

# DESIGN AND ANALYSES OF ZERO ENERGY BUILDING USING REVIT SOFTWARE



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Vellore Institute of Technology

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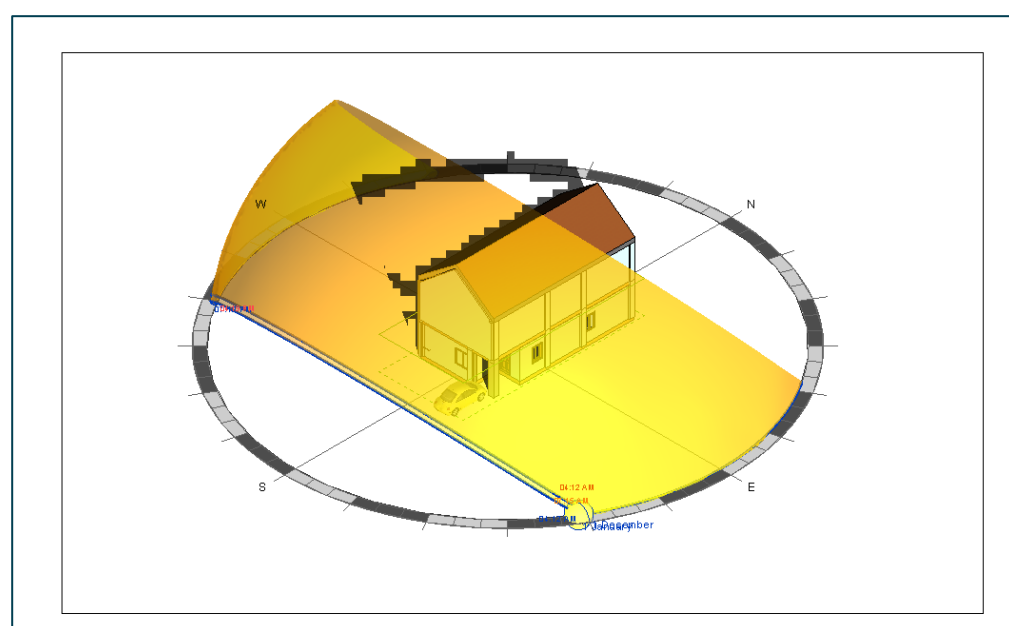
## Abstract

The design uses about 75% of its light from the daylight to conserve energy for lighting. The building uses green materials to increase the overall sustainability. It analyses the energy efficiency of normal building and a zero-energy building. This Study also found that since the project spend related to energy efficiency was high, the cost of sustainable buildings could match or even be less than those constructed through traditional methods.

## Methods

This Zero - Energy Building gets its energy from the sun with the help of Solar Panel. It is important to find out at what orientation we can get much energy,.

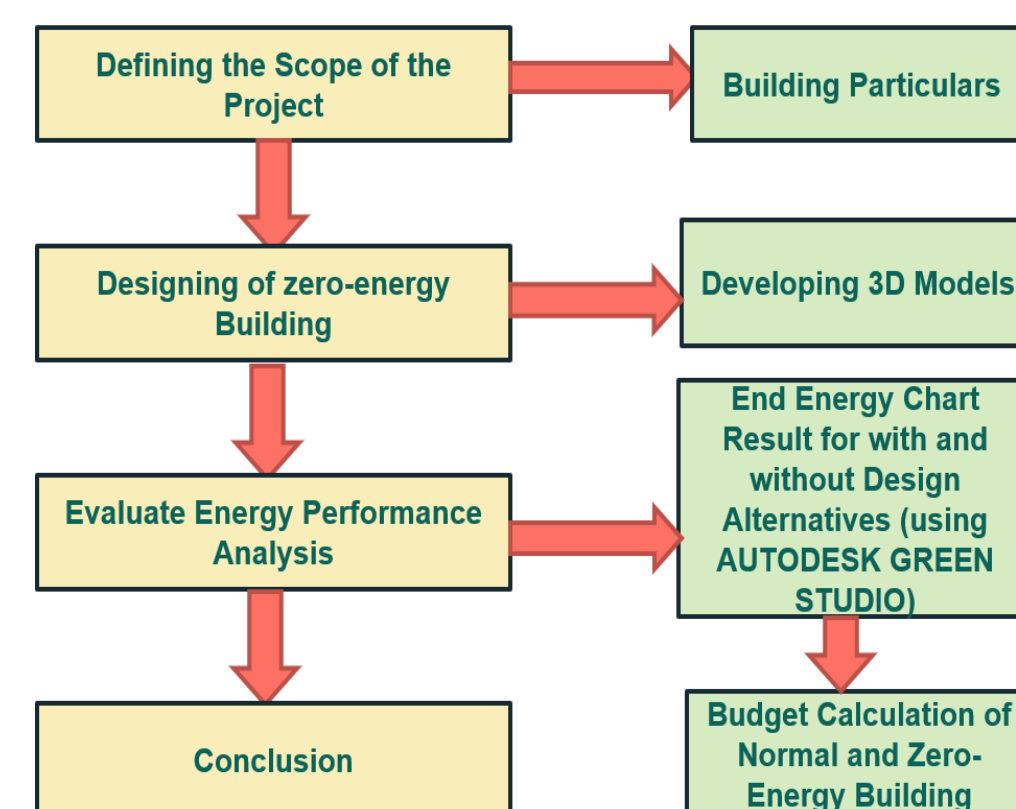
It was carried for the whole Day for February 28<sup>th</sup> 2023. According to the Sun-Path Diagram orientation of the selected structure is modified , to fulfil the requirements of achieving a ZEB from 0° to 30° true north.



Sun path Diagram (28<sup>th</sup> February 2023)

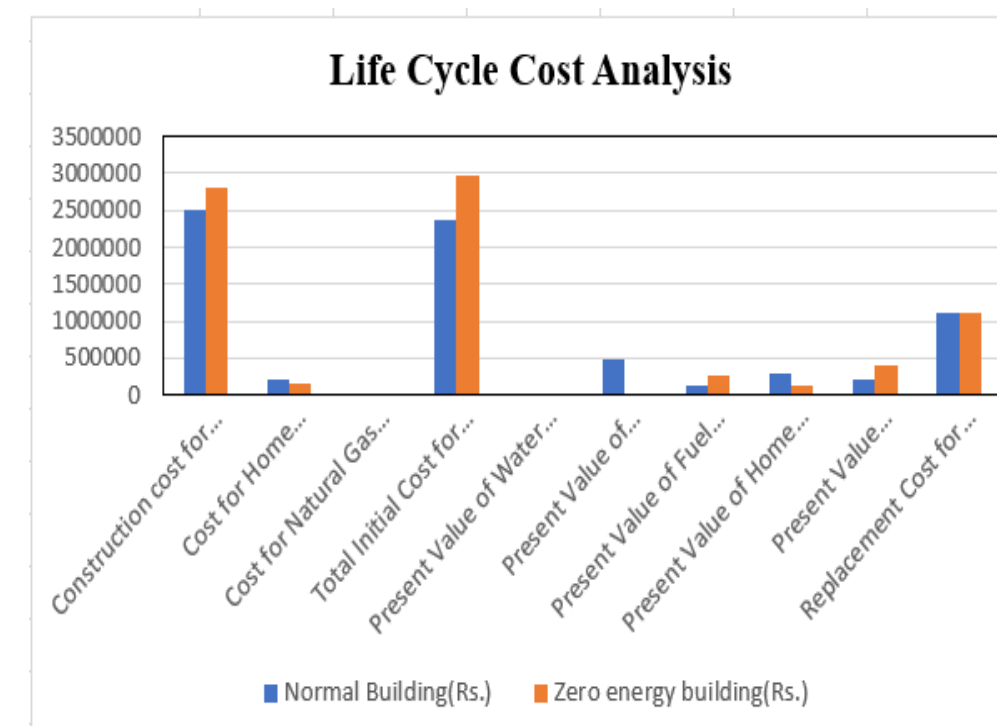
## Data Analysis

AUTODESK Green Building studio allows to run building Performance simulations to optimize energy efficiency and to work toward carbon neutrality earlier in the design process. The stimulation result is used to understand building energy use and consumption then iterate the designs to improve the sustainability's energy model which can also be exported to gbXML format.



Building Particulars	Dimensions
Total Area of Land Required	1456 ft <sup>2</sup>
Total Building Area	1128 ft <sup>2</sup>
Total Parking Area	25 ft <sup>2</sup>
Framed/ Load Bearing Strucutre	Load Bearing Structure
No.of Floor	Ground Floor + First Floor
Type of Foundation	DPC Layer
Depth of Basement	0.45 m
Total Number of Rooms in the Building	12
Wall thickness	0.23 m
Size of Thread	0.3 m
Size of Width	2 m
Size of Rise	0.15 m
Height of Super Structure Excluding Roof Slab	3.45 m for First Floor
Depth of Roof Slab	0.15 m
Depth of Lintel	0.15 m
Column Size	0.3 x 0.3 m <sup>2</sup>

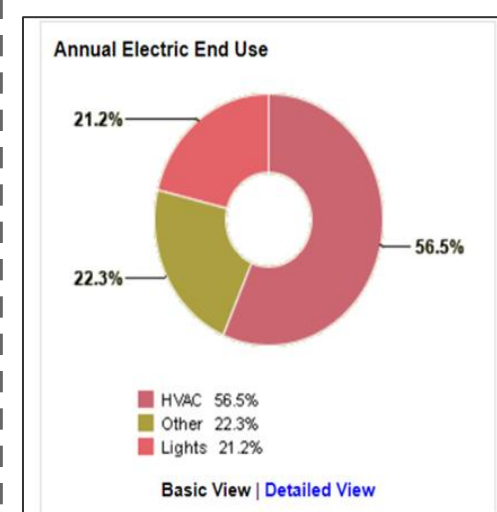
The details of building Particulars



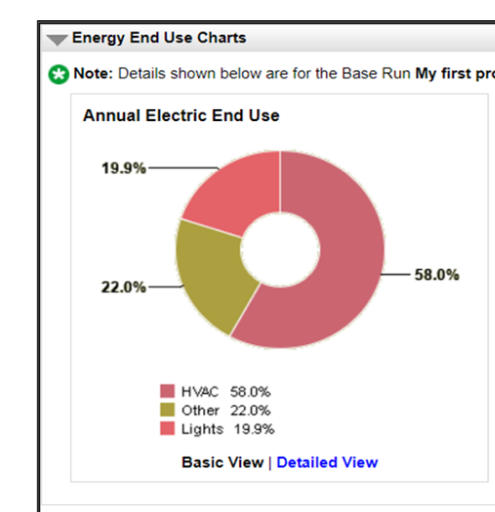
## Results

The innovative energy efficiency measures with design alternative include: energy efficient light fixtures using T – 5 lamps; Sensors for energy and water savings; Energy saving regenerative lifts; geothermal heat exchange technology for heat rejection from air – conditioning.

The difference between LCC of Conventional Building and ZEB is around Rs. 100000/-. From this study, LCC for ZEB is less than that of Conventional Building. Hence ZEB is much efficient and economic than the conventional building.



Without Design alternatives



With Design alternatives

## Conclusion

Energy analysis has been done for both normal building and a sustainable building using Autodesk green studio. It has reduced the annual energy use intensity from 38 kBtu/ft<sup>2</sup> / year to 35 kBtu/ft<sup>2</sup> / year. The annual energy cost from Rs.379 to Rs.349 per year. The Payback period was calculated for zero energy building was found to be 30 years.

Sun – Path Diagram helps the researcher to find the orientation of the building. The end energy chart consists of detailed graph of various parameters like Annual CO2 Emissions, Annual Energy and Lifecycle Energy which gives clear idea for designers to analyse energy requirement parameters

## References

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