Climate Change Engineering Design Challenges Workshop

WELCOME!

Warm-Up Questions:

- **What questions do your students ask about climate change?**
- **What climate or environmental issues do you see in your hometown?**

NCSE
National Center for Science Education

Workshop Facilitators

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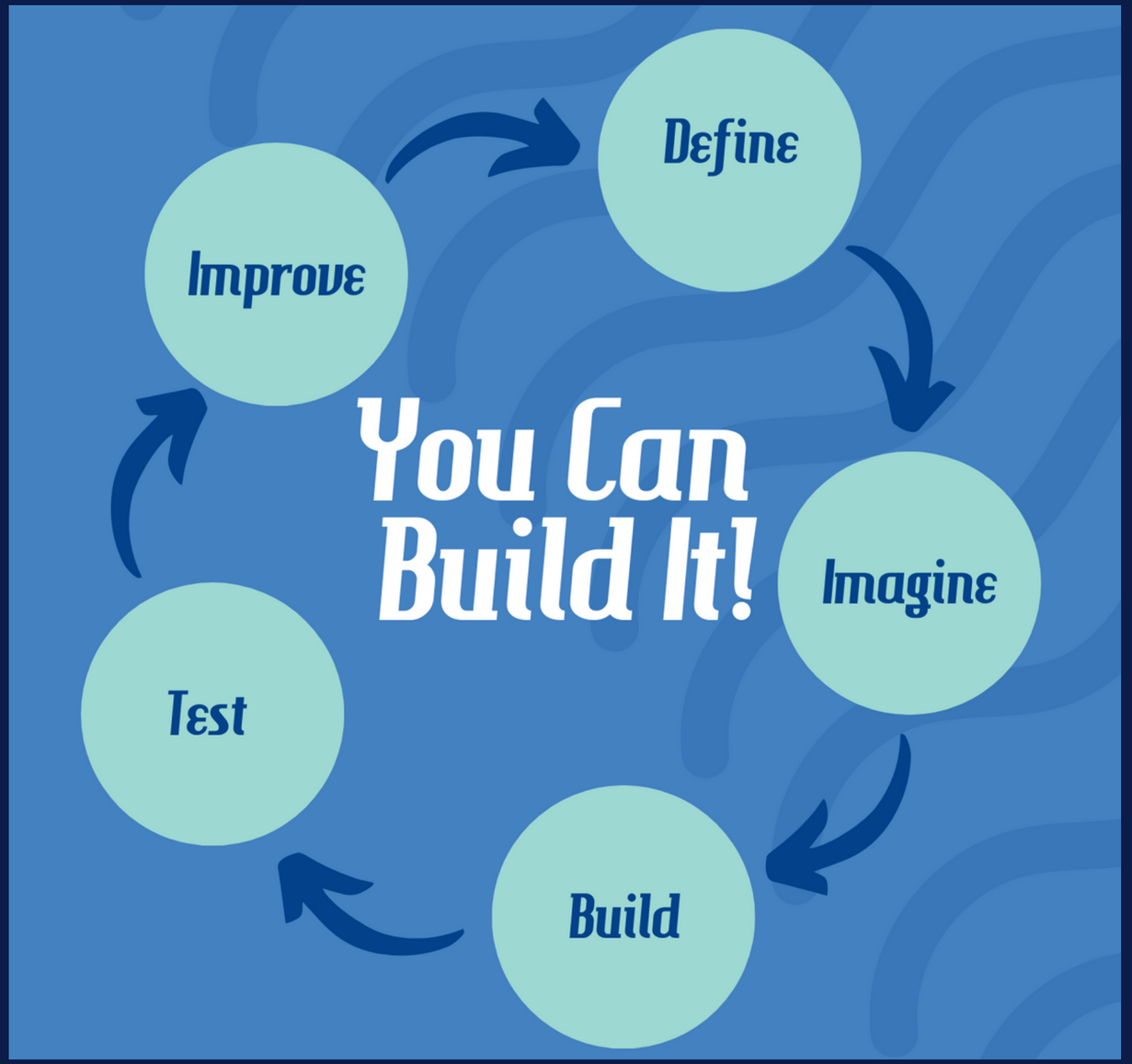
Today's Agenda

- Introduction to Engineering Design Challenges
- Effective Engineering Design Facilitation
- The 5E Model and Engineering Design Challenges

Activities mentioned today can be found on our website at:
https://ncse.ngo/breaking-down-barriers/diysci-resources

Introduction to the Engineering Design Process



NGSS Connections

3-5-ETS1-1 Engineering Design: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

4-ESS3-2 Earth and Human Activity: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

MS-ESS3-3 Earth and Human Activity: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-5 Earth and Human Activity: Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

MS-ETS1-1 Engineering Design: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Engineering Design: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

How do we do climate change engineering design effectively?

FOCUS ON SOLUTIONS, BUT DON'T FORGET WE'RE THE PROBLEM

- solutions-only problems
- climate anxiety
- empower action

MAKE IT LOCAL

- solvable and understandable
- helps build stewardship

PUT IT ALL TOGETHER: 5E MODEL & ENGINEERING DESIGN CHALLENGES

Adapting the 5E Model

ENGAGE

Tell people about a local climate problem and encourage them to brainstorm solutions and ask questions to try to solve the problem.

EXPLORE

Have them build and test their model, then explain what happens.

EXPLAIN

Start to contextualize the solutions that they are developing within the realm of the overall problem. Introduce content that will help them think in the broader system, while still keeping it local.

Adapting the 5E Model

ELABORATE

Have them to re-do the design challenge keeping in mind both what they learned from the first round and what they know about the system.

ENCOURAGE ACTION

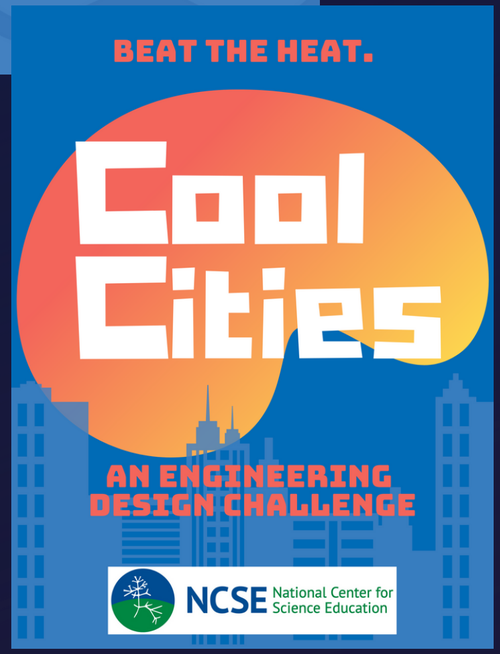
Based on what they learned, have them design a plan to take action.

EVALUATE

We aren't going to cover this today, as this depends on grade level.

Today's Run of Show

- Walk you through context and content of 2 Engineering Design Challenges
- Discuss activity and how to scaffold it
- Brainstorm session
- Make it Local activity

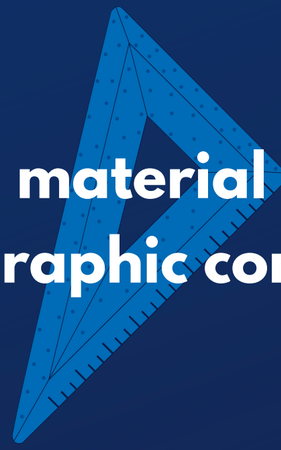


Make it Local

RISING TIDES

ocean
or river?

COOL CITIES



material or
geographic constraints

climate
equity