

ERG C100

- **Capacity Factor** - the ratio of the actual output of a power plant over a given period of time to its potential output if it were to operate at maximum capacity over that same time interval. Capacity factor describes to what degree a power plant operates (how often or at what output level).

Total Energy = PowerOutput(Nameplate Capacity) × Time × CapacityFactor

- **1st Law Efficiency** - the ratio of useful work produced (electricity, or electricity and purposeful heating in the case of cogeneration) to the amount of primary energy put in to the power plant to produce that useful work. Efficiency describes how well a power plant converts energy from one form into another.

- **High Voltage Transmission** - high voltage is used for

transmission of electricity because $P_{loss} = I^2 \times R$, which means that line losses increase at the current over the line goes up. Thus, we'd like to reduce current to reduce line losses. Power = Voltage x Current, meaning that if power flow is fixed, there is an inverse relationship between voltage and current. If we want a smaller current value at a fixed power flow, then the voltage has to increase. In sum, high voltage means low current, which in turn means smaller transmission losses.

- **Benefits/Pitfalls of using Biofuels for**

Transportation - *potential benefits*: Lower lifecycle carbon emissions (cellulosic ethanol), reduced dependence on foreign oil (US context), liquid fuels can work with existing vehicles

and fueling infrastructure.

potential pitfalls: Competition between food and fuel (increased food prices), indirect land use change, depletion of soil nutrients or increased use of artificial fertilizers

- **Electricity industry's development from Edison's small decentralized utility model to one of large centralized power stations**

- Scales of economy and improving efficiencies meant that electricity could be produced more cheaply by larger turbines. The development of alternating current allowed electricity to be transmitted over longer distances with less loss.
