Advanced Building Science   Name: _____

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BBE 4415/5415   **Huelman**
Department of Bioproducts & Biosystems Engineering   **University of Minnesota**
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Lab 8. Residential Energy Loads, Consumption, and Costs (2.5 Points)

Finally -- this assignment will take you into the world of computer energy analysis for loads, energy consumption, and predicted energy costs. Use the building information from Labs 6. & 7. and the assumptions below to do your analysis.

Note: You will need to install REM/Rate from the Architectural Energy Corporation. You can access a downloadable demo version at their website [http://www.archenergy.com/products/rem/]. This demo version does not allow you to save or print, so you will need to complete the assignment in one session. Or you can install and register under the U of MN license. This will give you full functionality for one year, but must not be used for commercial purposes.

Assumptions:
        Use Minneapolis, MN
        Use default appliance and lighting loads; electric range and dryer
        Electricity is $0.11/kWh; $5.00 service charge per month
        Natural gas is $0.85/therm; $6.00 service charge per month
        Setpoints: 70 degrees for heating; 75 degrees for cooling with programmable setback
        Integrated space & water heating:
        Cooling: 13.0 SEER; 0.70 SHF; no ventilation cooling
        Ducts: Set default areas; Qualitative default + proposed reduced leakage (all in conditioned)
        Infiltration: Use blower door data (350 cfm @ 50Pa)

1. Once you have completed the inputs use the "quick calc" to complete the following:

Annual Loads (MMBtu/yr)   **Design Loads (kBtu/hr)**

  Space Heating   _____   Space Heating   _____
  Space Cooling   _____   Space Cooling   _____
  Water Heating   _____   Water Heating   _____

Annual Consumption (MMBtu/yr)   **Annual Costs ($/yr)**

  Space Heating   _____   Space Heating   _____
  Space Cooling   _____   Space Cooling   _____
  Water Heating   _____   Water Heating   _____
  Lights/Appliances _____   Lights/Appliances _____
  Photovoltaics   _____   Photovoltaics   _____
                                     Service Charges _____

  Totals   _____   **Totals**   _____

2. Compare the cooling loads and costs for this house using natural ventilation or whole house fans for natural cooling:

	Annual Load	**Design Load**	**Costs/Yr**
A. No Ventilation	_____	_____	_____
B. Natural Ventilation	_____	_____	_____
C. Whole House Fan	_____	_____	_____

3. What would the heating and cooling costs be if the setpoint temperatures were 72 degrees for heating and 74 degrees for cooling?

	Heating $/Yr	**Cooling $/yr**	**Total $/Yr**
A. Revised Setpoints	_____	_____	_____

4. Do a quick calc (showing your work) using the "heating degree day method" and "cooling degree day method". Compare and comment on your estimates compared to the results from REMRate above.

Estimated Heating Energy = _____ CCF

Estimated Cooling Energy = _____ kWh

5. Commentary: