



<p><b>1. What is our purpose?</b></p> <p><b>1a) To inquire into the following:</b></p> <ul style="list-style-type: none"> <li>● <b>transdisciplinary theme</b></li> </ul> <p>An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.</p> <ul style="list-style-type: none"> <li>● <b>central idea</b></li> </ul> <p>People produce and use different types of energy which leave an environmental footprint.</p>	<p>Class/grade: 4<sup>th</sup> Grade      Age group: 9 -10 yrs</p> <p>School: Willard      School code: 7202</p> <p>Title: Energy</p> <p>Teacher(s): Gray, Negrete, and Van Der Heide</p> <p>Date: 10/2/17-11/10/17</p> <p>Proposed duration: 90 hours      over 7 weeks</p>
<p><b>1b) Summative assessment task(s):</b></p> <p>What are the possible ways of assessing students' understanding of the central idea? What evidence, including student-initiated actions, will we look for?</p> <p>Summative: The students will demonstrate their understanding of the central idea by creating project/presentation of their choice showing a type of energy, how it's used, and its benefits/detriments.</p> <p>Teacher will assess students ability to: name a form energy, describe and illustrate how that form of energy is created/ manufactured etc; explain the positive and negative impacts of that form of energy on the world.</p> <p>Through the study of this unit we would expect that students would demonstrate action by:</p> <ul style="list-style-type: none"> <li>● reflect on their energy use.</li> <li>● come up with a conservation plan.</li> <li>● choose to write a letter of concern regarding energy production to a city or state official.</li> </ul>	<p><b>2. What do we want to learn?</b></p> <p>What are the key concepts (form, function, causation, change, connection, perspective, responsibility, reflection) to be emphasized within this inquiry?</p> <p>Key concepts: function, connection, responsibility</p> <p>Related Concepts: conservation, environment, resources</p> <p>Subject areas: science, languages, social studies</p> <p>What lines of inquiry will define the scope of the inquiry into the central idea?</p> <ul style="list-style-type: none"> <li>· Types of energy</li> <li>· Production of energy</li> <li>· The impact of energy use</li> </ul> <p>What teacher questions/provocations will drive these inquiries?</p> <ol style="list-style-type: none"> <li>1. What is energy and how is it made?</li> <li>2. How does energy affect our life and environment?</li> <li>3. What is the difference between electricity and energy?</li> <li>4. What conducts/does not conduct electricity?</li> <li>5. What are other methods of creating energy and what is our responsibility regarding their use?</li> </ol> <p>Provocations:</p> <p>OTQ activity using different photos related to energy.</p>

Planning the inquiry

**3. How might we know what we have learned?**

*This column should be used in conjunction with “How best might we learn?”*

What are the possible ways of assessing students’ prior knowledge and skills?

What evidence will we look for?

The teacher will survey the students regarding their knowledge of types of energy and how energy is made and used. The teacher will chart their responses.

What are the possible ways of assessing student learning in the context of the lines of inquiry? What evidence will we look for?

- Through science journals and investigations, the teacher will observe the students’ ability to run hands-on activities, control variables, and keep scientific records.
- Through science journals and investigations, the teacher will assess students’ ability to create and explain static electricity.
- Through science journals and investigations, the teacher will assess students’ understanding of the production of electricity and the basics of electricity including their ability to explain which factors affect the path of electricity. Students will also describe series circuits, parallel circuits, and switches; and identify insulators and conductors.
- Through research and investigation, the teacher will assess the students’ understanding of the various types of energies, the production of energy use and its impact on the environment.

**4. How best might we learn?**

What are the learning experiences suggested by the teacher and/or students to encourage the students to engage with the inquiries and address the driving questions?

1. Teacher/students inquire into how energy is made and record student theories and discoveries
2. Teacher/ students will investigate various forms of energy, how they are produced, and the pros and cons of different types of energy
3. Teacher/ students will investigate how energy changes form or does work.
4. Teacher/students inquire and reflect on how energy affects lives and the environment.
5. Teacher/students will model how materials gain an electric charge using static electricity.
6. Students read and discuss *The Magic School Bus and Electric Fields*, re-enacting a trip to a power plant and will watch video on Electricity.
7. Students will explore and chart ways of getting a light bulb to light.
8. Students will control variables to determine relationship between power source and output.
9. Students test materials to determine if they are conductors or insulators.
10. Students assemble series and parallel circuits and investigate their effects on light bulbs and motors.
11. Students will use their knowledge of energy and electricity to design a powered item.
12. 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

What opportunities will occur for transdisciplinary skills development and for the development of the attributes of the learner profile?

- Research skills: formulating questions, observing, and presenting research findings, as students conduct activities and experiment related to energy and its use.
- Thinking skills: application, synthesis, evaluation, and dialectical thought as students take learned information and apply it to create powered items.
- Communication skills: presenting, listening, and speaking, as students present findings from energy activities and experiments.
- Attitudes and Profile: creativity, curiosity, inquirers, and open-minded as students explore energy.

**Connections to NGSS standards of Earth’s energy and energy from the human body**

1. Transfer energy & speed
2. Transfer of energy in collision
3. Renewable and non-renewable resources

**5. What resources need to be gathered?**

What people, places, audio-visual materials, related literature, music, art, computer software, etc, will be available?

SEED kit--Bulbs and batteries; Cal. Science textbook; *The Magic School Bus and Electric Fields* by Joanna Cole (book and resource book); *The Magic School Bus Visits a Power Plant*, Magnets (horseshoe, rings, bars); *Energy Island* by Allan Drummond [The story of a wind-powered Danish island] and YouTube video of same; library video of Newton’s Laws of Motion;

How will the classroom environment, local environment, and/or the community be used to facilitate the inquiry?

The classroom configuration will be conducive to collaborative investigation and experimentation.

Students will go on a field trip to the California Science Center Big Lab where they will investigate the energy needed to create roller coasters.