Solar and Wind Energy

The physical resource, technologies, and social/environmental issues

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Roof Mounted Solar Hot Water System

Typically, a homeowner might save up to $500.00 in the first year on water heating. Should pay for itself in 4-7 years.

Solar Parabolic Trough Concentrator Array near Boulder City NV

A section of the parabolic troughs from the Nevada Solar One project near Boulder City, Nevada. The site covers about 300 acres and contains 760 mirror arrays.
Credit: Acciona Solar

Concentrating solar power (CSP) technologies use USDOE EERE

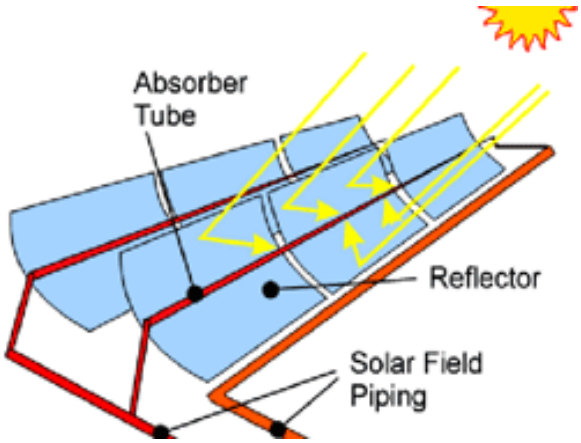


Figure 1. A solar collector assembly

Parabolic trough collector systems on solar trackers.

Solar Electric Generating Systems (SEGS)

The SEGS IV parabolic trough power plant in Kramer Junction, California.
Credit: Sandia National Laboratories

Power Tower

Heliostats reflect and direct sunlight onto the receiver at the Solar Two power tower in California.
Credit: Sandia National Laboratories / PIX 06051

Solar Thermal Power Tower

Aerial view of part of the National Solar Thermal Test Facility at Sandia National Laboratories, Albuquerque, New Mexico.
Credit: Sandia National Laboratories

These dish/Stirling units are being tested at Sandia National Laboratories in Albuquerque, New Mexico.
Credit: Sandia National Laboratories

Dish Solar Field R&D

The dish/engine solar field consists of a dish structure, the associated mirrors, and an engine at the focal point of the mirrored dish. Our R&D aims to support industry as it develops dish/Stirling systems for utility- and distributed-energy markets.

Concentrated Solar Power Distributed Generation

Four Infinia dish/Stirling systems are demonstrating that CSP can provide distributed power generation. I-2 kW scale
Credit: Infinia Corporation

Figure 1 The small-scale pilot Solar Tower plant constructed in Manzanares Spain consistently generated 50kW. It operated between 1982 and 1989.
(© 2001-2005 EnviroMission Ltd; RISE)

Solar Chimney

A standard PV array

Oregon Solar Energy Industries Association file photo

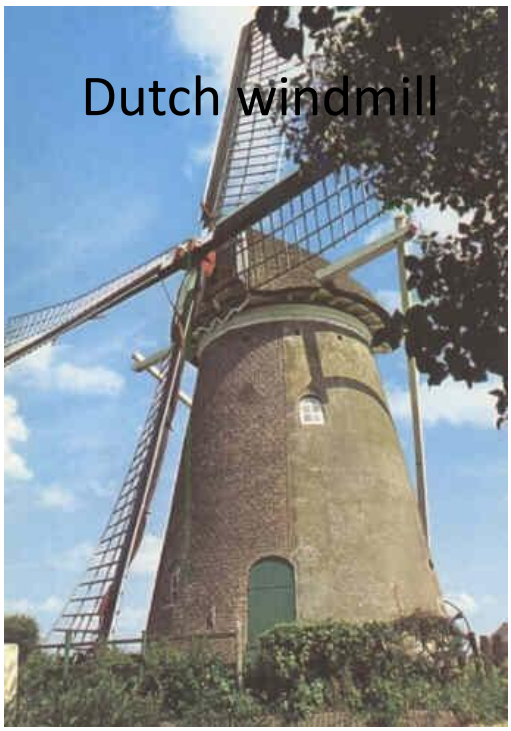
Free standing, tracking solar panels

These roof shingles are coated with PV cells made of amorphous silicon. When installation is complete, the PV shingles look much like ordinary roofing shingles, but they generate electricity.
The U.S. Department of Energy works to provide clean.

Photovoltaic Roofing Shingles

These roof shingles are coated with PV cells made of amorphous silicon. When installation is complete, the PV shingles look much like ordinary roofing shingles, but they generate electricity.
Photo credit: USDOE EERE

Early “WINDMILL” in Afghanistan (900AD)



Multibladed Wind Pump

Orientation

Turbines can be categorized into two overarching classes based on the orientation of the rotor

Vertical Axis **Horizontal Axis**

Types of Electricity Generating Windmills

Small (≤10 kW)
- Homes
- Farms
- Remote Applications

(e.g. water pumping, telecom sites, icemaking)

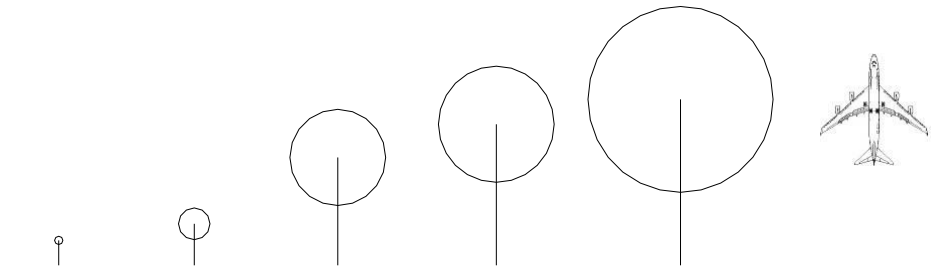
Intermediate (10-250 kW)
- Village Power
- Hybrid Systems
- Distributed Power

Large (250 kW - 2+MW)
- Central Station Wind Farms
- Distributed Power

Large Wind Turbines

- 450’ base to blade
- Each blade 112’
- Span greater than 747
- 163+ tons total
- Foundation 20+ feet deep
- Rated at 1.5 – 5 megawatt
- Supply at least 350 homes

Wind Turbine Technology



North Wind HR3
rating: 3 kW
rotor: 5 m
hub height: 15 m

North Wind 100
rating 100 kW
rotor: 19.1 m
hub height: 25 m

Lagerwey LW58
rating: 750 kW
rotor: 58 m
hub height: 65 m

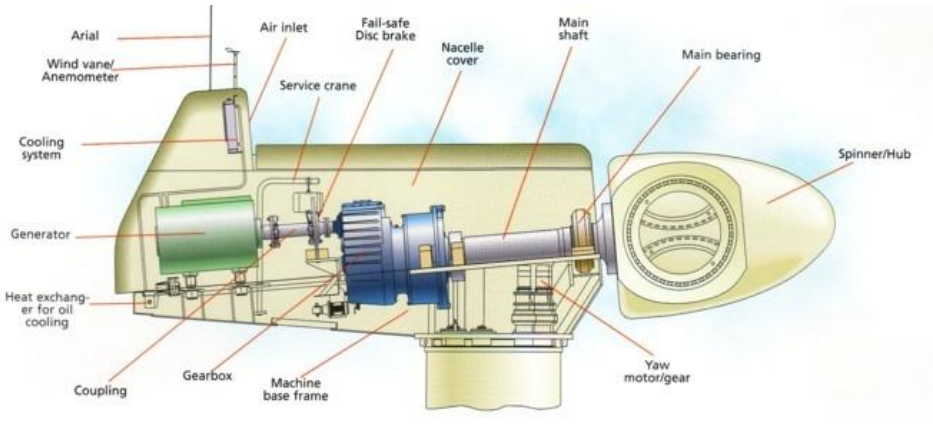
Enercon E-66
rating: 1800 kW
rotor: 70 m
hub height: 85 m

Enercon E-112
rating: 4000 kW
rotor: 112 m
hub height: 100 m

Boeing 747
wing span: 69.8m
length: 73.5 m

Comparative Scale for a Range of Wind Turbines

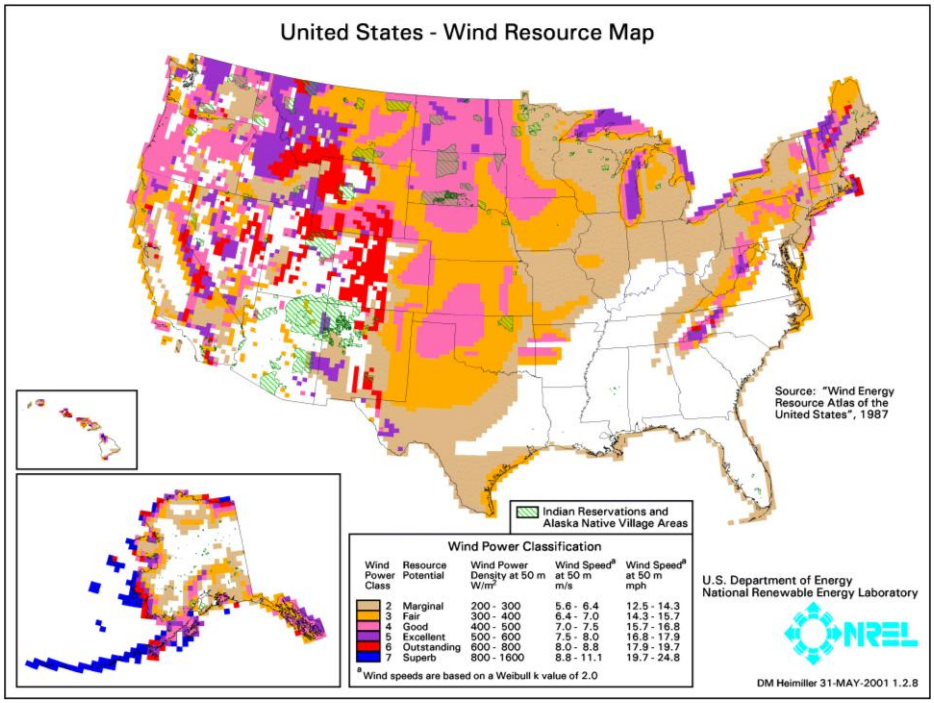
Inside a Wind Turbine



What is “Renewable Energy?”

Middelgrunden

Off-Shore Windfarms



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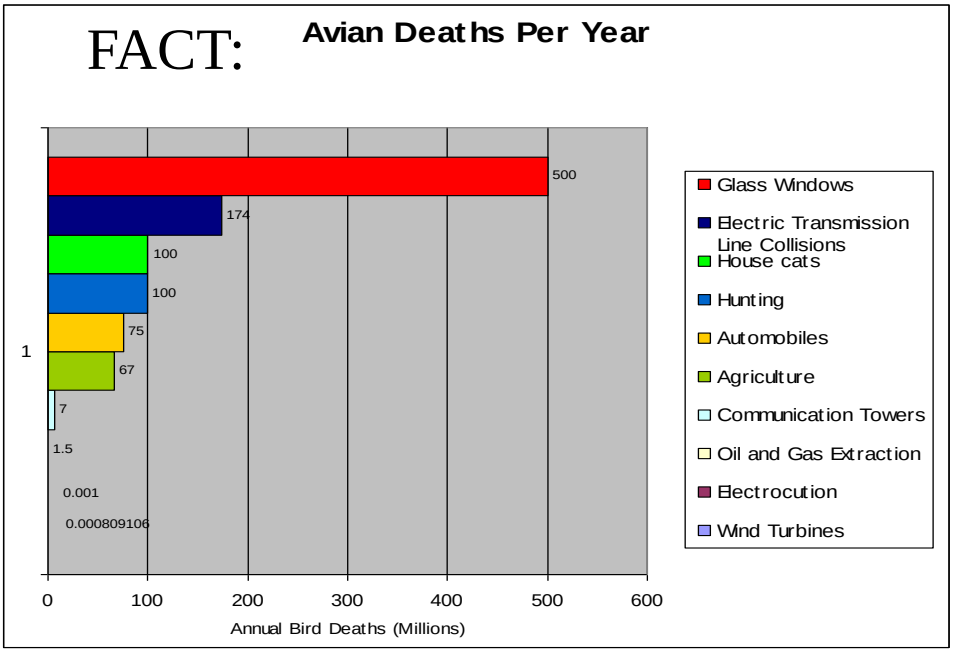
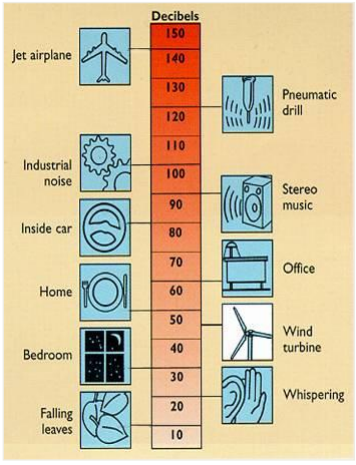


Impacts of Wind Power: *Noise*



- Modern turbines are relatively quiet
- Rule of thumb – stay about 3x hub-height away from houses

Go to Hull or Searsburg & listen!

Note: Searsburg turbines are older & a bit louder than many modern turbines

Carnage!


What do you want in your backyard?

Operations/ Maintenance

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