

RESEARCH TITLE

THE GREEN BUILDING IN JORDANIAN MUNICIPALITIES IS A NEW WINDOW ON THE ENVIRONMENT

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Abstract

The study aimed to identify the green building in Jordanian municipalities is a new window on the environment The study confirmed that the green building is an opportunity to address the issues of occupants' achievements, efficiency, environmental sustainability, and increase public awareness of the advantages of high-performance buildings, all in a comprehensive and integrated approach, in addition to increasing the efficiency of energy and resource use for occupants, as with rising energy costs, water shortages, and resources Ltd., and an endless number of other factors point to the fact that its occupants are living unsustainably.

This study focuses on examining the value and benefits of building home facilities with a sustainability concept, and the overarching questions in the application are: What are the key design factors that contribute to the operation of home facilities? What is the conceptual framework for developing a greenhouse design? The purpose of this study is to examine the awareness and implementation of green and sustainable design and architectural practices within homes in Jordan. A high-performance home protects the health of its occupants, provides a productive learning environment, connects its occupants to the natural world, increases average daily attendance, reduces satisfaction with operating costs, and reduces overall environmental impact.

The study relied on the study to reach its results using the descriptive and analytical approach, by clarifying that the green building in Jordanian municipalities is a new window on the environment The study reached a set of results and recommendations The study emphasized key considerations that take into account space design, energy and water efficiency, resource efficiency, indoor environmental quality of the building, and the impact of the building as a whole on the environment. The study recommended the need to secure reliable energy in various fields, primarily instead of oil energy, which is considered energy that can be accessed quickly.

Key Words: green buildings, environment, municipalities

Introduction

In the countries of the developed world, the dialogue that competes with politics and societal issues has become the environment. The environment has become the focus of everyone's attention now, after many years of pursuing technology and development and noticeably neglecting it. The concept of the environment is no longer limited to cleanliness and the provision of water only, but countries and continents have begun to compete in the field of clean energy production (wind energy, solar energy, hydropower, geothermal energy, tidal energy, and thermal mass energy), after confirming its possibility. In securing reliable energy in various fields, mainly instead of oil energy, which is considered energy that can be quickly accessed.

In the beginning, the application of private projects in the field of generating clean energy and adopting the principle of "green buildings" was limited only to developed countries, such as Europe and North America, where there are vast capabilities and space and they accepted this idea quickly, due to the awareness and good culture in that region.

A green building is a building that takes into account environmental considerations at every stage of construction, namely design, implementation, operation and maintenance, and the main considerations that take into account the design of spaces, energy and water efficiency, the efficiency of resource use, the quality of the building's internal environment, and the impact of the building as a whole on the environment. The main difference Between green buildings and traditional buildings is the concept of integration, where a multidisciplinary team of building specialists works together from the pre-design stage to the post-housing stage to improve the environmental sustainability properties of the building, improve performance and save costs.

The problem of studying

Green building standards are guidelines and standards that promote the design, construction and operation of buildings in an environmentally responsible and resource-efficient manner. These standards aim to reduce the negative impact of buildings on the environment, reduce energy consumption, and improve the overall performance of buildings. Sustainable buildings are designed to meet these standards by incorporating features such as solar panels, green roofs, and energy-efficient systems. By adhering to these standards, sustainable buildings can significantly reduce their carbon footprint and contribute to a healthier and more sustainable future.

Research Questions

The purpose of this study is to determine the value and benefits of implementing green building design and sustainable design features in constructing new building facilities. The value and benefits included energy cost savings and aspects to improve the environment, According to the research problem the following research questions are posed for this study:

- 1- What is the main design factors contributing to the environment and operating building facilities?
- 2- What is the conceptual framework for developing green building design?

METHODOLOGY

The study relied on the study to reach its results using the descriptive and analytical approach, by clarifying that the green building in Jordanian municipalities is a new window on the environment

Terminology of study

Green building :The term green building refers to a building that has been designed and implemented to achieve sustainability and effectiveness, based on some international standards prepared by specialized institutions that measure the extent of the building's compatibility with the environment and the possibility of it being classified as a green building. In other words, to what degree the building is environmentally friendly and does not cause damage to the environment. Damage to environmental resources¹

¹ - Manoj Sharma(2013)Green Building -Future and Challenges April ,Conference: National Conference on Electric Mechanical EngineeringAt: Jaipur

the environment: To define the environment as everything that surrounds humans, including water, air, land, and outer space, and everything these environments contain, including inanimate objects, plants, animals, and various forms of energy, systems, natural processes, and human activities.²

Municipalities: They are semi-official institutions or local groups that have a civil personality and are financially independent and have the powers to determine or cancel their borders. They contribute, according to their directions, to the economic, social, cultural and administrative advancement of their area. Under the Municipalities Law, the municipality is granted the powers and responsibilities that regulate it³

Chapter 1

Green building

Introduction

Since buildings have considerable impacts on the environment, it has become necessary to pay more attention to environmental performance in building design. However, it is a difficult task to find better design alternatives satisfying several conflicting criteria, especially, economic and environmental performance. Green building is a relatively new field. Its goal is to substantially reduce the environmental impact of buildings, while providing a healthy environment within buildings⁴

Definitions of "Green Building"

There are many definitions of what a green building is or does. Definitions may range from a building that is "not as bad" as the average building in terms of its impact on the environment or one that is "notably better" than the average building, to one that may even represent a regenerative process where there is actually an improvement and restoration of the site and its surrounding environment. The ideal "green" project preserves and restores habitat that is vital for sustaining life and becomes a net producer and exporter of resources, materials, energy and water rather than being a net consumer. (Governor's Green Government Council)

A green building is one whose construction and lifetime of operation assure the healthiest possible environment while representing the most efficient and least disruptive use of land, water, energy and resources. The optimum design solution is one that effectively emulates all of the natural systems and conditions of the pre-developed site – after development is complete.

(Governor's Green Government Council)

Green building (also known as green construction or sustainable building) refers to both a structure and the using of processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from sitting to design, construction, operation, maintenance, renovation, and demolition. (In other words, green building design involves finding the balance between homebuilding and the sustainable environment. This requires close cooperation of the design team, the architects, the engineers, and the client at all project stages) The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

Definition of Terms

The following terms are clarified for understanding:

Green construction: Efficient use of natural resources in developing communities that make an immediate and positive impact on the planet. It incorporates design, construction and operational practices that significantly reduce or eliminate its negative impact on the environment and its

² - Friis, Robert H(2012) Essentials of environmental health. 2nd ed. Sudbury, MA: Jones & Bartlett Learning, USA. Print.

³ - Qabilat Hamdi (2017). Legislation regulating the work of governorate, municipal and local councils in Jordan, German Agency and the Jordanian National Committee for Women's Affairs, Jordan.

⁴ - Alameda County Waste Management Authority (2002) New Home Construction: Green Building Guidelines, Alameda County Waste Management Authority, California USA.

occupants, and it's an opportunity to use resources efficiently while creating healthier environments for people to live and work in, it's can also significantly reduce construction and performance cost and increase the performance of these buildings in following five areas: [1] site Planning, [2] Water Management, [3] Energy Efficiency, [5] Material use.⁵

Leadership in Energy and Environment Design (LEED) : is changing the way we think about how buildings and communities are planned, constructed, maintained and operated.

Sustainability: Environmental actions or impacts of human actions by attempting to decrease the ecological footprint of humans, thus treading lightly on Earth. This equates to the reduction in the quantity of resources used, ending the waste and emissions produced “a form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”⁶

Sustainable development: development that meets the needs of the present without compromising the ability of future generations to meet their own needs ,In the long run, sustainable design is not an option but a necessity. Earth, with 6 billion people, Human depleting the land and water resources, destroying biodiversity, polluting the land, water, and air and changing the climate with potentially catastrophic results, In the short term, it seems that people do not have to practice sustainable design, but that is only true if people ignore the future, People using up resources and polluting the planet without regard to the needs of their children and their children's children.⁷

The history of green building

Individuals and companies have only been building green homes for the past thirty years; still, within that time, the green movement has been constantly growing. The history of green building dates back much further than the 1970's. It was in the midst of the industrial revolution that Henri Becquerel first witnessed the transformation of solar energy into electrical energy, known as photovoltaic power. Around this time, the late 1800's to early 1900's, a number of solar power plants were built to utilize the sun's energy for steam power. Then, in the 1950's, solar energy was used on an extremely small-scale, making way for the solar panel solution twenty years later.⁸

During the energy crisis of the 1970's, green building moved from research and development to reality. Builders and designers were looking for a way to reduce the reliance of buildings and homes on fossil fuels. Solar panels were used to make more environmentally friendly homes, although only in small numbers due to high initial costs.

The following year, 1993 saw many more advancements in the Green Revolution and the United

States Green Building Council (USGBC) was founded. The White House also had many green renovation projects done during the Clinton administration in 1993. More and more people started realizing the benefits and started making small changes in their homes by going energy star with appliances. In 1998 the USGBC launched their Leadership in Energy and Environmental Design (LEED) program and they helped contribute to the future of green building. These different programs have helped make many changes when it comes to environmentally friendly construction and they are a big part of the history of building green.⁹

For Jordan, this issue arises at a time when the built environment is failing to meet the increasing

⁵ - Ade, R., & Rehm, M. (2019). Buying limes but getting lemons: Cost-benefit analysis of residential green buildings -A new zealand case study doi:<https://doi.org/10.1016/j.enbuild.2019.01.040>

⁶ - Krüger, E. and B. Givoni (2007). "Outdoor measurements and temperature comparisons of seven monitoring stations: Preliminary studies in Curitiba, Brazil." *Building and Environment* 42(4): 1685-1698

⁷ - Lange, E., S. Hehl-Lange, et al. (2007) "Scenario-visualization for the assessment of perceived green space qualities at the urban-rural fringe." *Journal of Environmental Management*

⁸ - Attia, S. (2018) *Regenerative and Positive Impact Architecture: Learning from Case Studies*, Springer International Publishing, London, UK,

⁹ - Omer, A. M. (2008). "Green energies and the environment." *Renewable and Sustainable Energy Reviews* 12(7): 1789-1821.

demands on scarce resources. The construction sector is under increasing pressure to meet a rapidly growing need for housing and commercial space. However, so far the focus with regard to efficiency has been on raising the awareness of households regarding water and energy efficiency. These are minor measures that will not produce large-scale improvements in efficiency, unless they are complemented by sustainable design practices that cover the entire life cycle of buildings. Green building techniques and construction materials, together with sustainable energy technologies, have evolved quickly in recent years and their potential for savings and efficiency must be incorporated into construction and buildings management codes in Jordan. (Governor's Green Government Council)¹⁰

Green building concept: The term green buildings refers to the practices of creating structures and using processes that are highly environmentally efficient in using resources throughout the life cycle of the building, starting from site selection, design, operation, restoration and maintenance, to demolition and relocation. These practices are integrated with the classic design of the building in terms of public facilities and economic investment, durability or permanence over the life of the building, and finally comfort in use. As is well known, green buildings are known as sustainable buildings with high performance.¹¹

Green building standards:¹²

- 1- Insulation and construction: Many new buildings are insulated using recycled materials such as old blue jeans or blown fiberglass. Proper insulation contributes to significant savings on energy bills in the future. Walls can be made of iron and concrete, but using treated wood will not be more expensive. Many cities have places to store wood so that the remains of recycled or abandoned wood left after the end of construction work can be purchased. It is strong, cheap, and in many cases it can be It should also be luxurious.
- 2- Home appliances and equipment: Green building standards include looking for low-flow shower faucets or pressure toilet faucets, even using composting toilets, considering energy-efficient washers and dryers, placing a clothesline on an outdoor patio to hang wet clothes on sunny days, and making sure air conditioning units Completely insulated and clean, and look for instantaneous gas stoves or energy-efficient water heaters.
- 3- Flooring: :Instead of using expensive hardwoods, which pose a threat to the planet and deplete forests, many property builders have found inexpensive and beautiful alternatives in bamboo, which is technically not wood but grass, and is considered to date one of the hardest flooring materials and one of the easiest to renew, as is cork. Easily renewable, concrete can also be a strong and inexpensive alternative, as can old linoleum wrap, which is made from linen and other natural fibres¹³
- 4- . Paint and other materials: Many paint manufacturers are often looking for environmentally friendly alternatives to oil and rubber. One example is choosing milk-based paints (which smell like milk when used instead of irritating and carcinogenic chemicals). Recycled glass is now used in kitchen tiling. And bathrooms, "Truss" sinks are made from recycled materials, which look more beautiful and unique instead of granite stones extracted from mines¹⁴.
- 5- solar energy: Solar energy doesn't just mean expensive panels placed on your roof (although that is one type and is called active solar energy). Rather, home solar energy can be

¹⁰ - Pappu, A., M. Saxena, et al. (2007). "Solid wastes generation in India and their recycling potential in building materials." *Building and Environment* 42(6): 2311- 2320

¹¹ - Heerwagen J, Z. L. (2005). "The human factors of sustainable building design: post occupancy evaluation of the Phillip Merrill environmental center." Retrieved 2 June, 2008.

¹² - Paul, W. L. and P. A. Taylor (2007). "A comparison of occupant comfort and satisfaction between a green building and a conventional building." *Building and Environment*

¹³ - Vouvakis, D. and A. Xepapadeas (2007) "Changes in social welfare and sustainability: Theoretical issues and empirical evidence." *Ecological Economics*

¹⁴ - Wedding, G. C. and D. Crawford-Brown (2007). "Measuring site-level success in brownfield redevelopments: A focus on sustainability and green building." *Journal of Environmental Management* 85(2): 483-495

considered in the sense of investing in thick, segmented windows or in more complex photovoltaic cells. Although solar energy tends to be an expensive investment at first, the benefits start to show in your monthly energy bills.¹⁵

- 6- Gardens and green spaces: One of the criteria for green buildings is also to look for vibrant, shared green spaces with plants that require little irrigation, taking into consideration obtaining barrels to collect rainwater (many cities sell them during energy and water programs and projects), or converting your irrigation water system to “grey water.” (which involves using recycled water from dishwashers and clothes washers to water your garden or wash your car). Look for native trees in your area, and plant them so that these trees can protect your home's windows from the bright sun during the hottest days.
- 7- Neighborhood or residential area: While going green means being aware of what's going on in your home, you may also want to check out the neighborhood you're in. Are there recycling programs or public parks? Is there public transportation? Are bike lanes available that give you options to avoid traffic? Are there stores and restaurants near you that encourage you to walk?

The most important elements according to several resources

There is many of recourses have talk about the elements of green building, when we inert the green building, there are some of a basic elements in a different recourses.

According to LEED Green Building Rating System TM Version 2.0 Final there are five elements such as:sustainable sites, water efficiency, energy and atmosphere , material and resources , and indoor environmental quality.¹⁶

On other hand there are five elements according to Governor's Green Government Council which are :sustainable site design , water quality and conservation , energy and environment , indoor environmental quality , and materials and recourses. In Green Building Guide Book For Sustainable Architecture there are six element , which are : Sustainable sites , Water efficiency , Energy and Atmosphere , Materials and Resources , Indoor environmental quality , and innovation in design . Also there are six elements in Green Building Elements Gepetta S. Billie Renewable Energy and Energy Efficiency for Tribal Community Development Forest County Potawatomi Bingo & Casino Milwaukee, MN such as : Site , Water , Energy , Materials , Indoor environments , and Education ¹⁷.

Green Building Goals

There are many goals that motivate the planning and design of green Buildings . Perhaps the most widely recognized goals address environmental degradation:¹⁸

- 1- Mitigate global warming through energy conservation, reduction of GHG emissions, and carbon sequestration through biological processes, such as reforestation and wetland restoration.
- 2- Minimize environmental impacts resulting from the extraction of coal, natural gas, and oil, including oil spills; the mountaintop removal mining of coal; and the pollution associated with hydraulic fracturing for natural gas.
- 3- Reduce pollution of air, water, and soil.
- 4- Protect clean water sources.
- 5- Reduce light pollution that can disrupt nocturnal ecosystems.

¹⁵ - Allman, E. and Won, J. 2021. “Can ESG disclosure improve investment efficiency?” [online] blogs.worldbank.org. Available at: <https://blogs.worldbank.org/allaboutfinance/can-esg-disclosure-improveinvestment-efficiency#:~:text=Taken%20together%2C%20these%20results%20suggest> [Accessed November 28, 2022]

¹⁶ - Branger, F., Quiron, P., and Chevallier, J. 2017. “Carbon Leakage and Competitiveness of Cement and Steel Industries under the EU ETS: Much Ado about Nothing.” *The Energy Journal* 37 (3): 109–35.

¹⁷ - Chepeliev, M., Aguiar, A., Farole, T., Liverani, A. and van der Mensbrugge, D., 2022. “EU Green Deal and Circular Economy Transition: Impacts and Interactions.” *Global Trade Analysis Project (GTAP)*.

¹⁸ - Green Finance Institute. 2021. “The way ahead for the UK’s green mortgage market.” *Green Finance Institute*

- 6- Protect natural habitats and biological diversity, with specific concern for threatened and endangered species.
- 7- Prevent unnecessary and irreversible conversion of farmland to nonagricultural uses.
- 8- Protect topsoil and reduce the impacts of flooding.
- 9- Reduce use of landfills.
- 10- Reduce risk of nuclear contamination.

Goals for green buildings include providing for improved human health and comfort:¹⁹

- 1- Improve indoor air quality.
- 2- Improve indoor water quality.
- 3- Increase thermal comfort.
- 4- Reduce noise pollution.
- 5- Improve morale.

Some goals might be considered economic in nature:

- 1- Reduce energy costs.
- 2- Improve productivity.
- 3- Create green jobs.
- 4- Increase marketing appeal.
- 5- Improve public relations.

Some goals might be considered political in nature:

- 1- Reduce dependence on foreign sources of fuel.
- 2- Increase national competitiveness.
- 3- Avoid depletion of nonrenewable fuels, such as oil, coal, and natural gas.
- 4- Reduce strain on electric power grids and risk of power outages.

Some people broaden the goals of green buildings to include social or societal goals:²⁰

- a. Follow fair labor practices.
- b. Provide access for the disabled.
- c. Protect consumers.
- d. Protect parklands.
- e. Preserve historic structures.
- f. Provide affordable housing.

(Green building illustrated - Ching, Francis D. K. [SRG])

Principles of Green Design

The IRIS (Institute for Research and Innovation in Sustainability) developed the sustainability principles to serve as guidelines for assessment in design of sustainable facilities. ten principles were developed to assess aspects of progress toward sustainable development of a facility, sustainable vision and goals, considerations of social and ecological systems and the interaction with human activity, considerations of population growth and its impact, timeline and ecosystem impacts, linking visions and goals, providing impact data to stakeholders, creating open communication for development, inclusion of all stakeholders impacted from development to utilization, on-going assessment to allow for change or improvement, and maintaining on-going data to support the aforementioned possible change (IRIS, 2004). By utilizing these principles, the design phase of a project progresses toward a sustainable development²¹

¹⁹ - Hasanbeigi, Ali. 2021. "Global Cement Industry's GHG Emissions." Global Efficiency Intelligence (blog), May 17. Retrieved from <https://www.globalefficiencyintel.com/new-blog/2021/global-cementindustry-ghg-emissions>

²⁰ - HeidelbergMaterials. 2021. "HeidelbergCement produces cement with climate-neutral fuel mix using hydrogen technology." Available at: <https://www.heidelbergmaterials.com/en/pr-01-10-2021>

²¹ - Hino, M. and Burke, M. 2021. "The effect of information about climate risk on property values." Proceedings of the National Academy of Sciences, 118(17), p.e2003374118. doi:10.1073/pnas.2003374118.

With these institutes for research and innovation engineers and investors must adhere to find a new integrated environmental human society and continue the development of green buildings.

This research will enhance on the principles one and two which are:²²

1. Principle One determines a vision of sustainable development, establishing clear goals and definition of the vision.
2. Principal Two envisions considerations being made for the well-being of social, ecological, and economic systems and the interaction of systems with consideration of positive and negative consequences of human activity.

Chapter 2

Lighting

Also in green building it's very important to make the lighting comfortable in the house , and not wasting a lot of energy . so this chapter will talk about important things in lighting ; which is : test each appliance in the house , test the whole house , install compact fluorescent light , improve the lighting , control the lights ,and install a light tube . All of things will be explained in details .

There are three different types of lighting are commonly used at green bulding , and each has its benefits.²³

- 1- Ambient lighting is a type of general lighting that is used to evenly light a space. This type of lighting is often found in overhead fixtures, like chandeliers or flush-mounted ceiling lights. Ambient lighting is a good option for living rooms, dining rooms, and bedrooms.
- 2- Task lighting is a type of focused lighting that is used to illuminate a specific area. This type of lighting is often found in floor lamps, desk lamps, or pendant lights. Task lighting is a good option for kitchens, home offices, and reading nooks.
- 3- Accent lighting is a type of decorative lighting that is used to highlight certain features in a space. This type of lighting is often found in track lights, recessed lights, or string lights. Accent lighting is the perfect option for art pieces, fireplaces, and bookcases.

Test each appliance

Test each appliance using type of monitor works with plug-in lights and appliances—plug it into the wall, and plug the appliance into it. By using this meter it will show two things:²⁴

- 1- Enter the electricity cost .
- 2- find out how much each appliance costs to use .

using this it can be check each device individually to see how much it uses when it' on, and find out if it's really off when you turn it off.

You can also set it to monitor an item over time to find out how much that entertainment center or refrigerator uses in a week. This is especially useful for things like refrigerators . This type of meter is less expensive than a whole-house meter and more convenient for checking one item at a time.

Test the whole house

Another type of energy monitor checks the whole house at once. One product

²² - Huang, Y. and Wu, J. 2021. "Bottom-up analysis of energy efficiency improvement and CO2 emission reduction potentials in the cement industry for energy transition: an application of extended marginal abatement cost curves." *Journal of Cleaner Production*. Volume 296. Available at: <https://doi.org/10.1016/j.jclepro.2021.126619>.

²³ - Evans, L.B, (2003)Saving energy in manufacturing with smart technology", world energy, vol.6, No.2 pp 112-118,usa

²⁴ - U.S Energy information Administration,(2002) energy consumption by manufactures-Data table, USA

works by clamping onto the electric meter .

another uses sensors installed in the main electrical panel (it's necessary to follow directions carefully,).The whole-house monitor checks all the electric users, including the lights and appliances that are wired directly to the house.

It can show how many dollars per hour that use at any given time, as well as over time. Because they monitor the whole house at once, some of these meters have software to help to understand the use as individual items turn on and off .



Figure (4.1): A whole-house energy monitor

Install compact fluorescent light

Since 18 years ago they had made compact fluorescent light , which was best discovering in lights worlds to reduce electricity , but in that period it has a disadvantages , like .²⁵

- 1- they took time to warm up .
- 2- they have a complicated shape .
- 3- because of its complicated shape , it made of them harder to install and harder to un like .
- 4- it's cost was 20 \$ for the bulb , 18 JD .

now CFLs have been change to be smaller , brighter , look simple and better , easy to instant , and the price has come down .

Install CFLs in any fixture that sees more than two hours of use at a time, such as lights in the kitchen, living/family room, and kids' rooms; outdoor lights; or any light on a daily timer. This gives the most savings up front. If there is someone want to put CFLs in a light with a dimmer or electronic control, he have to be sure to get one that is rated for a dimmer, otherwise it won't work properly and could be a fire hazard. Another thing to be careful about is that in very cold weather (well below freezing), some CFLs used in outdoor lights can start slowly or be dim for several minutes.²⁶

Types of CFLs :

1- CFL floor lamps :²⁷

this type is much safer than units with halogen bulbs and use up to 80 percent less electricity than standard models.

²⁵ - Koomey JG(2007) Estimating total power consumption by buildings in the US and the world, Analysis press- USA.

²⁶ - Bureau of Energy Efficiency, Govt. of India, " Energy Conservation Building Code (ECBC)" User Guide, July 2009

²⁷ - Perkins, R, (2005)Electricity sector restricting in India: An environmentally beneficial policy, Energy policy vol.33(4), pp, 439-449-2005



Figure (4.2) : CFL floor lamps

2- built-in CFL :

This type can save on replacement costs and energy, especially when the person planning to buy a light fixture anyway.



figure (4.3) : - built-in CFL

3- Compact fluorescent light bulbs :²⁸

use 60 percent to 70 percent less electricity, burn cooler, and last longer than regular light bulbs. An ENERGY STAR label ensures efficiency and quality standards.



Figure (4.4) : - Compact fluorescent light bulbs

Improving the light

general area lighting mixed with focused task lighting is the most wanted . This is especially important in kitchens, where under-cabinet lights or pendant lights are more pleasing and more efficient than lighting the whole room with recessed can or ceiling fixtures. So if someone planning a kitchen remodel, he has to plan for maximum lighting efficiency. Short strings of white holiday lights—used year-round—are a great way to add sparkle and background lighting without deep shadows, at only 20w to 40w. put them around windows, across beams, or around the edge of a ceiling , LED(light-emitting diode) holiday lights use even less power. the best LED products for

²⁸ - Thakur.T, Deshmukh, S.G., kaushik S.C & Kulshrestha, M,(2005) Impact assessment of the Electricity on the Indian power sector, energy policy, vol.33 (9), pp, 1187-1198,

homeowners are specialty applications: small spotlights for accent lighting, under-cabinet strip lights, candelabra/chandelier fixtures, and holiday light strings .²⁹

Control the lights

To control the light outdoor and indoor , use a timer , but for wired light fixtures it has to install the timer in place of the on-off switch .

For indoor plug-in lamps, get a timer that plugs into the wall outlet. For exteriorlights, the better option is : Install a motion-plus-daylight sensor. It is not necessary to use CFL bulbs, because the lights will only be on for short periods (although a halogen floodlight will improve the efficiency of outdoor fixtures by about 30 percent).

Install a light tube

Also called a “tubular skylight,” this is a great way to bring natural outdoor lightinto a dark area. A light tube also reduces the need for electric lights in dark areas. With a price tag of \$200 to \$500, it may take many years for the tube to pay for itself in saved electricity, but there are aesthetic and health benefits to natural light as well . the good things for it is :³⁰

- 1- It's cheaper than a skylight .
- 2- is easier to install.
- 3- Contributes less to winter heat loss and summer heat gain .

A light tube looks like a domed ceiling-light fixture, but instead of being poweredby electricity, it's lit by natural sunlight from a collector dome on the roof.



Figure (4.5) :A tubular skylight



Figure (4.6) :From inside the house, a lighttube looks like a domed fixture

²⁹ - Gomes pinto Garcia, A, Szklo, A.S, Scahalfleer, R(2007) Energy efficiency standards for electric lighting in Brazilian Industry, Energy policy, vol 35(6), pp-3424- 3439,USA.

³⁰ - City of Boston, Massachusetts. Mayor Menino's Green Building Task Force Report, “Everyone benefits from green building...” Fall 2004.

Conclusion, results and recommendations

First: the conclusion

The conclusion of the study constituted the outcome of the results that represented the answer to the study's questions in addition to providing a set of recommendations. The study addressed The study showed that in developed world countries, the dialogue that competes with politics and societal issues has become the environment. The environment has become the focus of everyone's attention now, after many years of technology and development being pursued and noticeably neglected. The concept of the environment is no longer limited to cleanliness and the provision of water only, but countries and continents have begun to compete in the field of clean energy production (wind energy, solar energy, hydroelectric energy, geothermal energy, tidal energy, and thermal energy). mass energy) after ensuring that this is possible. In securing reliable energy in various fields, mainly instead of oil energy, which is considered energy that can be accessed quickly.

The study confirmed that the application of private projects in the field of clean energy generation and the adoption of the principle of "green buildings" is limited only to developed countries, such as Europe and North America, where there are vast capabilities and space and they quickly accepted this idea, due to awareness and good culture in that region. A green building is a building that takes into account environmental considerations at every stage of construction, namely design, implementation, operation and maintenance.

The study emphasized the main considerations that take into account space design, energy and water efficiency, resource efficiency, the quality of the building's internal environment, and the impact of the building as a whole on the environment. The main difference between green buildings and traditional buildings is the concept of integration, where a multidisciplinary team of building professionals works together from pre-design to post-housing to optimize the environmental sustainability characteristics of the building, improve performance and save costs.

Second: the results

- 1- The study showed that in developed world countries, the dialogue that competes with politics and societal issues has become the environment. The environment has become the focus of everyone's attention now, after many years of technology and development being pursued and noticeably neglected. The concept of the environment is no longer limited to cleanliness and the provision of water only, but countries and continents have begun to compete in the field of clean energy production (wind energy, solar energy, hydroelectric energy, geothermal energy, tidal energy, and thermal energy). mass energy) after ensuring that this is possible. In securing reliable energy in various fields, mainly instead of oil energy, which is considered energy that can be accessed quickly.
- 2- The study confirmed that the application of private projects in the field of clean energy generation and the adoption of the principle of "green buildings" is limited only to developed countries, such as Europe and North America, where there are vast capabilities and space and they quickly accepted this idea, due to awareness and good culture in that region.A
- 3- The study emphasized the green building is a building that takes into account environmental considerations at every stage of construction, namely design, implementation, operation and maintenance.
- 4- The study emphasized the main considerations that take into account space design, energy and water efficiency, resource efficiency, the quality of the building's internal environment, and the impact of the building as a whole on the environment. The main difference between green buildings and traditional buildings is the concept of integration, where a multidisciplinary team of building professionals works together from pre-design to post-housing to optimize the environmental sustainability characteristics of the building, improve performance and save costs.

Third: Recommendations

- 1- It is necessary for municipalities to pursue technology and development because the concept of the environment is no longer limited to cleanliness and the provision of water only. Rather, countries have begun to compete in the field of clean energy production (wind energy, solar energy, hydroelectric energy, geothermal energy, tidal energy, and thermal energy).
- 2- The researcher recommended that it is necessary to secure reliable energy in various fields, mainly instead of oil energy, which is considered energy that can be accessed quickly.
- 3- The study recommended the necessity of implementing private projects in the field of clean energy generation and adopting the principle of “green buildings” limited only to developed countries, such as Europe and North America, where there are vast capabilities and space. They quickly accepted this idea, due to awareness and good culture in that region.
- 4- The study recommended that municipalities should pay attention to space design, energy and water efficiency, resource efficiency, the quality of the building’s internal environment, and the impact of the building as a whole on the environment.

Reference

- Ade, R., & Rehm, M. (2019). Buying limes but getting lemons: Cost-benefit analysis of residential green buildings -A new zealand case study doi:<https://doi.org/10.1016/j.enbuild.2019.01.040>
- Alameda County Waste Management Authority (2002) New Home Construction: Green Building Guidelines, Alameda County Waste Management Authority, California USA.
- Allman, E. and Won, J. 2021. “Can ESG disclosure improve investment efficiency?” [online] [blogs.worldbank.org](https://blogs.worldbank.org/allaboutfinance/can-esg-disclosure-improveinvestment-efficiency#:~:text=Taken%20together%2C%20these%20results%20suggest). Available at: <https://blogs.worldbank.org/allaboutfinance/can-esg-disclosure-improveinvestment-efficiency#:~:text=Taken%20together%2C%20these%20results%20suggest> [Accessed November 28, 2022]
- Branger, F., Quiron, P., and Chevallier, J. 2017. “Carbon Leakage and Competitiveness of Cement and Steel Industries under the EU ETS: Much Ado about Nothing.” *The Energy Journal* 37 (3): 109–35.
- Bureau of Energy Efficiency, Govt. of India, “Energy Conservation Building Code (ECBC)” User Guide, July 2009
- Chepeliev, M., Aguiar, A., Farole, T., Liverani, A. and van der Mensbrugge, D., 2022. “EU Green Deal and Circular Economy Transition: Impacts and Interactions.” *Global Trade Analysis Project (GTAP)*.
- City of Boston, Massachusetts. Mayor Menino’s Green Building Task Force Report, “Everyone benefits from green building...” Fall 2004.
- Evans, L.B, (2003)Saving energy in manufacturing with smart technology”, *world energy*, vol.6, No.2 pp 112- 118,usa
- Friis, Robert H(2012) *Essentials of environmental health*. 2nd ed. Sudbury, MA: Jones & Bartlett Learning, USA. Print.
- Gomes pinto Garcia, A, Szklo, A.S, Scahalfleer, R(2007) Energy efficiency standards for electric lighting in Brazilian Industry, *Energy policy*, vol 35(6), pp-3424- 3439,USA.
- Green Finance Institute. 2021. “The way ahead for the UK’s green mortgage market.” *Green Finance Institute*
- Hasanbeigi, Ali. 2021. “Global Cement Industry’s GHG Emissions.” *Global Efficiency Intelligence (blog)*, May 17. Retrieved from <https://www.globalefficiencyintel.com/new-blog/2021/global-cementindustry-ghg-emissions>
- Heerwagen J, Z. L. (2005). "The human factors of sustainable building design: post occupancy evaluation of the Phillip Merrill environmental center." Retrieved 2 June, 2008.

- HeidelbergMaterials. 2021. "HeidelbergCement produces cement with climate-neutral fuel mix using hydrogen technology." Available at: <https://www.heidelbergmaterials.com/en/pr-01-10-2021>
- Hino, M. and Burke, M. 2021. "The effect of information about climate risk on property values." *Proceedings of the National Academy of Sciences*, 118(17), p.e2003374118. doi:10.1073/pnas.2003374118.
- Huang, Y. and Wu, J. 2021. "Bottom-up analysis of energy efficiency improvement and CO2 emission reduction potentials in the cement industry for energy transition: an application of extended marginal abatement cost curves." *Journal of Cleaner Production*. Volume 296. Available at: <https://doi.org/10.1016/j.jclepro.2021.126619>.
- Koomey JG(2007) Estimating total power consumption by buildings in the US and the world, Analysis press- USA.
- Krüger, E. and B. Givoni (2007). "Outdoor measurements and temperature comparisons of seven monitoring stations: Preliminary studies in Curitiba, Brazil." *Building and Environment* 42(4): 1685-1698
- Lange, E., S. Hehl-Lange, et al. (2007) "Scenario-visualization for the assessment of perceived green space qualities at the urban-rural fringe." *Journal of Environmental Management*
- Lange, E., S. Hehl-Lange, et al. (2007) "Scenario-visualization for the assessment of perceived green space qualities at the urban-rural fringe." *Journal of Environmental Management*
- Manoj Sharma(2013)Green Building -Future and Challenges April ,Conference: National Conference on Electric Mechanical EngineeringAt: Jaipur
- Omer, A. M. (2008). "Green energies and the environment." *Renewable and Sustainable Energy Reviews* 12(7): 1789-1821.
- Pappu, A., M. Saxena, et al. (2007). "Solid wastes generation in India and their recycling potential in building materials." *Building and Environment* 42(6): 2311- 2320
- Paul, W. L. and P. A. Taylor (2007). "A comparison of occupant comfort and satisfaction between a green building and a conventional building." *Building and Environment*
- Perkins, R, (2005)Electricity sector restricting in India: An environmentally beneficial policy, *Energy policy* vol.33(4), pp, 439-449-2005
- Qabilat Hamdi (2017). Legislation regulating the work of governorate, municipal and local councils in Jordan, German Agency and the Jordanian National Committee for Women's Affairs, Jordan
- Thakur.T, Deshmukh, S.G., kaushik S.C & Kulshrestha, M,(2005) Impact assessment of the Electricity on the Indian power sector, *energy policy*, vol.33 (9), pp, 1187-1198,
- U.S Energy information Administration,(2002) energy consumption by manufactures-Data table, USA
- Vouvaki, D. and A. Xepapadeas (2007) "Changes in social welfare and sustainability: Theoretical issues and empirical evidence." *Ecological Economics*
- Wedding, G. C. and D. Crawford-Brown (2007). "Measuring site-level success in brownfield redevelopments: A focus on sustainability and green building." *Journal of Environmental Management* 85(2): 483-495