**Background / Motivation**

Upsizing and oversized systems caused by miscalculations / homeowners wanting to cover more extreme design day temperatures:

* <https://www.reddit.com/r/heatpumps/comments/1apb9qg/36k_mitsubishi_hyperheat_does_not_qualify_for_irs/>
  + Very small differentials in temperature when operating at design day/full capacities. Can be solved by space heaters short term/added insulation over time rather than sizing up.
* <https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2019/4-monitoring-and-evaluation-for-greater-impact/what-can-connected-thermostats-tell-us-about-american-heating-and-cooling-habits/>
* <https://www.reddit.com/r/heatpumps/comments/1ag9csj/the_chances_of_under_estimating_your_propertys/>
* <https://heatpumpmonitor.org/>
  + Crowdsourced data on loads over time: clues into many oversized systems. Can look into as a time series visualization source for a particular property over time.
  + A screenshot of a graph

    Description automatically generated
  + A graph of a graph

    Description automatically generated with medium confidence
  + A graph of a graph

    Description automatically generated with medium confidence
  + ^ Some sources have room and outside temperature collected. Curious in the gap between the two on design temps/what is considered acceptable indoor temps.
  + Does include visualizations over time, the Y axis only shows the heating and cooling kwh used + coefficients of performance, not relative to loads.
  + TODO: find comparison to design day loads?
    - Whether or not a system on the site mentions design day loads is variable.
    - Can setup API to call data: <https://emoncms.org/site/api#input>
    - <https://github.com/emoncms/emoncms>
      * Maybe what we want is something akin to the dashboard builder?
    - Evaluate different metrics posted: COP (vs kwh heat), flow temperature vs kwh heat?
      * Room Temperature as sensible temperature vs outside temperature?

**Current Visualizations/Calculations:**

* NEEP visualization: capacity and load based on weather <https://www.reddit.com/r/heatpumps/comments/1ajp1yf/mitsubishi_hyperheat_force_it_to_run_low_and_long/kp319gk/?context=3&share_id=xo2p22cZffgqbx_Pezk71>
  + A graph of a temperature

    Description automatically generated
* <https://ashp.neep.org/#!/product/34536/7/25000/95/7500/0///0>
  + Includes oversized warnings if percent heating design load served is greater than 100%
  + Supplemental heat (purple slice on left) is needed when the heating system can’t keep up. However, based on the annual load per hours, supplemental heat would be likely very rare for the above visualization and would require a big outlier in temperature during the year.
  + **TODO**: is there a way to transform this data such that it’s on a time series over a projected year rather than based on temperature ranges?
    - Where is this visualization tool sourcing data from?
    - Can we potentially select an optimal sized system for the customer automatically using the NEEP heat pump list?
    - May be be possible to make an API Call?
    - Has CSV output
    - <https://ashp.neep.org/#!/product_list/> reference product list and the search function to find optimally sized system -> transform visualization?
* ResStock Load Calculations:
  + Modeling GitHub: <https://github.com/NREL/resstock>
  + <https://data.openei.org/s3_viewer?bucket=oedi-data-lake&prefix=nrel-pds-building-stock%2Fend-use-load-profiles-for-us-building-stock%2F2022%2Fresstock_amy2018_release_1.1%2Fmetadata_and_annual_results%2F>
  + <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4477719>
    - Need access – references plots for restock calculations

**To Collect/Axis Data Brainstorming –**

* **X: Time**
* **Capacity/Load:** design day value and percentage used on certain day