
The Green Machines


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Community Partner: PCR

- PCR: *People for Community Recovery*, an environmental justice non-profit organization from Riverdale, Chicago. Founded in the late 1970's, it has been voicing and pushing for social and environmental justice ever since [1].
 - Mission statement of the organization:
"PCR's mission is to enhance the quality of life of residents living in communities affected by pollution. PCR educates and advocates policy and programs in an effort to coordinate local residents on issues of the environment, health, housing, neighborhood safety, and economic equity." [2]
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- Website: <http://www.peopleforcommunityrecovery.org/>
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Project: Motivation and Description

- Minority communities often tend to have socio-economic as well as environmental problems due to structural racism. [3]
 - PCR is looking to build an EJ museum as well as training and research facilities in their community in order to promote green energy/cleaner (safer) environment, reduce the crime rate among the youth in the community, attract renown researchers, provide means for additional educational/professional opportunities to the community, and much more.

 - PCR is looking to power those building using mostly (if not all) renewable energy sources
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GIS



Project: Where we kick in

- We are to accomplish the following goals:
 - Compile and provide a report on the renewable energy sources
 - Create a 3D model of the building/s
 - Be able to use that 3D model in power consumption/distribution simulations
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Marketing Requirements

- The report provided should summarize renewable energy sources and their specifications for a green building
 - The system should be model/simulated in a software package
 - The construction site should be evaluated for relevant renewable energy geographical data
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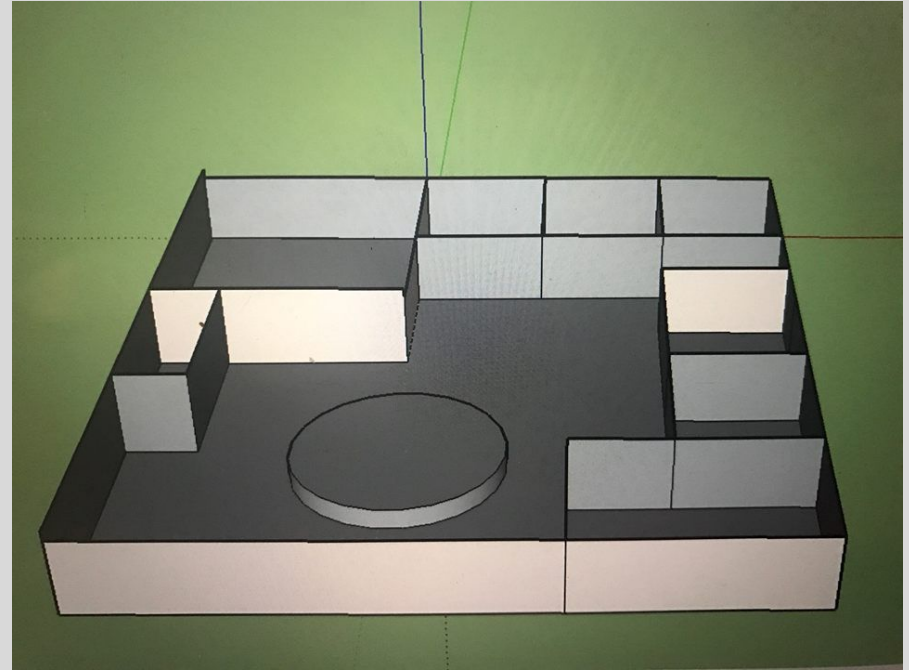
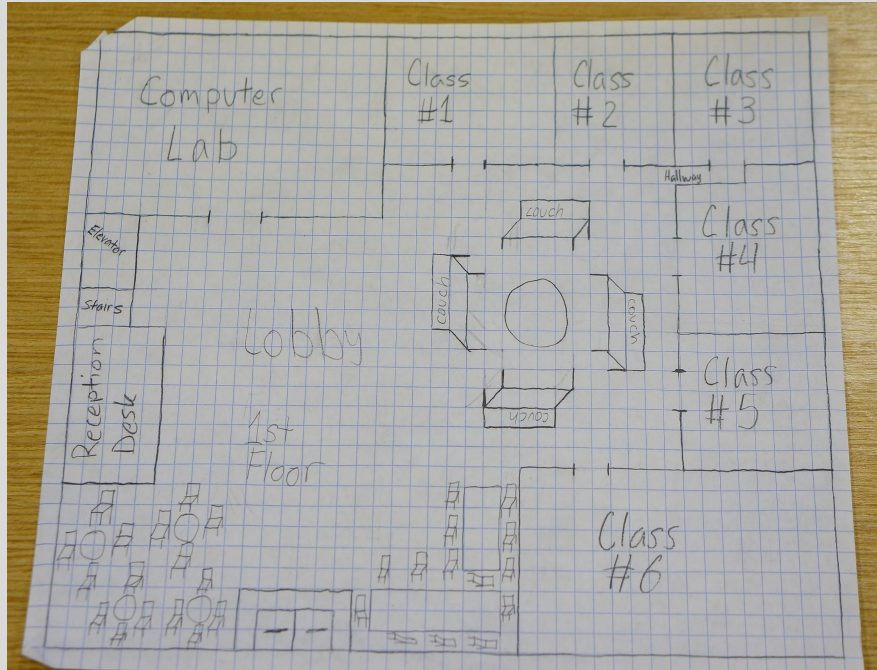
Engineering Requirements

- The 3D building model must be able to simulate renewable energy sources and provide results of consumption/distribution in watts/hr
 - The 3D model must have dimensions similar to the allocated space(23e3 sq ft)
 - The model should provide simulation results in under 24 hrs
 - The model should be able to conform to standard Illinois building codes or to LEED standard/rating system to buildings that are newly constructed
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- Extracted data from the model can be easily read by the user in terms of layout and category
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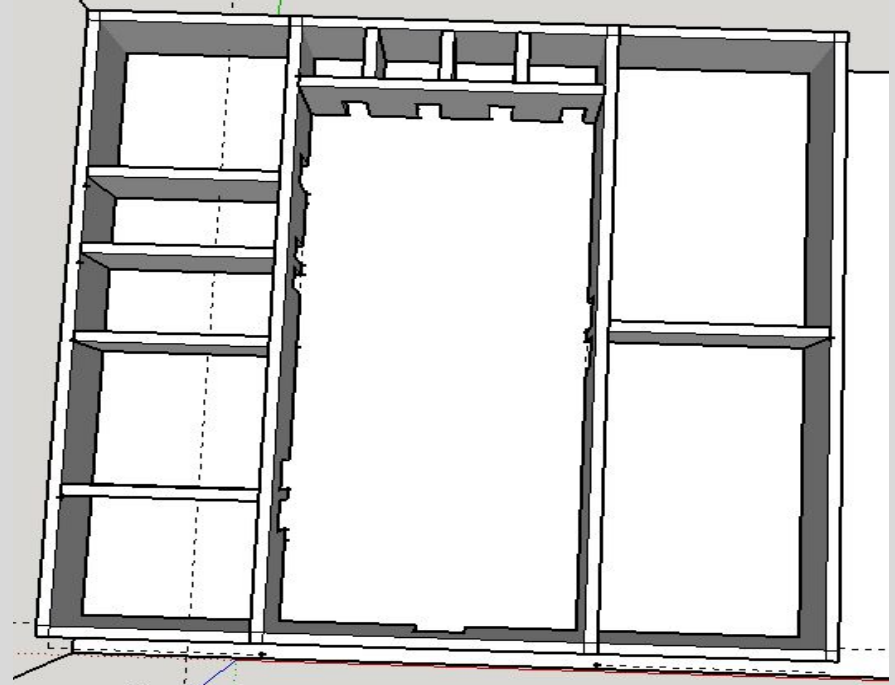
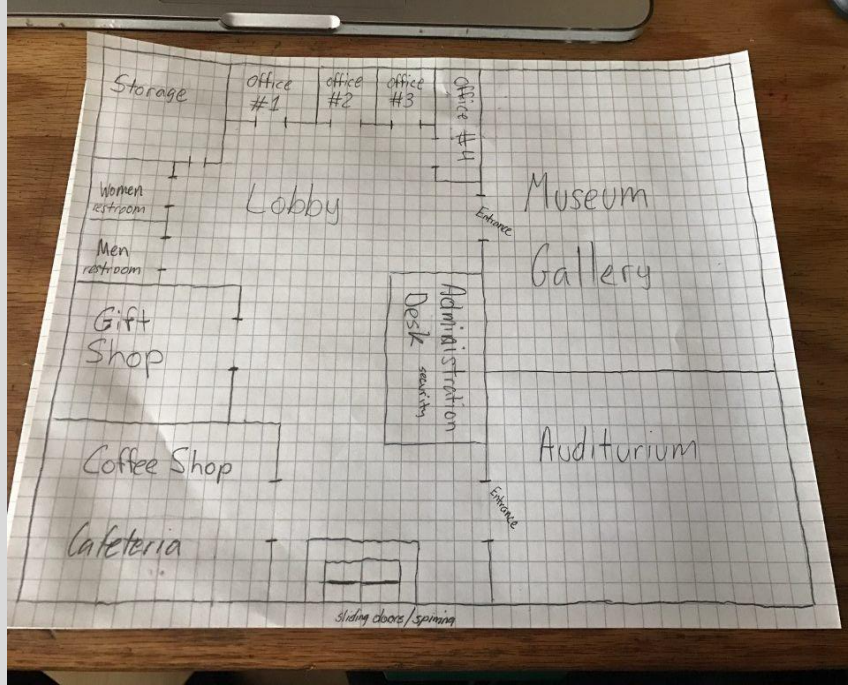
Design Alternatives

Criteria	Weights	Autodesk	OpenStudio	3D Printing
1.Education	.24	1.2	1.2	0.72
2.Resume	.25	1.25	0.75	0.75
3.Standards	.18	0.9	0.9	0.18
4.Ease	.17	0.51	0.51	0.51
5. Availability	.16	0.48	0.8	0.8
Score		4.34	4.16	2.96

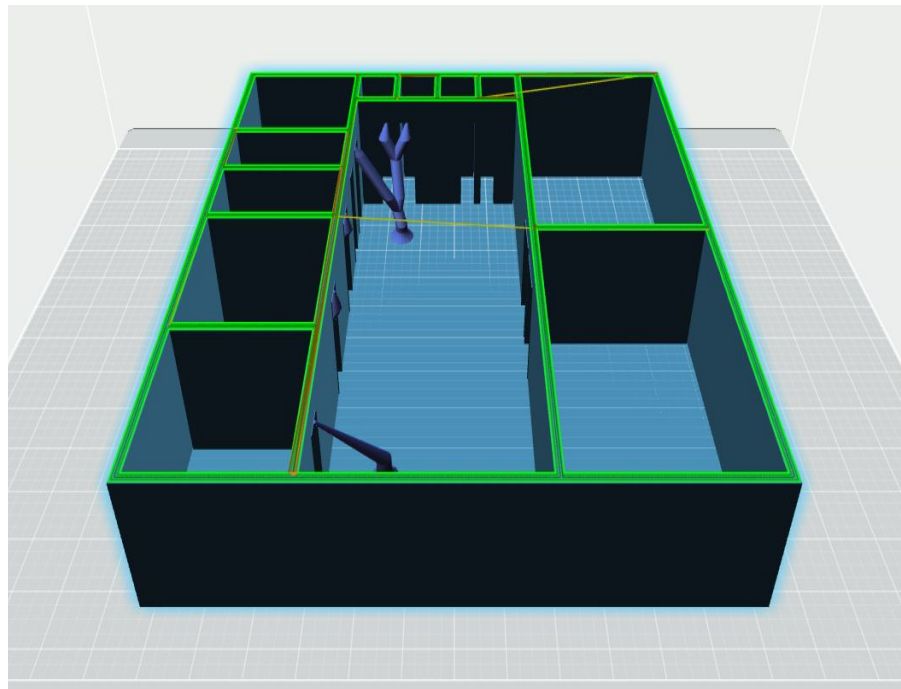
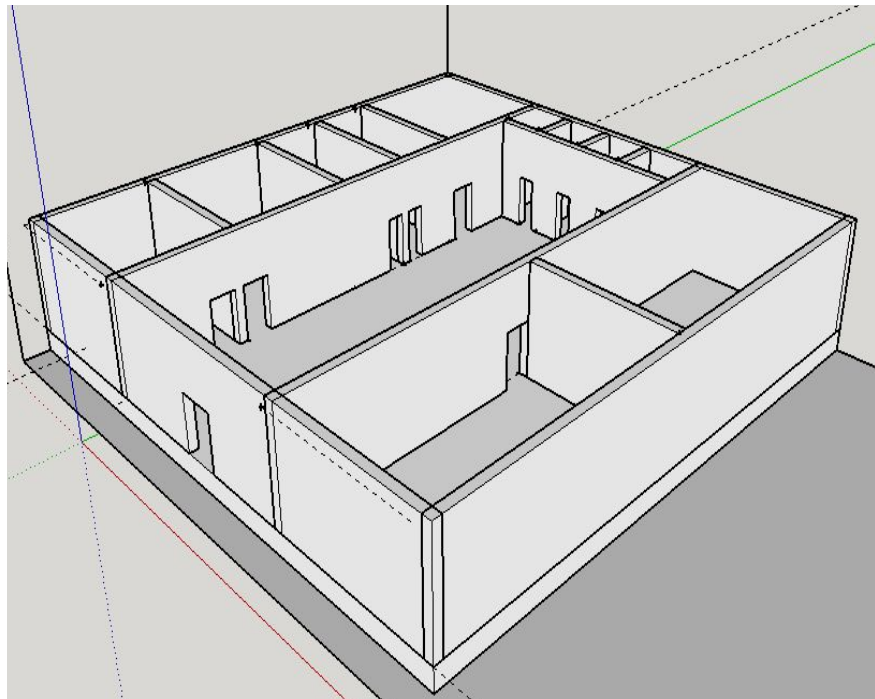
Preliminary Design: Training Building 1st Floor



Preliminary Design: Museum Building



3D Model Converted to 3D Printer Ready



Examples of Finished Products

Reasonable



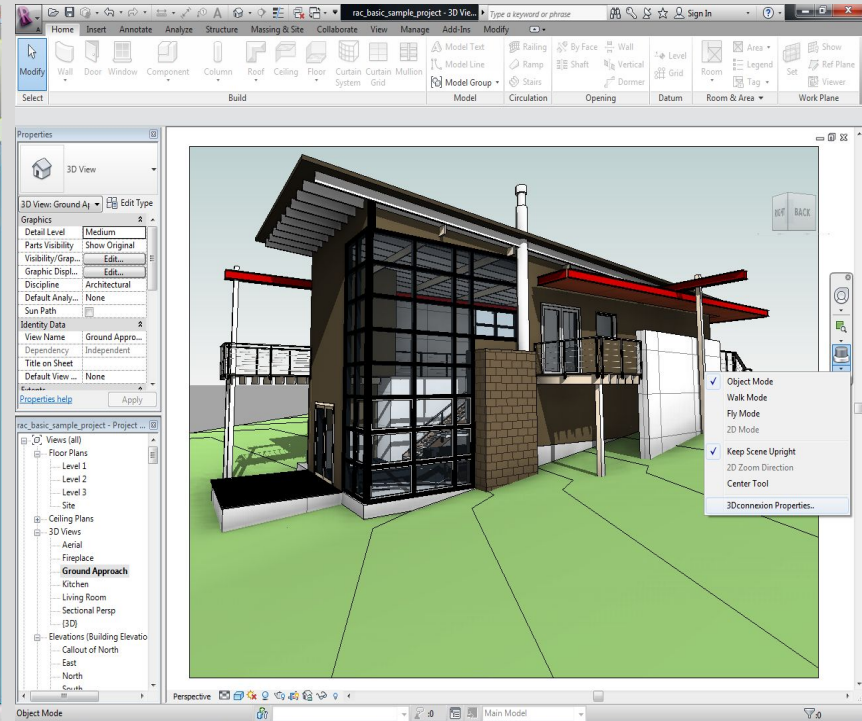
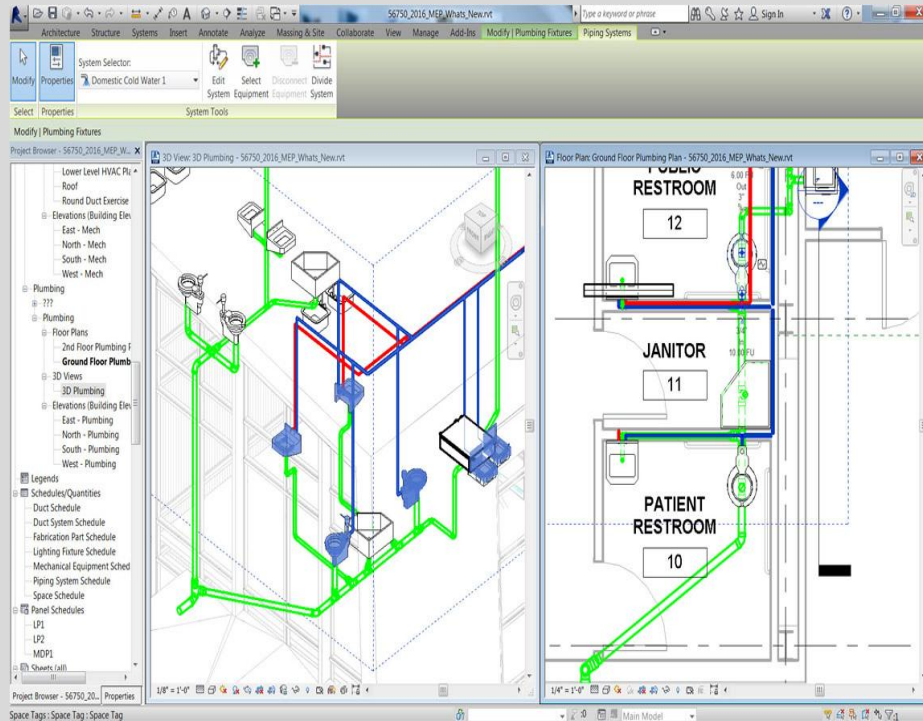
Unlikely



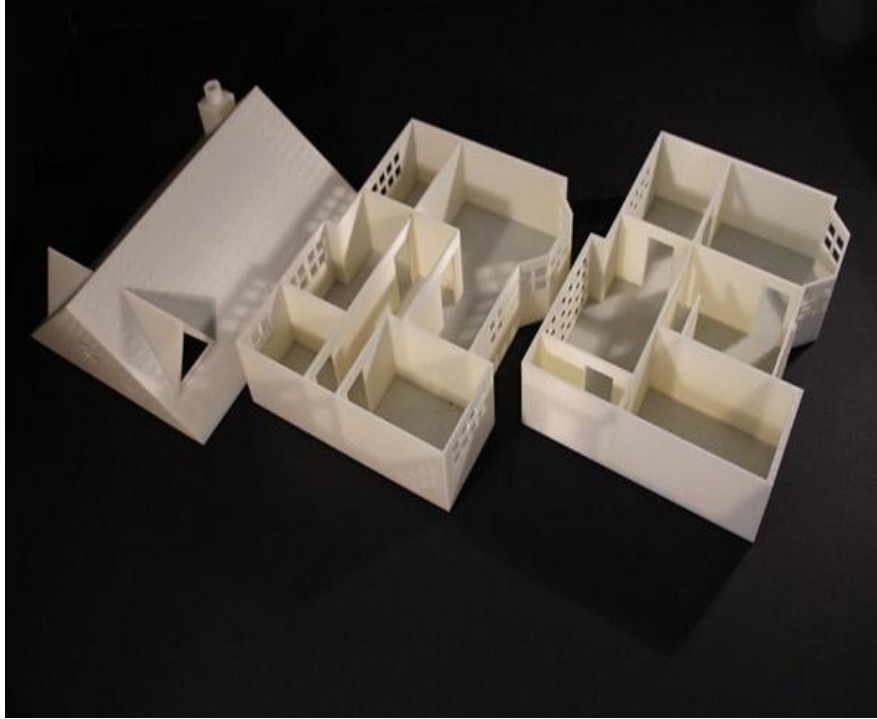
Revit Interface and Finished Product Example

Lots of Extras: Electrical Panels, lighting, etc

3D Modeling



3D Printing

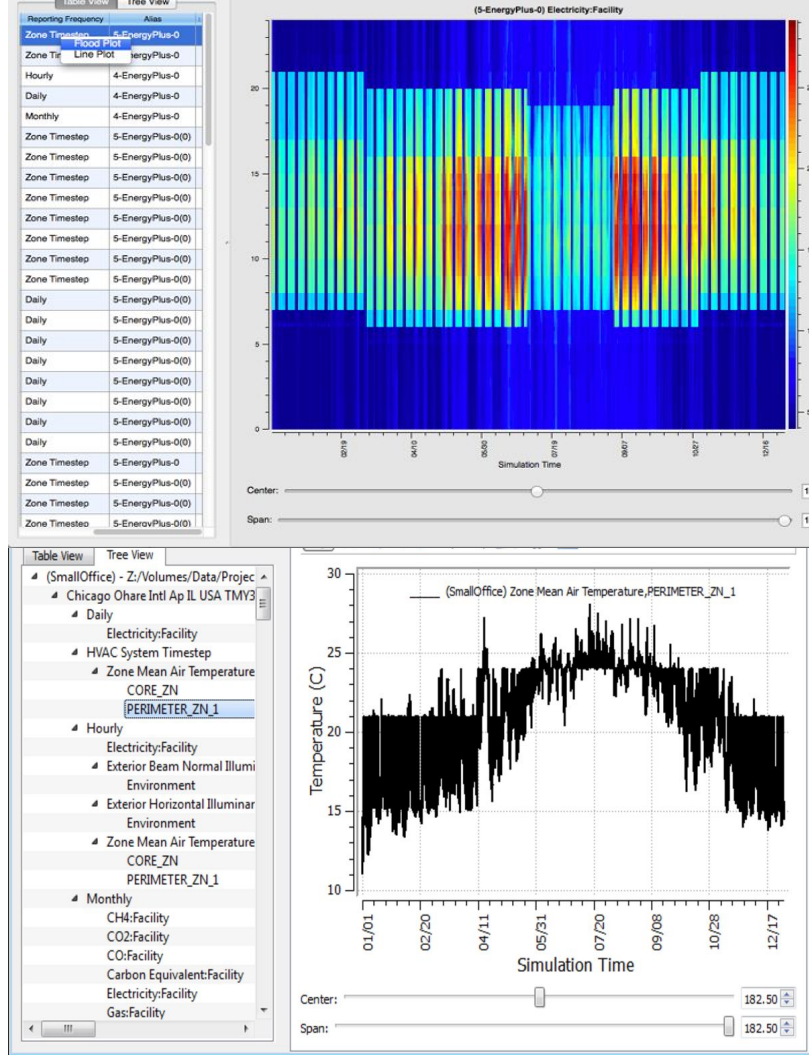


Remaining Work:

Power Simulation of Building

Energy Modeling - Simulation of building focused on:

- Energy Consumption
- Life Cycle Costs of HVAC, lights, & hot water
- Evaluate payback of various renewable energy sources or green energy solutions like solar panels/photovoltaics, wind turbines, and high efficiency appliances.



Remaining Work:

Power Simulation of Building

Energy-Analysis or Energy-modeling is used to:

- Predict the monthly energy consumption and bills
- Predict the annual energy cost
- Annual CO2 emissions
- Compare and contrast different efficiency options
- Determine life cycle payback on various options

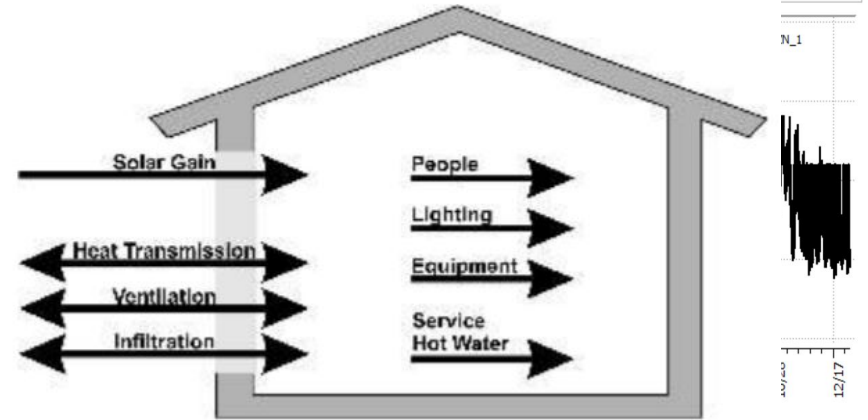
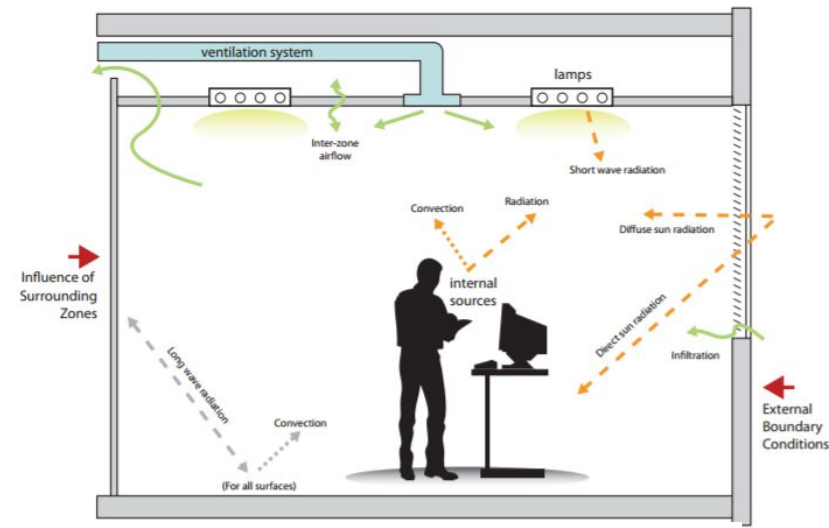


Figure Typical Energy Loads

South Korea .



Inspired by ODIN ENERGY
in South Korea.



Remaining Work:

Wind Turbine Tower

To incorporate wind turbine into the model
of our building to generate power from
converting turbulent wind into laminar wind.

A design inspired by Odin Energy, a
company in South Korea.



Manila, Philippines

Remaining Work:

Solar Panel Experiment

- Provide a solar panel setup for PCR's educational purposes

- Run tests of solar panel performance on-site

- Component selection for solar panel set up



References:

[1] People for Community Recovery. (n.d.). Retrieved January 27, 2017, from <http://www.peopleforcommunityrecovery.org/history.html>

[2] People for Community Recovery. (n.d.). Retrieved January 27, 2017, from <http://www.peopleforcommunityrecovery.org/mission.html>

[3] Alan H. Goodman, Yolanda T. Moses, Joseph L. Jones. *Race: Are We So Different?*

Ebook: John Wiley & Sons, 2012

Any Questions?

Thank You!

