

Integrative STEM Education

Alternative Energy

FESTO



Highlights

- Designing power generation systems for two cities
- Calculating the efficiency of the energy transfer process
- Measuring energy levels.
- Angling of solar cells with respect to incident sunlight
- Comparing and scaling results of aerodynamics and hydrodynamics
- Analyzing hydrogen as an energy source

STEM Connections

In the STEM Alternative Energy course, students discover how the four disciplines connect as they explore and practice the skills needed to work with different energy sources.

Once they are familiar with these technologies, they will have the opportunity to design innovative solutions to real-world problems, challenges and needs.

Science

- Energy conversion
- Energy storage
- Energy transfer

Technology

- Energy production
- Electroscope, anemometer, and light meter measurements
- Solar cells
- Nuclear plants
- Wind turbines
- Water turbines

Engineering

- Power distribution
- Power network design
- Trade-off assessments

Math

- Energy needs and consumption calculations
- Units of measurement
- Efficiency calculations
- Scaling parameters

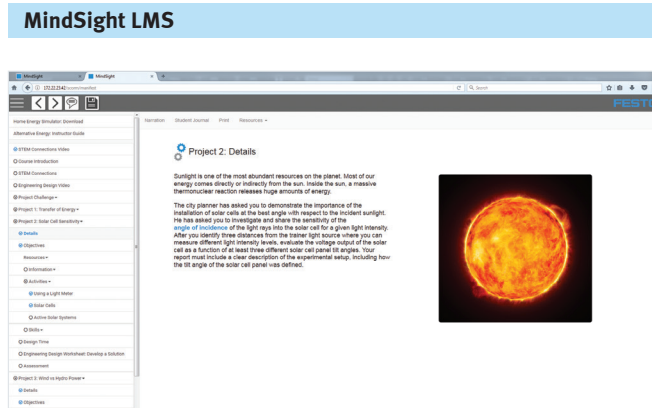
Integrative STEM Education

Alternative Energy

STEM Alternative Energy

The purpose of the STEM Alternative Energy course is to introduce the students to the basic principles of the many energy sources considered to be alternatives to our current dependence on nonrenewable fossil fuels.

The students will play the roles of alternative energy engineers who have been asked to provide specifications for the energy generation of two new cities. Their recommendations should be environmentally friendly, cost effective, and consist of at least 90% renewable sources.



Upon completion of the STEM Alternative Energy course, students will be able to:

- Identify sources of energy and the difference between renewable and nonrenewable energy.
- Define primary and secondary energy.
- Understand the technologies used to capture energy and convert it into a useable form.
- Recognize environmental impacts of energy technologies.
- Calculate the amount of a resource needed to meet energy needs.
- Quantify efficiency of energy systems.
- Analyze the benefits and drawbacks of different energy sources and the technology used to capture them.
- Conceptualize effective implementation planning.
- Develop a proposal that encompasses how a plan will meet the stipulations of the “triple bottom line.”

Equipment and Supplies

- Multimedia presentation
- MindSight Installation and User Guide
- Alternative Energy Trainer
- Wind turbine
- Leads 4 mm x 60 cm black
- Leads 4 mm x 60 cm red
- Light meter (Lux)
- Solar panel assembly
- Anemometer
- 1.5 V battery set
- Fan
- Electroscope assembly
- Electroscope leaves (556)
- Vial 556-1X assembly
- Pith balls
- Balloon set
- 100% wool 4.5 in x 9 in
- Horizon HydroCar FCJ-20 Set
- Scissors
- 12 in (30 cm) ruler
- Empty 8 oz plastic bottle
- Safety glasses
- Small funnel
- Protractor
- Distilled water
- Distilled white vinegar
- Baking soda
- Cannellini white beans
- Red kidney beans

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