Solar Expansion Questions

12/27/20221

Notes from Sonoma County Energy department consultation

Spoke with Elliot, former electrical/PV installer. Email Elliot and he will forward efficiency questions to his colleague Chris esp. #10 heat pump efficiency. Update presentation with answers first before sending. Also ask her about the rest of the heat pump system and overall efficiency, it may be worse than just the pump.

Send him presentation and spreadsheet on how to estimate added heat pump load from therms; add column with 95% furnace efficiency – added load will be lower, study COP more, include existing – “loads” spreadsheet

Separate presentation and spreadsheet on estimating power generation with batteries. Add columns for non-ideal fixed angle and shade. “PV generation and storage” spreadsheet. Add assumption of when loads are pulled; assume all when sun is not shining. Make 4-dimensional plot of solar panels, batteries, % from battery, cost, or 2 3D color plots.

Review contractors on SCP and SoCo then get bids.

Questions

1.) size grid interface

2.) Need to know how to install a transfer switch to reconnect the house directly to the grid when the Sol-Ark fails.

3.) Need to confirm that we don’t need a separate critical loads panel.

4.) Need to know how the Sol-Ark battery charging and discharging current can be gracefully cut back by the BMS in the event of an unbalanced cell or over-temperature instead of opening the contactor.

5.) Need to verify PV location is good since afternoon loss should mostly be made up by morning gain.

Create model for suboptimum angle using trig. Also setback 3’ from ridgeline and 1.5’ from sides – need to move some panels to above family room. No setback for garage.

6.) Need to research Solaria’s prospective longevity vs. LG which is top tier but from Korea not the US.

Sharp and BP don’t make panels any more, but Sharp still honors warranty and BP sold their warranty. Not sure about Solaria.

7.) Need to verify location: area, sun heating, can it be under the eaves in case of fire?

Yes it can be under eaves, but should be in shade. Doesn’t matter how far so put them in front yard under tree. Can’t put batteries in garage without smoke detectors and bollards to keep cars from hitting them, not desired, don’t have room. Add these notes.

8.) Need to verify using homemade batteries and BMS can be done legally to code, and won’t void the Sol-Ark warranty.

Suggests using a contractor for everything but the batteries - the part you can’t buy with used cells, the part that is really expensive and not mainstream yet, and to give Trevor an opportunity to be an entrepeneur. May need a professional engineer’s stamp which may be obtainable and good experience for Trevor.

9.) Need to verify location of heat pump; area, distance from duct system, can it be under eaves due to fire?

Can be wherever as far away or under eaves.

10.) Need to confirm that over half the house registers can be closed and doors to those rooms closed and with added temperature sensors the heat pump can continue to run efficiently given the small duct diameter.

Asked SCP 12/27

11.) Only a 5 year warranty; need to understand expected ongoing compressor repair costs, or look for an alternative with a longer warranty.

12.) Can we sell the used 8 year old furnace? It would be a shame to scrap it, but the PV and heat pump contractors should work together real time so both should be done at the same time instead of waiting for the furnace to die.

13.) Soft start so we can avoid a critical loads panel?

The Chiltrix has soft start and only runs at 3.6 kW max.

14.) Need to verify that heat pump alone for hot water is cost effective, and that a solar thermal preheater is not also needed which at 4’x10’ takes the space of 2 PV panels.

Asked SCP 12/27

15.) Can heat pump installation be DIY?

99.9% not DIY in Sonoma County, not encouraged.

16.) Select duct IF

17.) Select water heater

18.) Conduit routing

Make it as long as you want, just upsize cables.

19.) PV bid

20.) Heat pump bid

Asked SCP 12/27

Heat pump inquiry sent to SCP Advanced Energy Center contractors 12/27/2021:

We are ready to convert our 1955 home from natural gas furnace and water heater to an air source heat pump for cash. It needs to be a high efficiency system with no resistive backups and soft start so it can be powered by batteries charged by solar PV while disconnected from the grid. We need to know the overall heat pump system COPs so we can properly size the batteries and PV. We intend to close many of our registers to reduce our energy usage, but we have smaller ducts, so we need to know how efficiently the heat pump system will run with many registers closed. We also want to compare the installation and energy bill costs of heating our domestic water solely with the heat pump vs. adding thermal solar preheat.

Relevant SCP contractors:

|  |  |  |
| --- | --- | --- |
| All | 1 | Applied Building Science  |
|  |  | General (B) |
|  |  | Heating & Cooling; Water Heating; EV Charging; Solar Battery  |
|  |  | (707) 528-3468 jsutter@absnorthbay.com  |
|  |  |  |
| Part | 2 | Apperson Energy Management |
|  |  | General (B); Insulation (C2) Induction Cooking; Heating & Cooling;  |
|  |  | Water Heating; Insulation; Mini-Split Heat Pump; Air-to-Water Heat Pump  |
|  |  | (707) 485-0264 jim@appersonem.com |
|  |  |  |
|  | 3 | John Owens Services Inc  |
|  |  | General (B); HVAC (C20); Plumbing (C36); Electrical (C10) |
|  |  | Heating & Cooling; Water Heating  |
|  |  | (415) 456-2906 johnowensservices@gmail.com |
|  |  |  |
|  | 4 | Hatz Electric  |
|  |  | Electrical (C10) |
|  |  | Induction Cooking; Heating & Cooling; EV Charging; Solar Battery  |
|  |  | (844) 466-6640 office@hatzelectric.com  |
|  |  |  |
|  | 5 | Heatwave Systems  |
|  |  | Plumbing (C36) |
|  |  | Heating & Cooling; Water Heating; Air-to-Water Heat Pump; Heat Pump Water Heater; Smart Thermostat  |
|  |  | (707) 939-8482 joe@heatwavesystems.com  |
|  |  |  |
|  | 6 | Zero Energy Associates  |
|  |  | General (B); HVAC (C20) |
|  |  | EV Charging; Solar Battery |
|  |  | (707) 544-3900 info@zeroea.com |
|  |  |  |
|  | 7 | Advanced Alternative Energy Solutions |
|  |  | no license |
|  |  | EV Charging; Solar Battery |
|  |  | (707) 789-9537 info@aaes.biz  |
|  |  |  |
|  | 8 | SolarWinds Energy |
|  |  | General (B); Electrical (C10) |
|  |  | EV Charging; Solar Battery |
|  |  | (888) 866-8117 x101 cbradley@solarwinds-energy.com |
|  |  |  |
|  | 9 | Kingdom Minded Electric Inc |
|  |  | General (B); Electrical (C10) |
|  |  | Induction Cooking; Heating & Cooling; EV Charging; Solar Battery  |
|  |  | (707) 328-5060 sebastian@kingdommindedelectric.com  |