APES Renewable Energy Fill-in lab:

Hot water heater

What is the power used by the hot water heater?

What is the voltage?

What is the current in amperes?

Multiply current by voltage, what do you get?

How many kW is this?

If this device ran for one hour, how much would it cost? ($0.35/kWh)

Solar Panel

What is the voltage of the panel?

What is the current of the panel? (you may instead use the resistance of the load and V2/R)

What is the power of the panel in watts?

Power in kW?

How many $ would this produce in optimum sunlight in one hour?

If this panel cost $800, how many hours would it take to recoup this investment?

How many days is this? Months? Years?

This is called Return on Investment or ROI, usually measured in years. If the panel were working for 25 years, how much money would you make overall in the lifespan of the panel? (this is called TCO or total cost of ownership)

Wind Turbine:

Your instructor will show you a wind turbine that outputs 400 Watts of power in optimum wind.
If this turbine produced wind 50% of the time, how many kWh would it produce in one day?

How much money is this?

If this turbine cost $800, what would be the return on investment?

If this turbine lasts 15 years, what is the TCO for this?

Solar Thermal Panel

You may have noticed that the dishes in the cafeteria are not always clean. One reason for this is wash water that is not up to the proper temperature. If you purchased a 1 meter by 4 meter solar panel that captured solar radiation of 800 W/m2, how many watts of power would this capture in optimum sunny conditions?

If this ran for 1 hour, how many kWh would it capture?

If this panel cost $800, what would be the ROI for this?

If this panel lasts 30 years, what is the TCO for this?

EROEI: Energy Return on Energy Investment: http://en.wikipedia.org/wiki/EROEI

Energy ROI is different from normal ROI, which can be applied to airplanes, amusement parks or any other business. If oil currently costs $80 per barrel, and costs you $20 to produce, what is your profit margin?

Ok, now what happens when the cost to prospect, drill and transport this oil rises?

Now imagine that the energy used to prospect, drill and transport the oil exceeds the amount of energy you can capture with that oil. What does this do to your concept of renewable energy? What would be your response?