Daylighting Analysis of a School Building Using Simulation Technology

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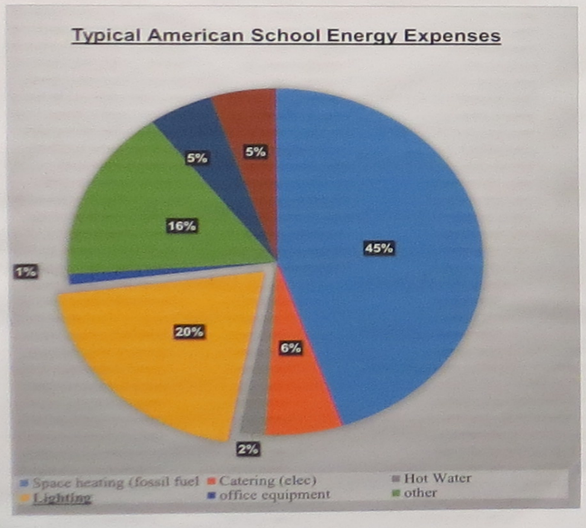
Introduction/Background

ighting is one of the most flexible factors of a uilding. A building can be lit from a number of ources such as light bulbs, skylights, and indows. In terms of efficiency many steps can e made to enhance the way a building receives ght in order to save money and energy. onventional lighting systems expend gnificant amounts of heat as a waste product hen generating light. In addition, dependency n artificial light without use of daylighting is nhealthy for building occupants. Today, merica's schools spend more than $8 billion ach year on energy and about 26 percent of lectricity consumed by a typical school is for ghting alone.



Objectives

- Design a school building in which 80% of the lighting is received passively
- Reduce the heat emissions produced due to artificial lighting by at least 20%
- Decrease the energy consumption by 33%
- Long term saving for the community and taxpayer's money and better utilizmoney for educational purposes

Research Question

How can lighting in a school building be enhanced in a way that makes it sustainable economically, ecologically and socially while still being suitable for learning?

Methods and Tools

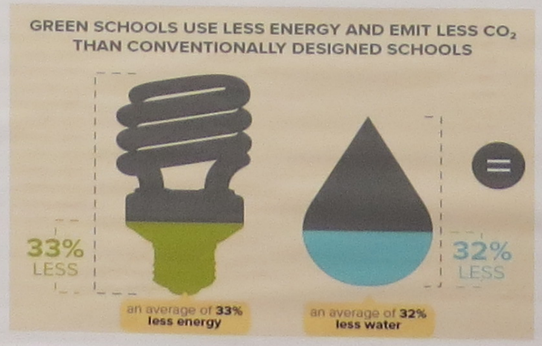
Research
- Conduct research on effcient lighting
- Conduct a survey about students' experience with the lighting in class at their school.

Data anyalsis
- Based on the research conducted begin to asses which lighting types and sources will suit the school best economically and ecologically.
- Analyze the results from the survey conducted to analyze how bright a room should be for an occupants comfort.

Design
- With the data received and analyze begin to plan out the school and the classrooms
- Use the software Sketch Up to create a 2D computer sketch of the school

Simulate
- The model will be imported into Sefaira, which is an energy analysis software.
- Based on the data from Sefaira analyze the effieciency of the school (how much energy used?)

Simulation analysis
- Based on the data recieved from the energy simulation, make the necessary changes to the school building design.



Significance

Lighting is one of the factors of a building that equally affects all parts in terms of sustainability.

- The types of bulbs installed in a building and the amount of time they are used greatly affects the energy bill.
- Incandescent light bulbs, though cheaper, releases gradual but dangerous amounts of CO_2.
- The occupants of a building need a balance of daylight and artificial light for a better working environment.
- Schools need to take advantage of sustainable and efficient methods.

Expected Results

After conducting the project, the expected results should be a school building design with the optimal amount of passive and efficient light sources. This school should be well lit, as well as decrease the heat created by lighting, improving the overall cost, and conditions of the school.

Bibliography

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