HW06

(1) $m_{water} = 55g = 0.055kg$

$\Delta T_{water} = 60°C - 20°C = 40°C$

$\Delta m = 0.5g = 0.0005kg$

$c_{water} = 4.18 J/g°C$

$$EC = \frac{Q}{\Delta m} = \frac{m c \Delta T}{\Delta m} = \frac{m_{water} c_{water} \Delta T_{water}}{\Delta m}$$

$$EC = \frac{(55g)(4.18 J/g°C)(40°C)}{0.5g} = 18{,}392 \frac{J}{g} = 18.4 \frac{kJ}{g}$$

(2) $mpg = 45 \frac{mi}{gal}$ Honda Civic Hybrid, 2015

$$COST = \$ \frac{4.00}{gal}\left(\frac{1 gal}{45 mi}\right)(80 mi)$$

$$COST = \$ 7.11$$

(3) $$\#\ barrels = \#bbl = \left(\frac{1 bbl}{5.8 \times 10^6 Btu}\right) 34.78 \times 10^{15} Btu$$

$$\#bbl = 6.0 \times 10^9\ bbl$$

(4) 4.3 to 11.8 billion bbl technically recoverable.

(5) 2014 consumption: $34.78\ Q Btu \left(\frac{1 bbl}{5.8 \times 10^6 Btu}\right) = 6.0 \times 10^9 bbl/year$

MIN: $\#years = \left(\frac{1 year}{6.0 \times 10^9 bbl}\right)(4.3 \times 10^9 bbl) = 0.72 years$ (MIN)

MAX: $\#years = \left(\frac{1 year}{6.0 \times 10^9 bbl}\right)(11.8 \times 10^9 bbl) = 1.97 years$ (MAX)

HW 06

2014 PRODUCTION: $18.32\ \text{QBtu}\left(\frac{1\ \text{bbl}}{5.8\times10^{6}\ \text{Btu}}\right) = 3.16\times10^{9}\ \text{bbl/year}$

MIN: $\#\text{years} = \left(\frac{1\ \text{year}}{3.16\times10^{9}\ \text{bbl}}\right)(4.3\times10^{9}\ \text{bbl}) = 1.36\ \text{years}$

MAX: $\#\text{years} = \left(\frac{1\ \text{year}}{3.16\times10^{9}\ \text{bbl}}\right)(11.8\times10^{9}\ \text{bbl}) = 3.73\ \text{years}$

(6) RESERVES: $36.4\times10^{9}\ \text{bbl}$

2014 CONSUMPTION: $34.78\ \text{QBtu}\left(\frac{1\ \text{bbl}}{5.8\times10^{6}\ \text{Btu}}\right) = 6.0\times10^{9}\ \text{bbl/year}$

$\#\text{years} = \left(\frac{1\ \text{year}}{6.0\times10^{9}\ \text{bbl}}\right)(36.4\times10^{9}\ \text{bbl}) = 6.1\ \text{years}$

(8) $\frac{40\ \text{kWh}}{\text{d}} \sim$ rate of automobile energy use.

* NOT BAD FOR LIVING IN N. MANCHESTER

$\frac{\#\ \text{J}}{\text{d}} = \frac{40\ \text{kWh}}{\text{d}}\left(\frac{1\ \text{J}}{2.78\times10^{-7}\ \text{kWh}}\right) = 1.44\times10^{8}\ \text{J/d}$

$\frac{\#\ \text{Btu}}{\text{d}} = \frac{1.44\times10^{8}\ \text{J}}{\text{d}}\left(\frac{9.49\times10^{-4}\ \text{Btu}}{1\ \text{J}}\right) = 1.37\times10^{5}\ \frac{\text{Btu}}{\text{d}}$