

Energy Transformations

Science Grade-Level Expectations

The exercises in this instructional task address content related to the following science grade-level expectations:

(PS-E-C6) Describe energy transformations (e.g., electricity to light, friction to heat) (GLE 39)

	Objective
Task	- Compare ways of transforming energy
Sample Student Exemplar Response	

Implementation Tips:

- This task is intended to be integrated into a larger unit that contains hands-on science opportunities, student-led investigations, non-fiction reading, and a variety of other instructional strategies.
- Teachers may choose to use or modify the task as part of an instructional lesson or as a formative or summative assessment.
- Strategic instructional decisions will need to be determined prior to implementation such as:
 - Should the provided text be read aloud to students or read independently by students?
 - Will students work collaboratively or individually to complete the task?
 - What content knowledge and skills will students need to have prior to attempting the task?
 - Does the task need to be modified based on the needs of my students at the time of implementation?

- Read [How Electricity is Generated through Hydropower](#).
- Read [How Electricity is Generated through Coal](#).

Task: Compare how electricity is generated using hydropower to how it is generated using coal.

Sample Student Exemplar Response

Electrical power generation through hydropower begins with the kinetic energy of falling water while coal energy generation begins with the chemical energy found in coal. An intermediate stage in hydropower generation is floodgates opening to release the kinetic energy of falling water, but in coal energy generation the intermediate stage requires the coal being burned in a boiler to produce heat energy. In hydropower generation, turbine blades spin to convert kinetic energy to mechanical energy. In coal energy generation, steam from the heated water spins the turbine to convert heat energy to mechanical energy.

The final step in both processes is similar. In the last step of both hydropower energy generation and coal energy generation, the generator uses a magnetic field to convert mechanical energy into electrical energy.

The two types of energy production are also different in other ways. Hydropower generation is a clean energy production process with no by-products that have to be treated, but coal energy transformation creates by-products that need to be treated. Hydropower generation also includes the ability to store energy in the form of dammed water, but the coal energy generation does not have that ability. More coal must be stored and added to the process. In conclusion, these two types of energy transformation are very different.