

## Purpose

The purpose of this activity is to reflect on and build on the interview you conducted with children about energy.



*How do children think about energy, investigations, and data?*

## Predictions, Observations and Making Sense

### Children's Ideas about Energy

Pick one thing about your interview to share with your group and/or the class. This might be something interesting that a child said, a surprising observation, or something you learned.

In what way(s), if any, were the ideas expressed by your students **similar** to the way we have talked about energy in Next Gen PET?

In what way(s), if any, were the ideas expressed by your students **different** to the way we have talked about energy in Next Gen PET?

## Children’s Ideas about Investigations and Data

 In Part 3 of your interview, you asked how they might plan an investigation to test whether it was the type of container that the cocoa was contained in that mattered. What ideas about planning an investigation did the children suggest?

 In the final question of the interview, you asked the students to look at some data, either a data table, or a graph. Look at the grade level expectations for the children that you interviewed (either K-2 or grades 3-6). Circle any of the expectations that you observed in the students you interviewed.

Grades K-2 Expectations	Grades 3-5 Expectations
<p>Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <ul style="list-style-type: none"> <li>• Record information (observations, thoughts, and ideas).</li> <li>• Use and share pictures, drawings, and/or writings of observations.</li> <li>• Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.</li> <li>• Compare predictions (based on prior experiences) to what occurred (observable events).</li> <li>• Analyze data from tests of an object or tool to determine if it works as intended.</li> </ul>	<p>Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.</p> <ul style="list-style-type: none"> <li>• Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.</li> <li>• Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.</li> <li>• Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.</li> <li>• Analyze data to refine a problem statement or the design of a proposed object, tool, or process.</li> <li>• Use data to evaluate and refine design solutions.</li> </ul>

## Summarizing Question

Based on what you learned about children's ideas about energy, investigations, and data from this interview, imagine how you might design an activity for children to meet the performance expectation from the NGSS. Note that this is a fourth grade expectation. The full description of the performance expectation is included at the end of this activity.

*4-PS3-2 Energy. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.*

With your group, describe an idea for a classroom activity to meet this performance expectation. You may be asked to share your ideas with your class.

4-PS3-2 Energy		
<p>Students who demonstrate understanding can:</p> <p><b>4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.</b> <i>[Assessment Boundary: Assessment does not include quantitative measurements of energy.]</i></p>		
<p>The performance expectation above was developed using the following elements from the NRC document <i>A Framework for K-12 Science Education</i>:</p>		
<p><b>Planning and Carrying Out Investigations</b>                      Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.</p> <ul style="list-style-type: none"> <li>• Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.</li> </ul>	<p><b>PS3.A: Definitions of Energy</b></p> <ul style="list-style-type: none"> <li>• Energy can be moved from place to place by moving objects or through sound, light, or electric currents.</li> </ul> <p><b>PS3.B: Conservation of Energy and Energy Transfer</b></p> <ul style="list-style-type: none"> <li>• Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced.</li> <li>• Light also transfers energy from place to place.</li> <li>• Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy.</li> </ul>	<p><b>Energy and Matter</b></p> <ul style="list-style-type: none"> <li>• Energy can be transferred in various ways and between objects.</li> </ul>
<p><i>Connections to other DCIs in fourth grade: N/A</i></p>		
<p><i>Articulation of DCIs across grade-levels:</i>  <b>MS.PS3.A ; MS.PS3.B ; MS.PS4.B</b></p>		
<p><i>Common Core State Standards Connections:</i>                      ELA/Literacy -</p> <p><b>W.4.7</b> Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),</p> <p><b>W.4.8</b> Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-2)</p>		

## References

Achieve (2012). *Next Generation Science Standards*. Available at <http://www.nextgenscience.org/>