

Wind Turbine Design



Photo by Stan Shebs

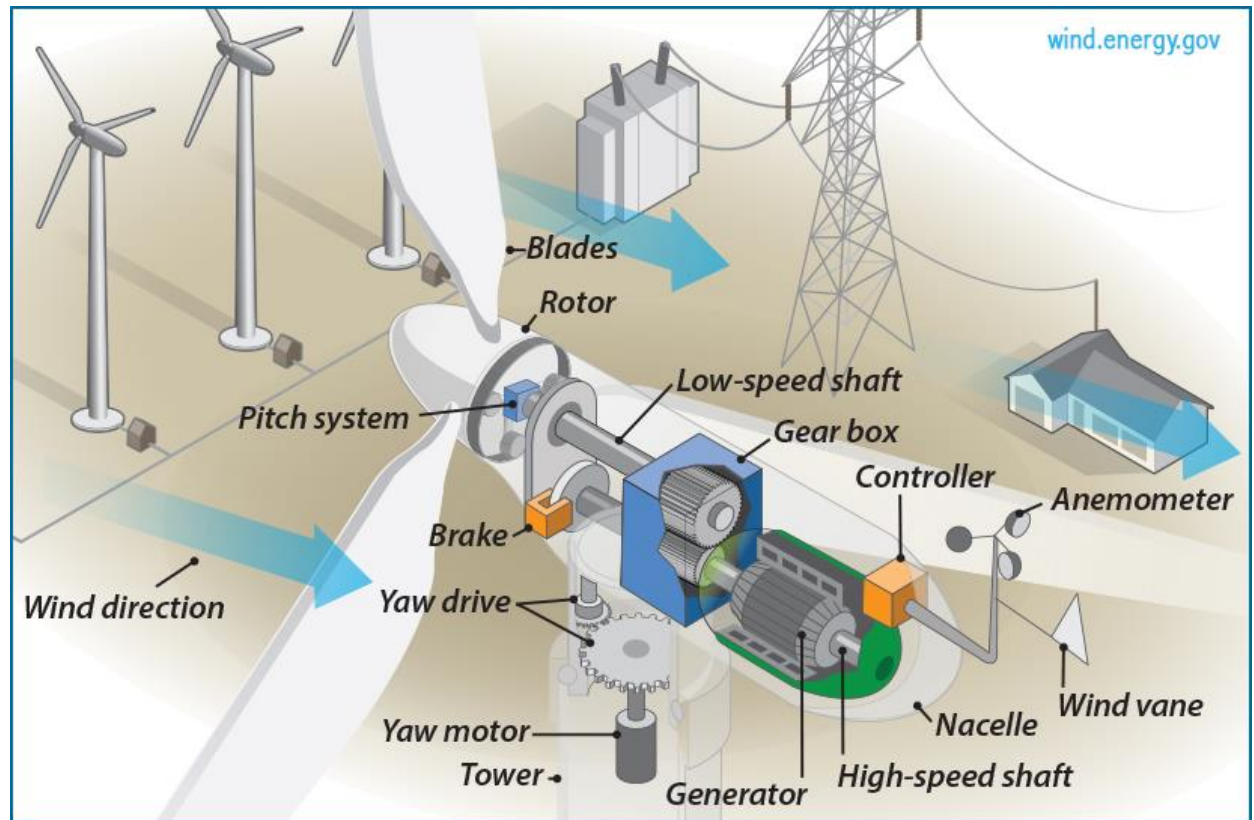
Wind Energy for Electricity

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.



© Hans Hillewaert



**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)



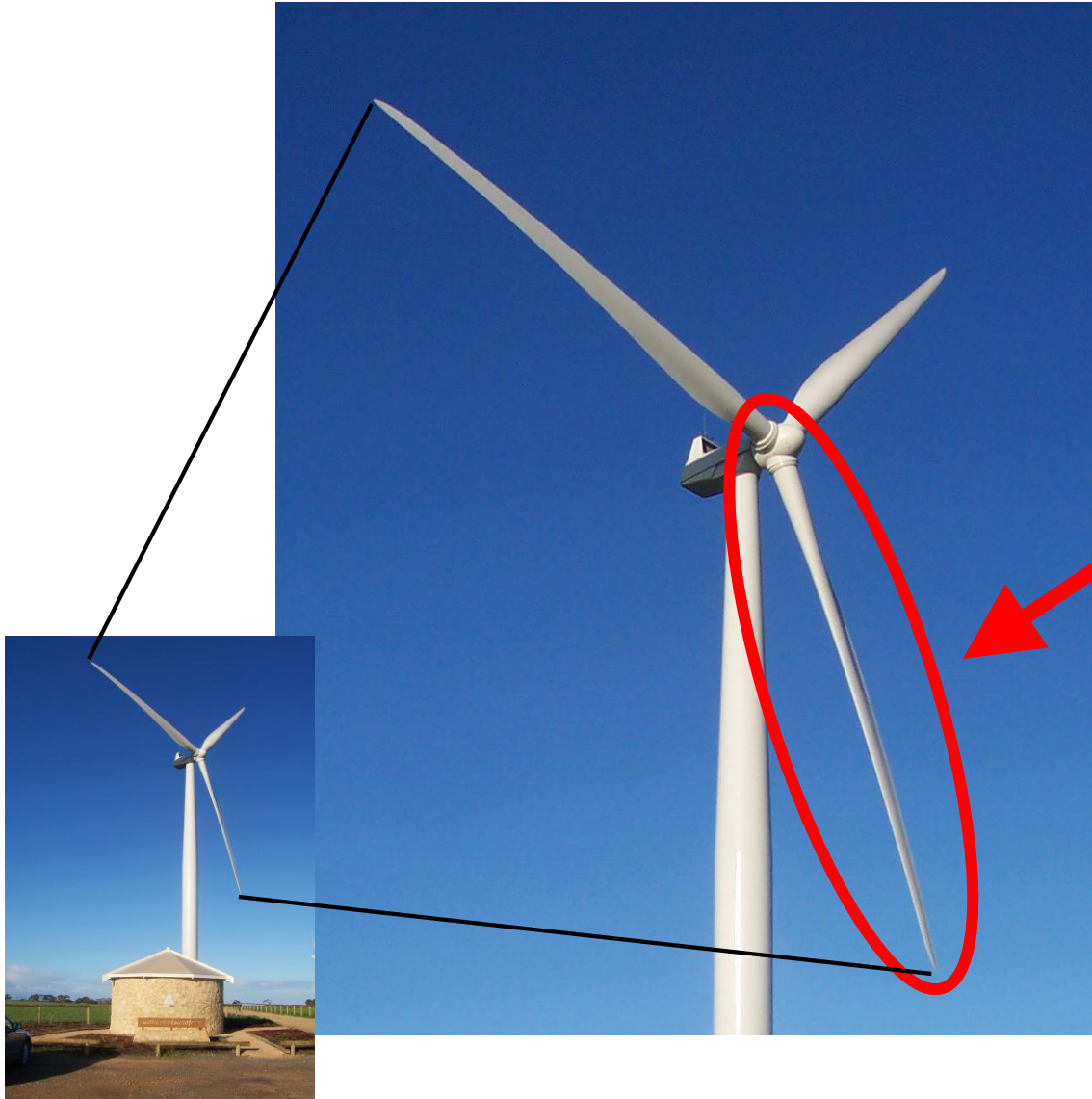
Notice any similarities or differences?

Altamont Pass (1980s) 100 kilowatt

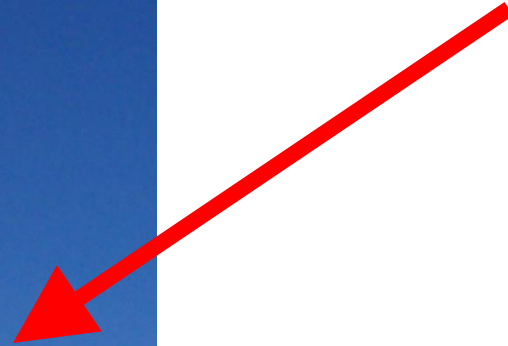


Similarities?
Differences?

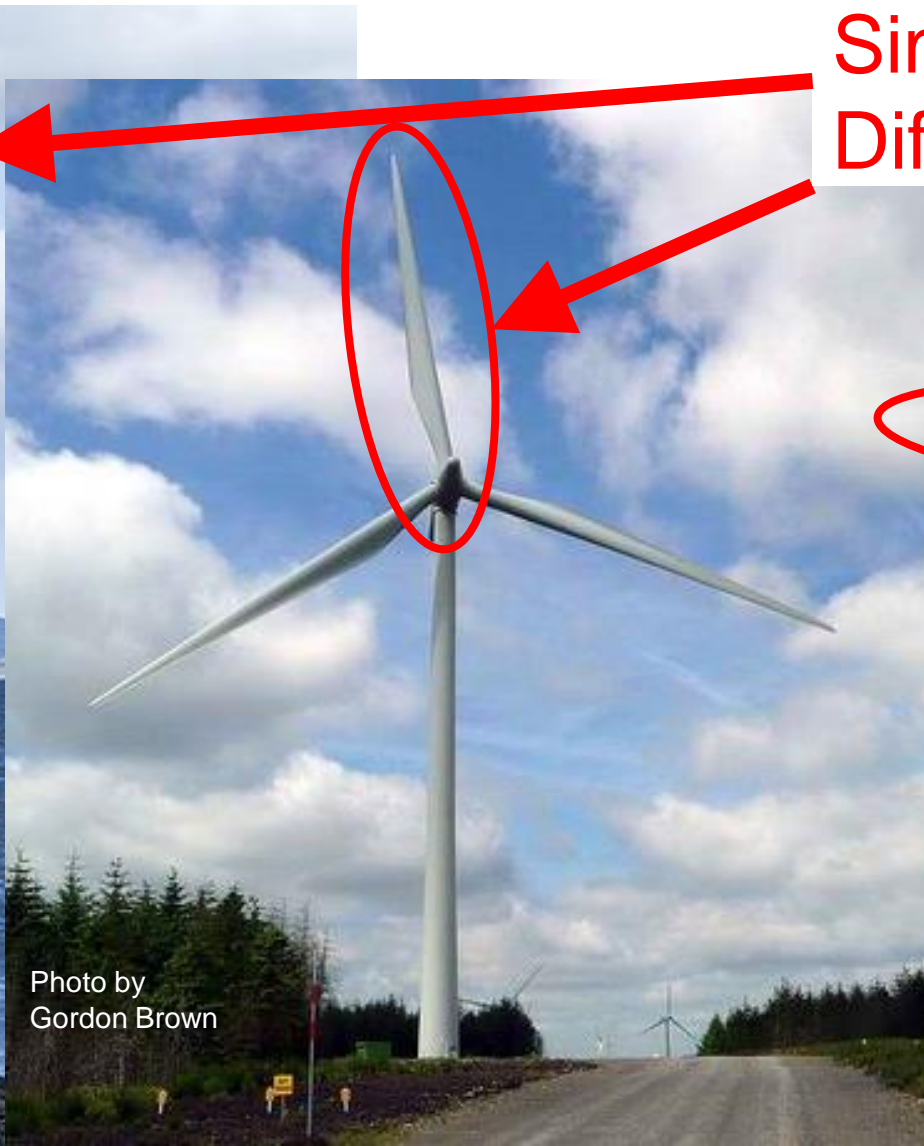
1.5 Megawatt Turbine (2005)



Similarities??
Differences??



3-7 Megawatt Turbines (Now)



Similarities??
Differences??

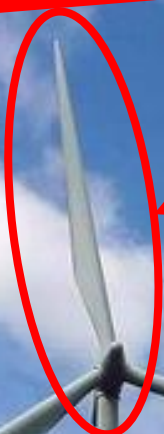


Photo by
Gordon Brown

Photo by William Starkey

How big are wind turbines?

Look at how they
have changed
over time...



1600-1800



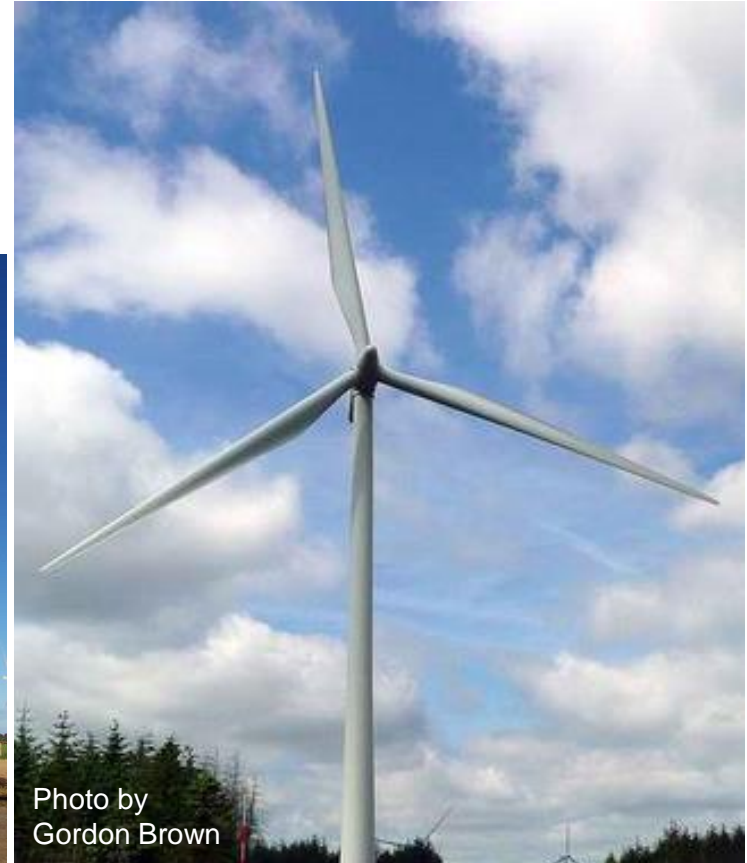
1900's



1970-1985



1990-2005



2014

How are you going to design your turbine blades?

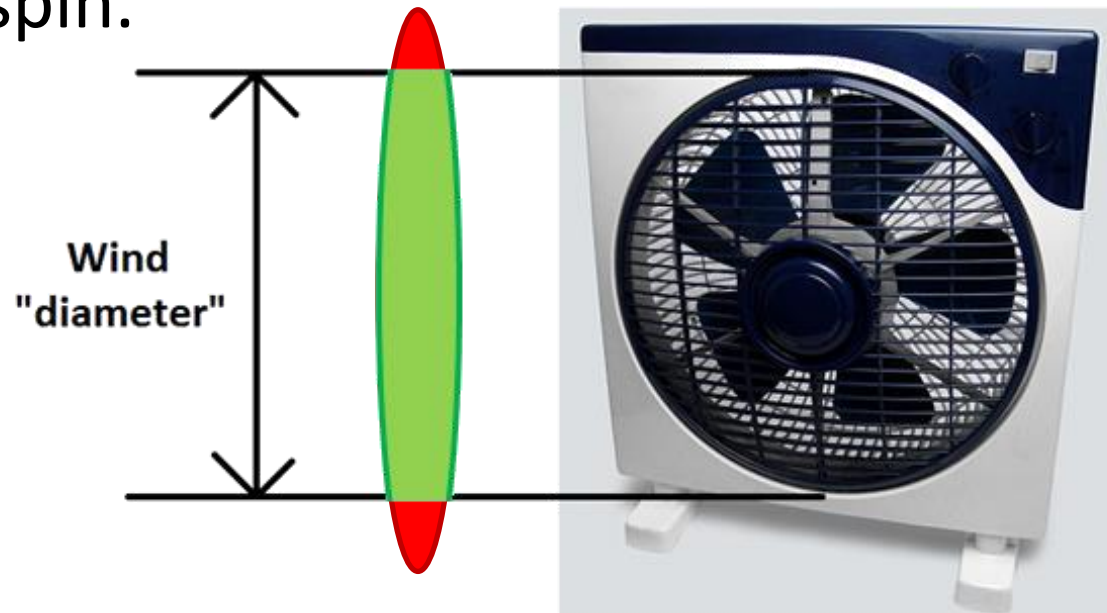
You can test...

- 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

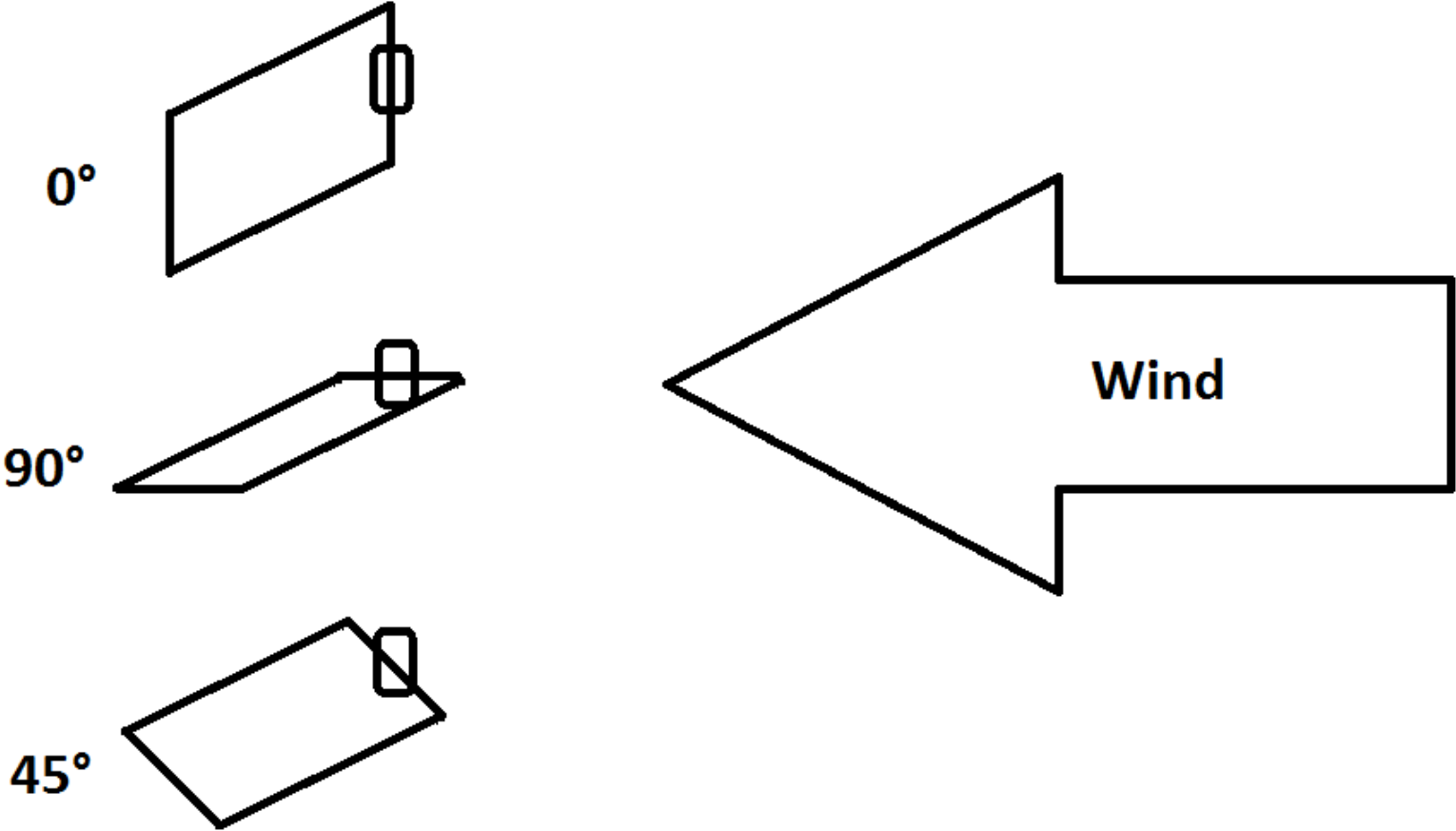
Flat or curved?



Middle or edge?



Blade Angle



Think about what will transfer the most energy!