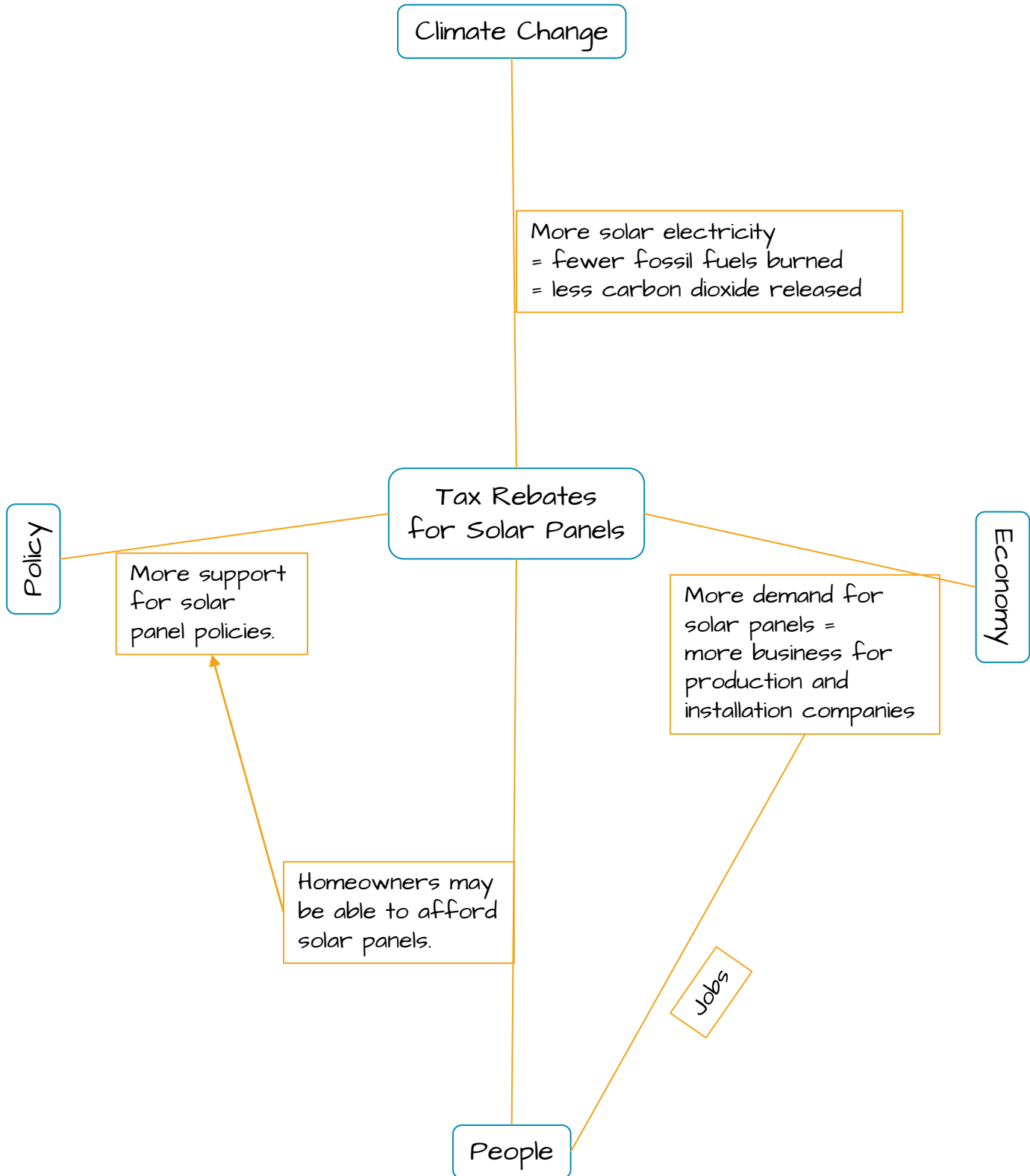
1. Read the fact sheet for your state for either the Inflation Reduction Act or Infrastructure Investment and Jobs Act. (There are not state-by-state fact sheets for the CHIPS and Science Act.)
  - Inflation Reduction Act: <https://climate.mit.edu/ed/IRAFactSheets>
  - Infrastructure Investment and Jobs Act: <https://climate.mit.edu/ed/InfraFactSheets>
2. In your group, choose one predicted impact for your state that most interests you.

## Make System-Wide Connections

Systems thinking helps us make connections between ideas and actions that may otherwise seem unconnected. As we find more and more connections, it becomes easier to see how these concepts are related to our everyday lives, our communities, and the people and places we care about.

1. In your group, use a large piece of paper, whiteboard, digital whiteboard, or another collaborative platform.
2. In the center, write your chosen local impact.
3. On the four sides, write Economy, Climate Change, People, and Policy.
4. Draw lines connecting these concepts and write the connection on the line. You may draw as many lines as you can think of, including lines between connections. A simplified example is on the next page.

# State Impacts: System Thinking Map



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## System Thinking Map: Questions to Discuss

As you build your systems thinking map, discuss some of the following questions with your group. As you discuss, you may find even more places to add connections, new concepts, etc. Feel free to add more notes on a separate piece of paper if your map gets crowded.

## Patterns and Concepts

- What patterns do you see in your connections?
- What questions do you have about possible connections?
- Are there any other concepts you should add around the outside?

## Promises and Challenges

- What about this topic most interests you? Do you think it could help your community? Why or why not?
- Do you think it could help with climate change or other national concerns? Why or why not?
- What obstacles do you see for this idea?
- Do you think this legislation does an effective job of addressing these issues in your area? Why or why not? Do you think there are ways policymakers could better address these issues?

## Imagining the Future

- Imagine you oversee making decisions about how your community will use funding or resources from these pieces of legislation. Which kinds of projects would you promote? Why?
- Who in your state or local government makes decisions about these issues? What would you want to tell them?

## Find Local Impacts

Do you have any local examples of your chosen topic? In the example systems thinking map, tax rebates for solar panels might lead to more solar panels on houses or municipal buildings in your community. Search local news to find stories of projects or proposals that may be funded by one of the pieces of legislation you have researched.

# America's Big Year of Climate Action

"It is absolutely the case that these bills are very much leaning into more carrots than sticks. Because what we hope to do is invest more in these new technologies. Invest in the innovation, which we're very strong at. Invest in the deployment and the adoption."

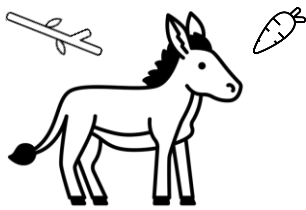
*Dr. Liz Reynolds, MIT Department of Urban Studies and Planning*

*TILclimate podcast: Today I Learned About America's Big Year of Climate Action*

## Design Your Own Climate Bill

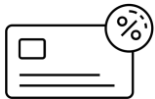
Large-scale bills such as the Infrastructure Investment and Jobs Act, the Inflation Reduction Act, and the CHIPS Act cover a wide and sometimes overwhelming number of kinds of projects and processes. Sometimes, bills are designed to focus on a single area of the economy (like the fuel economy of cars), or a single kind of technology (like capturing CO<sub>2</sub> from power plants). Today, you will design a small climate change bill to have one specific impact.

## "Carrots" and "Sticks"



Laws that are meant to encourage behavior change often use a combination of incentives and disincentives to have their intended effect. These are often referred to as "carrots" and "sticks", suggesting a treat offered to an animal, versus a stick used to poke the animal into moving. While there are many ways a law can do this, there are some broad categories, listed on page 11.

*Which would you categorize as carrots, and which as sticks?*



**Tax Credits**



**Loans**



**Taxes/Fees**



**Regulation**

## Categories of Climate Change Action

There are many kinds of action that communities can take to slow climate change and adapt to its effects. Broadly speaking, these actions fall into three categories, which are explained on page 10.

*Which categories have you seen in your community?*



**Energy Shift**



**Energy Efficiency**



**Climate Adaptation**

Images from The Noun Project by Azam Ishaq, SBTS, Ida Desi Mariana, Uta Nomi, Phạm Thanh Lộc, CHARIE Tristan, Zach Bogart, Justin Blake, Alex Quinto, Amethyst Studio, and coloripop

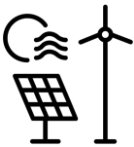
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## Climate Actions

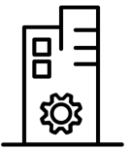
As we burn fossil fuels like coal, oil, and natural gas and cut down forests, we release carbon dioxide (CO<sub>2</sub>) into the atmosphere. This CO<sub>2</sub> acts like a blanket around Earth, trapping heat. Trapped heat is warming Earth, the ocean, and the air. Overall, the world is getting warmer, leading to increases in extreme weather, such as storms and droughts.

But we know how to reduce how much CO<sub>2</sub> we add to the atmosphere. Two major categories include: Energy Shift, and Energy Efficiency. Since the climate is already changing and will continue to change even as we reduce the amount of CO<sub>2</sub> we add to the atmosphere, action is also needed in Climate Adaptation.

For each of the three action categories, list specific projects or ideas. These may be things you have seen in your community or heard or read about somewhere else.



**Energy Shift:** Innovations that allow us to produce energy without producing CO<sub>2</sub> and other pollution. (*Consider: Solar, wind, nuclear, carbon capture, etc.*)



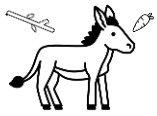
**Energy Efficiency:** Innovations that help us use less energy, especially in heating and cooling buildings. (*Consider: Replacing heating systems, windows, insulation, etc.*)



**Climate Adaptation:** Innovations that protect people and places from harmful climate change impacts. (*Consider: Flood prevention, storm warning systems, drought relief, etc.*)

# America's Big Year of Climate Action

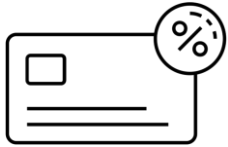
## Government Incentives



Governments, whether at the Federal, State, Tribal, County, or City/Town level, have multiple tools available to affect the behavior of businesses, lower levels of government, and individuals.

In terms of climate-related actions, “carrots” may take the form of tax credits and loans that make it less expensive to make or buy climate-friendly technologies or other innovations. “Sticks” may be taxes and fees that make it more expensive to make or buy systems that produce more climate pollution, or regulations that restrict the production or use of climate-polluting technologies.

For each of the four categories, list specific ideas. These may be things you have seen in your community or heard or read about somewhere else.



**Tax Credits:** Discounts on taxes for individuals or businesses when they buy or use a new or preferred technology or other innovation. *(Consider: Rebates on electric vehicles, etc.)*



**Loans:** Money for businesses or local governments to invest in new infrastructure, supplies, technologies, or other innovations. *(Consider: Manufacturing upgrades, updated infrastructure, etc.)*



**Taxes/Fees:** Higher taxes or direct fees on businesses that produce excess climate pollution. *(Consider: Taxes on buying or selling gas, etc.)*



**Regulation:** Direct restriction on the use or production of climate pollution. *(Consider: Cap-and-trade agreements, etc.)*



# America's Big Year of Climate Action

## Design Your Climate Bill

While real-life bills usually include hundreds of different provisions, today you will choose a single action and a single tool to achieve that action.

**Goal:** What is the goal of your bill? What part of the economy does it affect?

*(Consider: Manufacturing, construction, energy production, transportation, etc.)*

**Action:** Which of the climate actions you listed earlier do you want to encourage?

*(Consider: Energy shift, energy efficiency, or climate adaptation.)*

**Tool:** Which of the “carrots” or “sticks” will have the best effect?

*(Consider: Tax credits, loans, taxes, regulation.)*

**Put it Together:** Explain how the tool you are using will have the effect you want on the action you are choosing.

*(Consider: Are you trying to increase or decrease the use or production of something? Will a “carrot” or a “stick” work better here?)*

**Think Ahead:** How would industry or the general public react to this proposal? Can you see any possible problems with how it may work? Describe the effects of your bill and solutions to any challenges you might identify.

*(Consider: Would a small business vs a large business have a different impact? How about a rural area vs an urban or suburban area?)*

**Make Your Case:** Imagine you are an elected official, trying to get your climate bill passed. How would you talk about it to different audiences in your constituency?

*(Consider: Who needs to buy in to this plan the most? Who is most affected by it?)*