International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 05 | May-2016 www.irjet.net p-ISSN: 2395-0072

A comparison between Normal buildings and Green buildings- A case study approach

Balramdas[1], Prakash meher [2], Snehasish behera[3], Bibik rath[4], Shreetam dash[5], Paramjeet choudhary[6]

[1] *Associate Professor, Department of Electrical Engineering, GIET, Gunupur, Orissa, INDIA*

[2,3,4,5,6]*Final Year UG student, Dept. of Electrical Engineering, GIET, Gunupur, Orissa, INDIA*

Abstract:

Now-a-days due to excessive population growth, people require more number of houses to stay within but they generally built normal building in which energy consumption is more which inefficient. But the energy source is decreasing very fast now-a-days, so by implementing green buildings throughout the world, we can reduce the conventional energy consumption and so by reducing pollution.

In this paper an analysis has given to compare between Normal buildings and Green buildings and its economical analysis.

Key words: Green buildings, Green materials, Sustainable energy, passive energy systems.

1. INTRODUCTION

A Green Building, also known as a sustainable building, it is a structure that is designed, built, renovated, operated, or re-used in an ecological and resource efficient manner. To build a green building we have to consider the parameters such as sustainable site, water resources, energy & atmosphere, materials & resources and indoor environment quality. The key objective of this project is to develop a smart and sustainable building which will reduce our conventional energy consumption and increase renewable energy consumption. This will make our buildings eco-friendly.

2. PARAMETERS OF GREEN BUILDING

There are some parameters which we have to observe for making a green building such as:

- Sustainable site
- Water resources
- Energy and atmosphere
- Materials and resources
- Indoor environment quality

2.1 Sustainable site

This building is connected to residential zone or neighbourhood with an average density of 10 units per acre net. And within half at least 10 basic needs such as restaurant, school, hospital, post office, it can also be within the range of 1 km from railway station and bus line which makes it use by building occupants. This helps in reducing land development impact from single occupants. It can also be within the range of 1 km from railway station and bus line which makes it use by building occupants. This helps in reducing land development impact from single occupants vehicle. Site interruptions owing construction should not exceed 40 feet from building parameters and 5 feet from roadway curve. The degraded habitat area are restored heavy grave and promote bio diversity. The building location and design is selected in such a way that minimises site interruption. The natural surroundings of green building provide straw connection between the built and natural environment and also minimises adverse impact on normal portion of the site. The progress area on site increases the natural processes of evaporation and filtration by eliminating storm water runoff while in progress area maximises the water runoff. Which enter develop soil erosion. In order to light pollution the interior laminar of the building maintain the majority of direct beam illumination within the building. The interior light should not exceed out through the windows. The exterior should be designed so that all sight and the building mount luminary produce maximum initial illumination.

2.1 Water resources

The most effective method to minimise storm water runoff is to reduce in progress area. The vegetated roof of green building is designed in such a move that native plant on the roof eliminates the storm water runoff and contaminate which facilitate and cooling of the building.

The waste water inventory develops onsite and this water can be used function that conventionally serves by portable water. This is done by storm water harvest and rain water treatment system. Green building possesses high fixtures and dry fixtures such as non water urinals which help to reduce waste water volume in the building by disturbing portable water only for specific application benefit entire community through lower range in taxes. The most effective

method to minimize storm water runoff is to reduce in progress area. The vegetated roof of green building is designed in such a move that native plant on the roof eliminates the storm water runoff and contaminate which facilitate and cooling of the building. The progress area on site increases the natural processes of evaporation and filtration by eliminating storm water runoff while in progress area maximizes the water runoff. Which enter develop soil erosion.

2.3 Energy and atmosphere

At night the geo thermal heat pump system in which the refrigerant circulates through copper tubing placed in the ground exchanges heat directly with the soil through the walls of the copper tubing which is used to convert the water to ice in the ice storage box.

Green building total energy used is through the use of onsite non-polluting renewable energy systems such as VIP. We have also employed high temperature solar panels on the rooftop, geothermal and wind technologies on site.

We can observe a solar energy system converting solar energy into electricity which is used to operate the building. The use of such renewable energy reduces environmental impacts such as natural resource destruction, air pollution and water pollution.

2.4 Materials and resources

The indispensable waste particles generated by building occupants, Green building is dedicated to the separation and storage of materials including glass, liquids, and metals.
20% to 50% of the building materials and products used are extracted and manufactured within the region, thereby supporting the regional economy and reducing the environmental impacts resulting from transportation.
Rapidly renewable building materials made from planks such as bamboo. They are typically harvested within a 10 years of cycle or shorter are used in green building.
In Green building, we have used 50% of the total value of wood based materials which are FSC certified. This way we encourage environment responsible for management.

2.5 Indoor environment quality

Printers and urinals are designed with offerble windows increase thermal mass and other architectural element which allows passive ventilation and space conditioning. These areas should be 25 feet from other area to avoid indoor air contamination Natural ventilation is a process of supplying and removing air through an indoor space by natural means. The exterior designated area for smoking.
Daylight improve indoor environment of building by exposing occupants to natural light. A well designed daylight building is esteemed to reduce lighting energy use by 50% to 80%. Green building provides connection between indoor spaces and the outdoor through the interaction of daylight and views into regularly occupied area of the building to the building occupants.

3. INNOVATIVE IDEAS & IMPLEMENTATIONS:-

Some of the innovative ideas are given below:

Innovative water waste technologies:-

The water from roof is also collected in the tank at the bottom of the building and the excess water is channelled to nearby lake. This water is used for onsite water irrigation process and it can also use portable water after the process of water treatment system.

Water reclamation system:-

Water reclamation is the process where the green water collect is recycled and reused to augment the natural system and also used as portable water.

Geo-thermal air conditioning system:

At night the geo thermal heat pump system in which the refrigerant circulates through copper tubing placed in the ground exchanges heat directly with the soil through the walls of the copper tubing which is used to convert the water to ice in the ice storage box.

Under-floor air distribution:-

The ice produced during geothermal heat pump system is used to cool the building throughout the day time. Cool air is dispersed to the zone through the radiant flooring systems while the diffusers suck the hot air out of the zonal atmosphere.

CFC reduction in hvac equipment:-

CFC's are the root cause of the serious environmental and health problems. Zero use of CFC and HFC based refrigerants in Green building reduces ozone depletion and global warming. By this way it creates no harm to the mother earth.

Solar energy system:-

We can observe a solar energy system converting solar energy into electricity which is used to operate the building. The use of such renewable energy reduces environmental impacts such as natural resource destruction, air pollution and water pollution.

Green power:-

Installing solar panels offsite encourages investments in offsite renewable energy. This helps in supplying power equivalent to 50% of the total energy requirement of the building anywhere in the country.

Rapidly renewable materials:-

Rapidly renewable building materials made from planks such as bamboo. They are typically harvested within a 10 years of cycle or shorter are used in green building.

Certified wood:-

In Green building, we have used 50% of the total value of wood based materials which are FSC certified. This way we encourage environment responsible for management.

Low emitting materials:-

A large number of building products contain compound that have negative impact on indoor air quality and earth atmosphere. We have low VOC product that improve indoor air quality during the construction process as well as lifetime of the building.

Storage & collection of recyclables:-

The indispensable waste particles generated by building occupants, Green building is dedicated to the separation and storage of materials including glass, liquids, and metals.

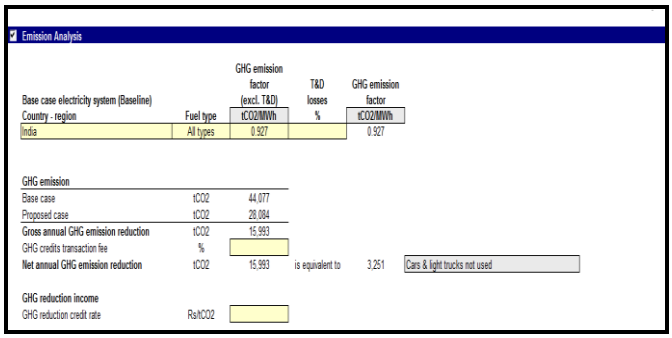
3. SIMULATION:

Our building simulation analysis involves the following steps to ensure accurate output. Understanding the region and its climate conditions, the building information model of the structure is created. A building orientation analysis is conducted to determine the optimum building orientation. A shadow analysis is performed to study the shadow effects of surrounding structures on the building. Reflection analysis is then done to study the sun path for this site. A solar analysis, living analysis and solar radiation study is also performed at this stage, and energy analysis is executed to estimate the energy usage of the building and acoustic analysis is conducted to study the flow sound within the building. A fire and smoke analysis is administered out to study the movement of smoke in the event of a fire in the building. A fluid dynamics analysis is performed to study the ventilation and airflow pattern of the building. A life cycle analysis is conducted to determine the buildings environmental and economic performance throughout its life.

In this analysis the electrical equipments are to be considered are energy efficient appliances. For these equipments the base case and proposed case are considered. By using efficient devices the power saving is of 36.2%.

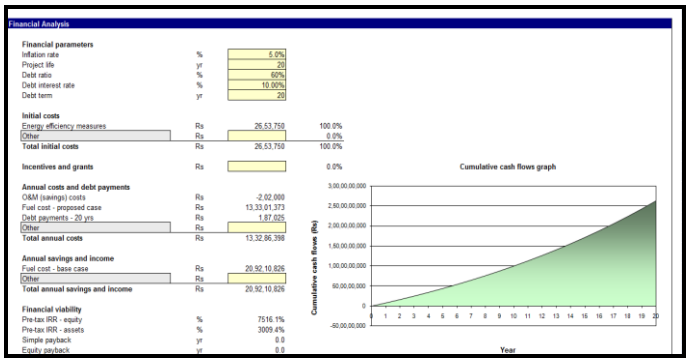
This section summarises key information for the base case and proposed case facilities, including detailed information for each fuel type used, as well as fuel consumption and annual energy use information for heating, cooling and electricity. This section also provides a tool to allow the user to benchmark their project for various energy and reference units.

Emission Analysis

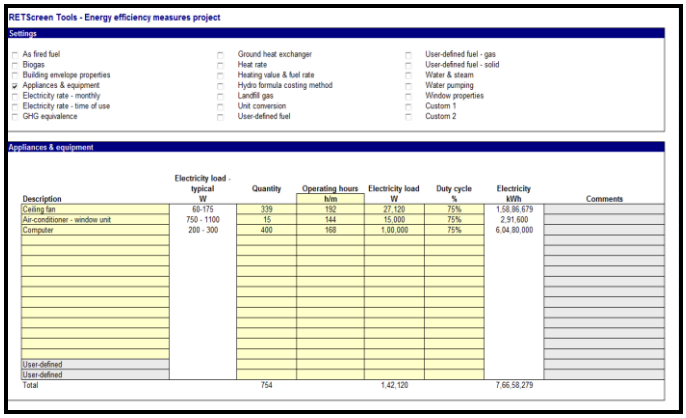


In emission analyses GHG factors are same in anywhere in India for all types of fuels and the value is 0.927 MWH.

Financial Analysis



In pecuniary investigation, the fuel rate for base case with proposed cases are compared even though the initial venture is high the payback period is very less in some times it may be accepted levels. Here the project life is considered for 20 years.



Ceiling fans, AC's, Computers are considered as tools and there total consumption of electricity is calculated.

4. CONCLUSION:

In this paper an analysis has been made on the systematic procedure towards achieving Energy efficient buildings and financial analysis including fuel rate, payback period analysis and cost of unit electricity saved. Initially the schemes may be costly but frequent usage of these schemes may decrease the cost of such schemes and these step by step procedures may evaluates the energy conservation procedures to go for Energy efficient buildings and Green buildings.

References:

1. G.R.K.D. Satya Prasad "HVAC system performance and operational strategies in Green buildings - A Simulation approach" International Research journal of Engineering and Technology" Vol. 3, Issue 2, March – 2016
2. G.R.K.D. Satya Prasad "Thermal performance analysis of earth air tunnel system applicable to Green buildings" International Research journal of Engineering and Technology" Vol. 3, Issue 2, March – 2016
3. G.R.K.D. Satya Prasad "Economic optimization of Wall's Insulation Thickness on Energy Performance of Green buildings" International Research journal of Engineering and Technology" Vol. 3, Issue 2, March – 2016
4. G.R.K.D. Satya Prasad "Integration of Renewable energy sources in zero Energy buildings with Economical and Environmental aspects by using Homer " in International journal of advanced engineering sciences and technologies, ISSN:2230-7818,vol-9,Issue No-2,2011; page no: 212-217
5. G.R.K.D. Satya Prasad Energy and Comfort Management in Energy Efficient Buildings Using RETSCREEN Software-A Case Study Analysis" in International Journal of Engineering Research and Application ISSN: 2248-9622, Vol. 3, Issue 6, Nov-Dec 2013, pp.378-381
6. Baden, S., et al., "Hurdling Financial Barriers to Lower Energy Buildings: Experiences from the USA and Europe on Financial Incentives and Monetizing Building Energy Savings in Private Investment Decision." Proceedings of 2006 ACEEE Summer Study on Energy Efficient Economy, Washington DC, August 2006.
7. US Department of Energy. Annual Energy Review 2006 27 June 2007. Accessed 27 April 2008.
8. Torcellini et al. Zero Energy Buildings: A Critical Look at the Definition.National Energy Renewable Laboratory (NREL). June 2006.
9. Frej, Anne, editor(2005). Green Office Buildings: A Practical Guide to Development Urban land Institute.pp. 138-142. ISBN 2005904468.
10. Building Science Glossary." Building Science Consortium. Accessed 27 April 2008.
11. Clarum Unveils California's First Zero Energy Home Community. 1 April 2003.
12. Database of State Incentives for Renewable & Efficiency (DSIRE) Home 2007