

## Into the Wind

**Announcer:** [0:03] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod, made possible by a grant from 3M. [0:23] [music]

**Narrator:** [0:39] We can feel the wind's power even though we can't see it. But what is wind? The sun heats different parts of the Earth's surface unevenly. Warm air expands and rises, leaving room for colder, denser air to fill in the gap. What we call "wind" is the movement of air from high- to low-pressure systems. The kite is a fun and simple way of controlling the wind's power. [1:47] All forms of kites, made in different shapes and sizes, cause a varying force upwards. When air hits a kite's wing at an angle, the air is deflected downward. Based on the shape and surface area of the kite, this produces a forward thrust and an upward lift. Remember Newton's Third Law of Motion? Every action has an equal and opposite reaction. This makes kites fly. How does the wind affect your life? How can you harness the wind's power?

[2:19] [music]

**Announcer:** [3:13] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and Terrapod, made possible by a grant from 3M. [3:31] [new film]

**Announcer:** [3:35] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod, made possible by a grant from 3M. [music]

**Narrator:** [4:02] Wind blowing off the ocean creates an updraft when it hits the cliff. Wind gliders ride this updraft. Forward motion increases airflow over the wings, creating lift. A pilot controls the glider by pushing on the control bar and shifting body weight, changing the direction of flight. How can you harness the wind's power? [4:54] [music]

**Announcer:** [6:13] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod, made possible by a grant from 3M. [new film]

**Announcer:** [6:35] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod, made possible by a grant from 3M. [music]

**Narrator:** [7:13] The wind's motion is a source of energy. Wind is a medium that carries mechanical energy, the flow or kinetic energy of the air. The kinetic energy of the wind is transferred to the sailboat. How can you harness the wind's power? [9:16] When sailing across the wind at an angle, the wind force splits between forward thrust and heeling force. This causes the sailboat to roll to one side as it speeds forward. Many of the boats on the bay burn fossil

fuels, but they create pollution, and fossil fuels are non-renewable. Wind is a clean and renewable source of energy.[music]

**Announcer:** [10:29] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod, made possible by a grant from 3M. [new film]

**Announcer:** [10:51] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod. Made possible by a grant from 3M. [music] [laughter]

**Narrator:** [11:23] The wind's motion is a source of energy. How can you harness the wind's power? [11:34] The pinwheel is a simple windmill. You can make your own pinwheel. You'll need a square piece of paper, scissors, a pencil and a pin. The energy of the wind becomes rotational energy of the pinwheel.

[12:52] The pinwheel is a simple windmill. Both harness the kinetic energy of the wind to make rotational energy. The wind turbine uses the same basic principals as the windmill and the pinwheel.

[14:06] [music]

**Narrator:** [14:28] As with the pinwheel and the windmill, the wind turbine turns the wind energy into rotational energy. Rotational energy is a type of mechanical energy. The mechanical energy goes through a gearbox. The generator turns this mechanical energy into electricity. This electricity can be stored in a battery or sent out into the municipal grid where it helps power our homes. [15:12] How does the wind affect your life? How can you harness the wind's power?

[15:37] [music]

**Announcer:** [16:09] This film is brought to you by 4-H, America's largest youth development organization, in collaboration with Montana State University and TerraPod. Made possible by a grant from 3M.

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