Grow in the Snow?

Optimizing Year-Round Passive Solar Greenhouse Designs

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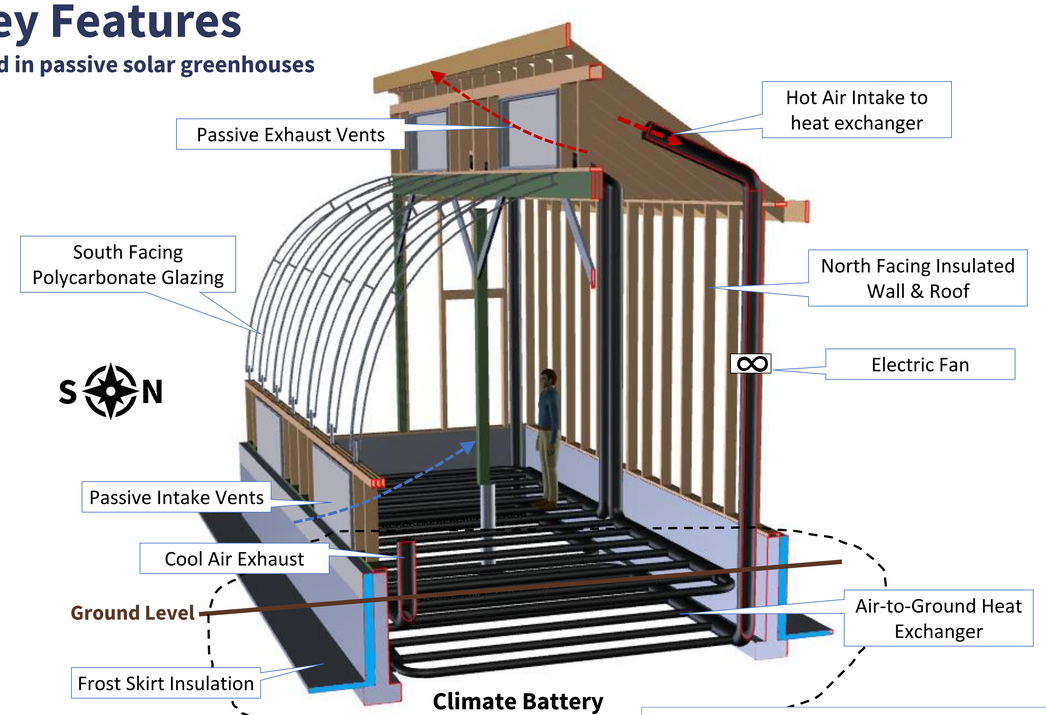
Key Features

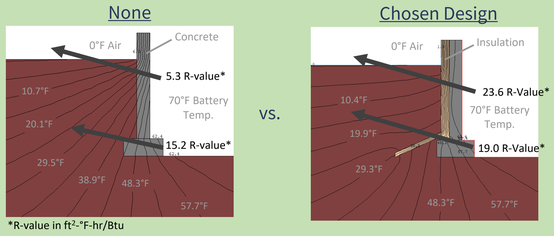
Used in passive solar greenhouses



A climate battery stores excess daytime & summer heat for later use.

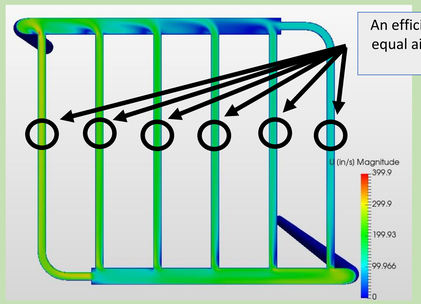
Engineering Simulations

Simulated heat loss through 6 different insulation methods.



*R-value in ft²-°F-hr/Btu

CFD(Computation Fluid Dynamics) was used to analyze potential heat exchanger layouts



An efficient design will have near equal air velocity (color) through each tube.

Other simulations were used to determine:

- the heat transfer rates from tubes to the soil storage system
- the pressure drop curves to help select the right size fans
- the heat loss rates through the building structure

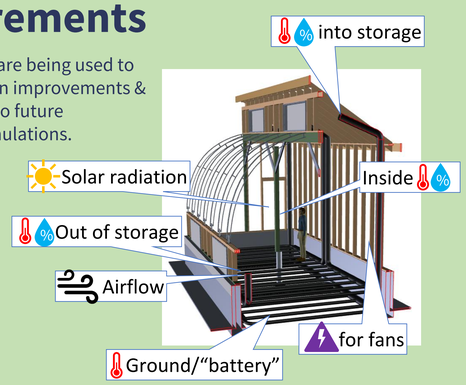
Construction

The bottom layer of tubes for the climate battery.

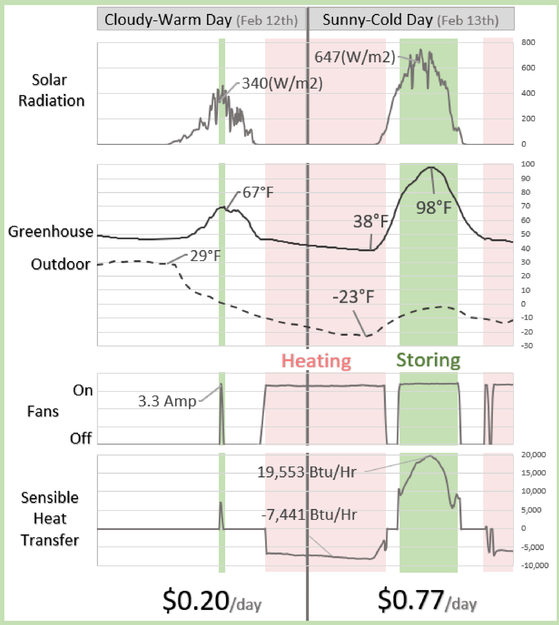
Started operation Jan. 1st 2020

Measurements

Measurements are being used to recognize design improvements & for feedback into future engineering simulations.



Performance Example



Traditional Greenhouse costs would be:

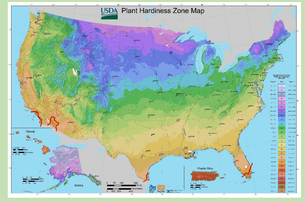
$5.40/day to propane heat an equal **glass or 6mil polyethylene** structure

$2.11/day to propane heat an equal **triple-wall polycarbonate** structure

What's Next?

- Collect more data!
- Use data to estimate cost trade-offs for various growing zones.
- Automate cooling vents to prevent overheating
- Share updates on Facebook & YouTube
- Grow plants!

Up to Hardiness Zone 10 so far!



Special thanks to:

North Central SARE Farmer-Research Grant Program

Everyone that helped with construction:

- **My family: Ashley, Tessa and Olin**
- **Dr. David Zeman**
- **Braeton Hill**
- **Avram Katz**
- **Del Mutschelknaus**
- **Nate Aldrich**
- **Brad Carsrud**
- **Geoff Guthrie**
- **Craig Ysbrand**