HeatingNotebook

September 6, 2021

0.1 # Neds Heating Projections

0.2 Overview

This is a notebook containing calculated heating needs and costs for the Neds Housing Cooperative. The purpose of this document and the accompanying code files is to allow us to be as accurate and well informed as possible when making decisions about how to heat our home. This includes giving us the option to model different scenarios in the future down to fine, granular detail. For example, we want to be able to model scenarios in which some people are working from home, and need their rooms at $20C$ during the day. Or, we want to be able to work out how much we'd pay if we have a heating pump in the main house, but haven't finished insulating.

I've built up this as a fairly simple, but hopefully comprehensive toolkit. It's structured such that this document ought to be readable by anyone. All of the main code used for calculations is in `main.py`, and I've tried to comment these things. The functions for getting weather data are stored in `weather.py` but, as I say, probably no one needs to inspect that. We review the heating needs here

0.3 Disclaimers on calculations

1. First is that I don't know how to model the heat loss due to vents. This is easily amended, but currently they're included as fixed offsets.
2. The U values for the house are not accurate. These are sourced from generic online sources, and ought to be *roughly* correct, but they're not from the datasheets of our actual materials (as opposed to the U values for the flat, which I believe are correct.)
3. The measurements for the house are also estimates, but these are less likely to be accurate. The flat measurements are actual measurements however.

0.4 Current Situation

Here is a list of the current estimated heat loss values for all rooms, in units of $J/(sK)$

0.4.1 Flat

```
Flat Large Bedroom needs 214.13 J / (K*s)
Flat Bathroom needs 208.16 J / (K*s)
Flat Main Room needs 49.44 J / (K*s)
Flat Small Bedroom needs 212.07 J / (K*s)
```

[37]: `[None, None, None, None]`

0.4.2 House

```
Dan needs 82.61 J / (K*s)
Jen needs 32.23 J / (K*s)
Bryony needs 8.82 J / (K*s)
Sophie needs 14.34 J / (K*s)
Sarah Lloyd needs 8.82 J / (K*s)
Tim needs 19.40 J / (K*s)
Nels needs 19.40 J / (K*s)
Downstairs Kitchen needs 43.14 J / (K*s)
Upstairs Kitchen needs 11.82 J / (K*s)
House Living Room needs 79.21 J / (K*s)
Downstairs Hall needs 22.80 J / (K*s)
Upstairs Hall needs 5.80 J / (K*s)
Downstairs Bathroom needs 211.00 J / (K*s)
So, when it's 0 C outside, and we want it to be 18C inside, currently we need a
total heating capacity of 10069.02 for the house
Similarly, we would need  12308.21 for the flat.
```