

**Curriculum Unit Title**

Harnessing the sun: a critical look at the feasibility of solar energy

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**KEY LEARNING, ENDURING UNDERSTANDING, ETC.**

Although solar energy is essentially limitless, our ability to harness it is not. The effective use of active and passive solar energy depends on many factors. Solar energy is not free and has economic, social and environmental costs.

**ESSENTIAL QUESTION(S) for the UNIT**

What is the difference between passive and active solar energy?  
What factors affect the efficiency of photovoltaic cells?  
What are the economic, social, and environmental benefits and costs associated with solar energy?

**CONCEPT A**

Solar energy heats the Earth unevenly.

**CONCEPT B**

Solar energy can be used to create electrical energy.

**CONCEPT C**

There is a cost to using solar energy.

**ESSENTIAL QUESTIONS A**

What factors influence the amount of radiant energy that is absorbed from the sun?

**ESSENTIAL QUESTIONS B**

How do photo voltaic cells work? What factors affect the efficiency of either solar collection and/or solar energy transformation to electrical energy?

**ESSENTIAL QUESTIONS C**

What are the economic, social, and environmental costs and benefits associated with the use of photo voltaic cells?

**VOCABULARY A**

latitude, longitude, solar azimuth, solar altitude, solar noon, solar window, axis, irradiance, pyranometer

**VOCABULARY B**

Energy, photo voltaic, transparent, electricity, transformer, inverter, solar cell, solar array, fixed system, tracking system, voltage, wattage,

**VOCABULARY C**

Life expectancy, disposal, hazardous material, silicon mining, land use

**ADDITIONAL INFORMATION/MATERIAL/TEXT/FILM/RESOURCES**

<https://www.teachengineering.org> Teach Engineering STEM curriculum for K12 This site offers a variety of engineering based challenges associated with using active and passive solar energy at the elementary, middle and high school levels.  
<http://www.createenergy.org/> Center for Renewable Energy Advanced Technological Education. This site provides links to several key investigations and background knowledge on renewable energy with a focus on solar power.  
<https://www.energy.gov/science-innovation/energy-sources/renewable-energy/solar> The United States Energy Department site that provides a great deal of information on current uses of solar energy in both the private and public sectors.