6. a) 100 Quads = 10^{17} BTU   (1 kwH = 3400 BTU)

$$\frac{10^{17}\ \text{BTU}}{3400\ (\text{BTU/kwH})} = 2.94 \times 10^{13}\ \text{kwH}$$

half to electricity generation $= 1.47 \times 10^{13}$ kwH

30% efficient $\Rightarrow$ **4.4×10^{12} kwH of useable electricity per year**

b) $$\frac{4.4 \times 10^{12}\ \text{kwH}}{3 \times 10^{8}\ \text{people}} = 1.47 \times 10^{4}\ \text{kwH}$$ per person per year

$$\frac{1.47 \times 10^{4}/\text{yr}}{365\ \text{day/yr}} =$$ **40 kwH per person per day**

c) $$\frac{40\ \text{kw hours}}{\text{day}} * \left(\frac{1\ \text{day}}{24\ \text{hours}}\right) =$$ **1.67 kW per person**

↑ multiply by one!

7. a) 100 nuclear reactors × 1000 MW

$= 10^5$ MW $= 10^8$ kW

US electricity need: $1.67 \frac{\text{kW}}{\text{person}} * 3*10^8$ people

$= 5*10^8$ kW

⇒ We need 5× as many as we have

= 500 reactors

⇒ Would need to build 400 new reactors

b) 40,000 windmills $* \frac{1.5 \text{ MW}}{\text{windmill}} = 6*10^7$ kW

$5*10^8$ kW $- 6*10^7$ kW $= 4.4*10^8$ kW needed

$\frac{4.4*10^8}{6*10^7} = 7.33\times$ more

$7.33 * 40,000 = 293,200$ new windmills!