**Instructions Manual**

**This documentation provides usage instructions for the transformer overloading evaluation algorithm with selected heat pump and EV penetration levels.**

1. **Data Preparation:**

* You need to prepare 2 Excel files in the “.xlsx” extension:

1. RAW\_AMI.xlsx
2. RAW\_TC.xlsx

* **RAW\_AMI.xlsx:**

This is the file to store one-year hourly AMI data for all the customers in a feeder. The format of the file is as follows:

Headers: Time, Meter ID.

A table of numbers with numbers

Description automatically generated with medium confidence

Data Format:

Time: MM/DD/YYYY hh:mm

Meter ID: Meter ID, can be a string

* **RAW\_TC.xlsx**

This is the file to store transformer specifications and transformer-customer connectivity in a feeder. The format of the file is as follows:

A screenshot of a table

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Headers: Meter ID, Transformer ID, Transformer size (KVA)

Data Format:

Meter ID: Meter ID labels are identical to AMI data.

Transformer ID: Transformer ID that the meter is connected to (string).

Transformer Size: transformer kVA; the picture shows the format that CFU provided, but it can also be a single-digit number to represent the KVA rating.

1. **Algorithm Usage:**

Open **main.py**. You should specify the following parameters: 1. You need to specify the power factor of the transformer in order to transfer the KVA rating to kW.



2. You need to specify the penetration level (percentage) of the EV and heat pump (They can be zero).

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Run the rest of the code, and you will get a file in the output folder called “Final Aggregated Data\_EVPenLevel\_{Pen\_Level\_EV} and HPPenLevel\_{Pen\_Level\_HP}.xlsx The value of {Pen\_Level\_EV} and {Pen\_Level\_HP} will be the same as the one you set. You may change the penetration level and generate multiple profiles.

You will also get an Excel file in the output folder called “Transformer\_Load\_Analysis\_Results\_pen\_level\_{Pen\_Level\_EV} and {Pen\_Level\_HP}.xlsx” with your specified penetration levels.

This file contains three sheets. The first one is the maximum load per transformer over a year. The second one is the count of overloads per transformer over a year. The third one is the monthly overload breakdown for each transformer.