



Green Retrofitting for old Buildings

Kunde Shubham Bapusaheb, Mrs. M. C. Aher

P.G Student, Dept of Civil Engineering, NDMVP's K.B.T College of Engineering, Nashik, MH, India

Assistance Professor, Dept of Civil Engineering, NDMVP's K.B.T College of Engineering, Nashik, MH, India

ABSTRACT: This work inspects inventive styles, practices and objectives of old building retrofits while demonstrating green design methods and execution strategies. The present building stock is substantively huge and denotes one of the largest chances to decrease energy waste and control air contamination and worldwide warming. In relations of tall buildings, numerous will advantage from retrofits. There are lengthy lists of unproductive all-glass curtain walls, primarily endorsed by the modernist crusade, that are outstanding to retrofit. The all-glass curtain wall buildings depend on synthetic freshening, refrigeration and heating system, and suffer from poor insulation, which together create them energy hogs. Latest practices specify that green retrofit has facilitated older buildings to growth energy efficiency, enhance building performance, growth tenants' pleasure and boost economic return while decreasing greenhouse gas emission. This survey also focus on how retrofitting is possible on old building with different levels with initial cost estimation. We have collected the survey base on 8 type different questions. The system also denote each step of execution of current work in figure 1. The phase 1 focus on stakeholder commitment, phase 2 for building integrity audit, in 3 building operation, 4 used for resolve building operation and finally phase 5 improvements of building. Once finish all phases all phases done the outcome of proposed work

KEYWORDS: sustainable design; green retrofit; energy efficiency; building's performance; holistic approach.

I. INTRODUCTION

Great progress in financial activity across the world leading to rise in human activities is causing an irreversible damage to the global environment, which in future will have an undesirable impact on the quality of life of future generations. As per UNEP Report, at present-day, buildings contribute as much as one-third of total over-all greenhouse gas (GHG) emissions, principally through the use of remnant fuels throughout their operational phase. The building sector donate around 30% of global yearly greenhouse gas release and consumenear by 40% of overall energy [2]. One of the key culprits is carbon dioxide emissions, which is concerned to donate up to 40% of all global emissions in which India's position is 144th in carbon emission rating in the world. Due to remarkable progress in new infrastructural developments in intermediate economies of developing countries, and the insufficient and improper use of present building stock universally, it is an imperative of the industry to develop sustainable building technologies. If no physical steps are booked soon, greenhouse gas emissions from buildings will more than dual in the next two decades. Therefore, if objectives towards GHG emissions decrease are to be achieved, then emissions from the building sector must covenant with as a necessity by the policy makers. Reduction of GHG emissions from buildings must be one of the remarkable milestones of each nationwide weather change strategy.

The planet required to contain improved GHG emissions by at least fifty percent, in the next 40 years to move the worst-case situation of climate transform. Across the world at least twenty five percent decline in emissions wants to be accomplished in the coming eleven years. With time flying by, the nations want to work quicker to achieve the purposes to avoid irremediable damages. Sustainable is a key architectural idea of the 21st century. Green building is the method of constructing or transforming structures to be ecologically conscientious, sustainable and resource-efficient throughout their life cycle.

This merges many features like effective water use, energy-efficient and ecological atmosphere, use of renewable energy and reprocessed/recyclable materials, effectual use of landscapes, effective controller and building management systems and enhanced inside quality for good health and comfort of the residents. The idea of green buildings not only favors human health but also precautions earth from harmful and poisonous after-effects, fulfilling the accountability of the concept of ecological development.



II.LITERATURE REVIEW

Previous published literature on the financial implications of “green” certification mostly focuses on new construction within the U.S., and results generally designate a optimistic connection between environmental certification and economic results in the market. One study, based in Australia, by Miller and Buys (2008) studied the paybacks of retrofits from the viewpoint of tenants in a large office property. They found very optimistic sentiments that green retrofits would continue and were well received by tenants. No study we are alert of has inspected the economics from a broadly selected sample. Eichholtz, Kok and Quigley (2010) document huge and optimistic effects on market rents and selling prices subsequent ecological certification of office buildings. Relative to a control sample of conservative office buildings, LEED or Energy Star labeled office buildings’ rents per square foot are about 2 percent greater, effective rents are about 6 percent greater, and dividends to selling prices per square foot are as high as 16 percent.

Other studies (Fuerst and McAllister 2011; Miller, Spivey and Florance 2008) authorize these findings. Moreover, these results appear tough over the course of the financial crisis, system document for a recent dataset of 3,000 green buildings that both energy effectiveness and “greenness” of buildings are capitalized into rents and sales prices. Moreover, this outcome is not smashed by the recent recession in property markets. Other studies mention evidence signifying positive financial benefits from earlier absorption, higher occupancy rates, lower functioning expenses, greater residual values as well as greater occupant productivity. To date, there are no theoretical studies examining the market performance of “green” renovations. There are many case studies of single buildings which have been retrofit for the owner-occupant but less so in the private rental market.

Anecdotal suggestion suggests that the move of occupants towards “green” real estate is due to improved reputational benefits, business social accountability directives and employee productivity. Such a shift in occupant favorites suggests that occupants are using the buildings that they vacate to interconnect their commercial vision to stakeholders and employees.

The literature on corporate social responsibility (CSR) has generally investigated this link between corporate social performance, reputation benefits and employer attractiveness. In a current broader study Pivo and Fisher (2010) recommend higher rents and proceeds for those engaged in CSR. In other approaches frequently invoked rationale for occupy green office space is tenant productivity. Miller et al. (2009) document in reviews that over minimum of occupants of environmentally certified buildings found their employees to be more productive. Interpretation of these results is problematic, though, as these responses cannot be controlled for with management style and individual employee characteristics. However, surveys reporting on tenants in London indicate that there is indeed a shift in corporate preferences.

A 2008 research report documents that 58 percent of tenants find energy efficiency “essential” and 50 percent find green attributes “essential. Improving the bottom line concluded building energy competence is frequently reported as one of the direct economic benefits for real estate investment companies when considering energy productivity and sustainability in their portfolios.

Jones LaSalle (2010) reports that of 115 office properties in its portfolio for which the energy efficiency was enriched in 2006, the normal realized savings for 2007 and 2008 were \$2.24 million and \$3 million individually. British Land (2010) reports that crossways its portfolio, there is a reported 12 percent decrease in energy use, amounting to \$1.12 million in annual savings in energy, and a reduction of 11.1 million kWh of energy used in 2009.

Another stimulus for demand of sustainable space is government regulation and in many markets such as Boston or San Francisco or Washington, D.C., we see increased government pressure both on the regulatory side and from direct government office demand from the government services offices (federal GSA or California GSA) that need Energy Star-labeled space for most new leases.

III.METHODOLOGY

The client needs a pathway to energy management, provided by an independent (non-product) based team. Furthermore, it has been proven time and again that this is a process, requiring continuous analysis and feedback to management. Energy management is not satisfied by a one-off fix-it-all approach and requires client participation and commitment. We need to first define scope of work with below points.

1: Insulation, primarily roof secondary walls as well as floor also.



- 2: Retrofitting heating equipment's in older houses, results in household savings of 30–80% due to cut in energy-use and a reduction of CO₂-outlets by 30–100%.
- 3: Thermostats in all rooms
- 4: New windows.
- 5: Plugging air leaks.
- 6: Tuning up heat and cooling (HVAC) systems.
- 7: Switching to compact into light bulbs and/or LED light bulbs
- 8: choose different appliances which can use minimum energy. In the different countries, this is certified by the Energy Star.
- 9: Minimized usage of water by installing aerators and low-flow heads of shower.
- 10: Convert to green power, including solar energy and updatable such as heating-pellets and biogas
- 11: Using low-VOC products to recover indoor air quality
- 12: Planting native plants and other appropriate landscaping measures.

A. Energy Management Process & Performance Improvement

Somewhat in contrast to the above methods, the American Society of Heating Refrigeration and Air-conditioning Engineers recommend a feedback loop in their energy management approach, which is not to be confused with others who are defining a retrofitting process. What is significant to notice between the two (retrofitting and energy management) is that energy management requires a feedback or cyclical process under continuous review of the implemented strategy.

This concept does not look to be present in most energy retrofitting projects where the before and after effects are closely evaluated. More recently, this continuous loop process has been known by other organizations sanctioning energy retrofitting and environmental processes for buildings. An overview process is indicated with minimal detail on what occurs within each stage. There is some common ground among the previous retrofitting and energy management methodologies. In summary, most seem to advocate the following: An initial commitment to the scope of work and understanding of the business case. Understanding the baseline through initial analysis and through an auditing process, resulting in benchmarking the performance against similar projects. Developing an action plan with strategies, realizing energy retrofitting potential savings, prioritizing strategies and risk recognition. Implementation of a strategy followed by monitoring and validation. Setting new goals: results of a feedback loop.

B. Retrofitting assessment

A pre-retrofitting methodology is proposed in this paper into four sections (Figure 4) and includes a “building integrity audit” which is particularized on in the following sections:

1. Development of a building performance retrofitting management plan and its commitment.
2. A “Building Integrity Audit”: comprising a complete summary of building services, energy systems and building fabric, mechanical and occupant schedule, control and then recognizing energy waste.
3. Pre-retrofitting Energy Management: understanding the, scheduling, control, and energy use through sub-metering:
4. Implementing a staged and ranked approach to retrofitting the building services, systems and fabric. The below figure shows the each stage of Energy Retrofitting of proposed models

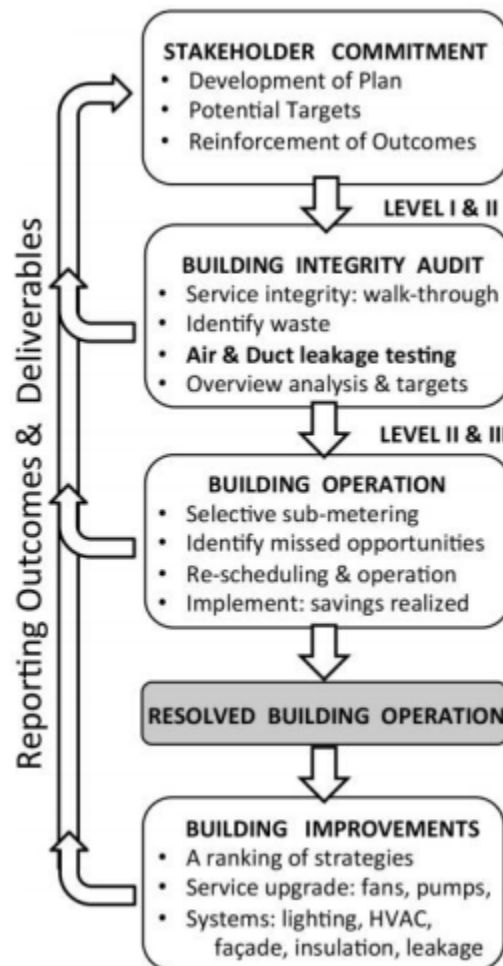


Figure 1: Energy retrofitting of proposed model

Survey indicates the significance of a ‘decision processes for energy-efficient retrofits. This initial stage engages the client in planning a schedule of ongoing energy management and retrofitting. The key is to obtain client commitment and consent to a suitable staged process and procedure for the proposed project. Timelines need to be drafted and approved; induction and access to the premises need to be granted for the next stages. In addition, an alliance wants to be formed between the building management and the energy management team. Furthermore, the processes, methodologies and business casenecessity to be explained to all stakeholders. Although this may perform to be a minor step in the overall process of energy management and retrofitting, it is probably the most significant stage. It is essential that the whole management team is engaged in the decision-making process to establish a program that is not a one-off project.

C. Pre-retrofitting Energy Management

Here, a process of specific equipment sub-metering selection is identified. It is unjustifiable, from an financial standpoint, to measure every component. The metering results are partitioned into building operational schedules. Peak loads (kW) and energy waste are also identified. Statistical and analytical algorithms are often tailored and applied to this data to explain anomalies in energy use. Discrepancies in operation, perhaps leading to equipment failures, scheduling, and lack of control are targeted. Once again, the primary aim is to classify and remedy functioning energy waste before the construction capital retrofitting process begins. The rationale for install energy meters is twofold: to manage energy consumption/ costs and to improve tools energy use and reliability. Intelligent metering systems enable building owners to take benefit of demand



management opportunities and to calculate needs based on historical record.

D. Case Study

(1) Roof and roof constructions

1. In connection with change of the roof a decision will be taken on the possibilities for a possible mounting of sun cells or photovoltaic (PV) modules as well as solar thermal collectors?
2. In any case preparations are made for a possible later mounting of PV modules or solar thermal collectors, including labeling / piping to inverters or storage tanks in loft room or cellar?

(2) Windows and entrance doors

1. The dwelling is optimizes regarding utilization of passive solar heat, with an account of how possible overheating problems, if any, have been solved?

(3) Materials in general

1. Only building components and installations totally free of PVC are applied. Where possible only materials with ecological certification are applied Where applicable only materials with environmental documentation are applied (documented)

(4) Building constructions– indoor

1. Floor slab, ceiling and floor As flooring materials are only applied wood, natural stone or ceramic?
The building project will be connected with the local district heating?
2. The municipality has received documentation to the effect that the heating system in the house ensures maximum cooling of district heated?

(5) Water and plumbing

1. Water saving toilets with differentiated flush are installed?
2. Rain water collection for garden irrigation is installed?
3. Water saving taps are installed?
4. A main water metering device is installed in each block, for use in green accounting for all blocks?
5. “Grey”waste water is utilized?

(6) Electric installations

1. Use of electric installations without PVC?
2. Installation of individual consumption display for electricity consumption?
3. All white goods must be certified as “low energy” or be prepared for that. (White household electrical appliance goods are freezers, refrigerators, stoves, washing machine, tumble dryers and dishwashing machines)?
4. Low basic lighting is installed outdoor. Supplemented with user activated stronger specific lighting?

(7) Indoor air climate and ventilation

1. Air tightness measurement 3) of the building in order to document a natural air change via constructions?
2. Installation of user controlled balanced mechanical ventilation with heat recovery, on demand, where exhaust air is used for heating of inlet air?
3. Inspection possibilities available for all pipe joints?

(8) Waste

1. Space for composting container is included in the garden plot?
2. Appropriate containers for fractionated waste disposal are built in kitchens and in the outdoor disposal places?
3. Life cycle assessment of building materials?

IV.DISCUSSIONS

Reviews of actual savings in real buildings show a wide discrepancy in delivered savings, with many projects bringing



savings well under 10% of pre-existing energy costs, far short of forecast savings and hardly discernible within the noise of utility bills, while other projects successfully deliver savings of 40% and more. Common problems include avoiding definite enhancements which mean weak development scope, non-life cycle cost, absence of consideration of the latest retrofit plans etc. This paper deliberates current strategies for retrofitting commercial buildings and practical this procedure to the retrofitting of several Australian buildings. However, the approach may not be limited to Australia only, and it is possible to apply this methodology elsewhere. The objective is to provide facility managers with cost effective, staged, and practical retrofit technologies in directive to continuously improve their building stock for long-term performance.

V.CONCLUSIONS

Green building are today the most extensively used form of architecture. Creating green buildings is an important focus of building owners and even governments worldwide. In India some world class Green Buildings have built in past few years, but quiet the idea of green buildings for overall masses is in infancy stage. Current work is an attempt in the direction to make people, communities and general public aware about the advantages of green buildings for sustainable environmental development and management. In this work we also investigate the overall survey of old buildings and how we can achieve to retrofitting all those with proposed methodology.

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