

Lean MEAN Green energy machines!



Nuclear Power Vs. Wind Power

A renewable energy SHOWDOWN.

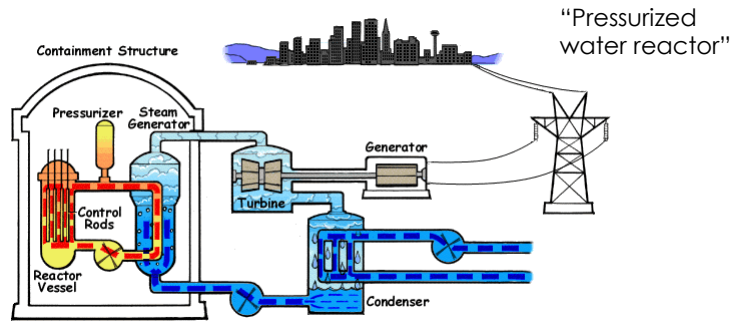
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What Is Nuclear Power? How Does It Work?

- Small amount of mass converting to energy
 - Act of fission (commonly used in nuclear reactors)
 - Nucleus of atom absorbs neutron, destabilizes, splits into 2 ~equal nuclei
 - Release of large amount of energy
 - Act of fusion (not safely harnessed as of yet)
 - Fusing together two nuclei
 - Needs as-of-yet unsustainable temperature
 - 1,000,000 degrees C+!!!!!!
 - Hydrogen bomb can create conditions

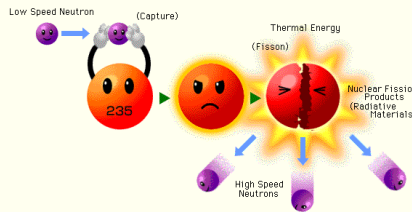
Reactor Model



Fission Model

Nuclear Fission

Nuclear fission is the process by which heavy elements split to form lighter elements, giving off energy. A common example is the fission of uranium in reactors. How does it work? A low speed neutron is absorbed by a uranium-235 molecule, causing it to destabilize and split into various nuclear fission products, such as barium and krypton. When the uranium molecule fissions into these products, energy and high speed neutrons are released.



Uranium 235 fisses, giving off energy, fission products, and high energy neutrons.

- When nucleus splits, released components have slightly less mass than original total
 - Difference converted to energy ($E=mc^2$)
 - Creates potential chain reaction

What Are Advantages of Using Nuclear Power?

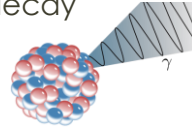
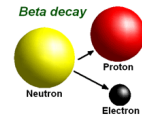
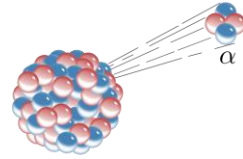
- Does not create byproducts that add to global warming and acid rain
 - fossil fuel burning does
 - Releases carbon, CO₂
- Cost effective
 - Plant pays self off in under 2 years
- Uranium is an abundant resource (and cheap!)
 - Future plants will use thorium, plutonium

What Are The Disadvantages of Using Nuclear Power?

- High potential for nuclear radiation release
 - ex: Japan earthquake incident
- Lack of ability to dispose of nuclear waste properly
 - About 1/3 of material annually used in reactors becomes waste
 - Can take potentially 1,000s of years to become inert and lose radioactivity
- **Biological danger!**
 - Cause cancer, birth defects,

Radioactive Decay

- Process by which radioactive materials spontaneously disintegrate
 - Alpha decay: nuclei split, release helium atom
 - Beta decay: electron or positron emitted (nuclear charge becomes positive or negative)
 - Gamma decay: electromagnetic decay (photon released)

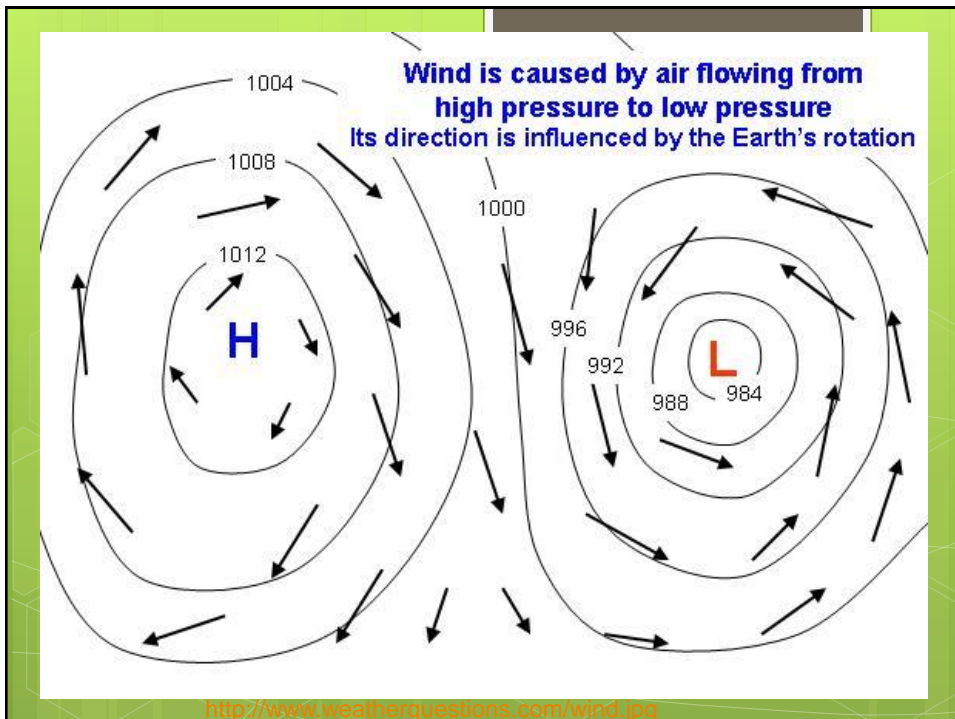
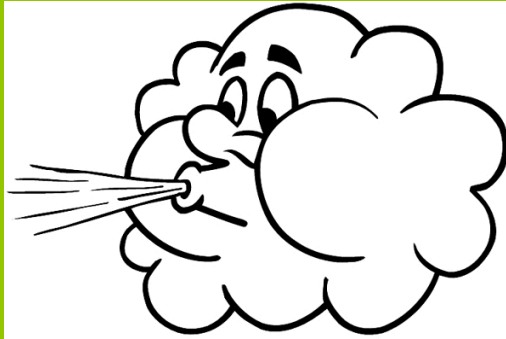


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“Wind power or wind energy describes the process by which the wind is used to generate mechanical power or electricity.” -U.S. Department of Energy

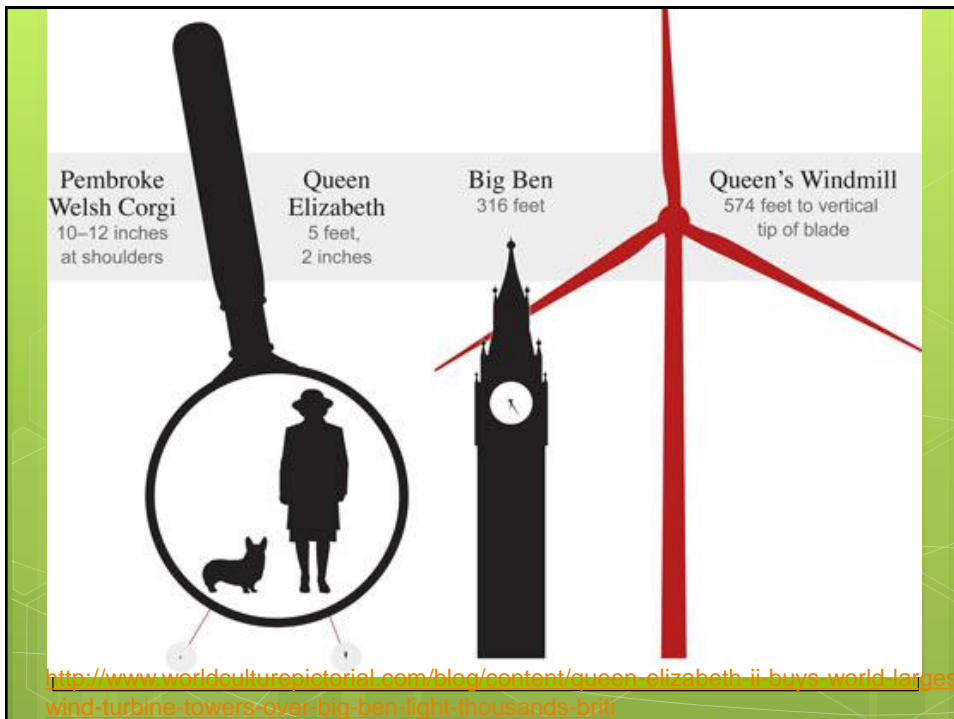
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We need the all powerful wind!! But
where does the wind come from...?

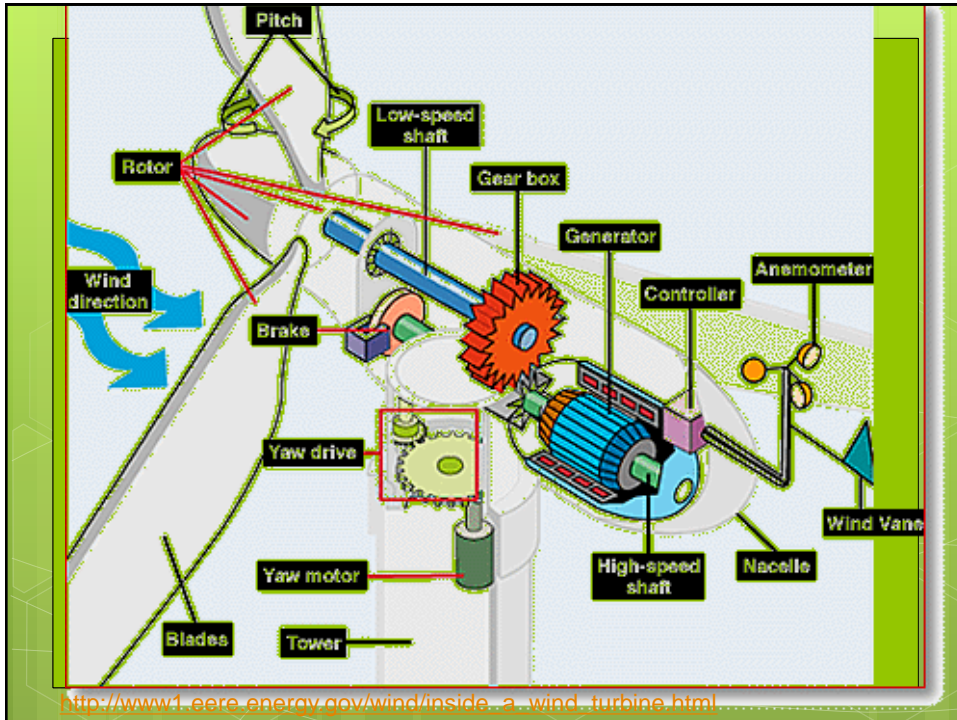




http://i.telegraph.co.uk/multimedia/archive/01082/wind-farm_1882864b.jpg



<http://www.worldculturepictorial.com/blog/content/queen-elizabeth-ii-buys-world-largest-wind-turbine-towers-over-big-ben-light-thousands-brit>



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The United States Department of Energy
made a video for you... :)

<http://www.youtube.com/watch?v=tsZIT3eQFR0&hd=1&t=48s>

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- Wind is FREE!!!
- After turbines are manufactured, they are not responsible for any greenhouse gas emissions. Wind power is GREEN.
- Each turbine, only take up a small portion of land.
- Remote areas that have trouble connecting to electrical ~~Text~~ can benefit largely from wind power.
- Wind power can be utilized in both developed and underdeveloped parts of the world.
- Wind turbines come in many different sizes, and they can fill small or large needs.
- Wind power is a domestic energy source! Go USA!
- Wind Power relies on wind, which is a renewable resource! Won't disappear!
- Wind Power is the LEAST expensive renewable energy today.
- Wind Power can add economic value to rural areas.
- Wind Power Plant owners have to pay farmers rent for use of their land.
- Wind Farms can double as agricultural space.

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The Benefits of 20% Wind Energy by 2030

According to the American Wind Energy Association, if we increase our nation's wind energy capacity to 20% by 2030, it would...

Reduce Greenhouse Gas Emissions

"A cumulative total of 7,600 million tons of CO₂ would be avoided by 2030, and more than 15,000 million tons of CO₂ would be avoided by 2050."

Conserve Water

"Reduce cumulative water consumption in the electric sector by 8% or 4 trillion gallons from 2007 through 2030."

Lower Natural Gas Prices

"Significantly reduce natural gas demand and reduce natural gas prices by 12%, saving consumers approximately \$130 billion."

Expand Manufacturing

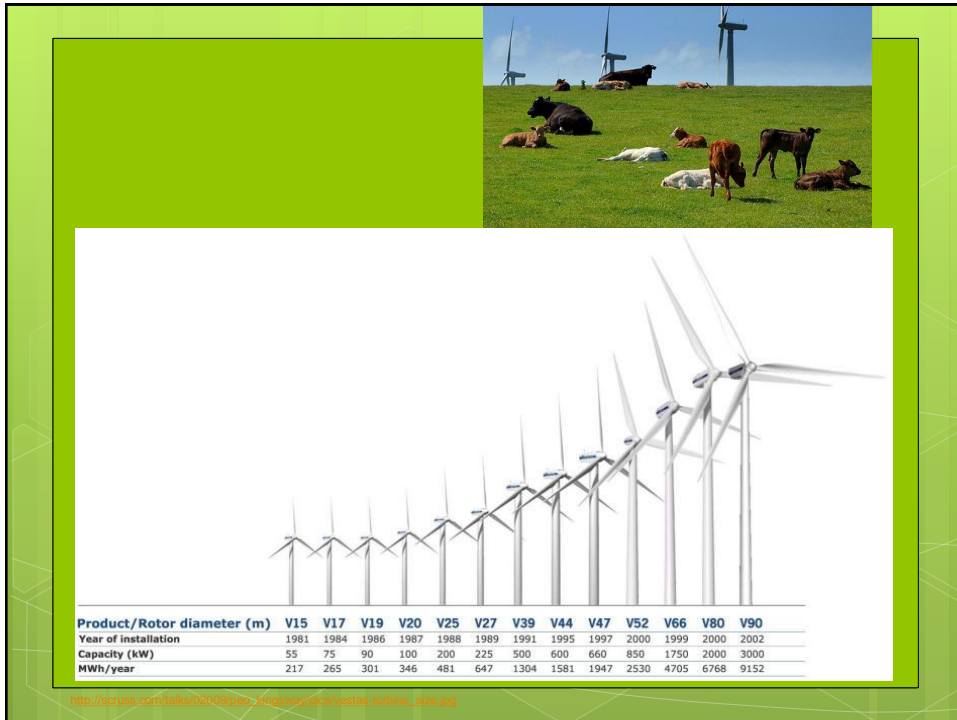
"To produce enough turbines and components for the 20% wind scenario, the industry would require more than 30,000 direct manufacturing jobs across the nation (assuming that 30% - 80% of major turbine components would be manufactured domestically by 2030)."

Generate Local Revenues

"Lease payments for wind turbines would generate well over \$600 million for landowners in rural areas and generate additional local tax revenues exceeding \$15 billion annually by 2030. From 2007 through 2030, cumulative economic activity would exceed \$1 trillion or more than \$440 billion in net present value terms."

Wind energy offers many advantages, which explains why it's the fastest-growing energy source in the world. Research efforts are aimed at addressing the challenges to greater use of wind energy.

http://www1.eere.energy.gov/wind/wind_ad.html



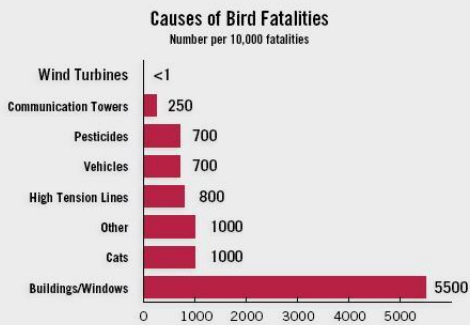
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- Wind is not consistent.
- Wind farms are not effective in just any location.
- Some of the best land is expensive.
- Some consider turbines "unsightly"
- Has been responsible for many bird and bat deaths!
- Can effect television reception if live close to turbines
- Noisy "swooshing sound".
- High initial investment is needed.
- Some pollution is produced in manufacturing of turbines.
- Large farms are needed for entire community's to benefit.
- Wind often blows best away from major population centers.
- Transmission lines must be built to distribute power.
- There is not yet a cost effective way to store excess power.
- Land used for wind energy development has to compete with other types of use for the land, sometimes more highly valued.

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http://www.windpoweringamerica.gov/wind_installed_capacity.asp

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Source: Erickson et al., 2002, Summary of Anthropogenic Causes of Bird Mortality.

http://www.ecoethic.com/news/2009/11/10/wind_turbines_birds.asp

Compare and Contrast

--Both are clean energy

No Greenhouse Gases

--Mechanism

NP: Chemical Substances <Uranium - 235 plutonium - 239 uranium - 233>

Fission/ Fusion In the Reactor

Electric Power

WP: Air Flow – Generator – Electric Power

--Both influenced by The geography

Compare and Contrast

Environmental Risk

NP: little of waste but very dangerous

Require Facility -- cost

WP: No Waste

Routine Maintenance in the electric
grid- cost

Regulation & Ownership