EYE: A Middle School STEM Unit on Energy Flow

Missouri Association of Rural Educators

Annual Conference

Lake Ozark, MO

10/19/2023

This material is based upon work supported by the National Science Foundation (Award No 2009127 and Award No 2201204). Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the NSF

Welcome

- Introductions
- Thinking About Energy Systems
- An Overview of the Energy and Your Environment (EYE) Curriculum
- Next Steps: An Opportunity for Rural Teachers
- Other Opportunities
- Q&A / Listening

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Introductions: Our Research Team

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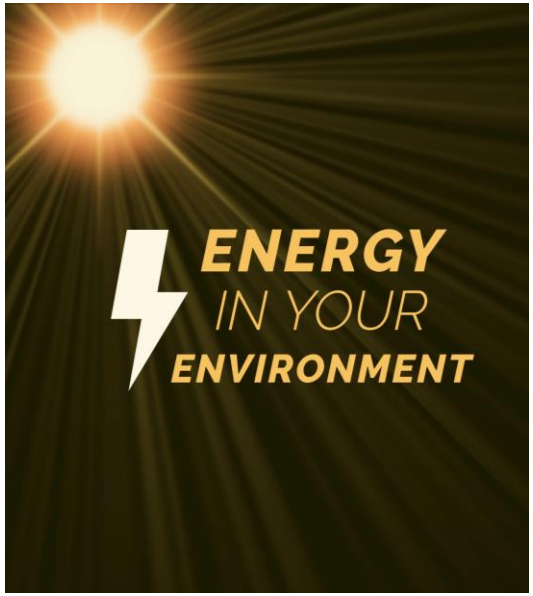
EYE…



Energy in Your Environment (EYE)

NSF-funded middle school curriculum that uses sustainable architectural design principles to teach energy literacy concepts.

- 5 to 6 weeks of instruction
- Standards-aligned
- Place-based and hands-on for engagement
- Integrated engineering and prototyping
- Classroom-ready teacher resources (slides, student sheets, game cards, budget spreadsheet)

Draw a Model

- How does energy flow from the natural environment to your school building? How does that process affect the natural environment?
- Include in your model if/what things are changing or happening. Write *how and why* things behave your model
- Think about what's happening under ground, above ground, and in the sky.

Share your model

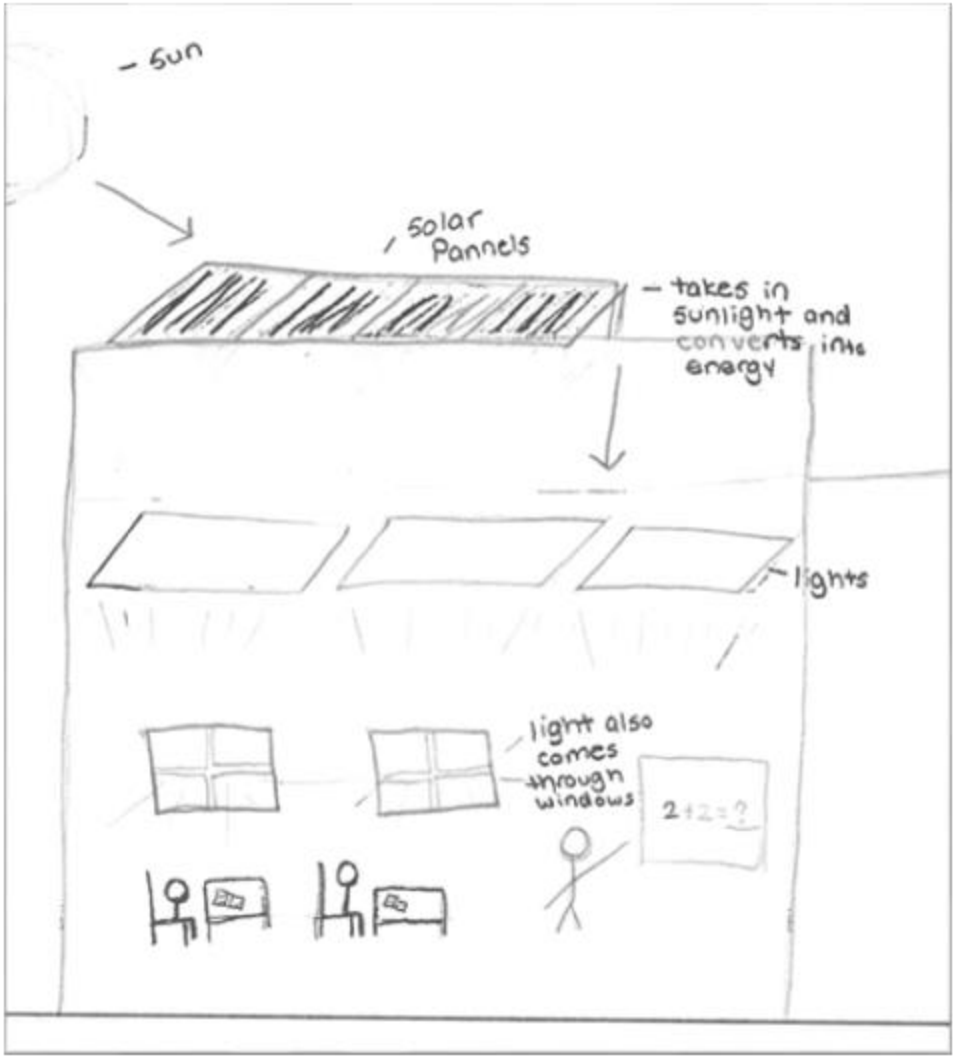
TALK TO SOMEONE CLOSE BY ABOUT YOUR MODEL.

LISTEN TO SOMEONE CLOSE BY TELL YOU ABOUT THEIR MODEL.

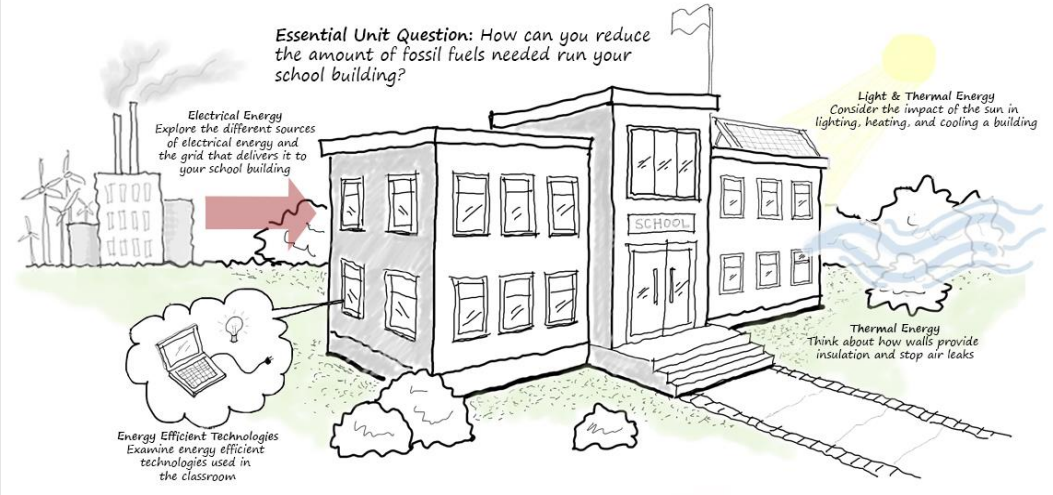
MAKE CHANGES TO YOUR MODELS AS YOU LISTEN TO EACH OTHER.

Why include modeling?

- Makes students' thinking explicit
- Meets Missouri Science Learning Standards on modeling
- Links to engineering design
- Simplifies representation of complex ideas/concepts
- Communicates through multiple modes to show depth and breadth of knowledge



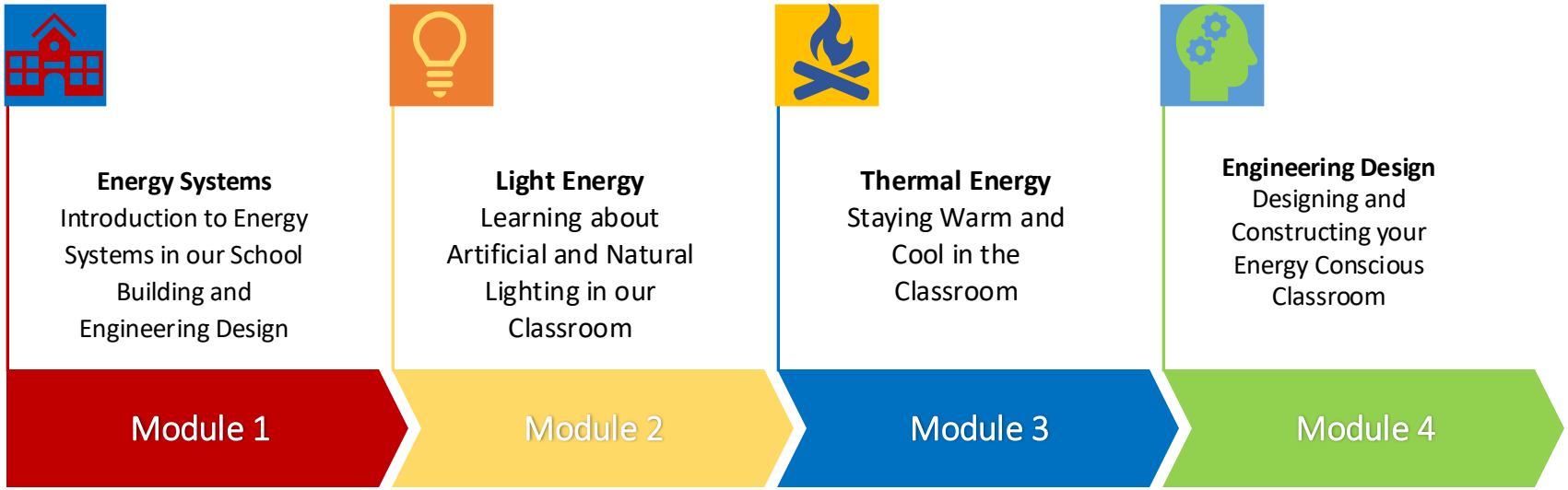
The Energy in Your Environment Unit



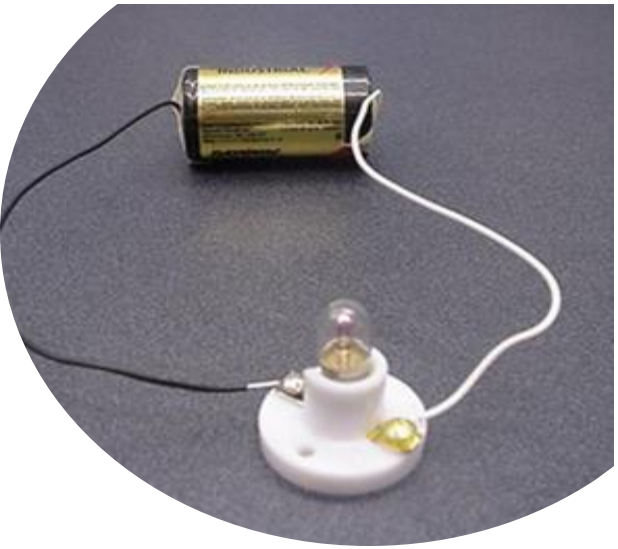
The school building is a place-based environment to learn about energy.

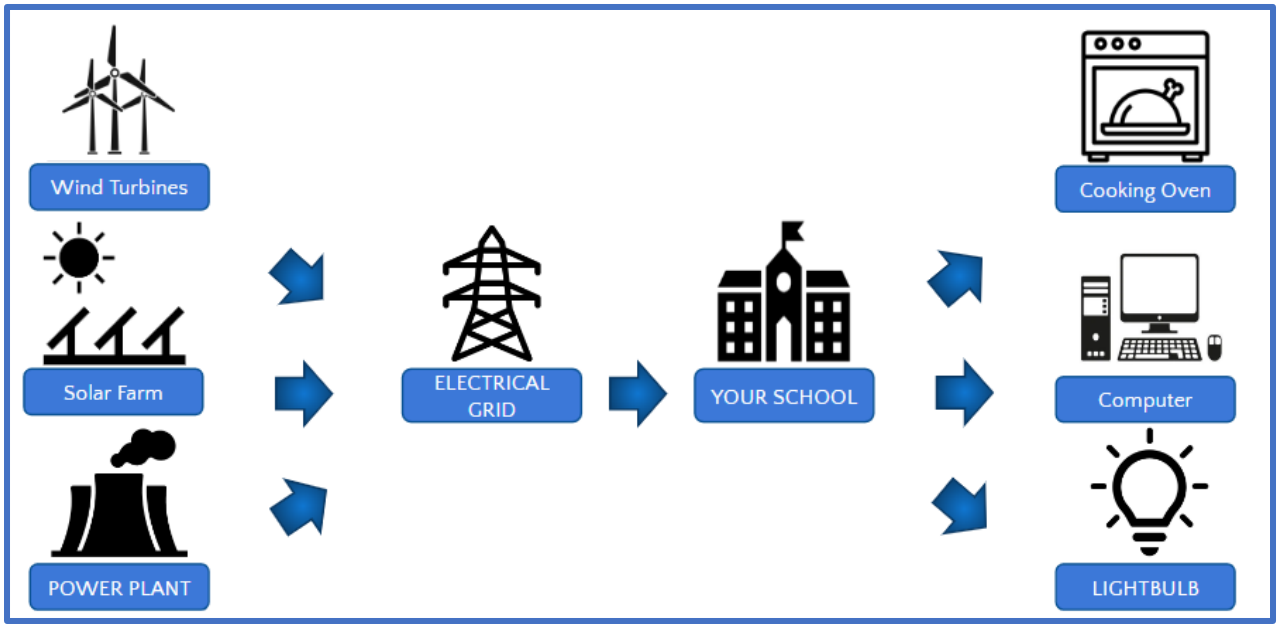
Modelling supports locating and tracing energy systems – key for energy literacy.

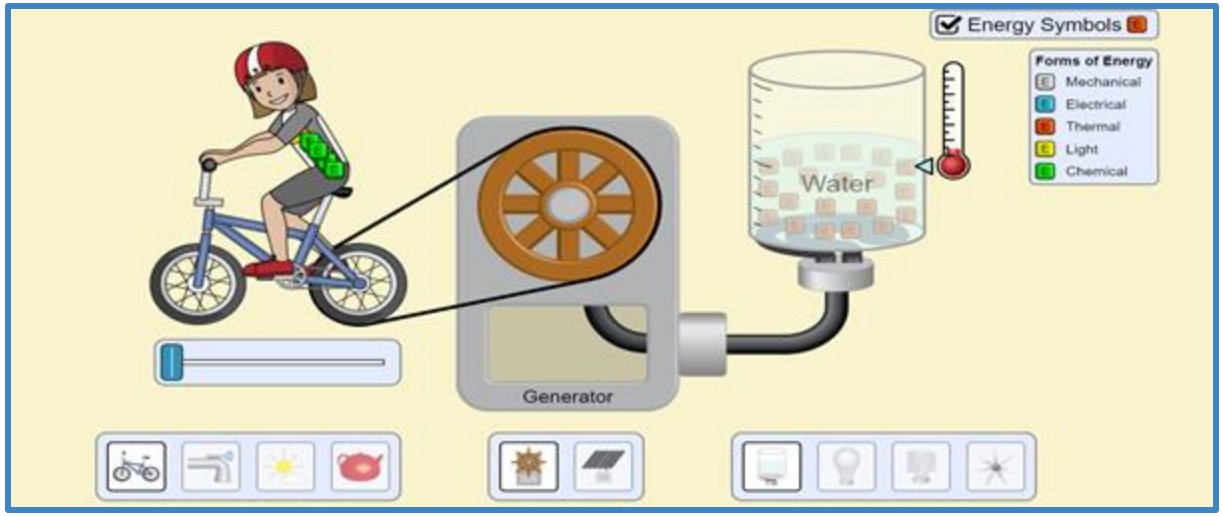
EYE: VERSION 2.0 UNIT ROADMAP, 5-6 weeks of instruction



Module 1: Energy Systems & Energy Walk



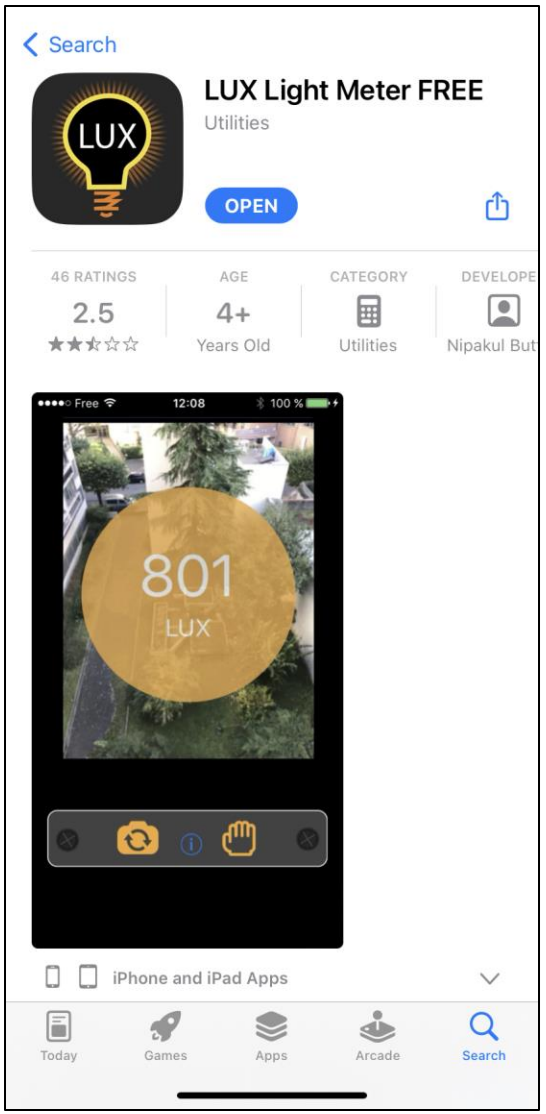




Module 2: Light Energy

Investigations of Natural and Artificial Lighting:

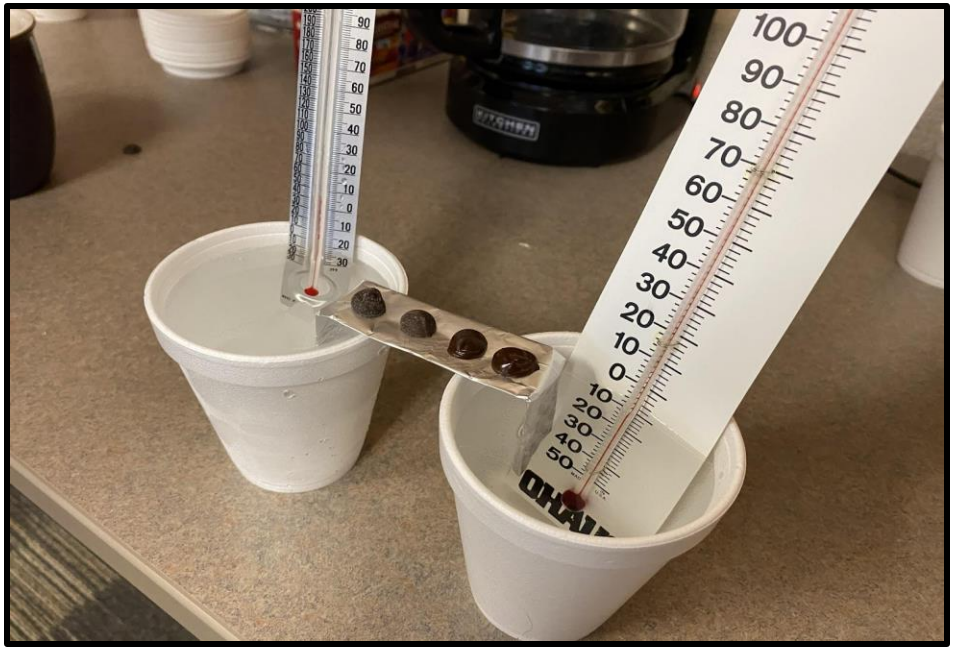
- **Path & Behavior of Light**
- **Measuring Light Illuminance**
- **Which Bulb?**

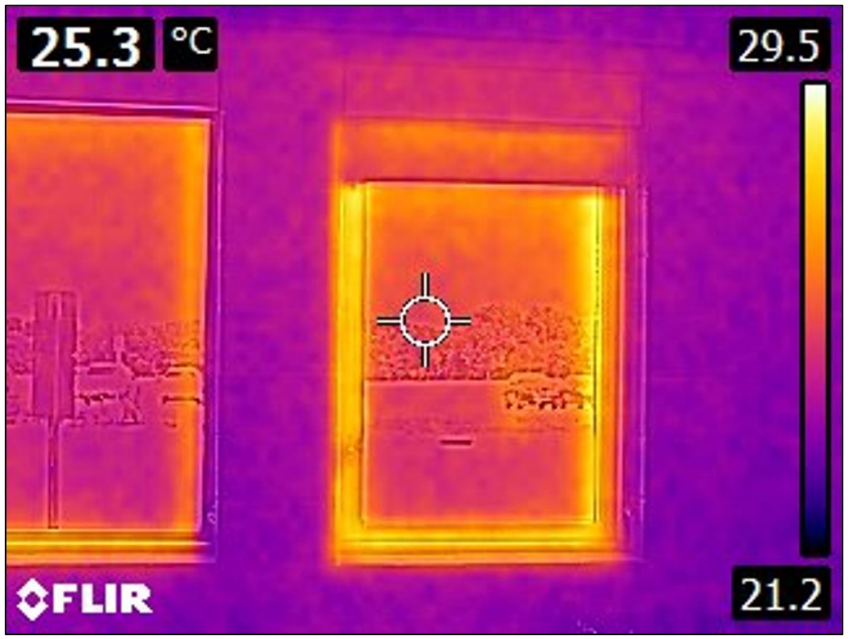


App Store for iPhone or iPad

Module 3: Thermal Energy

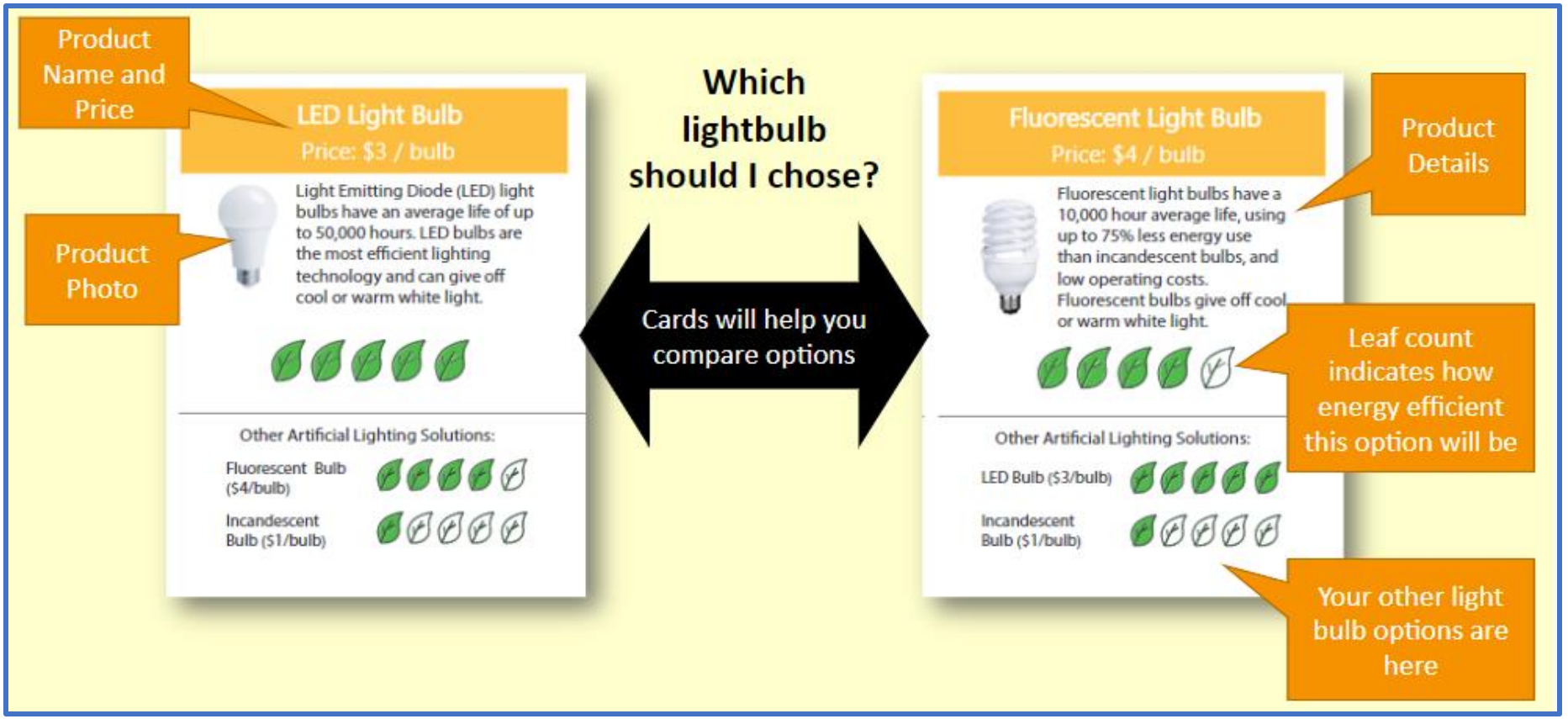
- **Conduction, Convection, Radiation**
- **Infrared Camera Images**





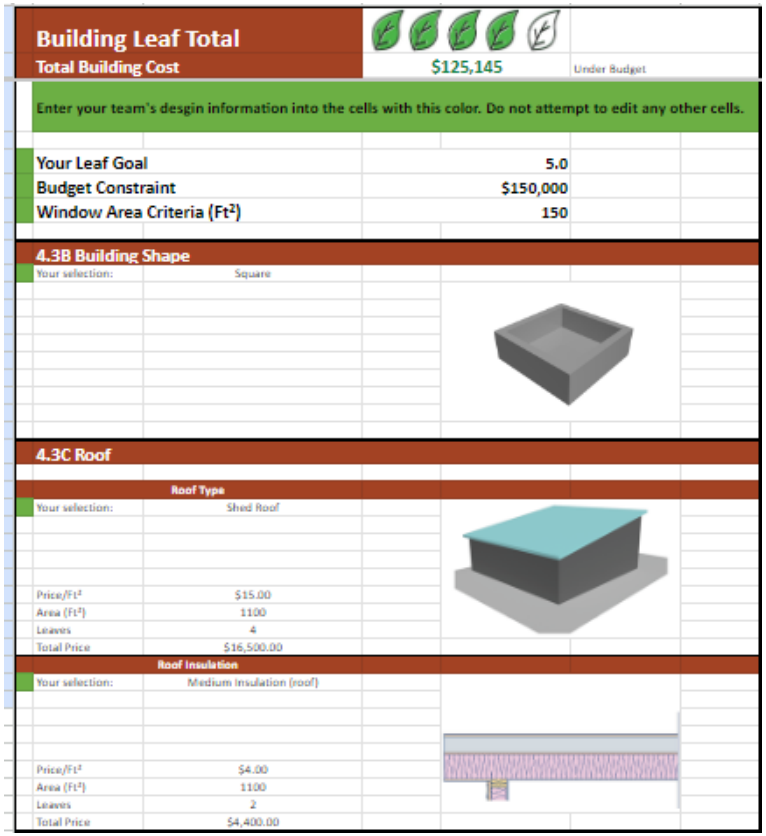
Module 4: Engineering Design & Prototype

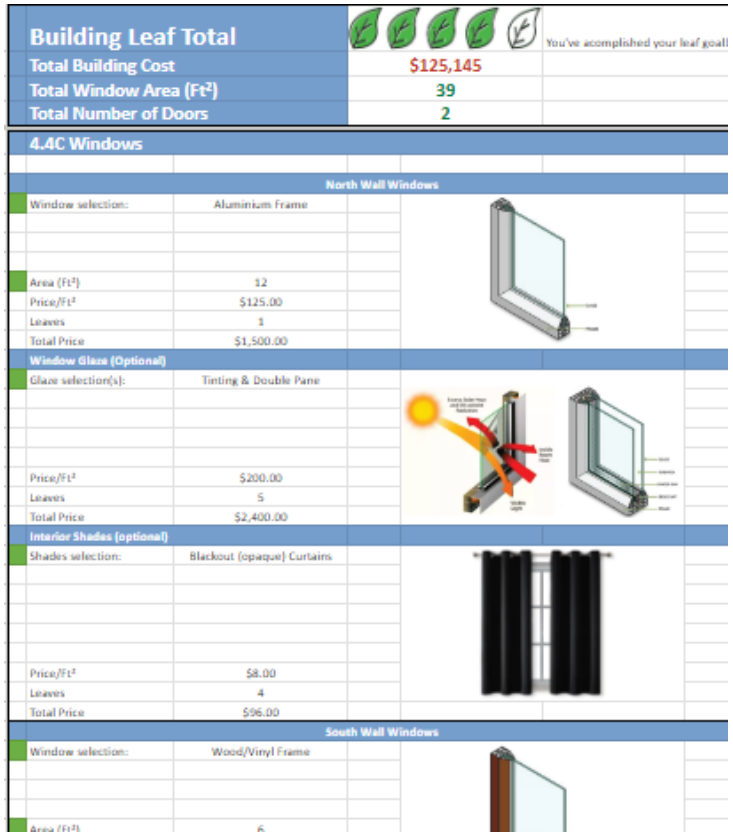
- Game cards allow students to compare design options
- Data on costs and relative energy efficiency (leaf count)



Engineering Design and Budget Excel Spreadsheet

- Pages for Shape & Roof, Walls, Windows & Doors, Electrical Source, and Artificial Lights
- Provides a running total of installation cost and leaf count for student decision making



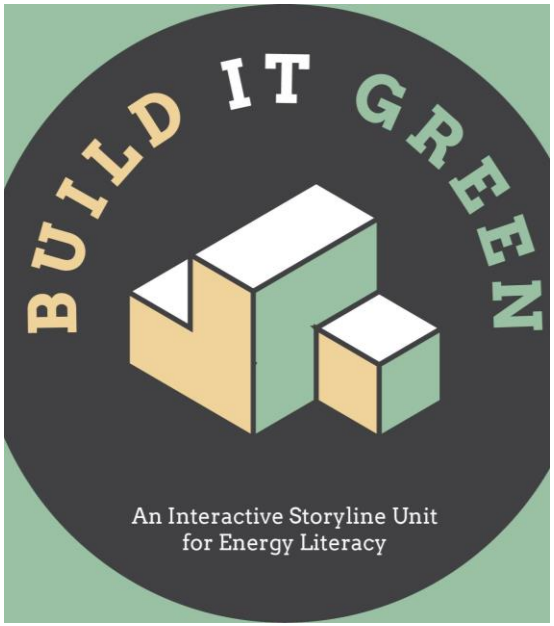


EYE: ENERGY & YOUR ENVIRONMENT

Photo: Han Vu / Missourian

Excel Spreadsheet to receive feedback on design decisions

Final 3D Model of energy efficient schoolhouse design



Next Steps

EYE is Transitioning into BIG!

- Build it Green! – New NSF Grant Funding
- Curriculum is being revised to add a suite of open-access digital tools and emphasize a storyline curriculum model.

If you are a RURAL middle school teacher - EYE/BIG! needs you!

Our project needs rural middle school teachers to join us for curriculum development and pilot testing.

- PD, Materials, & Stipend provided
- Your voice added to national curriculum

Take a flier with our QR code to a Google Forms sign up page.

For More Information:

Contact Dr. Laura Zangori:

zangoril@missouri.edu

Visit Encore Learning Lab for a link to the EYE curriculum:

https://education.missouri.edu/learning-teaching-curriculum/encore-learning-lab/

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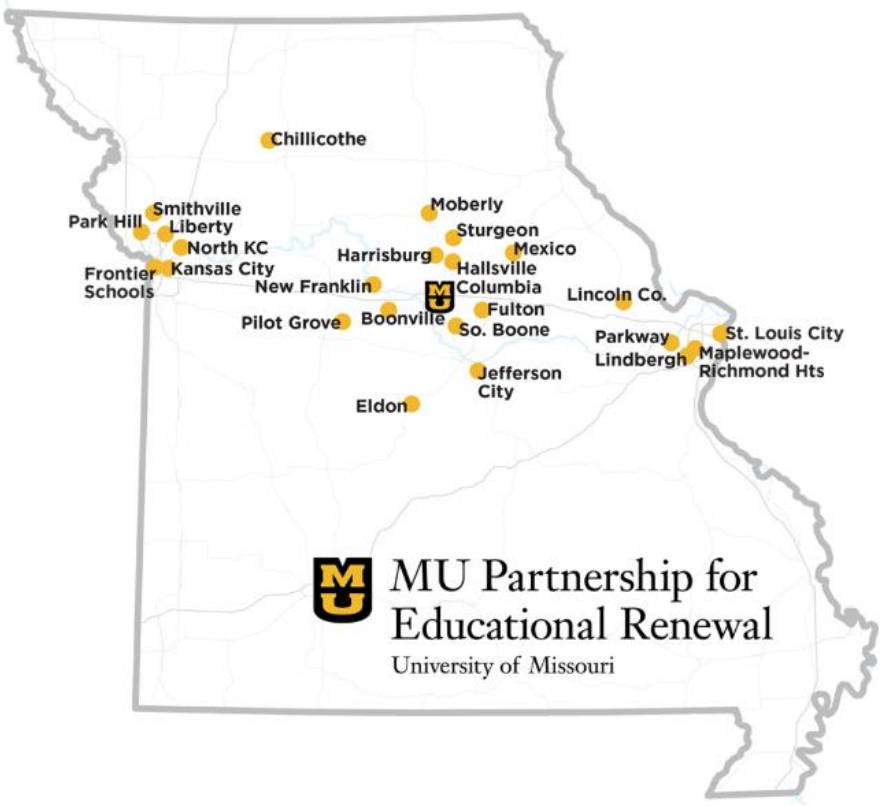
Mizzou Opportunities



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Q&A / Listening Session

- We want your feedback…
  - What initiatives are your school districts undertaking in science and STEM educatin?
  - What do your rural school districts most need to support science and STEM education?