**Business Logic Constraints:**

**User**

* Anyone will be able to submit their data and can browse the selected set of reports available.

**Input**

* The user will not have an option to go back and/or be able to change data they have previously entered.
* If these validations fail, an appropriate error message should be displayed.
  + Entering an invalid postal code that is not on the provided list should be rejected.
  + This listing of postal codes will not change.
  + If the email address already exists in the database.
  + A heating/cooling thermostat entry is required unless the user has indicated they do not have heating or cooling.
* The user for a newly added household should first be shown the “add appliance” form.
* The user for a newly added household should be shown the “Add power generation” form.
* If a house is “off-the-grid”, no option for skipping “Add power generation” should be presented.
* If all generators are deleted and the household is “off-the grid”, the user cannot leave “Power generation listing” form until at least one generator has been added.

**Report**

* In the event a report does not return any results, an appropriate message should be displayed instead of a blank page or an empty table.
* Any instances where a NULL value might be returned should be replaced with an empty string
* If a sort order is not specified as ascending or descending, then ascending order is implied.
* If a number is rounded, unless otherwise specified, it should follow the “half rounds up” method.
* If a report definition asks to limit the number of rows returned from a larger set of sorted results, allow the DBMS to arbitrarily choose that subset, with no more than the specified number of rows returned - “tie-breaking” to determine which rows are shown is not required.
* Top 25 popular manufacturers
* All possible appliance types should be present in the table even if the manufacturer does not have any appliances belonging to one or more appliance types.
* Heating/cooling method details
* All household types should be displayed even if a household type does not have one or more heating/cooling method(s) associated with it.
* Water heater statistics by state
* If there are no water heaters and/or households for a state, the state should be displayed on this report with blank values for all statistical columns.
* All energy sources should be displayed even if the selected state has no water heaters utilizing that energy source
* Off-the-grid household dashboard
* All household types must be displayed even if that household type has no off-the-grid households
* All appliance types should be displayed; if there is no data for a specific appliance type then all values for that appliance type should be displayed as zeroes.
* Household averages by radius
  + The postal code input should be validated, and if invalid, an appropriate error message displayed.
  + All averages should be calculated using only households which have corresponding attributes. If an attribute is not present for all of the households within the search radius, no value should be displayed for that attribute.