

Solar Updraft Towers: Innovations in Renewable Energy

Lesson 5: Learning About Solar Updraft Towers

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DESCRIPTION

This lesson helps students learn about solar updraft towers being planned and built around the world to help solve the energy crisis by using unlimited power from the sun. This will provide real world context to the engineering challenge they engaged in during the previous lesson. A video is shown to the class; then students are encouraged to spend time searching the internet and writing about what they learn on an individual KWL chart.

GRADE LEVEL(S)

3, 4, 5, 6, 7, 8

SUBJECT AREA(S)

Solar updraft towers, renewable energy innovations, passive solar energy usage

ACTIVITY LENGTH

2 hours

LEARNING GOAL(S)

1. Students will be able to define and explain what a solar updraft tower is.
2. Students will make connections between their previous engineering challenge and a real world solution to the world's growing energy demands, including careers.

STANDARDS REMINDERS

- It is critical students are discussing the impacts that other fuel sources have on the environment in comparison to solar updraft towers. They will need to be able to bring a discussion of renewable vs. nonrenewable resources into this lesson and place the solar updraft tower somewhere along a "spectrum of impact."

LESSON PLAN

- Review which key scientific concepts a solar updraft tower relies on to function that students have already been discussing as a result of their phenomena observations.

CONTENT BACKGROUND

STUDENT BACKGROUND

Students participating in this lesson should be familiar with the following:

- Hot and cold air moving together, creates wind, which can be converted into electrical energy.
- The Chimney Stack Effect happens when cold air is outside of a structure and warm air is inside. The cold air will be sucked up into the structure to push air up and out.
- Engineers have used Chimney Stack Effect on a major scale to plan and construct Solar Updraft Towers that will power a city.
- Solar Updraft Towers are best located in hot, sunny location

EDUCATOR BACKGROUND

Educators leading this lesson should be familiar with the same content as students.

MATERIALS NEEDED

HANDOUTS/PAPER MATERIALS

- Worksheet 6-Solar Updraft Engineering Design

CLASSROOM SUPPLIES (ENGINEERING TABLE)

- Paper and pencils
- Projector or other YouTube video-playing device
- Computer queued up with EnviroMission Video - “EnviroMission and the Solar Updraft Tower on the Discovery Channel” video on YouTube by Brett Rodli (<https://youtu.be/xb-mQcvGczo>)

LESSON PROGRESSION

PLANNING AND PREP

- Preview the suggested video about solar updraft towers.
- Take some time, watching 2 or 3 videos about solar updraft towers.
- Arrange for computer time for students.

LESSON PLAN

- If you want your students to continue designing new towers, print off Worksheet 6.
- Print off “Worksheet 7-Solar Updraft KWL”.
- Queue up solar updraft video for students (“EnviroMission and the Solar Updraft Tower on the Discovery Channel” at (<https://youtu.be/xb-mQcvGczo>))

LESSON SEQUENCE

DAY 1

- Show the class the suggested five-minute video on Solar Updraft Towers.
- Have a discussion about them and determine questions students have about this innovation
- Pass out “Worksheet 7-Solar Updraft KWL” worksheet to each student
- Encourage students to conduct an internet search, finding all they can about Solar Updraft Towers and recording it on their charts.

DAY 2

- Have a class discussion on what the students learned and what they would like to know more about.
- Have a discussion about why they students think solar updraft towers are not being built when they say they are supposed to be.
- Do the students think Solar Updraft Towers will catch on as an expensive, but successful renewable energy solution, or do they think it is not a good idea? Why?

DAY 3

- Revisit the Solar Updraft Tower toys the students made in lesson 4 and make improvements or embellishments, based on what they learned about Solar Updraft towers.
- Encourage students to incorporate elements into their design that make them more effective or more appealing to develop. These could be decorations meant to symbolize a particular aspect, such as habitat protection, agriculture, etc.

ASSESSMENT AND EXTENSIONS

FORMATIVE/SUMMATIVE ASSESSMENT

Students will be assessed on the quality of answers and completeness of their Solar Updraft Towers KWL worksheet.

LESSON PLAN

LESSON EXTENSIONS

- Continue a discussions of the roles that money, time, location, innovation and public support play in the development of new ways to use energy sources.
- Write a letter to the innovators and companies found in videos and research.
- Research renewable energy careers and industries in response to “the world’s growing energy demands”.