

Wind Harnessers

Primary Curriculum	Grade 4 (NGSS Standards: 4-PS3-1, 4-PS3-2, 4-PS3-3, 4-PS3-4, 4-ESS1-1, 4-ESS2-1, 4-ESS3-1, 3-5-ETS1-1, 3-5-ETS1-2, 3-5-ETS1-3)
Supplemental Curriculum	Grades 3–5+
Notes	Standard unit/refill kit comes with enough materials for 30 students. Full kit contents can be found online at www.creosityspace.com/wind-harnessers-g4.html .
Full Unit (EWH402).....\$900 Refill Kit (EWH405).....\$680 Book of Ideas Class Pack (Grade 3-BUS033, Grade 4-BUS043, Grade 5-BUS053).....\$250	

Description

What makes the best wind turbine?

Air—invisible to the human eye and seemingly lightweight—often gives us the impression of nothingness. However, anyone who has experienced a tornado, or even a strong windstorm, knows that air is anything but “nothing.” Join Marguerite as she talks about capturing wind to help power our daily activities.

Using the overarching phenomenon of wind turbine design, students will explore the connections between motion, energy generation and transfer, the land around us, and engineering as they ask themselves: “Can you capture the wind?”

Main Investigation

Power Providers



Number of Lessons* Best Suited For

- | | |
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| <p>Full unit – 22 lessons</p> <p>Supplemental program – minimum 5 lessons</p> | <ul style="list-style-type: none"> • Classroom science instruction • Afterschool program |
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**Lesson = 30–40 min. block, 50% of full unit lessons can be delivered in non-science classes*

Overarching Enduring Understanding

Can you capture the wind?

Number of Lessons*

Full unit – 22 lessons

Supplemental program – minimum 5 lessons

*Lesson = 30 – 40 min block, 50% of full unit lessons can be delivered in non-science classes

FLOW OF INSTRUCTION

4-PS3-1

Use evidence to construct an explanation relating the speed of an object to the energy of that object.

4-PS3-2

Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.

4-PS3-4

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

3-5-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.

3-5-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.

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.

4-ESS2-1

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS1-1

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS3-1

Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

4-PS3-3

Ask questions and predict outcomes about the changes in energy that occur when objects collide.

Introductory Investigation: The Power of Air (hands-on investigation, occurs during week 1)

Often air is described as “nothingness” when in reality it is a very powerful something. To start off this unit students will get some hands-on experience with the power of air through as they construct and race balloon-based hovercrafts.

Investigation: Power Providers (hands-on investigation and research project, occurs during weeks 2–4)

In this multipart investigation students begin by exploring the details of wind power through the design, construction, and evaluation of wind turbines. (4-PS3-1,3,4; 3-5-ETS1-1,2,3).

In the second part of this investigation, they expand this discussion to include the investigation into other sources of renewable energy such as wave power and hydro power, including discovery, mechanism for energy generation and pros and cons of implementation. (4-ESS1-1, 4-ESS2-1, 4-ESS3-1, 4-PS3-3)

Challenge: Power Play (summative challenge, occurs during weeks 5 and 6)

For this summative challenge students must pick a renewable energy technology and describe the following things:

- Discuss the natural phenomenon that is being used to generate energy and describe the evidence that this natural phenomenon has power based on its impact on Earth (e.g., wind erosion, water erosion, etc.).
- Describe how power is generated from this renewable energy.
- Describe and compare the impact on Earth from using this energy source versus a non-renewable energy source.