Powering Progress NGSS Standards & Alignment

	Grades 3-5	Middle School	Evidence of students meeting the PEs during Powering Progress
ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	•Groups articulate the challenge: lift a given mass within time and material constraints. •Students identify the criteria and constraints, such as time and material availability, of the water wheel challenge as part of the planning process.
ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	• Students sketch more than one design. • Groups discuss advantages and disadvantages of each design
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.	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.	• Students make observations and comparisons when testing different designs. • Students use the same amount of beads for each test. • Students measure the work done by each water wheel design by measuring the distance each load is lifted
ETS1-4		Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	• Students show evidence of improved efficiency of their water wheel designs
PS3-2.	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.	Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	•Students trace energy transformations on the *Follow the Flow* worksheet. •Students discuss changes in the gravitational potential energy of water stored behind a dam.
PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.		• Students identify and distinguish between potential and kinetic energy in the context of flowing water and rotating wheels. • Students change how quickly beads are released from the water wheel hopper.
PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.		• Students build and test prototypes, collect performance data, and troubleshoot using scientific concepts (balance, friction, tolerance). • Students use leverage and mechanical advantage to improve designs
PS3-5		Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object	•Data tables demonstrating measurable improvements. •Reflective write-ups that connect specific design changes to efficiency gains