Wind Turbine Design
Wind Energy for Electricity

Wind turbines convert **kinetic** energy from the wind into **electrical** energy.

The wind causes the blades to spin, which turns a rotor, activating an electric generator.
Today we will work like engineers to design a wind turbine!

But first let’s do some research!

Look at the following examples of windmills and wind turbines and take note of their design details.
Dutch Windmill (1850s)

Pay close attention to the blades!

- How many?
- What material?
- How shaped?
- How angled?
- How attached?
Farm Wind Water Pump (Early 1900s)

Notice any similarities or differences?
Altamont Pass (1980s) 100 kilowatt

Similarities?
Differences?
1.5 Megawatt Turbine (2005)

Similarities??
Differences??
3-7 Megawatt Turbines (Now)

Similarities??
Differences??

Photo by William Starkey

Photo by Gordon Brown
How big are wind turbines?

Look at how they have changed over time...

- 1600-1800
- 1900's
- 1970-1985
- 1990-2005
- 2014

Photo by Gordon Brown
How are you going to design your turbine blades?

You can test...

- Number of blades
- Size and shape
- Stick placement
- Blade angle
How Many Blades and What Size?

- While the minimum is 1 blade, for balance it is best to have at least 2 blades.
- The maximum is 6 blades.
- Bigger blades collect more energy, but are harder to spin.
- Blades that are larger than the wind diameter collect no energy at the tips!
Blade Shape and Stick Placement

Flat or curved?

Middle or edge?
Think about what will transfer the most energy!