

Cal Prep: Seema Desai, Carlos Lima, Michael Klein

Lesson Plan Outline

-Lecture on how wind turbines work

What are wind turbines used for?

Give examples (small/large)

How do they work?

-Wind pushes on blades, turning a generator, creating electricity

-Discussion of design equation

$\text{Power} = (\text{density of air}) * (\text{swept area}) * (\text{wind velocity})^3$

Opportunity to relate to electricity lessons → $\text{Power} = \text{work}/\text{time}$

What does this suggest will maximize the power of a turbine?

Which of the factors do you think matter most?

Briefly explain additional concepts? (angle of attack, lift, friction, etc.)

-Discussion of limitations

What might some problems be with wind turbines?

-Intermittent power

-Siting issues (location)

-Discussion of real-world set-up

If we want, show/discuss some actual wind farms

-Activity

Mentees are going to build a mock turbine

Will have the ability to control number, size, and angle of blades

Design challenge: maximize amount of weight turbine can lift

Suggested materials:

TINKERTOYS!

Cardboard tube for turbine chassis

Corrugated cardboard/foamboard for turbine blades

Tape/string

Some kind of weights

Fan