

ESS/Integrated 1 Solar Energy Lessons

Lesson	Description	Key Topics	Standards	Materials	Resources/Links
Solar Energy: When and Where is Best?	Students explore the basic concepts of solar energy availability and use.	Solar radiation Renewable resources Photovoltaics	ESS 3-4 Evaluate technological solutions to human impact	Data Table will be used for collecting student data. ** PRINT**	Solar power presentation Solar power estimation worksheet Solar energy maps
Solar Comparison	Compare Montana to any other State for Solar	Irradiance Watts/m ²	ESS 3-4 Evaluate technological solutions to human impact	Computer	Solar State By State comparison map
Multimeter Testing	Learn and demonstrate how to properly use a multimeter	Multimeter Voltage Current Power Ohm's Law Series Parallel	MT CTE Standard 4 2. practice safe and appropriate use of technology. 3. mastery of tools and equipment needed for an entry level job or advanced training.	Breadboard Wires Batteries x 2 Multimeter PLTW Solar panel Alligator clips Light bulb	
Getting to know your Solar Panel					

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<p>PV Orientation</p> <p>Or</p> <p>Ideal Conditions</p>	<p>Students will be collecting data on orientation and azimuth to determine the optimal solar input. Students will graph data.</p>	<p>Array Tilt Angle Azimuth Insolation Irradiance Irradiation Latitude Ohm's Law Peak sun hours Solar incidence</p>	<p>ESS 3-2 Cost-benefit ratios of energy sources</p> <p>HS-PS3-3 Analyzing an energy-conversion device</p>	<p>laboratory manual key word list photovoltaic module insolation meter (solar meter) multipurpose meter (2) wires with alligator clips protractor ruler rod or other long thin object graph paper compass heavy paper or cardstock</p>	
<p>Non-Ideal Conditions</p>	<p>Measuring the output of solar panels under a variety of conditions</p>	<p>Array Tilt Angle Azimuth Insolation Irradiance Irradiation Latitude Ohm's Law Peak sun hours Solar incidence</p>	<p>HS-PS3-3 Analyzing an energy-conversion device</p>		

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How much energy is a kilowatt hour?	<p>Students will climb stairs and measure their energy and power output and relate it to kilowatt-hours</p>	<p>Force Work Power Kilo kilowatt-hours</p>	<p>HS-PS3-2. Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects).</p>		Student Laboratory Sheet
Smart Solar?	<p>Compare Missoula to other cities in the country to determine if it is worthwhile (in your opinion) to put solar modules on your house.</p>		<p>MT Geography Standard 3: Students apply geographic knowledge and skills (e.g., location, place, human/environment interactions, movement, and regions).</p>	<p>Computer</p>	
Carbon Footprint and Climate Change	<p>Classes use a carbon footprint calculator and an online discussion forum to get your kids talking about climate change and how they can help!</p>	<p>Carbon footprint Climate change</p>	<p>LS 2-7 Design solutions for reducing human impact</p>	Lesson plan Carbon Footprint Data Sheet	

*indicates foundational lesson