Energy-Efficient Residence Hall

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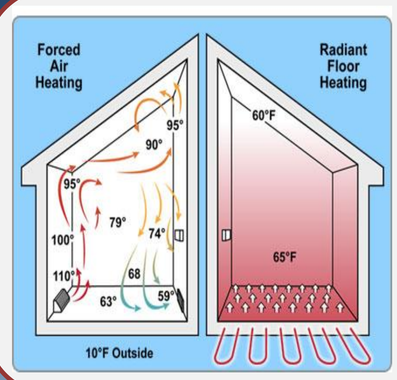
ABSTRACT

Recently, there has been an increase in the number of energy efficient buildings in the U.S. We want to encourage this green movement by providing people with a simple and systematic approach for green building construction. Our project focuses on creating a guideline for an energy-efficient residence hall. We have looked into energy-efficient and eco-friendly lighting, heating, insulation, and other aspects that integrate into a green building. Our guideline, as a result, will aid colleges in the Worcester community to design and construct green residence halls.

Solar water heaters on the roof converts sunlight to heat, reducing water heating bills from 50%-80%.

Stairwell

Closable vents leading from the floor to the stairwell along with windows in the stairwell leading outside act as a thermal chimney which gets rid of excess heat.

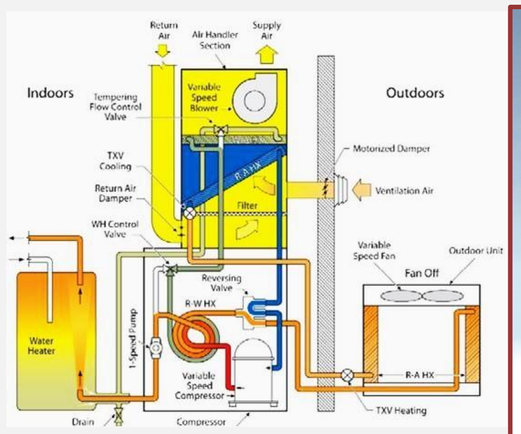


Radiant Floor Heating

Radiant heating system is placed directly below flooring material. Solar-heated water runs through thin pipes and heats the room with a 20% to 40% higher efficiency than other heating systems.

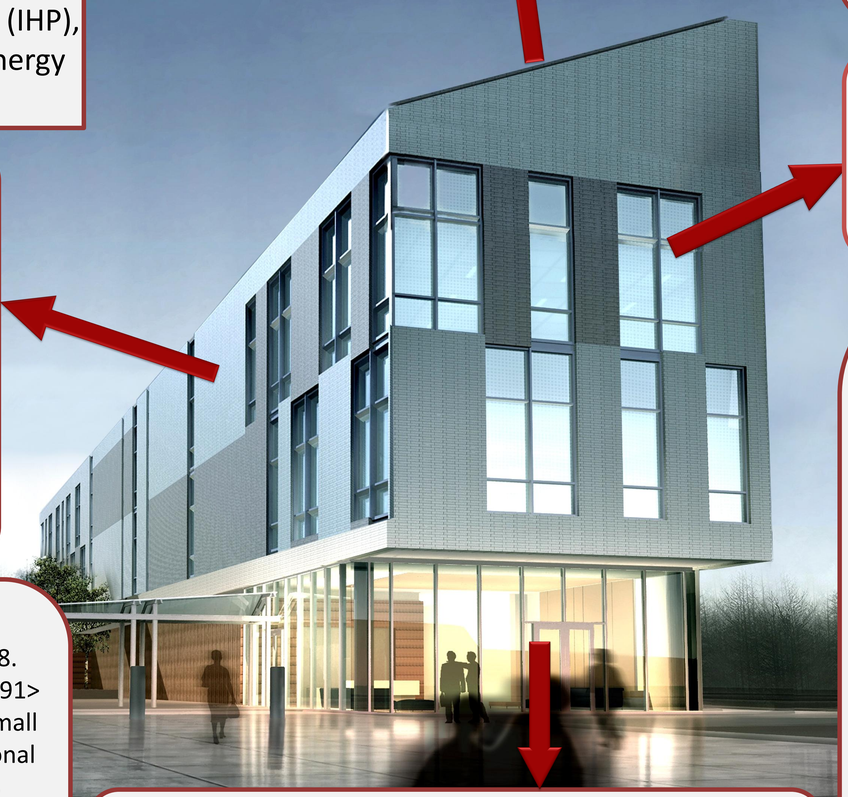
Integrated Heat Pump

Studies showed that air-source Integrated Heat Pump (IHP), illustrated in the chart below, will result in 46- 67% energy saving. Calculated payback period is 5-10 years.



Walls

The walls are made of concrete for its insulation value and structural integrity.

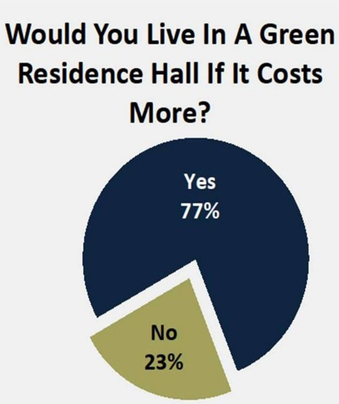


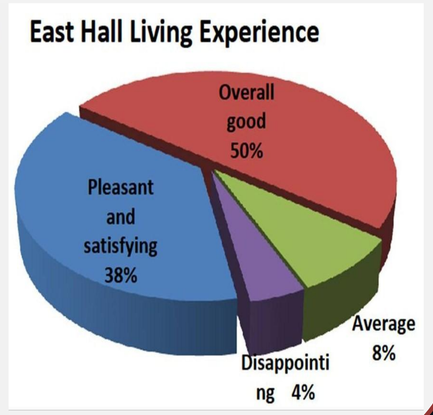
Windows

- Window ratio of up to 70% to maximize day lighting
- Double-glazed windows that provide efficient insulation
- Special window design that optimizes air flow for cooling purpose

Residents

Results form our survey shows that WPI students are willing to live in green residence halls. Feedback from East Hall residents show that students enjoy their green building living experience.





Lighting

Fluorescent lighting produces as much light as a normal incandescent light bulb while using 65%-75% less energy.

Selected References

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