



# ENERGY AUDIT OF RESIDENTIAL BUILDING

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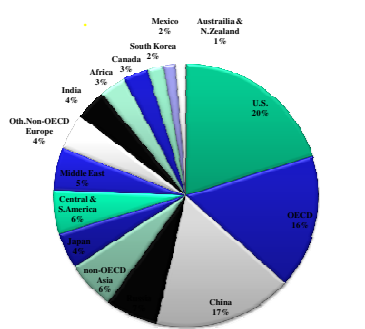
## Abstract

This paper deals with the study of energy audit of residential building at Trumbull, CT (USA). Worldwide, 30–40% of all primary energy is used for buildings and they are held responsible for 40–50% of green house gas emissions. Sustainable development is essential for the residential building construction. It has various benefits such as low environmental impact, high economical and social gains.

An energy audit is an assessment of how much energy is used and identifying where it is used. We can get a detail idea about energy consumption, identifying, enumerating and evaluating possible energy saving opportunity.

## Introduction

Heating and cooling requirement of any building depends upon many variables like physical structure, geographic location of building, design component, equipment operation, climate variation. Building orientation can significantly influence energy use in moderately well insulated house without any other passive elements or controls. Ideal orientation for the building is when the major axis is east to west.



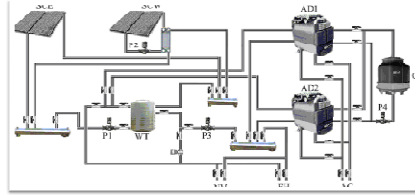
World Energy Consumption Building Sector

## Energy Efficient Building

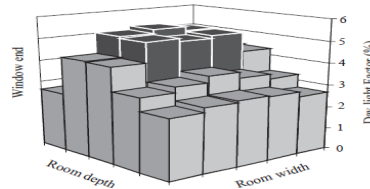
- Energy efficient measures can be developed for old buildings need to be refurbished and new building before construction.
- Energy efficiency is made by energy requirement building standards – Thermal energy consumption coefficient, 90-120 kwh/m<sup>2</sup>/year.
- Reduction of energy demand of existing building and Modern energy efficiency option .

## Energy Technology

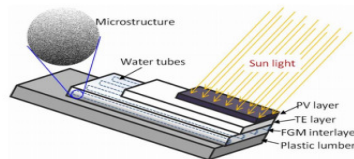
### 1.Solar Integrated Technology



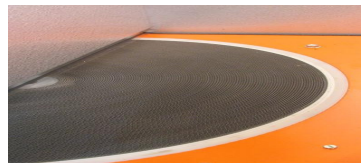
### 2.Daylight Factor



### 3.Novel Solar hybrid Technology



### 4.Energy Recovery wheel



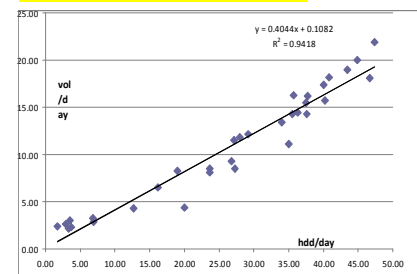
Measuring Air tightness with blower test

### 2.Lumen Method:

Type	Number of tube required	Power Use by tube (watt)	Cost	Total cost
CFL 42w	24	1088	11 \$	\$264
LED 12w	47	564	40 \$	\$1880

## Results

### Degree day analysis model :



Burnham predicted consumption :	2443.1 gal
Buderus actual consumption :	2229.4 gal
Fuel Savings :	213.7 gal
% Gallon Savings :	8.75%

## Conclusion

By doing energy audit we come to know about energy losses in the building and reduce energy bill. Adding of insulation decrease 50 % of energy consumption. Implementation of different thermodynamics models and computer simulations for energy analysis we could achieve maximum energy savings. The research and innovative technologies have been under development regarding green building for saving energy and impact on environment.

## Case Study: Trumbull, CT

Input	Details
Location	Trumbull
Heating degree day	5400
Cooling degree day	5000
House type	Existing
Type of Frame	Wooden
Primary heating system	Fuel Oil, Efficiency - 67%
Air conditioning system	Heat pump, SEER - 15.0
Current fuel oil prices for space heating	3.84 \$/gallon
Current electricity price for space cooling	0.61 \$/kWh
Discount Factor	3.4%

## Methods

### 1.Blower Test Method

Items	Before Insulation	After Insulation	Difference
Heat loss coefficient	115.2W/K	73.0 W/K	42.2 W/K
Annual heating energy	13.99 GJ	7.18 GJ	6.81 GJ
Cost	\$274.9	\$141.0	\$133.8

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