Energy Efficiency Worksheet

Show all calculations with units

1. 3.2 tons of coal is used to provide enough heat to bring the temperature of 2.0 x $l0^5$ gallons of water up 30^0 F. The heat value of one ton of coal is 2.5 x10^7 BTU/ton. One gallon of water weighs 8 lbs and BTU's are calculated by multiplying pounds of water by their change in temperature in degrees Fahrenheit.

a. What is the input energy?

b. What is the useful energy?

c. What is the efficiency?

2. A cord of wood is used in a wood stove/fireplace to heat a house. If the transfer from the wood to the house is 70% efficient, how much heat will be delivered? The heat in a cord of wood is 2.0 x 10^7 BTU.

b. Where did the waste energy go? Look at a fireplace to figure this out.

3. a. Natural gas, with the heat content of 1030 BTU/ft^3 is used to produce electricity. If 4.5×10^6 ft^3 of natural gas is used, and the conversion is 65% efficient, how many kWh of electricity can be generated? One kWh = 3413 BTU.

b. If the electricity produced above is used to power an electric stove that has 79% efficiency, how many BTUs can be delivered by the stove?