Institutional Building Energy Simulation

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Abstract- *A growing concern about Global Warming and Climate Change, seeks way to reduce environmental impact by promoting Green Building. GRIHA is the most widely adopted sustainable building rating system in India. In these research the energy consumption of the Institutional building is minimized by suggesting energy saving alternatives, followed by eQUEST a quick energy simulation software based on Whole Building Performance method.*

Key Words: **Global Warming, Green Building, GRIHA Rating, eQUEST, Whole Building Performance method.**

1. INTRODUCTION

Green Buildings are energy efficient buildings, design, constructed and operated to minimize the total environmental impact while enhancing user comfort and productivity by energy conservation measures in the interior as well exterior of the building. eQUEST a quick energy simulation tool based on Whole Building Performance is used for the energy performance of the building.

2. WORK OBJECTIVE

To analyze the energy consumption of the Institutional building using eQUEST software for the base case. By suggesting energy saving measures we can minimize the building energy consumption.

3. METHODOLOGY

The whole building performance method is used to study the annual performance of the building using eQUEST software. WBP method uses the output of a simulation program to demonstrate the proposed building complies ECBC User Guide. The simulation program be a computer based program capable to model proposed design features.

3.1 ENERGY SIMULATION PARAMETER DETAILS

Table-1: Energy Simulation Parameter Details

Description		Unit	Base Case
Building Type			Institutional
Climate Type			Composite
Location			Indore M.P.
Latitude			22.7˚N
Longitude			75.8˚E
Building Details	Floor		G+5 (floor) + 1 Basement
	Operation		7 Hours
	Working days		5 days a week
External Wall	Insulation R-value	m^2k/w	1.994
	Assembly U-factor	w/m^2k	0.462
Roof	Insulation R-value	m^2k/w	0.87
	Assembly U-factor	w/m^2k	0.99
Vertical Fenestration	Material	Frame	Aluminum
		Glazing	Single clear
	WWR	%	≤40 %
	U-factor		7.1
	SHGC		0.82
	VLT		0.76

3.2UTILITY DETAILS

3.2.1LIGHT POWER DENSITY:Total light load (w)/ Area of particular space type (ft^2)

Table-2: Light Power Density

Space Type	Base Case LPD
HOD office	1.257
Class room	1.628
Computer Lab	1.637
Restroom	1.049
Library	1.504
Corridor	0.583
Active Stair	0.703
Atrium	0.209

3.2.2OFFICE EQUIPMENT POWER DENSITY: Total office load (w)/area (ft^2)

Table-3: Office Power Density

Space Type	B-OPD
HOD office	4.234
Class room	-
Computer Lab	5.535
Restroom	-
Library	54.343
Corridor	-
Active Stair	-
Atrium	-

4. RESULT

Table-5: Annual Consumption Details

	Annual Energy Consumption (KWhr)	Annual Unit Consumption Bill (INR)
Base Case	914210	4323570

5. CONCLUSION

Energy Conservation Measures such as efficient Building Envelope Design, Glazing selection with optimized shading and lighting design has changed the perspective of the study as compare the conventional building and made possible to achieve energy saving of 30%. By achieving 65 points in GRIHA Rating System the building is rated as GRIHA 2-Star Building.

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