

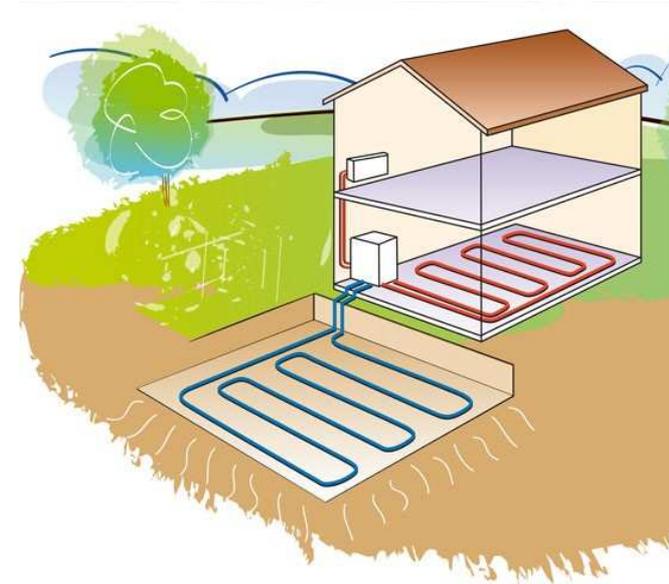
Wind energy



Renewable energy

=

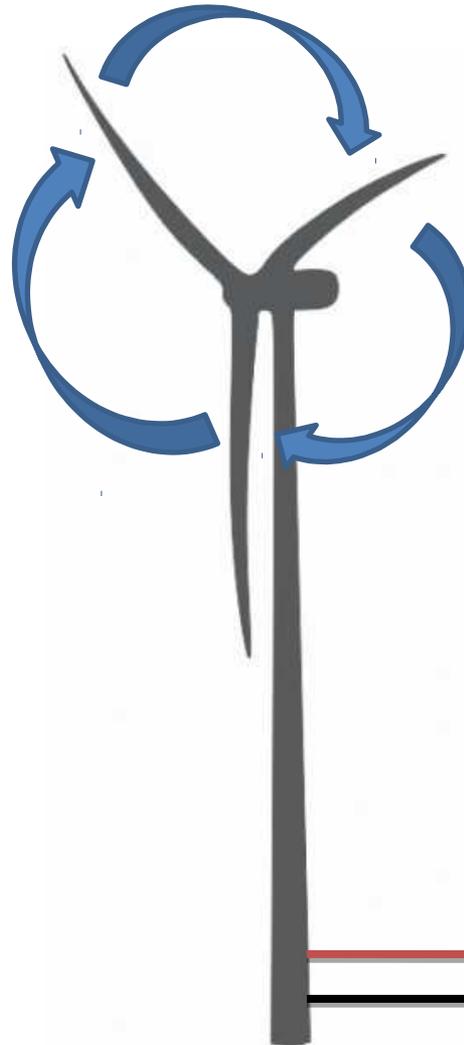
naturally occurring, inexhaustible source of energy from rain, biomass, wind, sun, and geothermal heat.



Wind energy explained



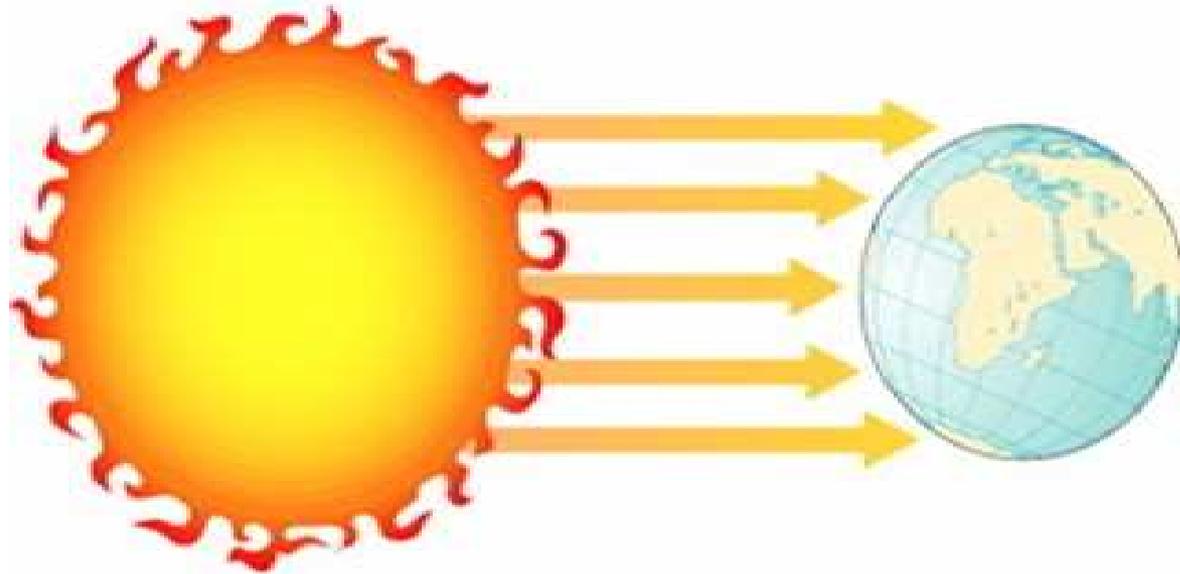
Wind



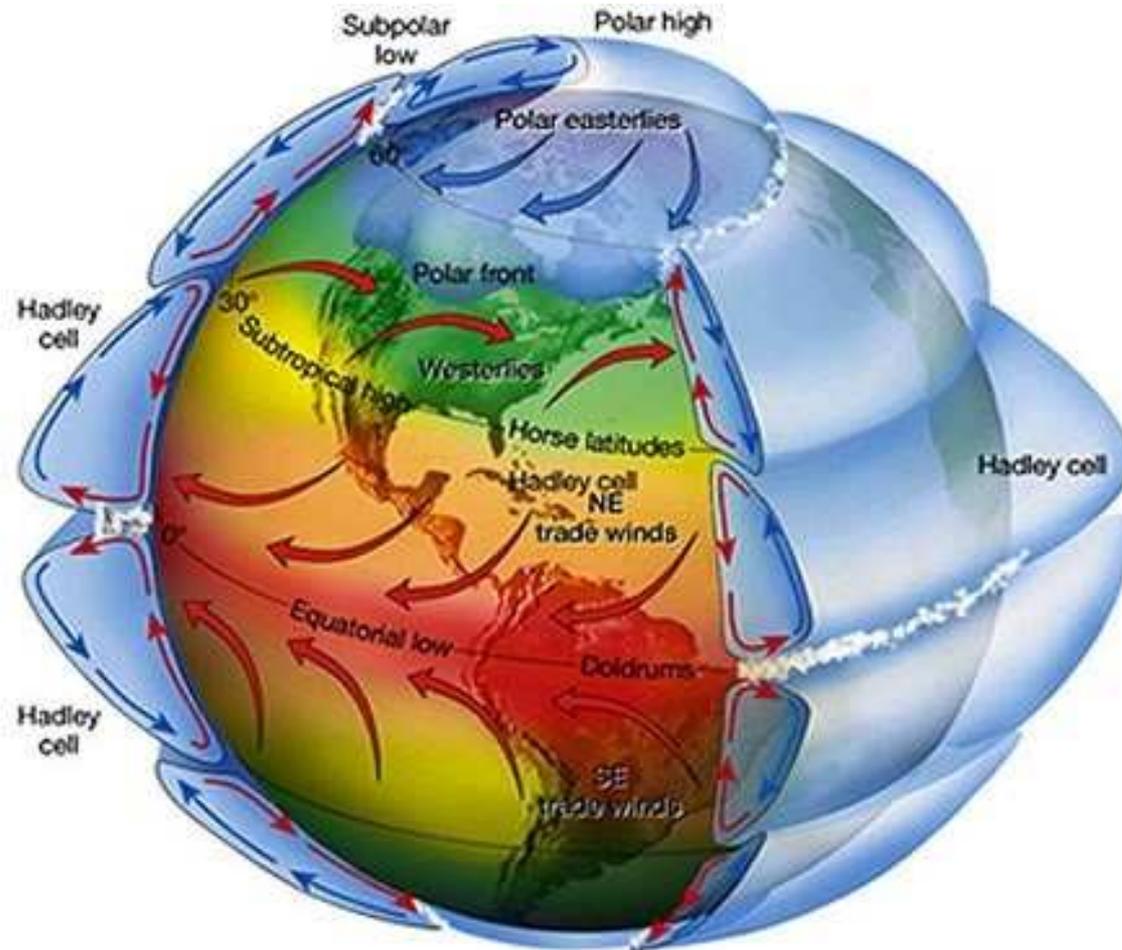
Electricity

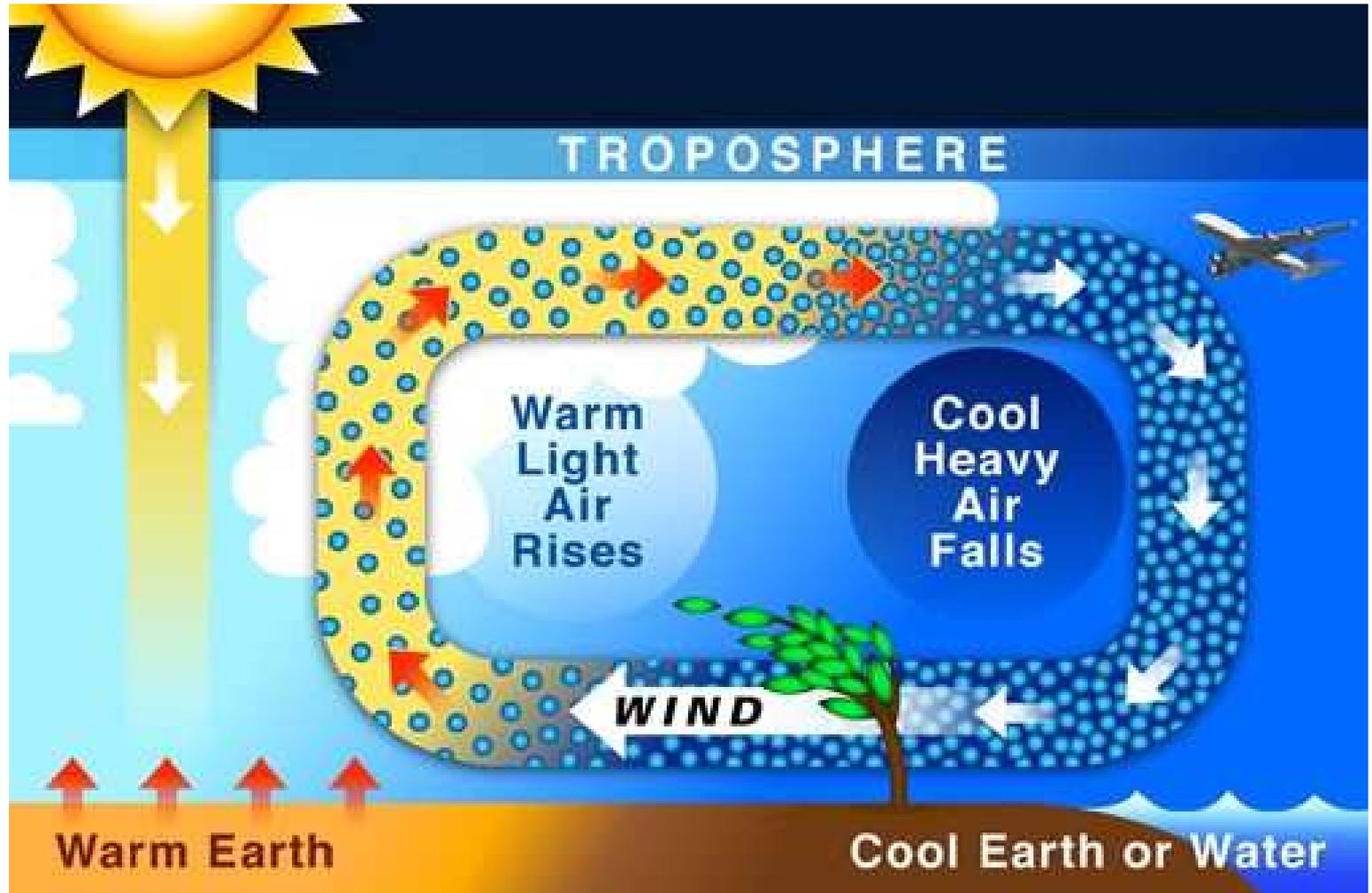


**the sun heats the planet earth
the earth tries to equalize its temperature**

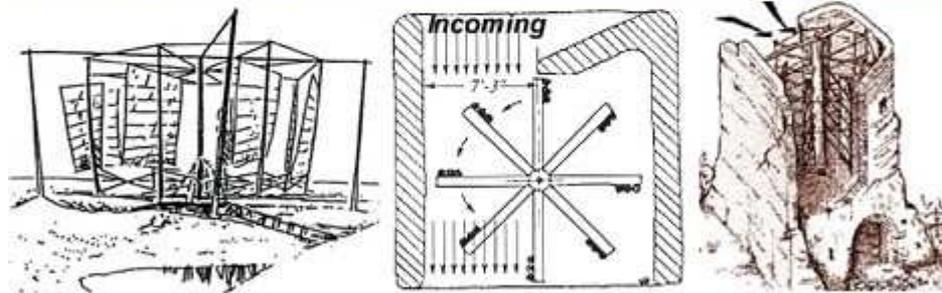


the sun heats the planet earth
the earth tries to equalize its temperature





For thousands of years man has used the energy from the wind



Persia, 500 AD

Transform grain to flour



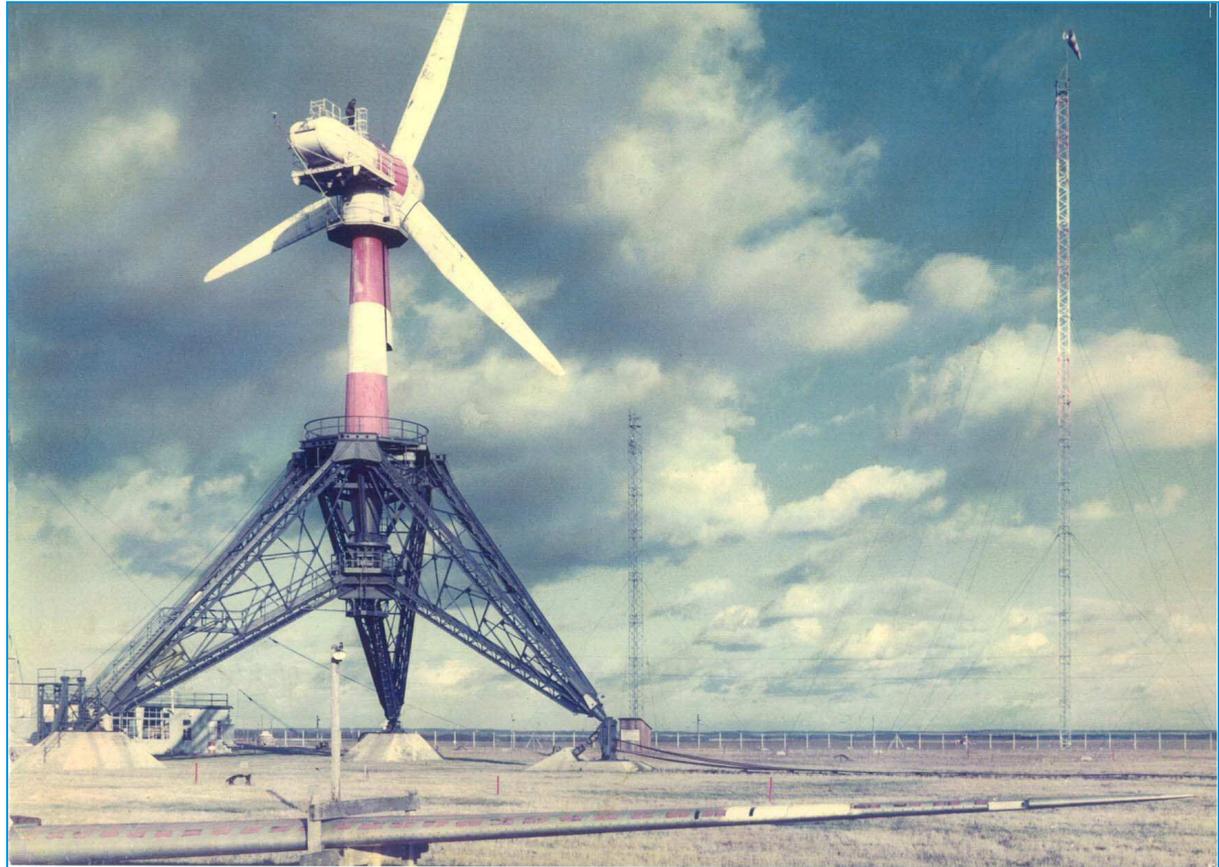
France, 1200

Producing electricity



France, 1930s

Producing electricity

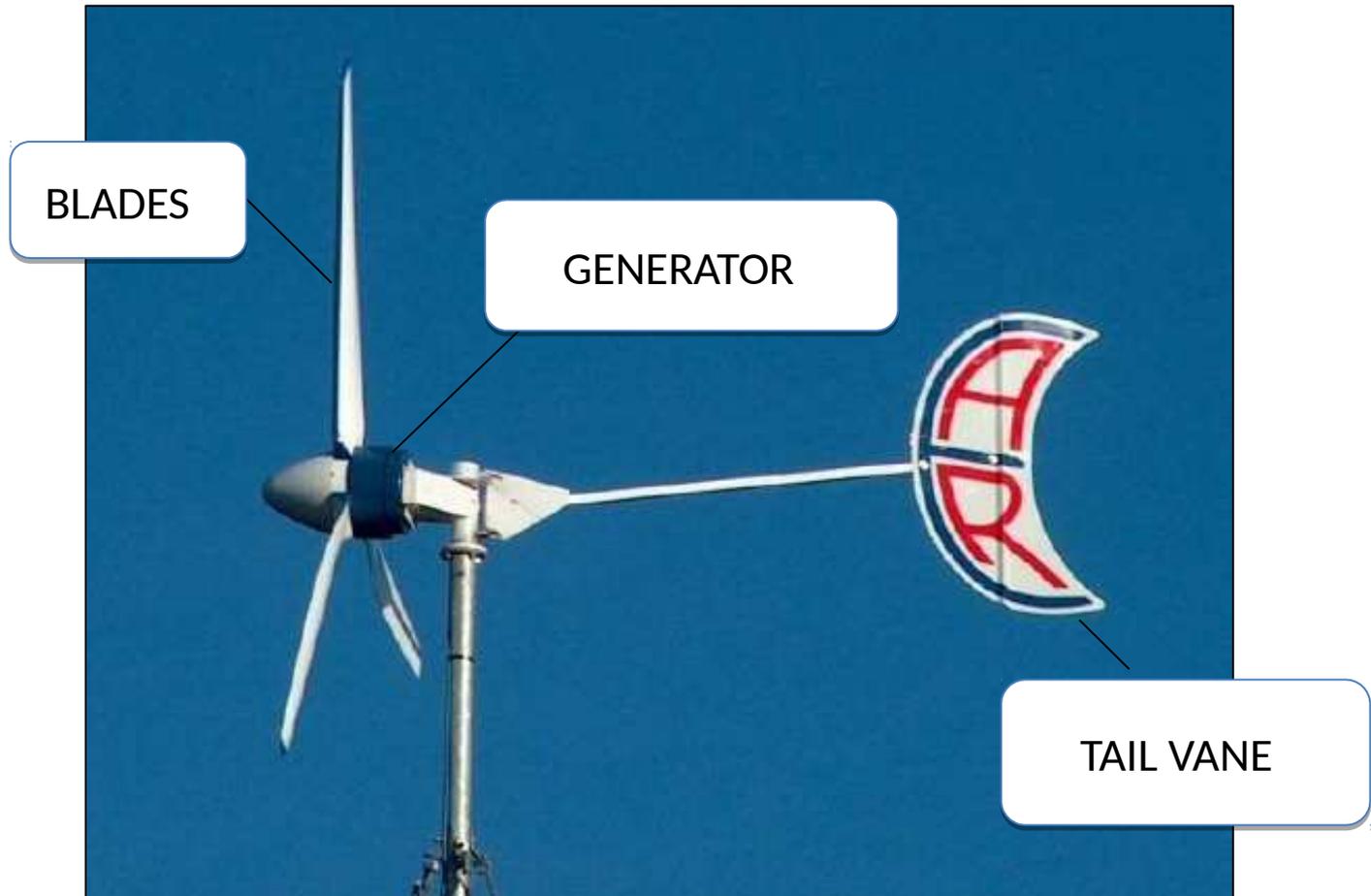


France, 1960s

**France produced 4% of its electricity with
wind power in 2016**



Small wind turbine



Energy in the wind

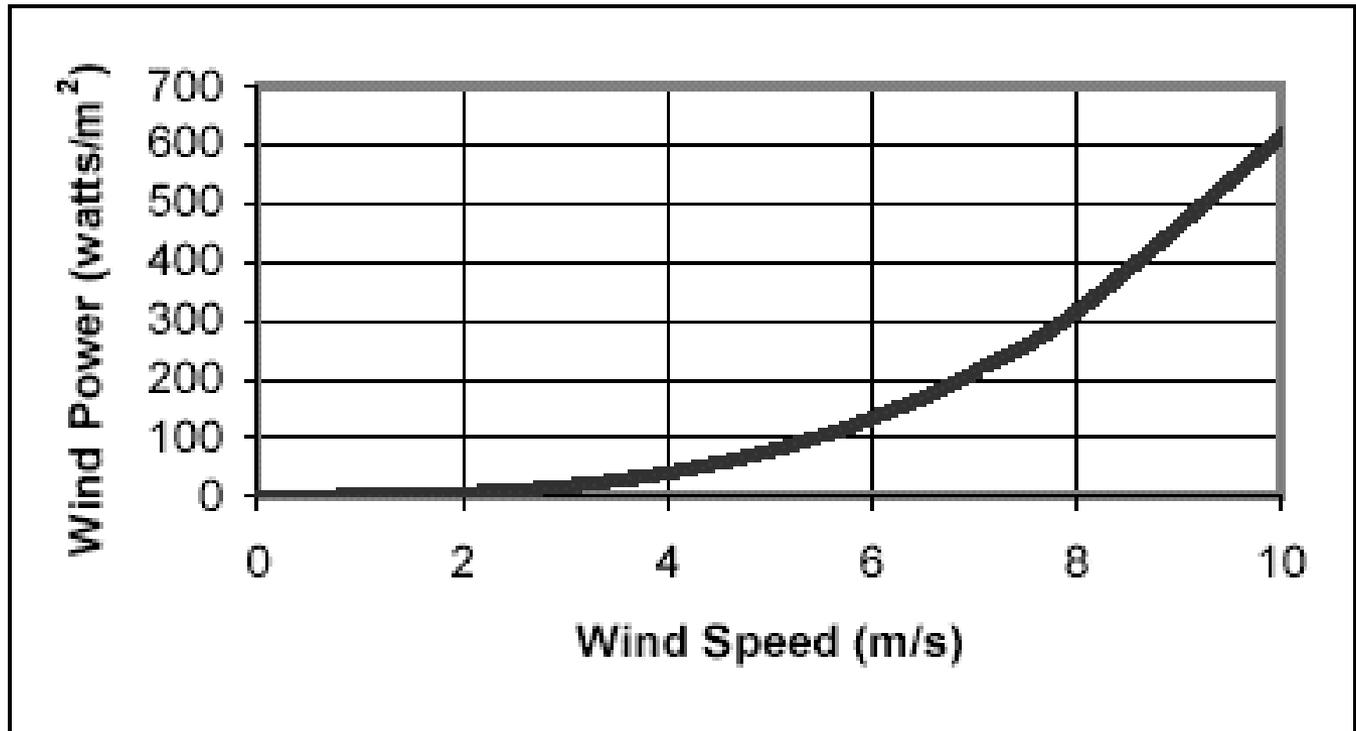
$$P = \frac{1}{2} \rho S$$

$V^3 C_p$

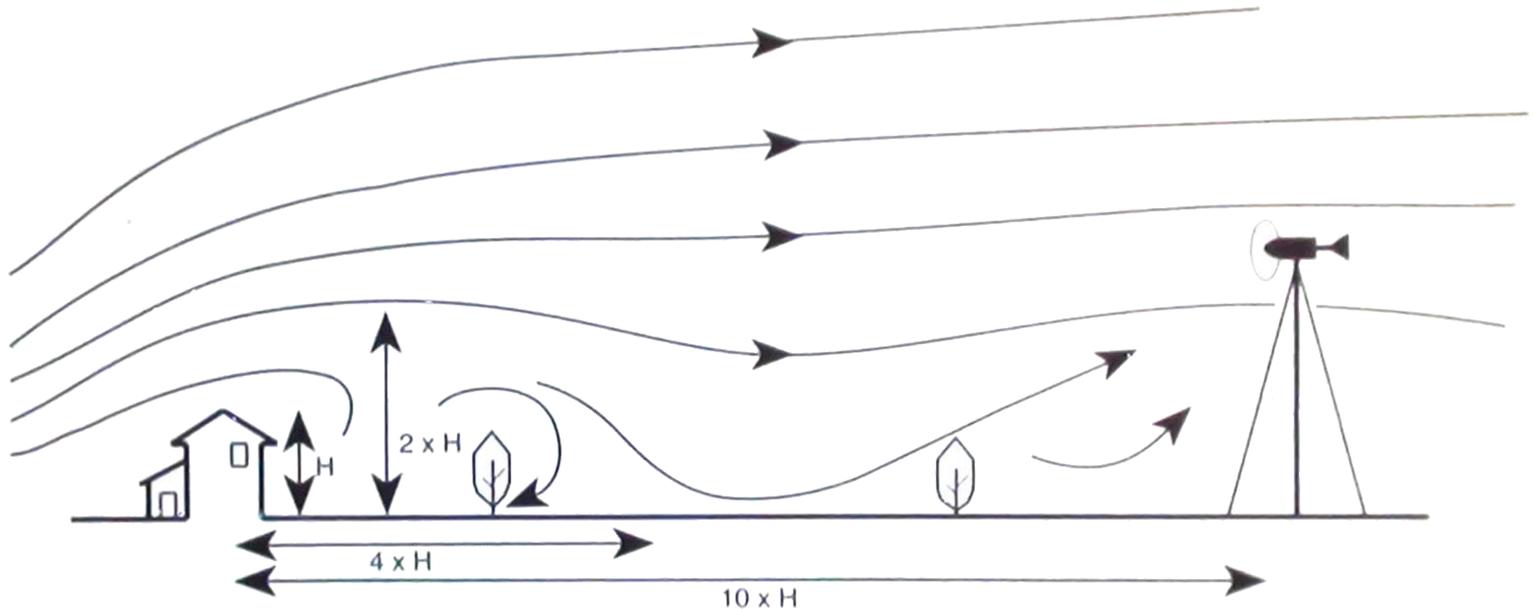
- ρ = air density (1,225 kg/m³)
- S = surface (m²)
- V = wind speed (m/s)
- C_p = coefficient of power (< 59%)



Small changes in wind speed make big changes in energy produced



Tower height



Small changes in wind speed, make big changes in the energy produced.

93% more energy in the wind at 5m/s than at 4 m/s

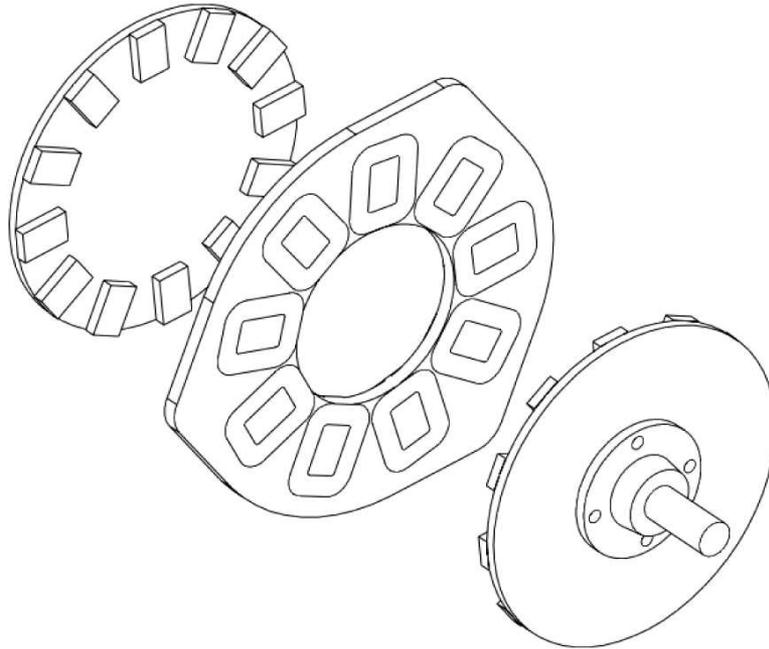
**Since 2004, we've been teaching people to
build small wind turbines**



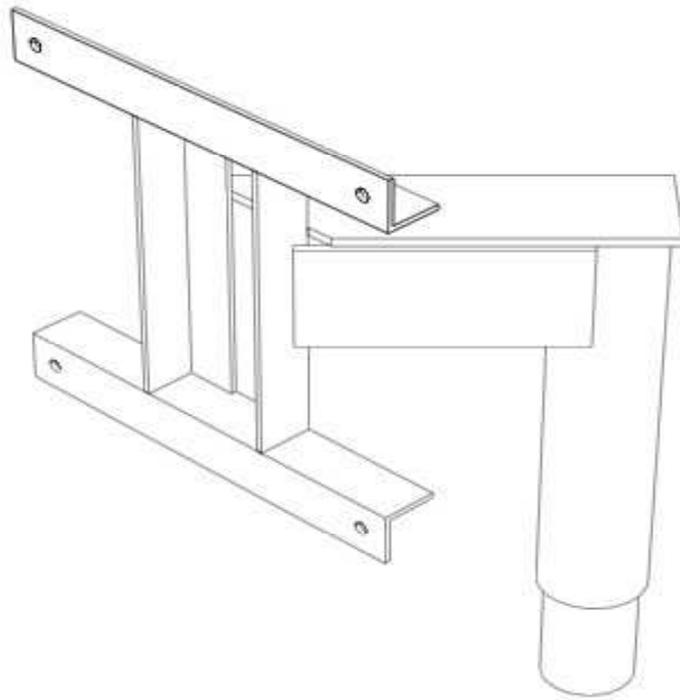
Building wooden blades



Building the generator



Building the nacelle



Raising the turbine



Using energy





Cool stuff...



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