“Energy"

ESO

Course on Maker Education by Jennifer Schmidt
https://www.thecogentconstruct.com

UNIT SECTIONS

Energy

1. Forms and Sources

2. Renewable -What do you need to power? Where?

3. Machines - Materials

4. Consume - How would it be implemented?

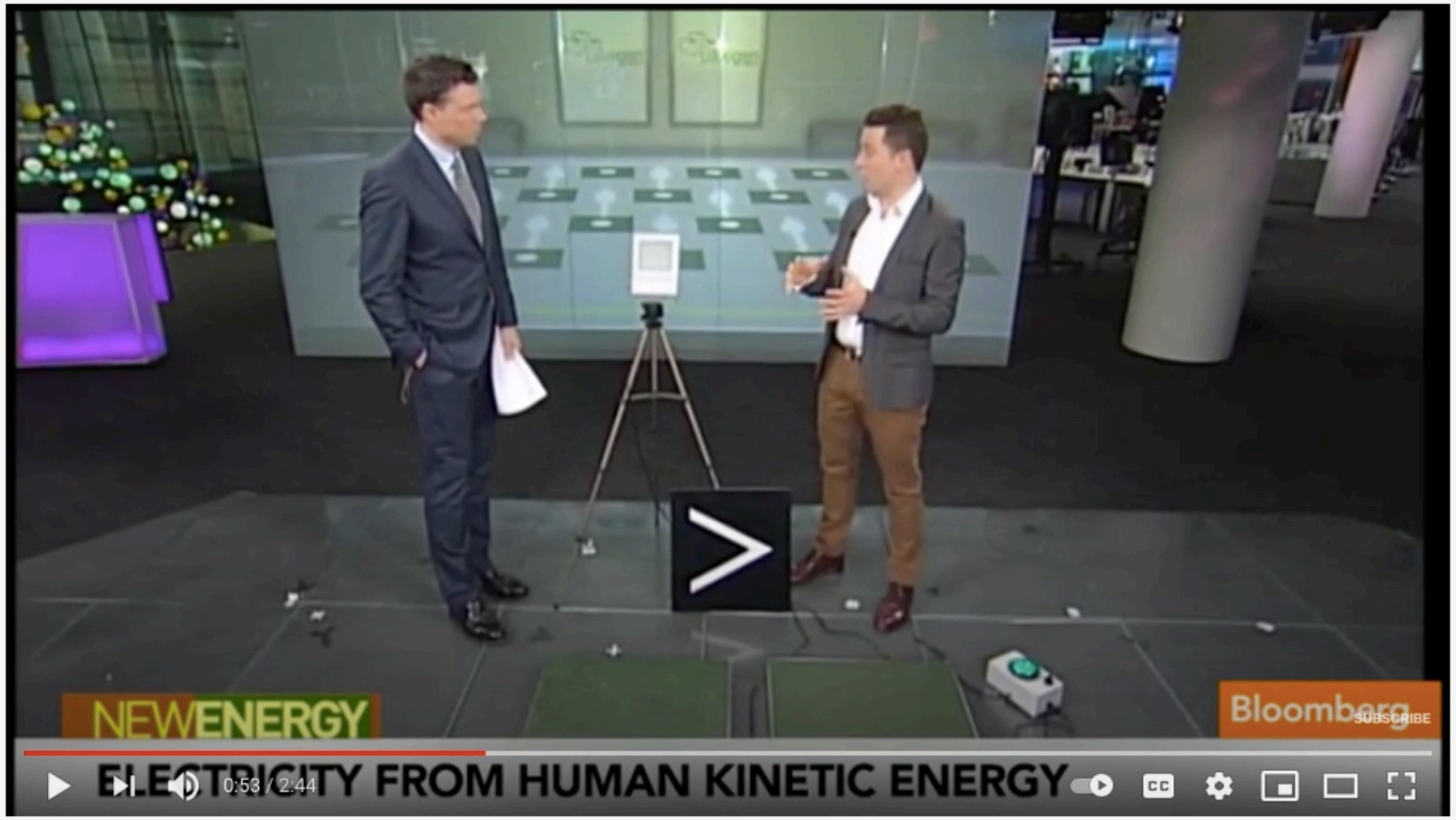
Grammar focus: Conditionals

https://www.alternative-energy-news.info/technology/inventions/

CALP

Electrical
Energy
Equilibrium
Fan
Fossil fuel
Geothermal
Gravity
Hydroelectric
Kinetic
Mechanical
Natural gas
Non-renewable
Nuclear
Oil
Petrol
Plant
Potential
Power
Renewable
Solar
Thermal
Tidal
Tide
Transference
To harness
To hinder
To rotate
To transfer
To turn
Wave
Wind
Wind turbine

Advance Organizer



How Walking on the Street Converts to Electricity

48,465 views • Jan 27, 2014

399 19 SHARE SAVE

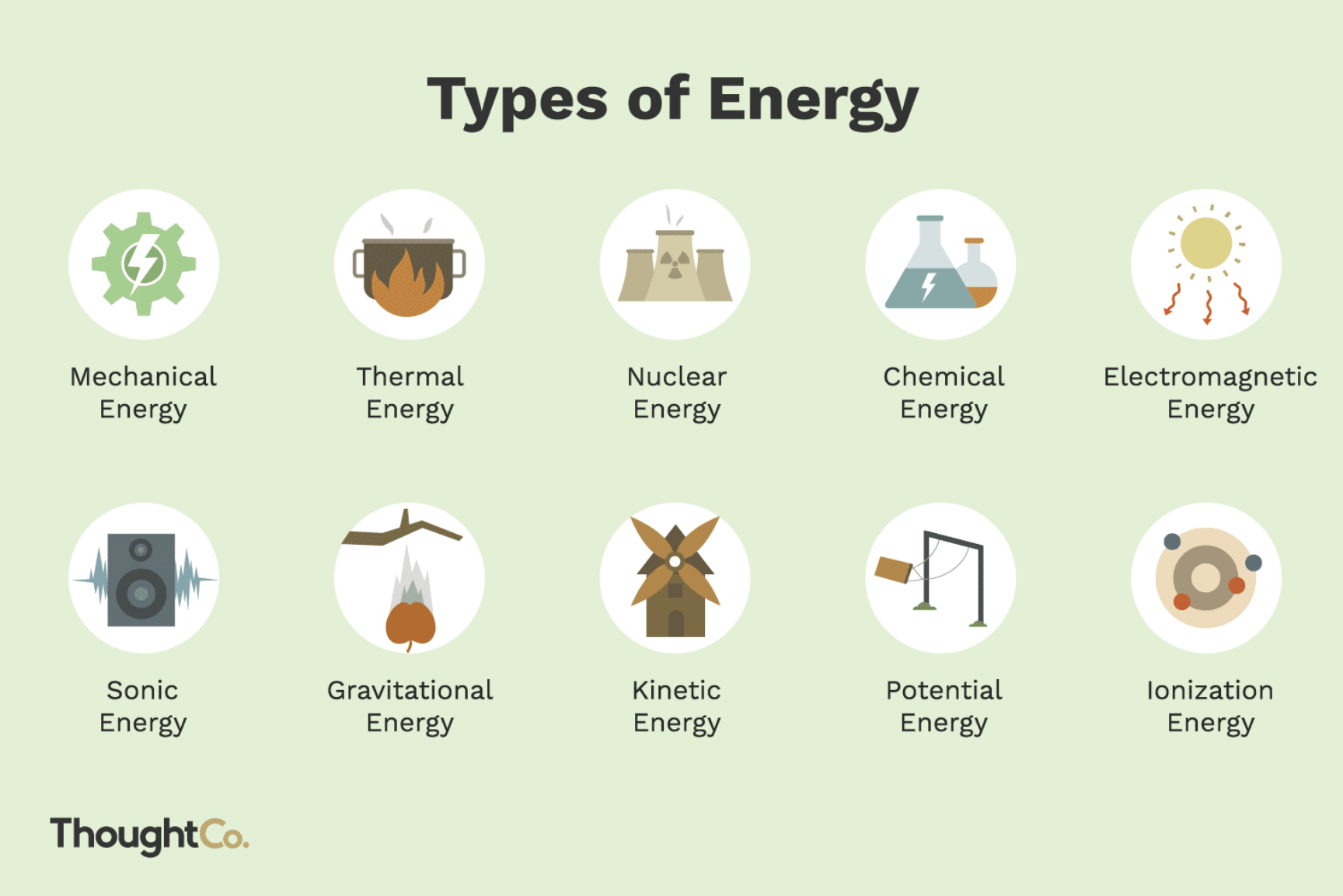
https://www.youtube.com/watch?v=szDuMz-T7b4

Advance Organizer Questioning

1. What is a sidewalk?
2. How could you generate electricity from a sidewalk?
3. What material did he use? Why?
4. What do you need to think about when creating a source of renewable energy?

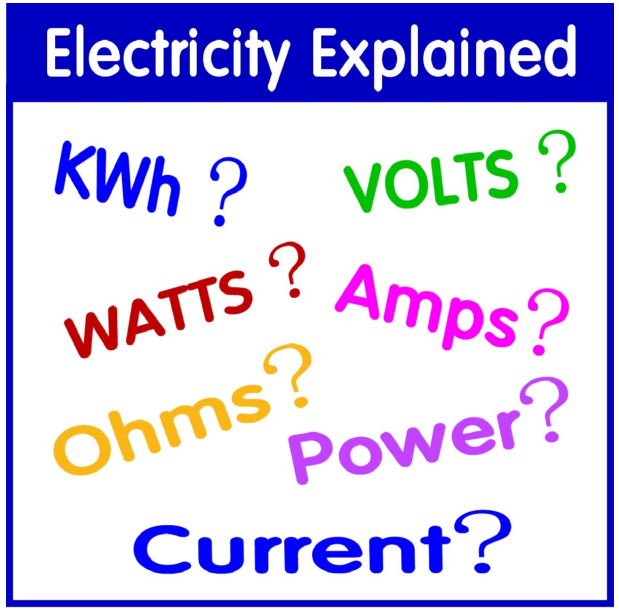
Driving question: What goes into creating a machine that generates renewable energy?

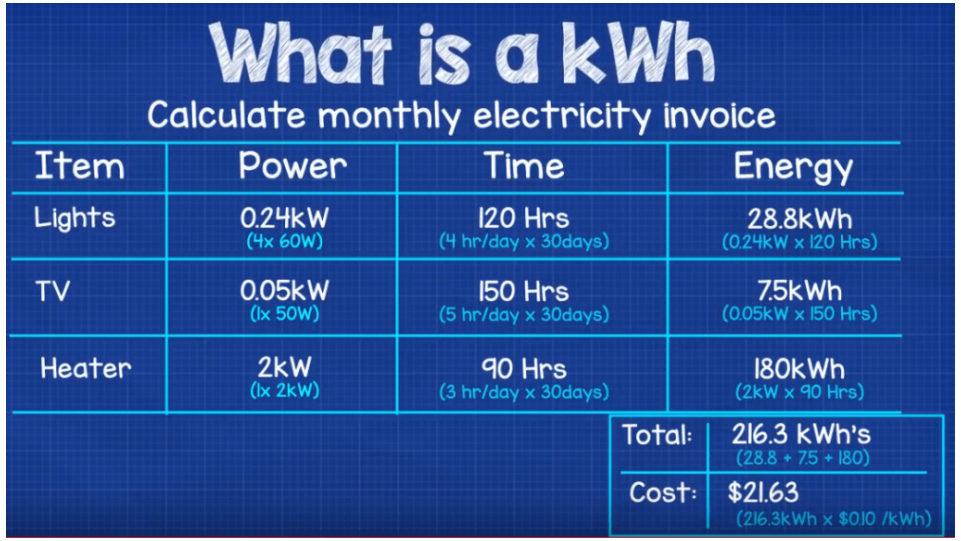
Section 1
Lesson 1

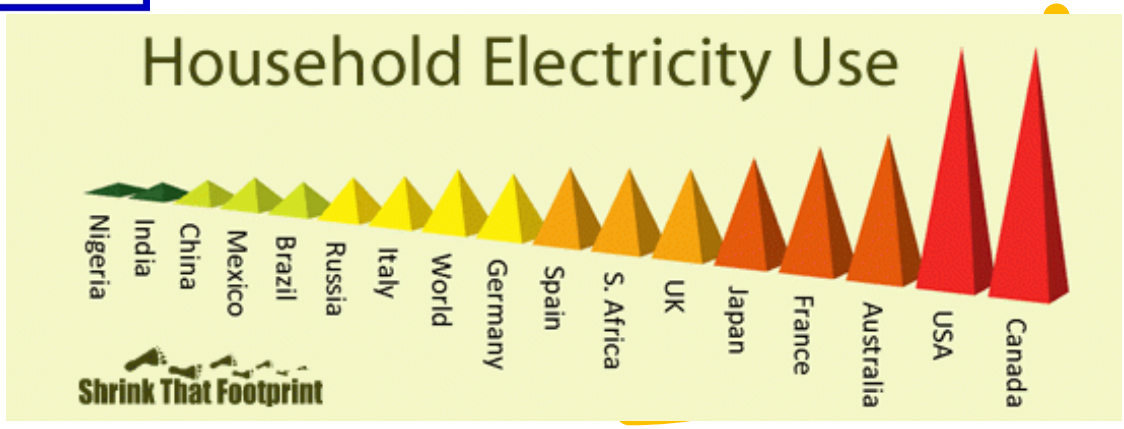


Section 1
Lesson 2

Describe things you use that run on energy.
What is the object?
What type of energy does it use?

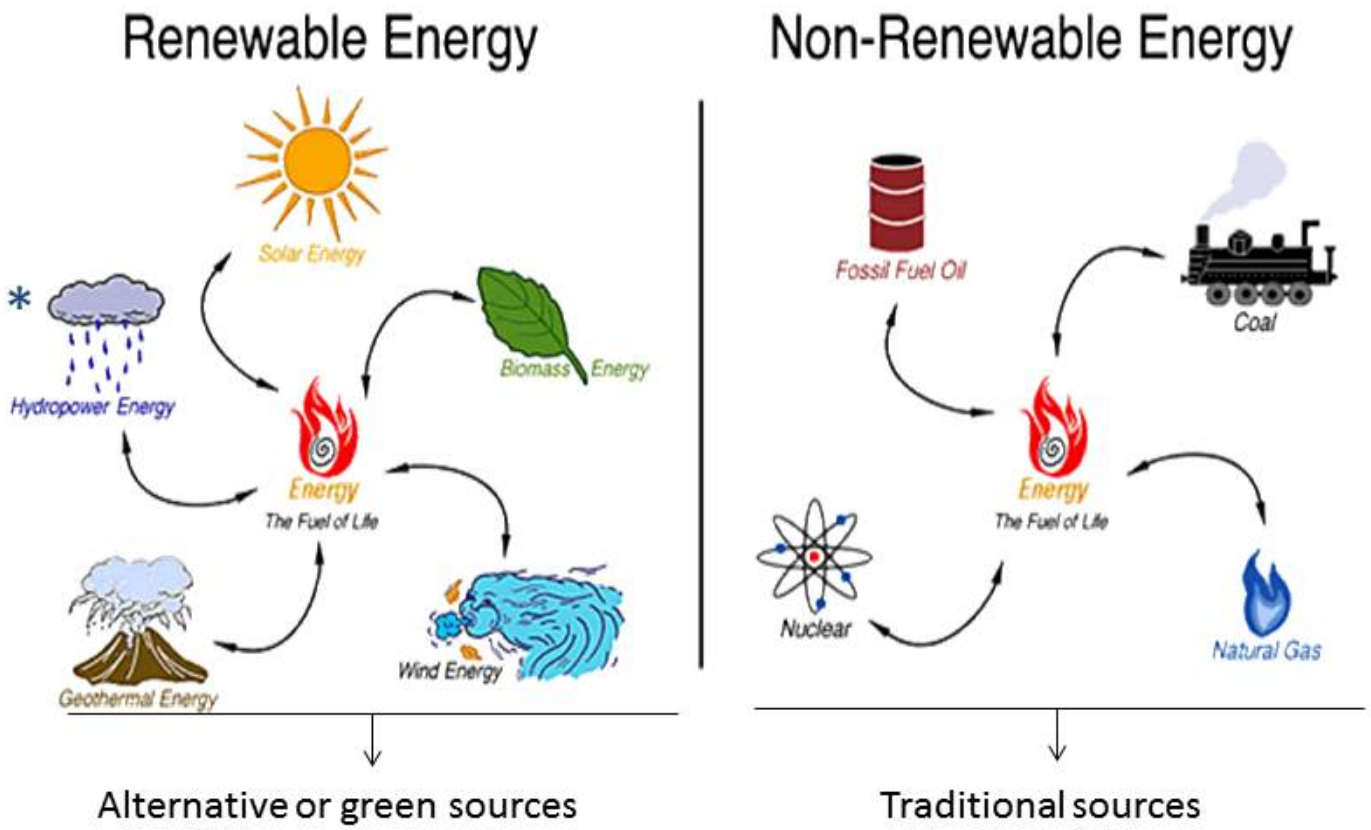






Section 2
Lesson 1

3. Sources of energy



The French city of Toulouse has some 70,000 streetlights - and hefty electricity bills. The city has been working with Toulouse's Technical University on ways of cutting lighting costs without compromising safety. The aim of the Trott-Èlec project – the name derives from the French for 'electric pavement' – is to harness footsteps as an alternative energy source that can, for example, be used to power lighting in pedestrian areas. One of Trott-Èlec's biggest headaches is 'harvesting' the kinetic energy we produce as we walk.

Section 2
Lesson 2

Traffic Turbine: New device harnesses energy from busy roads

https://www.youtube.com/watch?v=XTYVgoJVRqA

Section 2
Lesson 2

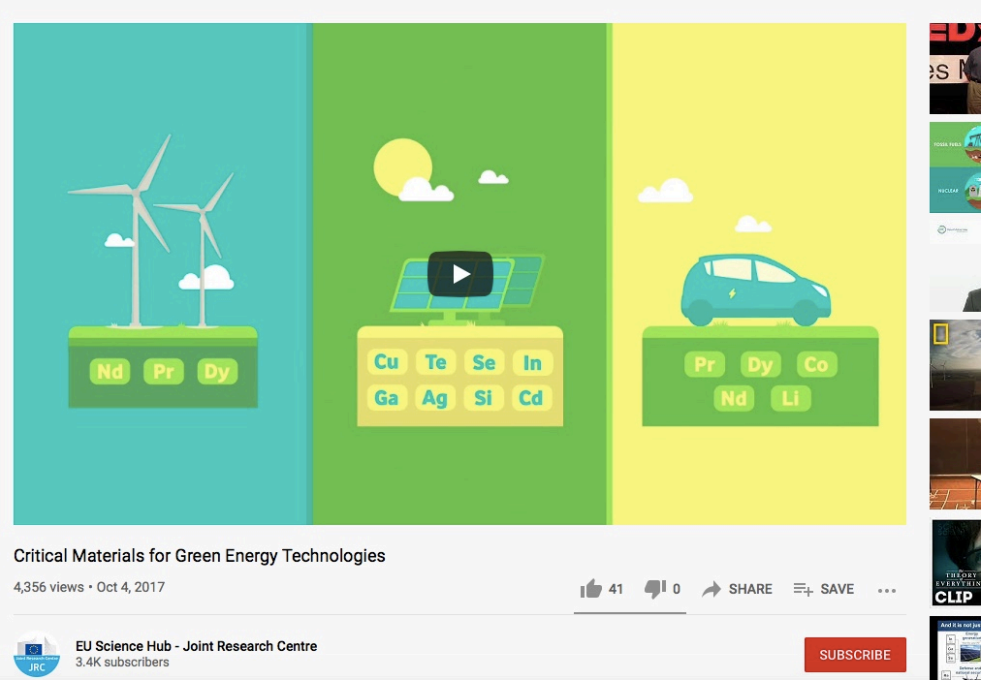
Think of an object(s) that is powered in traditional ways.

Think of at least 3 ways to generate energy to power that object in another way..using renewable energy. (Think outside the box on what you are powering..You can think big…like powering city lights)

At least one of the 3 ways must be human power.

Work in groups. Present your idea to the class.

Section 3
Lesson 1



https://www.youtube.com/watch?v=hHtzlqxgD3Y

After I teach the main content from section 3 about machines and materials, the students will now take the ideas they came up with in section 2 creative thinking task and start designing their prototypes.

Exemplars

Section 3
Lesson 1 and 2

William Kamkwamba: How I built a windmill

https://www.youtube.com/watch?v=gXucEPZ9srs

After we see this video and review the machine he created and the materials used…
We go on to the design thinking task. The students will fill out the next 4 slides.
(As we did in class for our spy gadgets.)

Section 3
Lesson 2

Design Thinking

Instructions:

In groups:

You know the object your group has decided on
Choose one of the alternative power sources you created in section 2
Come up with an invention that would create power in that way
Follow the design thinking:
For whom or for what is the invention?
Are there any limitations or possible problems
that must be taken into consideration?
Ideate: brainstorm
Sketch your prototype and label it with details

#1: EMPATHIZE

Who is my viewer?

Who is going to need it?

Design Thinking

Students fill this out…individually or in groups as needed.

#2: DEFINE

What's the goal?

Reflection questions

What are the restrictions or limitations?

Students fill this out...individually or in groups as needed.

#3: IDEATE

Brainstorm ideas

Choose an idea or solution!

Students fill this out…individually or in groups as needed.

#4: PROTOTYPE

Students fill this out…individually or in groups as needed.

Make a materials list

Sketch it out!

Section 3
Lesson 3

Tinkering

Now we are going to attempt to create a physical prototype of the sketch we made in the design thinking lesson.

Students must think about:
the materials they would need
time management
organization
planning
flexibility
problem-solving

individual / group ..who does what

Section 3
Lesson 3

Tinkering

Rules

1. Construct a prototype of your sketch for a new way to power XXX
2. Use recycled materials whenever possible
3. The prototype must move in the way you expect it to
4. The materials are “representative” of the actual materials
5. The materials and movement will be explained
6. If something isn’t working use the “3 times you’re out” idea
7. Be open to modification if needed
8. Document your progress: photos, log, journal, portfolio
9. Speak in English as much as possible
10. Ask for feedback from the teacher as needed (For problems, be ready with at least one solution before asking the teacher to solve your problem.)

Section 3
Lesson 4

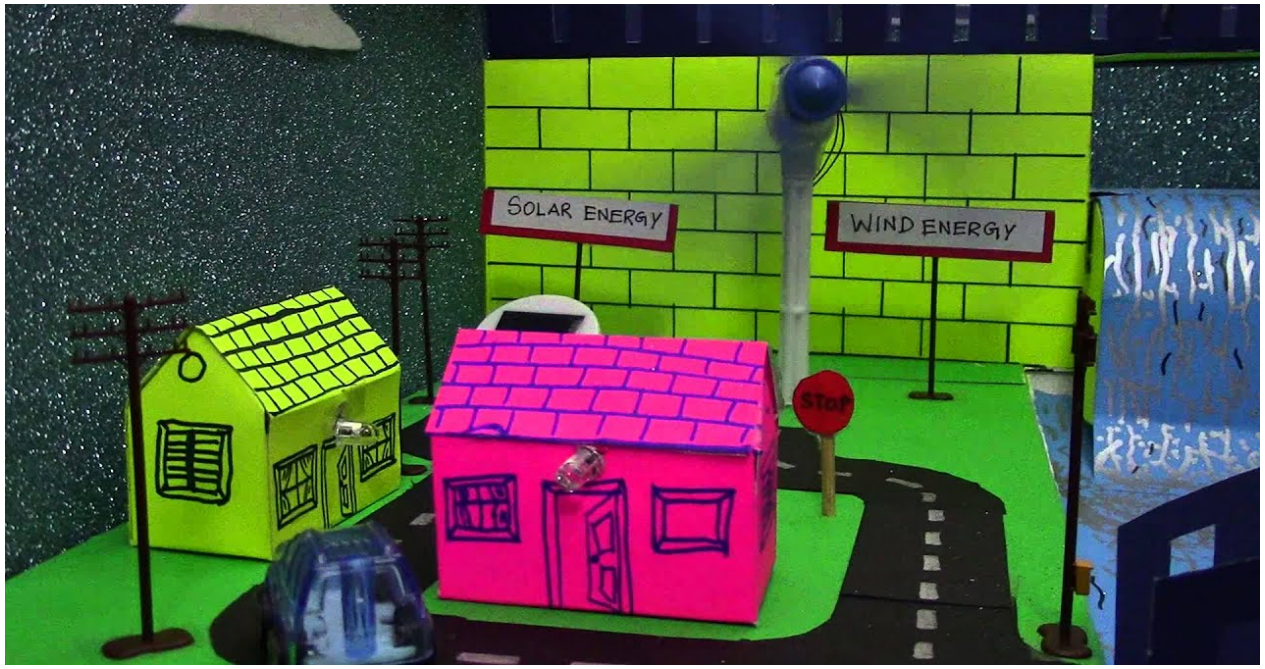
Tinkering

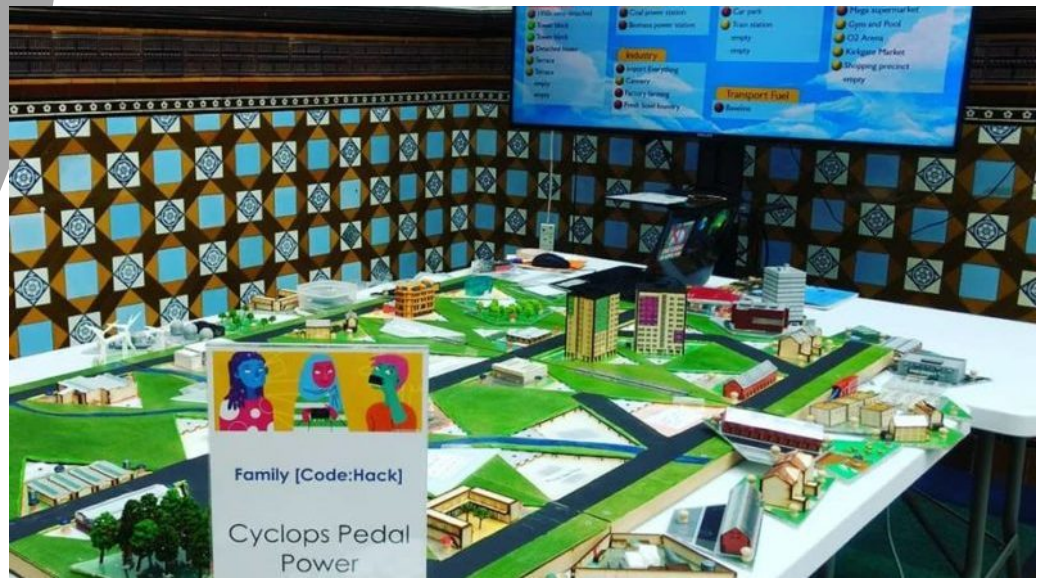
Problem solving

Section 3
Lesson 4

Tinkering

Complete final prototypes

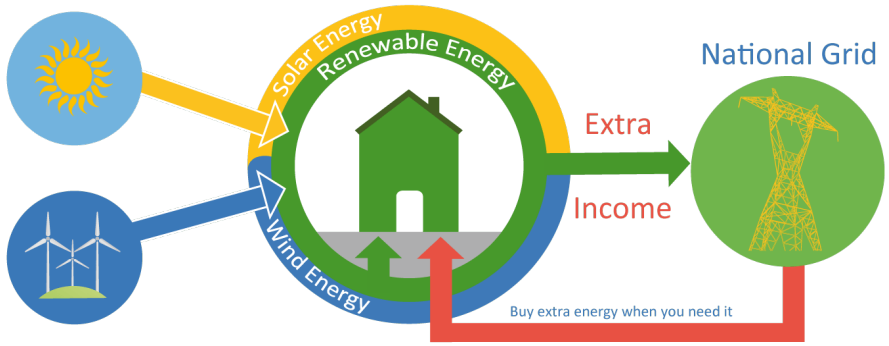




Section 4
Lesson 1

Implementation Plan

Adding complexity to the project



At a minimum, during the planning phase financiers, developers, and project managers should consider the project's impact on these elements:

- Biodiversity disturbance
- Noise
- Aesthetics
- Water quality
- Air quality
- Soil quality

4
Environmental Impacts of Renewable Electricity Generation

Section 4

Students will present their prototypes
Reasons
Materials
Use
Function

They will also discuss possible ways to implement them

They will also make note of possible secondary issues from their machines and offer possible solutions