The effect of solar energy on interior design leading to zero energy buildings

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Abstract:

Energy forms of all kinds are the backbone of our lives and the basis for our continuation. 80% of the energy consumed globally comes from non-renewable sources such as oil and gas, and the day may come when they are being implemented, as it is the primary source of secondary gas emission. Carbon dioxide is directly linked to climate change, which is the most prominent issue facing humanity. Most statistics indicate that the consumption of residential buildings constitutes about 30% to 40% of the total energy resources in the world, and contributes to the emission of 33% of carbon dioxide. All of which made the improvement in energy consumption and self-production in these buildings have become extremely important, so most researches went to Zero-energy buildings (ZEB).

The research problem is: relying on non-renewable energy such as electric energy, and the consequent energy shortage and increased carbon dioxide emissions that negatively affect the clean environment.

Electricity generation from transparent glass is our latest fast growing solution. It boils down to using solar panels to replace traditional building materials in some parts of the building such as windows and ceilings, skylights, balcony fences or facades, car park awnings and even walls. It can also be combined as an integral part of the building design as a component against wind and breakage. These advantages make it one of the fastest growing sectors in the photovoltaic industry. Technology is increasingly used in the construction of new buildings to give the buildings a wonderful aesthetic shape as well as being heat-insulated and shaded to various degrees along with its main role as a main or additional source of electricity for the building. On the other hand, some old buildings can be modified by replacing windows, skylights, or balconies, etc. This technique is the ideal solution for towers with glass fronts and for buildings and hangars for sectors that operate in the desert, such as the military sectors, which need combined energy to operate air-conditioners and lighting, etc

Keywords:

Solar energy, zero energy building, façade standards.

The importance of the research:

Transforming the world into 100% of clean renewable energy because most of the technology needed to transform the world from fuel to clean and renewable energy already exists. To implement this technology requires overcoming obstacles in the field of planning. The use of solar energy will be reflected in the positive results that contribute to keeping the environment clean. The efficient use of energy is represented by careful selection of windows, insulating glass that reduces heat leakage and the use of insulation materials for walls and ceilings for use in terms of air conditioning and heating.

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Research objective:

Replacement of solar energy instead of electrical energy to generate renewable energy, which suits the climate of the Egyptian environment and modern technological methods that meet Egypt's energy needs; l It is also clean energy that preserves the environmental safety from increasing the thermal range

Research methodology:

Descriptive method: which includes all information and data related to solar energy. The analytical method: which includes the analysis and interpretation of facts and information on the optimal use of solar energy.

Solar Energy:

Solar energy is the mother energy on earth, where all its energies are emitted by its rays. This energy can be transferred directly or indirectly to heat, cold, electricity and driving power. And solar energy varies according to its movement and its distance from the earth. Solar energy reaches homes via solar panels and the intensity of sunlight and its intensity over the map of the earth vary according to the seasons of the year above the hemispheres and their distance from the earth and its inclinations and place them over geographical locations throughout the day or during the year

The definition of solar energy is the light emitted and the heat produced by the sun, which the human has harnessed to his advantage using a set of technological means that are constantly evolving. Electric energy is generated from solar energy by thermal engines or photovoltaic converters, and applications that are made using solar energy which are heating and cooling systems during architectural designs that rely on the exploitation of solar energy and drinking water during distillation and purification.

Benefits of solar energy: Solar energy is sustainable energy and it is renewable, meaning that it is an energy that is not exhausted, it is a natural energy source and can be used to generate other forms of energy. Solar cells do not cause any noise when you convert sunlight into usable electric energy, solar panels at homes do not cause any emissions and do not cause any harmful impact on the environment.

Picture of corrugated roof over open mesh structure and the use of electric power panels.

MAD panels used to generate electricity from sustainable solar energy.

MAD architects present their model for the "home of the future" and they are looking forward to the interstitial "secluded air" that aims to break the boundaries between the inside and the outside, giving residents the feeling of living in nature. Instead of a traditional house - where walls and ceilings form boundaries - a curved floating roof slopes down over an open mesh structure. With a clear layer of water-resistant glass, the wavy part protects the "inside" from rain, while providing natural ventilation, and allowing sunlight to flood inside. MAD has developed the above solar panels strategically, the angle of each position ideal for harnessing greater amounts of sunlight and saving energy throughout the home. Collectively, they generate enough electrical energy to power the daily consumption of a family of three.

"Maintaining openness to the sky and its surroundings," Life in the Garden "see life and energy (solar energy), and nature coincides smoothly with each other to create an architectural" landscape ", read in a statement released by the studio." One stresses the emotional connection of humanity with nature."

Building Definition of Zero Energy:

Zero energy buildings are buildings that improve energy efficiency and achieve a balance between the energy consumed and the energy generated by the building itself, from renewable sources such as solar or wind energy, i.e. simply buildings that produce an amount of energy almost equal to consumption. It is also connected to the regular electrical network, where the excess of the produced energy can be sold or an additional amount can be invested as needed.

The basic elements of buildings are zero energy.

Insulation: One of the simplest ways to reduce energy consumption is to achieve high insulating floors, walls and ceilings for zero-energy buildings, and the most effective way to obtain excellent insulation is to use Insulated concrete forms (ICFs), which are cement insulated with external layers of insulating material which are of low cost, strong and environment friendly.

The economic cost of zero-energy buildings

The cost of building zero-energy buildings is greater than the cost of constructing a regular building, due to the advanced technologies used and the additional requirements for this type of building. The cost of zero-energy construction exceeds the cost of creating a regular building by 7.3%. In the long-term energy bills must be taken into account, according to the previous study, the cost of construction can be fully recovered over a period ranging from 7.8 to 13.8 years of saving on bills, and the profit increases with future energy price increases, and the cost of the basic components of this buildings in a continuous decline.

Conclusions and recommendations:

•Setting an energy strategy in Egypt, and creating clear alternative legislation to create renewable energy for competition, especially with modern technology.

••Large installations for solar energy can produce solar energy regardless of the weather condition, whether sunny or not, which makes it sustainable and reliable to produce electricity, usually these facilities are thermal as they store the heat generated, where they use it in the event if it was not sunny.

•The advantage of solar energy compared to other energy sources is that the technology used in it remains relatively simple and not complicated in comparison to the technology used in other energy sources. Providing an environmental safety factor, as solar energy is a clean energy that does not pollute the atmosphere and leaves waste, which gives it a special status in this field, especially in the coming century.

Glue transparent solar cells to the windows to generate electricity from sunlight during the day, and use them as a kind of lighting when evening falls.

•Relying on the design of buildings with zero energy, with optimal utilization of renewable energies, the best is to use of a layer of Nano materials that do not stick to dust and dust to increase the efficiency and continuity of the use of photovoltaic cells to generate electrical energy.

•Modernizing the uses of solar energy in the field of building and architecture and studying reducing energy losses and relying on reducing the ratio of carbon monoxide and first to maintain environmental safety and sustainability.

•Applying all means of rationalizing energy conservation and studying its best methods in addition to supporting citizens who use solar energy in their homes and in the field of industry and tourism.

References:

- Tawagowhat alethad eloroby 77/2001- alethad eloroby hwl tarweg almotawleda an masader al taka al motagdadh fi aswak alkahraba al dakhlia alkahraba" 23 mayo 2012 http://gcarabic.com

"the European union directions about generating renewable energy resources in the markets of electricity" 23rd/5/2012.

- http://www.egynews.net/wps/portal/reports?params=237274
- Alesawy,Sara (2013)Albank Aldwly yoaked nagah mshroea al korimate lltaka alshamsia fi masr –kharida al ahram –el ethnin 24 yonio 2013

"the international bank confirms the success of Al-korimat project for solar energy in egypt-24th june/2013.

- . http://gate.ahram.org.eg/NewsContent/14/57/363157/%D8%A7%D9

- http://gate.ahram.org.eg/NewsContent/14/57/363157/%D8%A7%D9%82
- https://www.france24.com/ar/
- http://amr-poma.blogspot.com/2012/08/blog-post_24.html#.Uci-rNht1N0
- http://amr-poma.blogspot.com/2012/05/blog-post_5132.html#.Uci4wtht1N0
- http://amr-poma.blogspot.com/2012/06/blog-post_5180.html
- http://muhannadknol.files.wordpress.com/2011/01/cooling-heating1.jpg
- http://www.arch-news.net/1
- http://www.3marah.com
- https://www.arageek.com/tech/net-zero-energy-buildings
- http://www.tech-tech.net
- http://www.arab-eng.org/vb/eng9809
- http://www.env-news.com/
- http://albenaamag.com/2013/10/05/%D8%A7%D8%A
- https://ar.wikipedia.org/wiki
- Hosam Hisham http://goo.gl/EFa9iK
- http://www.dw.com/ar Elmostakbal Alan-magalht elolom we eltecnologia "future now, journal of science and technology".
- http://www.solaracil.com/index.php/solaracil-projects/glass-pv
- http://www.arch-news.net/

http://ar.wikipedia.org/wiki/%D8%B3%D8%AF_%D8