EE 201 — HW 1.9   Name_____

According to the always fun www.eia.gov web site, the state of Iowa used about 166.9 trillion BTUs of electrical energy in 2017. (https://www.eia.gov/beta/states/states/ia/overview) Presumably, very little of this was from solar energy.

Calculate the total amount of land area that would have to be covered in solar cells if all of the electrical energy used in Iowa in 2017 was generated using solar cells. Express your answer in square miles (or square kilometers, if you prefer).   For reference, a typical county in Iowa is 24 mi x 24 mi = 576 sq. mi.

Pertinent information: A typical solar panel can produce about 300 W when the sun is shining on it. Assume that on average there will be only 4 hours of useful daylight each day. A typical solar panel covers an area of about 17.5 sq. ft. (a bit bigger than 5 ft. x 3 ft.), and don't include any spacing between the panels.

Total area = _____

If a typical solar panel costs $200 (not including installation), what would be the total cost for the solar panels that would supply all of the electricity for the state of Iowa?

solar panel cost = _____

Of course, to go all solar would require batteries to store the energy when sun was shining and supply it during the rest of the day. Using the assumptions above, the batteries would need to store 20 hours worth of energy every day. If building-sized batteries cost $500/kW·hr of storage capacity, what would be the total cost of the batteries needed to handle the entire state?

battery cost = _____

There are 3 million people that live in Iowa. What would be the cost per resident to buy the solar cells and batteries if the state were to switch completely over to solar energy?

cost/resident = _____

Write your answers — and whatever work will fit — on this sheet. Staple any sheets with additional work behind.