

$1 \text{ cal} \simeq 4.2 \text{ J}$      $1 \text{ kcal} = 1 \text{ (food) Cal (weird!)}$      $1 \text{ J} = 10^7 \text{ erg}$   
 $1 \text{ hp (horse power)} \simeq 746 \text{ W}$   
 $1 \text{ kWh} = 3.6 \cdot 10^6 \text{ J (I pay \$ 0.1/kWh)}$

Energy Consumption

the World  *$6.0 \cdot 10^9$  people*  $\simeq 4 \cdot 10^{20} \text{ J/year}^*$   
 Human body heat  $\simeq 100 \text{ W}$   
     equivalent to  $\simeq 2 \cdot 10^6 \text{ cal/day}$   
     equivalent to  $\simeq 2 \cdot 10^3 \text{ Cal/day}$   
     equivalent to  $\simeq 10^7 \text{ J/day}$   
 Common Light Bulbs  $\simeq 40 - 200 \text{ W}$   
 My home (Electric, yearly average)  $\simeq 500 \text{ kWh/month}$   
     equivalent to  $\simeq 2 \cdot 10^9 \text{ J/month}$   
 My home (gas, yearly average)  $\simeq 2 \cdot 10^9 \text{ cal/month}$   
 cars  $\simeq 180 \text{ hp (max speed)}$   
     equivalent to  $\simeq 1.3 \cdot 10^5 \text{ W}$   
     my 30 gallon/month gas consumption  $\simeq 4 \cdot 10^9 \text{ J/month}$

---

\* Available Fossil Fuel on Earth  $\simeq 2 \cdot 10^{23} \text{ J}$

---

Energy Production

Sun  $\simeq 4 \cdot 10^{26} \text{ W}$   
 Solar Energy at Earth Distance  $\simeq 1.4 \cdot 10^3 \text{ W/m}^2$   
 Power Plants (fossil fuel and nuclear)  $\simeq 10^9 \text{ W}$   
 Hydrogen Bomb (10 Mega Ton)  $\simeq 4 \cdot 10^{16} \text{ J}$