

ENERGY EFFICIENT BUILDINGS

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ABSTRACT: The building area alone speaks to around 35% vitality utilization. Understanding the circumstance, the need of the day is to receive reasonable green building configuration approach which is a definitive answer for diminish the vitality request of the building. Over utilization of routine building materials cause an Earth-wide temperature boost as well as influences the normal assets. Green or reasonable building use key assets like vitality, water, materials, and land more effectively than structures that are recently constructed traditionally. A review has been embraced for the recently built and existing structures keeping in mind the end goal to survey its potential and ability to spare vitality. The paper in this way manages the different vitality sparing ideas which can be fused at the season of arranging, outlining, and development also, execution stage to have vitality proficiency in structures keeping in mind the cost point of view. Some green structures have been conceptualized fusing the different parameters for vitality reserve funds what's more, demonstrated in the product Autodesk Revit. These structures are broke down in Autodesk Green Building Studio to survey its vitality proficiency, so that different measures could be upgraded.

Keywords: Green Buildings, LEED-India, Autodesk Revit, Autodesk Green Building Studio.

INTERODUCTION

Maintainability has turned out to be progressively critical in the building business in later a long time. A development has struck build structures in a more proficient and practical way by diminishing vitality utilize and the expenses related in working and

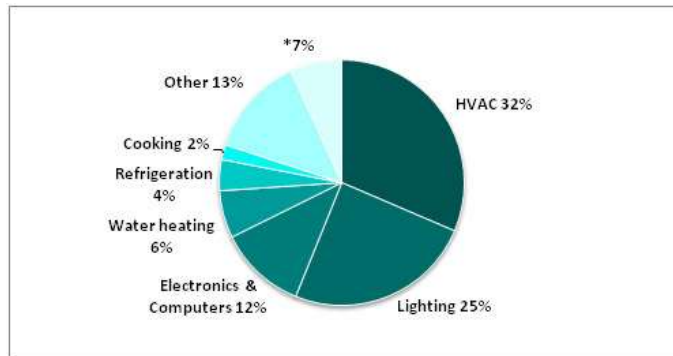
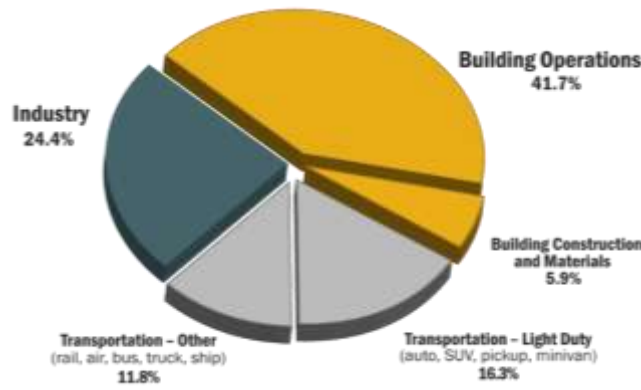


Environment amicable inventive advances like vitality productive materials, savvy contraptions, vitality productive entryways and windows, sunlight based water warming and creating power, rain water gathering, rain water reaping are utilized by numerous designers in various parts everywhere throughout the nation, yet now an ever increasing number of manufacturers and engineers are going in for undertakings that advance an eco-accommodating way of life.

ENERGY EFFICIENT CONSTRUCTION

Requirement for Energy Efficient development

The requirement for vitality productive development is taking energy by the rising force utilization in land division. The structures being outlined and utilized today are expending over the top vitality for warming/cooling and lightning. There is around 30-40% vitality sparing potential in the building business which might not just lessen the heap on the power division to take care of its demand additionally help the occupants in decreasing their vitality charges (ECBC, 2007).



In divisions, for example, private and the business area the significant part of the vitality utilization happens structures. This incorporates vitality utilized for controlling the atmosphere in structures and for the structures themselves, additionally vitality utilized for apparatuses, lighting and other introduced hardware. In different divisions a little part of the vitality utilization is comparative utilized for comparable purposes in connection to the structures. This is for example the case for a few structures in the business utilized for organization or a few structures agribusiness or ranger service.

The energy efficiency of new buildings determines the building sector’s energy consumption for far longer than other end-use sectors components determine their sector’s efficiency. Buildings will typically be constructed to be used for many decades and, in some cases, for more than a hundred years. In other energy end uses, the capital lifetime for efficiency improvement will be, at most, a few decades. Improvement of buildings’ efficiency at planning stage is relatively simple while improvements after their initial construction are much more difficult: decisions made during a building’s project phase will hence determine consumption over much, if not all, of a building’s lifetime. Some measures to improve efficiency are possible only during construction or by major refurbishment, likely to happen only after several decades.

LEED CONSTRUCTION

Leadership in Energy and Environmental Design (LEED) is a rating framework concocted by the United States Green Building Council (USGBC) to assess the natural execution of a building and support advertise change towards feasible outline. The framework is credit-based, permitting tasks to gain focuses for naturally neighborly moves made amid development and utilization of a building. LEED was propelled with an end goal to build up an "accord based, advertise driven rating framework to quicken the advancement and execution of green building rehearses."

LEED is a willful program; be that as it may, acquiring a LEED confirmation extends a positive natural picture to the group. Furthermore, utilizing many green building practices can bring about vitality and cost reserve funds over the life of the structure. Different favorable circumstances incorporate better indoor air quality and a lot of sunlight. Contemplates have demonstrated that specialists in these situations have expanded work profitability, work maintenance, and days worked. These advantages contribute specifically to an organization's benefits since compensations—which are around ten circumstances higher than lease, utilities, and support consolidated—are the biggest cost for most organizations possessing office space. Moreover, understudies in these situations have higher test scores and lower non-attendance. Retail deals are higher in daylight structures.

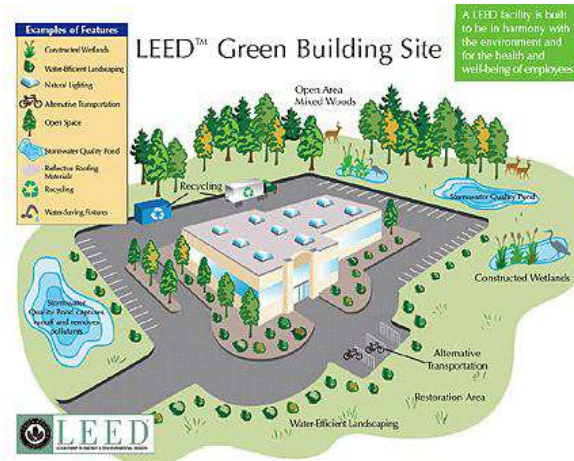
VARIOUS ENERGY SAVING CONCEPT

□ Site Selection-Although site determination is typically in light of value, a poor choice can block a few reasonable components. Making the most out of what the site brings to the table can be the distinction between a superior building and conventional one.

□ Orientation-Proper introduction considers uninvolved sun based pick up and day lightning. In the northern side of the equator, south-bound windows have the best presentation to the sun. West-bound windows should be deliberately planned, as the low point of the setting can bring about overheating.

□ Walls, and Roof-the envelope of the building is a noteworthy determinant of how much vitality is required to warmth and cool it. The test in planning the establishment, dividers and rooftops is to limit conductive warmth misfortune/pick up while limiting uncontrolled development of air into the building.

□ Energy Efficient Appliances-Use of vitality proficient and eco-accommodating machine lessens utility cost. While buying new electrical machines dependably search for Honey bee star rating. More stars show more effectiveness. The little extra introductory establishment cost will be remunerated many circumstances over by the reserve funds and the inhabitants comfort.



□ Heating, Air-Conditioning and Ventilation-Reducing the warmth heap of the structure takes into consideration the establishment of a littler warming and cooling framework. The significance of great ventilation frameworks is regularly disregarded amid the plan stage, however is a basic thought in green building.

□ Waste decrease Green engineering additionally tries to diminish misuse of vitality, water and materials amid development. One objective ought to be to decrease the measure of material going to landfills. All around composed structures additionally help diminish the measure of waste produced by inhabitants too, by giving nearby arrangement, for example, compost receptacles to diminish matter setting off to the landfills.

Outline

- The outline procedure concentrates on exploiting renewable assets appropriate from the begin. A few procedures include:
- Utilizing daylight through uninvolved and dynamic sun based and photovoltaic alternatives.
- Utilizing green rooftops and rain greenery enclosures to lessen water keep running off.
- Utilizing stuffed rock for parking areas rather than black-top or cement to upgrade renewal of ground water.
- Utilize high-effectiveness windows and protection in dividers, roofs, and floors.
- Utilize trees planted before windows to create shade in the mid year and augment sun oriented beams amid winter Green building configuration keeps a nearby beware of the full life cycle effects of the assets that make up the structure. Stylishly, the plan of the building doesn't generally consider the encompassing natural elements.

DEVELOPMENT

Green building ventures consider building materials right on time in the process too. Selecting what materials to utilize is normally part of the planning stage too to guarantee manageability in the next years. A few materials utilized include:

- Quickly renewable plant materials like bamboo and straw.
- Amble from timberlands affirmed to be economically overseen.
- Measurement stone, a characteristic stone or shake that has been chosen and created Reused stone and metal and different items that are non-poisonous, reusable, renewable, as well as recyclable.
- Utilize building materials from neighborhood sources to limit vitality use because of their transportation.
- Alongside materials, maintainability in the development procedure can likewise incorporate acts, for example, utilizing neighborhood, so that open doors and more noteworthy prosperity are encouraged in the nearby group.

OPERATION

The low operation costs of an efficiently constructed green building generate many long term benefits aside from sustainability. These include financial and health benefits, which can be incorporated in many ways.

Financial benefits:

Lower energy costs from some of the design processes—mentioned above, and including but not limited to:

- high efficiency windows and insulation
- passive solar building design
- roofs that create high solar reflectance (thereby reducing heat transfer to the building) and high thermal emittance (when a large percentage of absorbed/non-reflected solar energy is able to be released). These are called “cool roofs”
- These designs/efficient materials reduce costs directly in maximizing natural light, heating and cooling, thereby requiring less electricity useage.
- capitalized natural ventilation from absorption chillers
- heat recovery ventilation systems to recover heat from used air and transfer it to fresh air.
- Install fluorescent lighting to use 2/3 to 3/4 less energy than incandescent bulbs
- this lowers electricity use directly, as well as indirectly with cooling loads
- Installing highly efficiency appliances-some interesting statistics* about appliances to note, from the National Institute of Building Sciences’ “Whole Building Design Guide“:
- Older toilets use 3.7-7 gallons per flush
- Dishwashers use 8-14 gallons per cycle
- Top-loading washers use 45 gallons/load
- A dripping faucet waste 15-21 gallons per day like fluorescent bulbs, high efficiency appliances will reduce energy use directly by their efficiency and also by producing less waste heat.

REDUCE WASTE

Waste can be lessened on a few levels by adopting a green strategy to building. As far as development, utilizing the materials recorded above occupie squander from landfills. With the proper green-building measures, squander decrease carries on to the operation of a working also.

- on location squander administration, for example, isolating refuse, reusing and compost
- unified wastewater treatment frameworks reuse wastewater from dishwashing or clothes washers
- however these are expensive and utilize a considerable measure of energy—there are numerous littler strides to be taken as an option, for example, low power showerheads, changing over wastewater to compost by means of a biogas plant, and that's just the beginning .
- making it simple for inhabitants to lessen vitality squander as a piece of their day by day schedules, for example, clever building configuration to permit them enough light that daytime lights are superfluous, to specify one choice

COST EFFECTIVENESS

A Green building costs 3-8% more than the routine structures. Be that as it may, the cost is recuperated inside a few years through reserve funds in upkeep costs. Due to considerable lessening in operational costs, the aggregate cost of responsibility for building is constantly lesser than the traditional building. Greatest cost augmentation is expected to- Proficient envelopes, frameworks and lightning which are ECBC suggestions. Once ECBC gets to be distinctly compulsory, there will be no additional cost. Additionally an examination demonstrates that the Life Cycle Cost of Energy proficient structures is lower than that of the customary structures (Source: TERI-GRIHA).

Green structures are usually seen to be a considerable measure more costly than routine structures and regularly not worth the additional cost. Impressive research and investigation has been done concerning the cost effects of a green building. The cost could be somewhat higher than a routine building.

□ The incremental cost is constantly relative and depends on the degree of eco-accommodating elements as of now considered amid plan. The incremental cost would seem little if the benchmark configuration is as of now at a certain level of good eco-plan; it would seem immense in the event that the base outline has not considered green standards.

□ The second thing is to take a gander at the incremental cost in connection to the life cycle cost.

□ This sort of an approach could uncover. Nobody realizes that, structures would keep going for how long. Over its life cycle, the working expense would work out to 80-85 % while the incremental cost which is an onetime cost is just around 8-10 %. There is a diminishing drift in the incremental cost throughout the years.

GRIHA – GREEN RATING FOR INTEGRATED HABITAT

Evaluation... Griha is India's national rating framework for green structures.

It has been produced by TERI (the vitality and assets institute) and is embraced by the MNRE (Ministry of New and Renewable Energy). It depends on broadly acknowledged vitality and ecological standards, and tries to strike a harmony between set up rehearsals and developing ideas, both national and universal. Griha endeavors to limit a building's asset utilization, squander era, and generally speaking biological/natural effect by contrasting them with certain broadly satisfactory breaking points/benchmarks. Griha is a point based rating framework that comprises of 34 criteria classified under different segments, for example, site determination what's more, site arranging, preservation and productive usage of assets, building operation and upkeep, and development focuses.

THE BENEFITS OF GRIHA...

On a broader scale, this system, along with the activities and processes that lead up to it, will benefit the community at large with the improvement in the environment by reducing ghg (greenhouse gas) emissions, reducing energy consumption and the stress on natural resources. Some of the benefits of a green design to a building owner, user, and the society as a whole are as follows:

- Reduced energy consumption without sacrificing the comfort levels.
- Reduced destruction of natural areas, habitats, and biodiversity, and reduced soil loss from erosion etc.
- Reduced air and water pollution (with direct health benefits).
- Reduced water consumption.
- Limited waste generation due to recycling and reuse.
- Reduced pollution loads.

Energy Modelling for Building Performance

Traditional building design was largely reliant upon two-dimensional drawings (plans, elevations, sections, etc.). Building information modelling extends this beyond 3D, augmenting the three primary spatial dimensions (width, height and depth) with time as the fourth dimension and cost as the fifth. BIM therefore covers more than just geometry. It also covers spatial relationships, light analysis, geographic information, and quantities and properties of building components. Autodesk Revit® software is specifically built for Building Information Modeling (BIM), empowering design and construction professionals to bring ideas from concept to construction with a coordinated and consistent model-based approach. Revit is a single application that includes features for architectural design, MEP and structural engineering, and construction. It allows to design a building and structure and its components in 3D, annotate the model with 2D drafting elements and access building information from the building models database. The Revit work environment allows users to manipulate whole buildings or assemblies (in the project environment) or individual 3D shapes (in the family editor environment). Energy Analysis for Autodesk® Revit® software is a cloud-based energy simulation service powered by Autodesk® Green Building Studio® that supports sustainable design.

ENERGY ANALYTICAL MODEL CREATION

The energy analytical model feature in Revit building design software provides tools for fast, flexible creation of models for energy simulation. It can create energy efficient buildings 365 analytical models to suit different design stage needs, workflows, and precision preferences either directly from architectural building elements and room/space elements, or create it manually using conceptual massing.

Whole building Energy Analysis

Conceptual energy analysis tools help to make every design more sustainable. It can help in presenting analysis results in a highly visual format for easy comparison and interpretation. Also the tools can be used to quickly compare the energy consumption and lifecycle costs of design alternatives right from within Autodesk Revit

Architecture software.

Autodesk® Green Building Studio is a flexible cloud-based service that allows to run building performance simulations to optimize energy efficiency and to work toward carbon neutrality earlier in the design process. The Autodesk Green Building Studio web service provides:

- Annual energy cost

- Lifecycle energy costs (30 year)
- Annual energy consumption (electric and gas)
- Peak electric energy demand (kW)
- Lifecycle energy consumption (electric and gas)
- Onsite energy generation from photovoltaic and wind systems
- Water use analysis
- Assistance with day lighting using glaze factor calculations
- Natural ventilation potential calculations
- Carbonemission calculations.

Analysis results are presented in a highly-visual, graphical format for easy interpretation. It can also facilitate collaborative design, allowing to transfer essential information on your building design to the applications used for engineering design or code analysis. The Autodesk Green Building Studio service

CONCLUSION

The construction industry in India is one of the largest economic activities. As the sector is growing rapidly, preserving the environment poses lot of challenges and at the same time presents opportunities for various persons involved in this industry. The sustainable construction is the creation and operation of a healthy, resource-efficient built environment based on ecological principles. It lays emphasis on resource efficiency, environmental protection, and waste minimization. Energy efficiency is one of the simplest, quickest, cheapest, cleanest ways to address energy and environmental challenges. The incorporation of simple energy efficient measures in buildings can reduce a significant amount of energy consumption. Appropriate knowledge and technology is available for creating energy efficient and green buildings but behavioural, organizational and financial barriers need to be overcome for achieving desired results.

The construction industry must gear up for eco-friendly practices which will help in creating new jobs, and share inspiring cases from India and around the world. This will also help in transition to more sustainable economies, societies related to renewable energy, waste reduction and green building. With the increase in number of green projects, one can see a great future going green.

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