

SOCIAL IMPACTS OF SOLAR COOKING

VOL. 17



Developed by California Sunlight Grades 5-12

OBJECTIVES

Students will...

- Learn there are more than 3 billion people in the world that need to gather fuels for cooking.
- Learn there are more than 2 million premature deaths each year due to cooking pollution.
- Research people's activities in finding cooking fuels.
- Discuss the impact of the human activities on the environment and society.
- Build a solar cooker based on the Solar Balloon Energy Kit.
- Estimate the total amount of water that can be pasteurized by the cooker.
- Estimate lives, trees, and money that may be saved by using the solar cooker.
- Estimate the job and business opportunities that may be created by solar cooking.
- Develop a plan to help people in need by providing solar cooking technology.
- Apply critical thinking to solving the cooking and heating related problems in the world.
- Experience team building and real-world problem solving.

MATERIALS

- Solar Balloon Energy Kit(s) — SB52005
- Digital Laboratory Thermometer — SB33552
- Measuring Cup — WA29913
- Graph Paper, 8½" x 11" — 9706099
- Hot Pad for Handling Pan — SB01889
- Water
- Blue Plastic Wrap
- Hand Lens — SBI6445

ACTIVITY

1. Introduction — More than 3 billion people in the world do not have sufficient energy for cooking and heating. They often have to cut and burn trees to pasteurize water to make it safe for drinking. There are more than 2 million premature deaths each year due to open-fire cooking pollution. Cutting down trees for cooking and heating accelerates deforestation. Burning fuels indoor for cooking and heating represents a significant health problem. Spending time looking for trees or spending money for buying cooking and heating fuels also limits the resources for social development. Introducing community-oriented solar cooking technology and developing user-friendly solar cooker products helps solve the environmental, health, and social development issues. Encourage students to develop plans to help people in need.

2. Build a Solar Cooker — Give each student a sheet of blue plastic wrap and a hand lens. Tell the students to close their eyes and hold the hand lens and blue plastic wrap over their eyes. When they open their eyes, they should tell what they see, then write down their observations.

Questions: How does this activity differ from the worm activity? Can you see detail or colors? Can you detect movement? Can you see very far away?

3. Heating Water (Choose a Sunny or Partially Sunny Day)

Each group of students use the measuring cup to add one cup of water into the black cooking pan. Use the digital thermometer to measure the temperature of the water in the black pan. Record the time of the measurement and the water temperature. Put the black pan with water into the cooking sleeve under the small end of the balloon. Orient the balloon toward the sun. Measure and record the temperature of water in the black pan and the ambient temperature every two minutes until the water temperature reaches 160° F, at which water is fully pasteurized. Plot the water temperature and the ambient temperature as a function of the time on the graph paper. Calculate the time needed to pasteurize one cup of water. Then calculate the quantity of water that can be pasteurized in one day, presuming 12 hours of sunshine every day. Finally, each group of students calculates the total amount of water that can be pasteurized in one year if there are 300 sunny days.

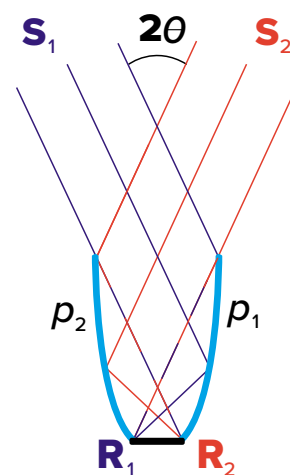
4. Needed Fuels Calculation

Based on the calculation results of the total amount of water that can be pasteurized by the Solar Balloon Energy Kit over one year, each group of students will choose one of the fuels (dry wood, heating oil, natural gas, electricity) to calculate the quantity of fuels needed to pasteurize that same amount of water. Presuming the wood-burning stove efficiency is 30%, students can calculate how much dry wood is needed, and how many trees may be saved if the Solar Balloon Energy Kit is used. Then estimate how much money can be saved.

Fuel	Efficiency	Heating Values (MJ/kg)
Dry Wood	30%	21
Heating Oil	30%	45
Propane	30%	50
Electricity	30%	36 (MJ/10kWh)

5. Plan to Help People in Need (Optional)

Encourage students to develop a plan to help people in need of cooking and heating fuels by providing solar cooking technology to them. Students may do research to identify communities where help is needed, and then work with NGOs, government agencies, and manufacturers to raise funding, develop technology, and deliver products to communities in need.



ASSESSMENT

Teacher observation, participation in activities, cooperation, handling materials, participation in oral discussion, completeness of projects, written work, and illustrations.

Lesson Plans are developed with teachers with no claim of original authorship.