Solar, Transportation

Schwartz Problem Set #7

Due Last day of class

1. Assume I was correct, that an electric car (or any other car) has a transportation efficiency of about 7.5 km/kWh, and that this is for a driving speed of 65 mph (please change to km/hr).
   a) Please find the rate of power delivered by the engine in Watts and HP.
   b) If a comparable gasoline driven gets mileage of 30 miles per gallon driving at 65 mph, please find the rate of power *intake* in the form of gas, and estimate the efficiency of this engine at this speed.
   c) Please find the mass of the batteries necessary to drive this vehicle 100 miles. Find it for lead-acid batteries, and also for lithium ion batteries. You will need to look up energy densities for the different battery types and convert units. There is a relevant slide in the transportation video.
   d) Given the power densities I have for batteries supplied in the videos, for the two above battery packs, what is the maximum power I could draw from the batteries? Is this power enough to kick ass or would I need some other energy storage device like a super capacitor? In order to answer this question, please look up the power of some car that has comparable mass.

2. Calculate the surface area of standard PV panels (15% efficiency) necessary for you to live your life. Please include the following consideration:
   a) We live in SLO and can anticipate the corresponding solar incidence.
   b) You continue to use electricity like always, and continue to drive like you always do, but in a (shared?) electric car.

   Please give your answer in square meters…. Does this area seem reasonable to you? Do you feel you are taking too much of the planet's surface area with this?
   c) Indicate what kind of lifestyle changes you would need to make in order to live like this.