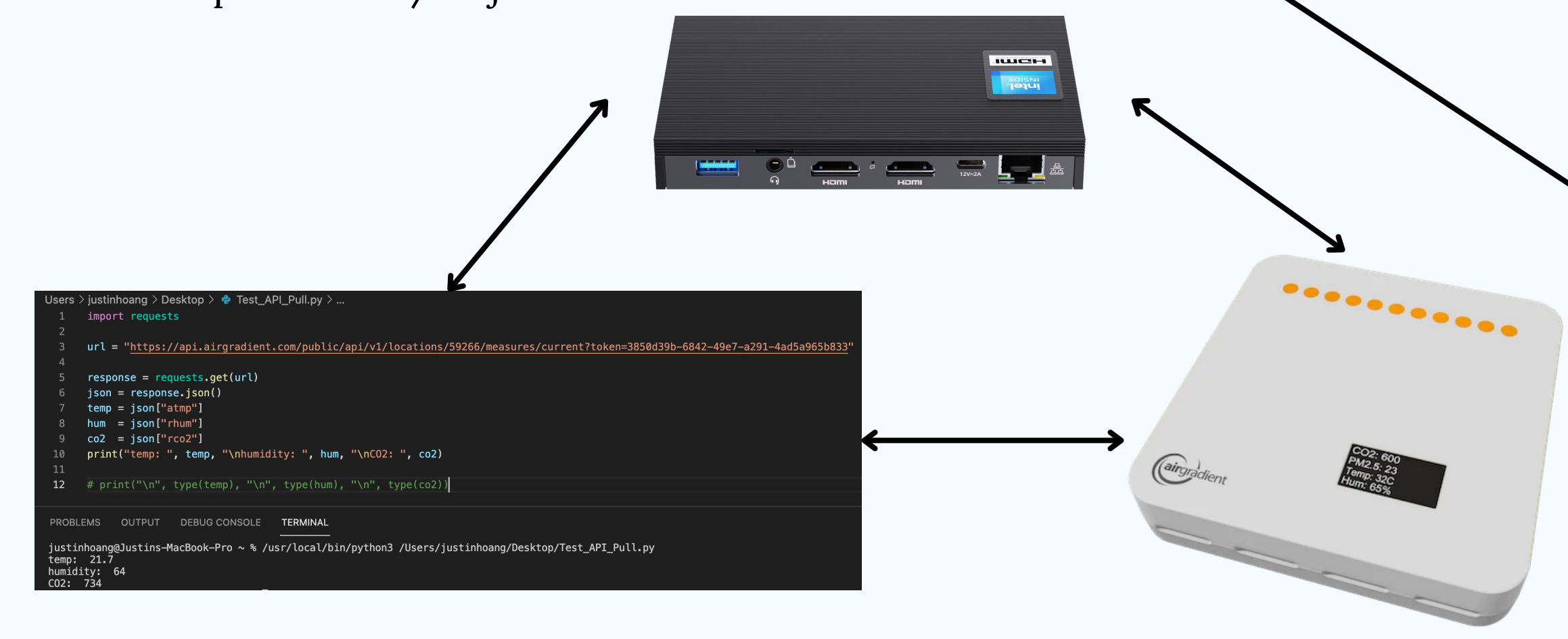BY: MARIAM AL MOUBASHER, HEEYOUNG SEO, MARIO VILLARREAL, JUSTIN HOANG, JACOB AQUINO PHAM, JOHN-JOHN ESTANISLAO, ABOAS HASSANKHIL
PROJECT SPONSOR: MARK WALTER

Project Overview

Ventilation Nation will design a modifiable testbed in order to analyze the effects of changing different physical and functional characteristics of a home and show how models can be used to improve ventilation-only performance. Our goal is to use this testbed as proof of concept for the feasibility of a real-world ventilation-only home thermal management system.
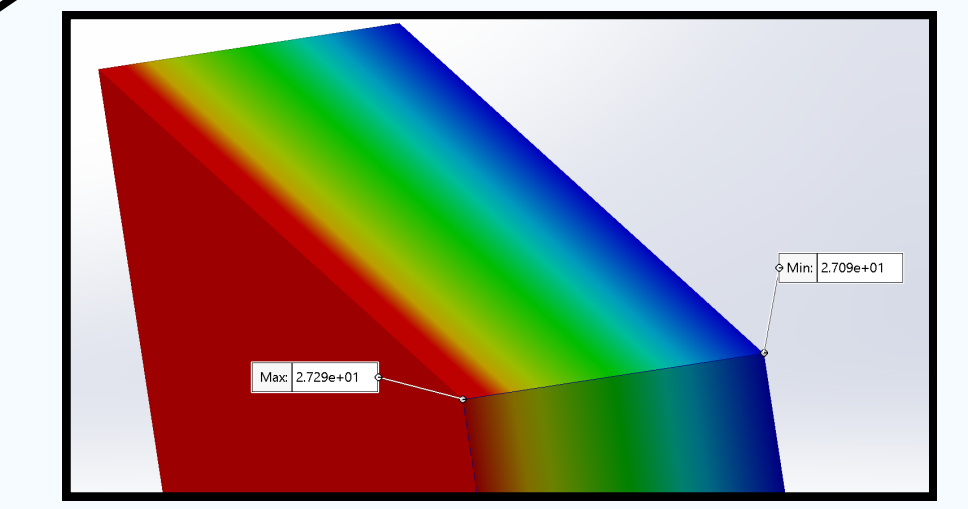
Controls

- The EISY is the home automation system used
- The Air Gradient Indoor Monitor is used to read air data from the room
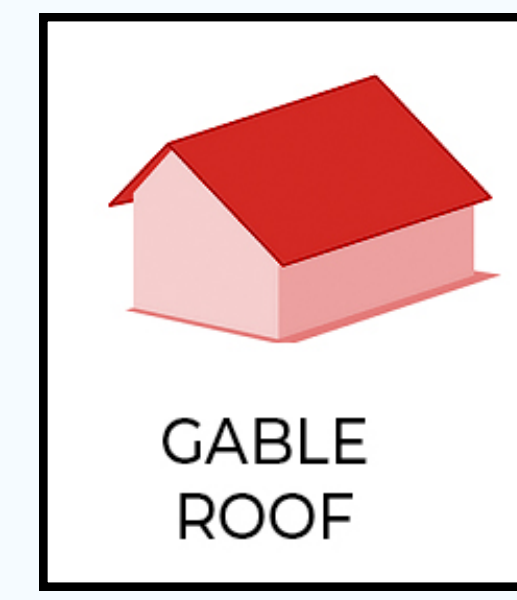- The code reads data from the sensor and sends it to the EISY for computations/adjustments

Building Envelope

- Analysis of Indoor Window Temperature
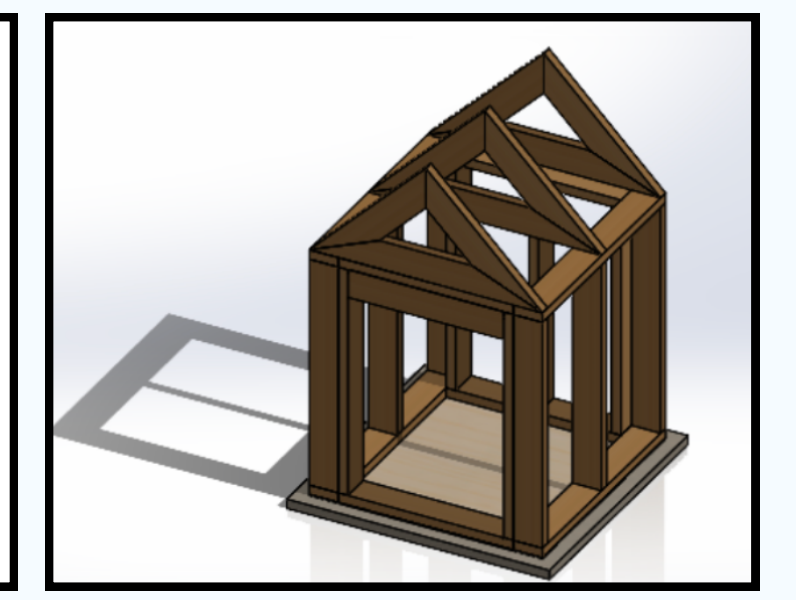 - Outdoor Temp: 29°C; Indoor Temp: 21°

- The testbed will be 4'x6'x6'
- Using 2''x4''s for the framing
- The testbed will have a Gable Roof
- A single paned window will be used and installed on the south facing wall

- Example of a Gable Roof
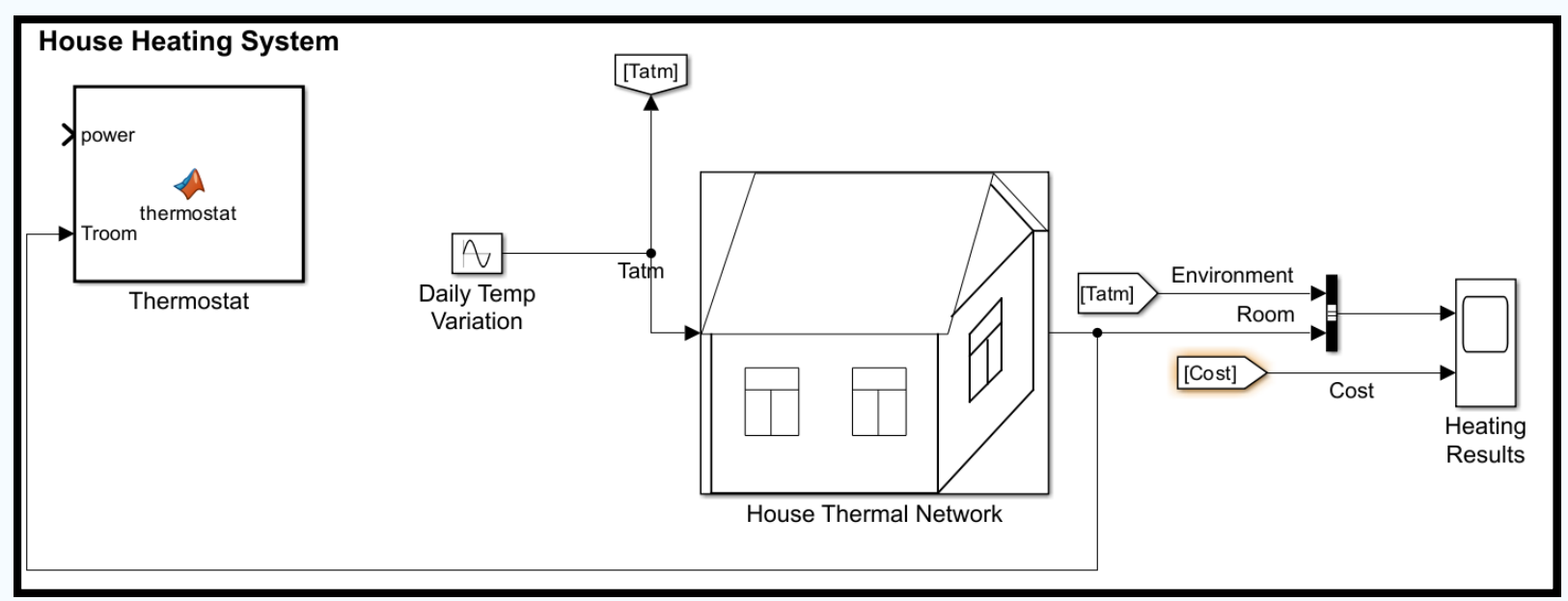- Framing of the testbed
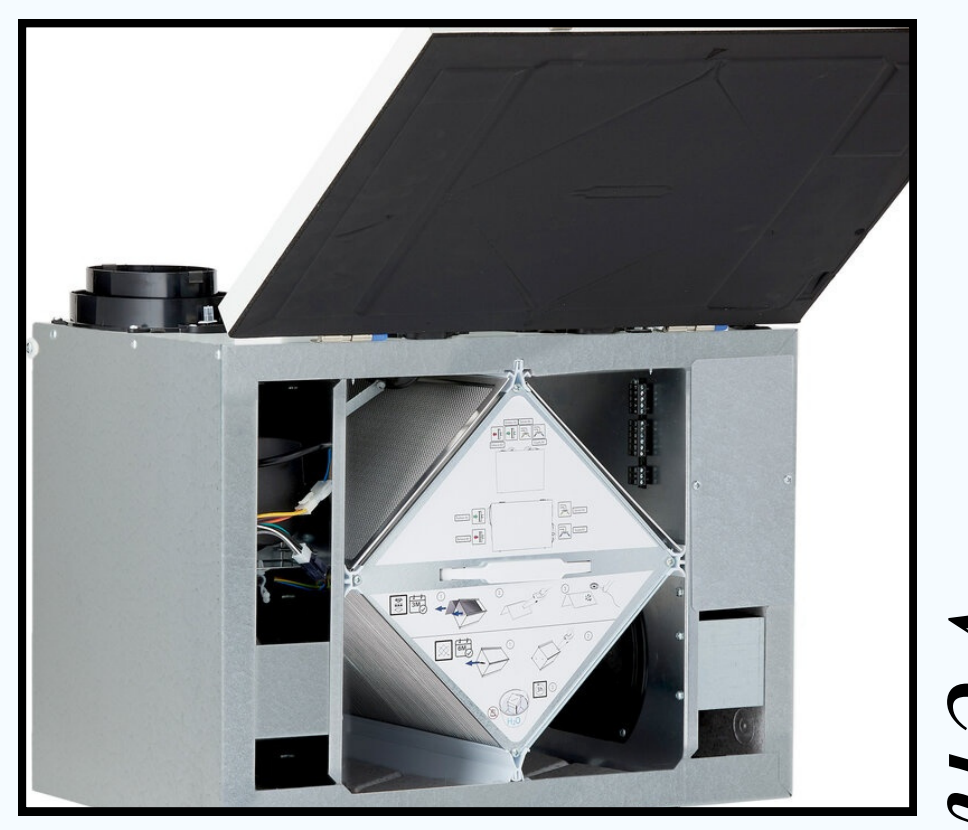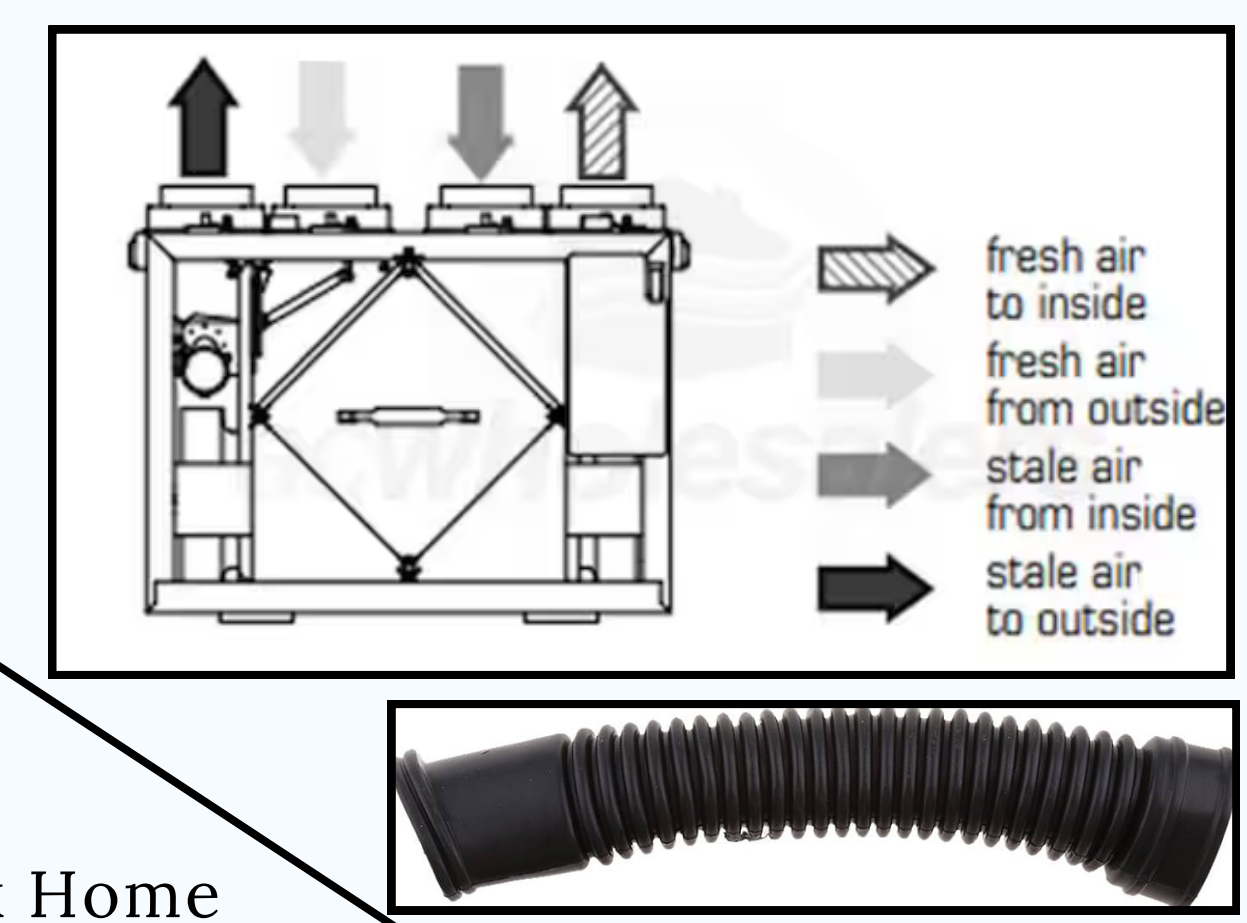
Insulation/Thermal Mass
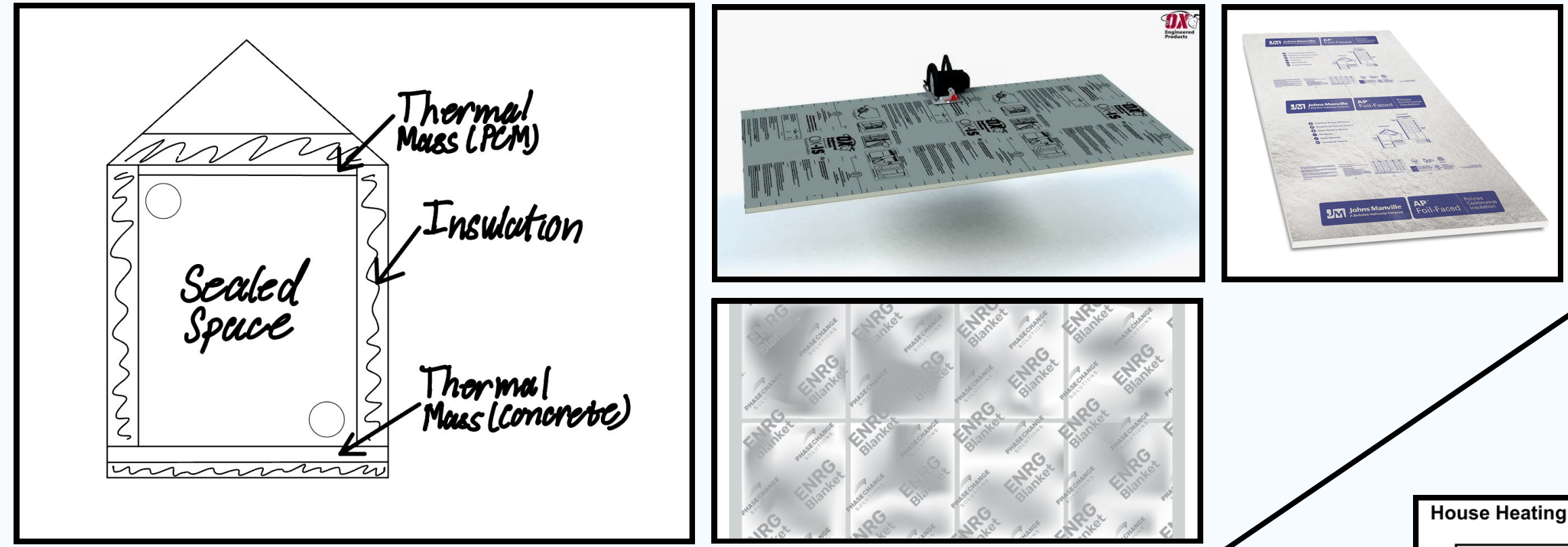
- The floor, walls, and ceiling of the structure will be insulated to create a sealed space within the main room of the testbed
- Our chosen insulation will be Polyiso Rigid Foam Insulation due to its availability and ease of use
- Thermal Mass in the floor and ceiling will absorb excess heat that can be used to maintain comfortable temperatures

Energy Model

House Heating System

Ventilation

fresh air to inside
fresh air from outside
stale air from inside
stale air to outside

- The Fantech Flex 100H is the ventilator we'll be using for our testbed
- The HRV works by exchanging the stale, polluted indoor air with fresh outdoor air.
- The Fantech Flex 100H will be used to control airflow
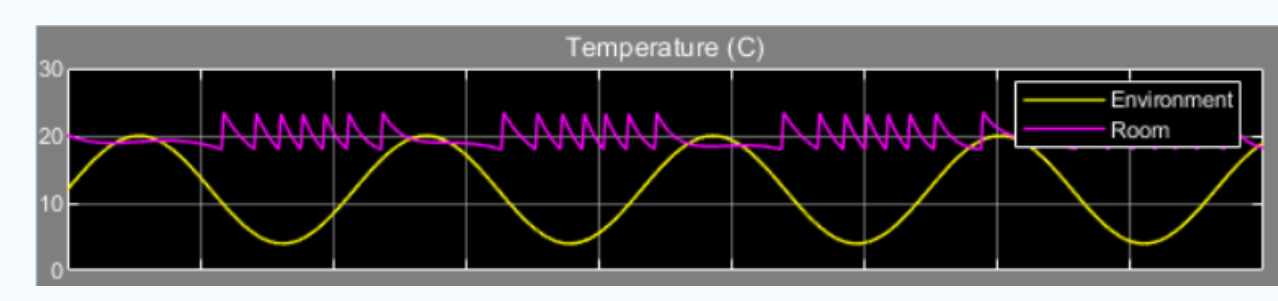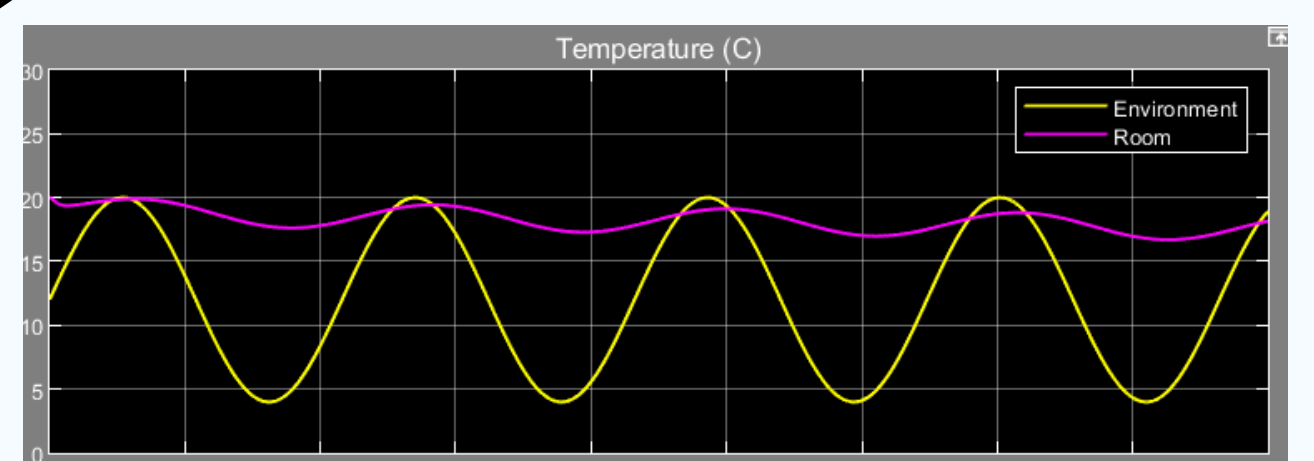
- Simulink Home Ventilation will be used to Model to verify our project will work
- Simulink will guess a visual representation of the thermal and environmental properties of the model
- EnergyPlus will help us calculate heat transfer rates and specify building materials and shading effects on our window