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The use of solar cells in energy saving and its impact on the architectural configuration of the buildings of the city of Baghdad

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Abstract: Solar systems are one of the environmental control systems. They use clean fuels and use them as environmentally friendly sources of renewable energy, namely, the sun. Iraq has a high solar brightness with very high radiation intensity. As is known, Iraq suffers from a severe problem in the field of electricity production and its continuous interruption due to the great damage caused to the electrical stations during the American aggression on Iraq in 1991 and the unjust siege imposed by the aggression countries and causing the deterioration of all infrastructure of the country and most importantly the production and transmission of electric power.

The current study aims at the possibility of spreading solar cell systems over the buildings and houses of the city of Baghdad and to identify the methods of architectural integration with buildings and ways to benefit from these cells in enhancing the beauty of the shape of the final architectural building. The need for uninterrupted electrical power can be integrated with the aesthetics of buildings. The architectural style of Baghdad houses also facilitates the installation and operation of photovoltaic cells. The study developed solutions available for longitudinal cell stabilization methods.

Keywords: Photovoltaic module, architecture art, energy crisis, Iraq

1. Introduction

Energy is a basic human need; its degree of availability and diversity of sources determine the way of life and the level of progress of society. There is no development without energy. Increased demand for energy and limited conventional energy sources have meant that renewable energy sources such as solar cells should be addressed as an adjunct to the electricity problem. The evolution of man's energy use and need over time has been manifested in various forms and ways [1]. Man has created new energy sources and is still looking and adapting to every new and harnessing his actions to the benefit or harm to himself, humanity or life [2]. The human need for energy has made the world's energy balance dynamic, which is constantly expanding to various sources. Energy sources have diversified from renewable and non-renewable. The dream of mankind as a whole has become the use of renewable energy for its abundance and to reduce dependence on the use of renewable energy as much as possible as it is on its way to extinction [3, 4].

Energy can take various forms including thermal, chemical, electrical, radiological, nuclear, energy (electromagnetic, energy, etc.) [5]. All kinds of energy can be converted from one form to another with the help of simple or sometimes complicated instruments, such as chemical energy to electric power through batteries or accumulators, conversion of thermal energy into mechanical energy, which we find in internal combustion engines, or conversion of solar energy into electrical energy, and so on [6, 7].

The types of energy used worldwide are divided into oil consumption, coal, natural gas, nuclear power, and renewable energy sources [8]. Renewable energies vary from mechanical sources such as waterfalls, dams, tides, and wind power. Therefore, power generation plants in dams, waterfalls, high tides, and high winds to exploit mechanical momentum in turbine operation [9]. Through direct heating in the heating of water [10, 11], heating and cooking [12], and can be directly converted to electric energy by solar cells [13, 14], concentrated power stations [15, 16], and solar chimney [17, 18]. There is also bio-residues, and include agricultural residues and biomass that are destroyed [19, 20]. The hydrogen is an important type of fuel, and is expected to play a major role in future energy production, and hydrogen-powered cars have begun to be used [21, 22]. Hydrogen in fuel cells are promising cells with large applications in the future [23]. Electricity is generated directly by passing hydrogen and air through it. Through hydrogen and oxygen, we get electrical energy. The remnants of this process are water only. Fuel cells do not contribute to polluting the environment. Nuclear power, which is produced by nuclear fission in nuclear reactors, is also used in the operation of ships, submarines and power generation [24]. The most important disadvantages are the radioactive waste, the disposal problem, and the high safety controls necessary to prevent the explosion of the reactor or leakage of radiation from it [25-27].

Renewable energy is energy derived from renewable natural resources that can not be implemented. Sustainable energy and renewable sources of energy differ from fossil fuels from petroleum, coal and natural gas, or nuclear fuel used in nuclear reactors. They do not create carbon dioxide residues or harmful gases or increase global warming, such as fossil fuels or waste [28-30]. Currently, the most renewable energy production comes from hydroelectric plants with great dams wherever rivers and waterfalls are located [31]. Wind and solar-powered roads are widely used in developed and some developing countries; however, the means of producing electricity using renewable sources of energy are becoming commonplace at recent days [32]. Many countries have developed plans to increase their proportion of renewable energy production to cover some of their energy needs by 20% of their consumption by 2020 [33] .

Demand for oil and its derivatives are expected to continue to grow until 2115, despite OPEC's expansion in encouraging the use of other sources of energy [34]. Based on the 2015 report of the Organization of Petroleum Exporting Countries, oil resources will increase by an average of 2.8%, coal 2.6% and gas Nuclear energy 2.7%, hydro energy 0.3%, biomass 3.3%, renewable energy sources 7.5%, which means that the world is going to replace renewable energy sources, even partially, fossil energy [35]. This means that the demand for renewable energy sources will increase more than the increase in demand for non-renewable energy sources, although the demand for renewable energy is still limited compared to the demand for energy.

Solar energy is the light and heat emitted from the sun that humans have harnessed to their advantage since ancient times using a combination of constantly evolving technologies. Solar energy technologies include the use of solar thermal energy for direct heating or in the process of mechanical transformation of the movement or electric energy, or to generate electricity through photovoltaic phenomena using photovoltaic panels as well as architectural designs that rely on the exploitation of solar energy, which can contribute significantly to solving some of the most pressing problems of the world today [36-38].

The solar energy received by the Earth is the source of life on its surface and the direct and indirect source of the various types of energy available to it, with the exception of nuclear energy and tidal energy [39]. Solar energy is in various forms, mainly solar radiation and indirect solar energy such as wind power, hydro power and plant energy. The irregularity of the distribution of solar energy in the atmosphere causes localized atmospheric variations, while solar radiation causes the evaporation of part of the ocean's water to the atmosphere and leads to precipitation on the surface of the earth and the return of water to the oceans through rivers or natural barriers resulting in its kinetic energy generation is hydropower [40-43]. Solar energy stored in agricultural materials is also the result of photosynthesis processes for the production of carbohydrate materials and the fermentation of these substances leads to the production of alcohol that can be used as fuel in internal combustion engines [44, 45].

Solar energy is clean energy as all the transformations necessary to take advantage of solar energy do not give by-products the pollution of the environment. The vast amount of energy carried by solar radiation is readily available in multiple life facilities. However, the most current uses of solar energy are in the areas of housing [46], agriculture [47], and water distillation [48, 49]. The potential for generating electricity (as is known, the only energy that is easy to generate, transport and use) is powered by solar energy and will remain the main energy we will need in the future. Solar energy can become one of the main sources of electricity generation in the future [50].

The most important problem faced by researchers in the fields of solar energy is the existence of the following:

1. Dust and try to clean the solar energy devices it: Research has shown on this subject that more than 21% of the effectiveness of solar energy lose if the device does not clean the receiver for the sun for a month. The best way to get rid of dust is to use continuous cleaning methods, ie at intervals of not more than three days for each period and vary from country to country depending on the nature of the dust and nature of the weather in that country [51-55].
2. Storage and use of solar energy during the night or cloudy days or dusty days: The storage of solar energy depends on the nature and quantity of solar energy, the type of use and the period of use in addition to the total cost of the storage method and prefer not to use storage devices to reduce the cost and take advantage instead of solar energy just when they exist. Solar storage is one of the topics that need more research and new discoveries. The storage of heat by water and rock is the best method at present. As for the storage of electric power, the most common method is the use of liquid and dry batteries (acid and lead batteries). There are currently more than ten methods of storing solar energy such as melting of metals, phase conversion of material [56-60].
3. The high temperature of the solar panel resulting from high solar radiation causes its low electrical efficiency and productivity [61-63]. Researchers have worked to find solutions to this issue by using photovoltaic thermal (PVT) systems. These systems use a cooling fluid (air, water, nanoscale fluid, variable phase material, variable phase material and nanoparticles) [64-70]. Practical experiments and theoretical studies demonstrated the high efficiency of solar electric cells with high thermal efficiency of PVT systems [71-75].

Solar energy can be converted into electrical energy and thermal energy through photovoltaic conversion and solar thermal conversion as follows:

1. Solar water heating: An integrated system consisting of several parts used in the collection of solar radiation falling on them and converted to heat energy is used to heat water during the hours of sunlight, where hot water is stored in a thermal tank for use during the day [76].
2. Solar heating: Solar water heaters can also be used to heat pool water. Solar collectors heat water to a little higher than the ambient temperature. Low-glazed solar panels, usually made of materials, are used for this purpose. Plastic specially designed for this purpose.
3. Desalination of salt water by solar energy: Here are several ways, including: Distillation: a process of fumigation of multi-stage or evaporation of solar flash evaporation. There are also many others such as icing, reverse osmosis, ion exchange, and wastewater treatment (where solar energy is also used to remove toxins from water polluted by photolysis) [77-80].
4. Solar cooking: The solar cooker is a device that uses sunlight in cooking, drying and pasteurization [81].
5. Use in agricultural activity: Those concerned with the development and development of agriculture seek to increase the utilization of solar energy in order to increase the productivity of cultivated plants. Some techniques, such as organizing seasons of agriculture by year of the year, adjusting the rows of cultivated plants, regulating the height of rows and mixing different plant varieties, can improve yield productivity, as well as the management of water pumping machines, drying crops, hatching chickens and drying chicken manure. Energy generated by solar panels was also used to make fruit juices [82, 83].
6. Use of solar energy to generate electricity: Solar energy can be converted into electrical energy through photoelectric conversion and is intended to convert solar or optical radiation directly into electrical energy through photovoltaic cells [84, 85]. As is known here some of the materials that conduct the photoelectric conversion process are called semi-conductors such as silicon, germanium, etc. Electricity is one type of energy found in nature and electricity is one of the energy carriers that can be used in many purposes. Electric is used in all human activities, including industrial production and use [86-90]. Electricity is produced in the form of primary and secondary energy, which can be obtained from natural sources such as energy obtained from water resources, wind, solar energy, tides and waves, and electricity is obtained as a secondary energy source of nuclear fission temperature Derived from nuclear fuel, geothermal energy and solar thermal energy, and by burning major combustible sources of fuel such as coal, natural gas, oil, biomass and waste. Just as the conversion of kinetic energy into electrical energy or double thermal heating, or as in batteries, the generated electricity is of constant current.

2. Energy Crisis in Iraq

Iraq has fought many major wars since 1980 and has been subjected to an unprecedented siege in history for the period from 1991 to 2003, if we add to this severe drought, which lasted two decades, the country has destroyed its infrastructure in a large and wide [91]. The Fertile Crescent (Mesopotamia) has turned into a desert and source of dust storms [92]. The eternal fountain rivers' water salinity has increased to a point where it has become unsanitary [93]. As for electricity since 2003 and until today, successive Iraqi governments spent $ 110 billion and today electricity is still cut for long hours and Iraqi citizens are equipped with 10 to 12 hours of electricity in the best of circumstances [94]. Cutting hours increase in the hot summer and increase the suffering of Iraqi citizens. So Iraqis relied on diesel and gasoline generators with different capacities from 1 kW to 1 mW [95]. The tragedy of electricity in Iraq is the preoccupation of the Iraqi citizen for several decades. Ref. [96] concluded in their book that the trend towards renewable energies, especially solar energy and photovoltaic cells in particular, allows to get rid of this dilemma.

The solar system consists of four main components: (PV photovoltaics) - Solar panels; Chargers; Batteries, and Power Inverters.

So the solar panel is a solar cells grouped together can be used to operate some equipment or stored in the DC deflected electricity current current batteries are recharged and used more than once and measured the strength of the cell tel Watt module, here are small plates starting from 2 watts or 32 watts up to billions of waters for large buildings and factories.

3. The relationship between solar cells and architectural configuration

There is a close connection between the concept of design and architectural design, since they cannot be separated. The processes of formation and formation in fact start from the first moments in which the architect begins the design. The architecture is a three-dimensional artistic form, using form, texture, material, size, light and color as parts of the organization characterized by a cohesive, unbreakable, uniform, harmonious and interrelated unity [97]. The shape is the name given to the sum of the parts, their relations with each other, and between them and the spaces within or around them which are all a character of that object or body.

Architectural formation is known as the external sensory body of materials, which is composed of a system of properties of the plastic elements and the sensory relations between them both at the horizontal level and in the volumetric or spherical configuration. Architectural design is a process initiated by the designer using visual visuals as basic elements and principles and design principles to transform them into blocks and spaces in a particular system. The architectural formation begins with the sensory characteristics of the various systematic forms, including some of the plastic values that govern the relations between blocks and architectural spaces [98-99].

The process describes the formation of a group of elements within the framework of the ruler of the relationships and foundations determine how these elements exist for each other, and the process of composition in the architecture is linked to two basic goals of the use and beauty, where the architecture represents a recreational space to meet the requirements of the human and at the same time addresses the space spiritual and sensory aspect. The modern technology has strongly influenced the plastic elements and provided a great deal of freedom and flexibility in the architectural form. Therefore, we must study these modern plastic elements thoroughly and increase the architectural awareness towards them [100, 101].

Here are several questions about the precedence of the composition of the composition and its foundations. The foundations are placed in advance and then are followed to produce the formation? The fact of the matter is that the formation comes first and from it devotes bases may contribute to the production of other formations, in the Greek architecture created exquisite formations of the temples after the effort of development and improvement until these configurations reached the result accepted by the eye and then was To develop the foundations of classical architecture. The sources and foundations on which the design and installation process depends on architecture, which begin from the first moments when the designer begins the design process that is based on its preparation, until the architect shapes the form that is closely related to the meaning through the user's point of view. In addition, the architect chooses the appropriate structure that achieves the relative importance of meaning as being abstract, structural or explicit [102].

Complex mass structures may sometimes form complex space. It is difficult to distinguish between these types of spaces, but they are nevertheless integrated, and this is what distinguishes a good architectural structure that depends on interdependence. The basic elements of form and space are complemented by other secondary elements. Photovoltaic value is only the result of the reflection of the mass on space with a light source, as well as the color which is the character of the surfaces of the forms as well as the texture. The line is the element located in each place that determines the shapes, blocks and spaces; it gives it texture and separates colors [103].

4. Building Integrated Photovoltaics (BIPV)

The integrated solar cell systems should be integrated with the building so that BIPV is transferred to conscious design techniques and is used with the equipment and systems selected and identified for suitability with the building. Costs must be tracked along the cell life cycle to see the total cost that can be reduced by avoiding costs especially for construction materials and labor that can raise costs. Steps to design integrated solar cells with the building include [104-108]:

1. Studying the application of energy-related design or energy efficiency measures to reduce the building requirements of energy.
2. Choose between the interactive solar cell system and the independent solar cell system
3. Provide adequate ventilation, the efficiency of cell conversion decreases with high operating temperature.
4. Evaluation using hybrid solar cell systems as a choice to improve system efficiency.
5. Study the direction of daylight and solar aggregation using thin semi-transparent models or crystalline models with cells that diverge between two glass models. Designers can use cells to form unique day-to-day lighting characteristics with the façade and the roof. The use of solar cell systems in maneuvering with this system can also help reduce unwanted cooling or heating with the increase associated with the costs of architectural work.
6. Integrate cell models into shading devices and identify cell lines with the glass vision areas of the building that can provide suitable negative solar shades.
7. Managing designers to fully understand the effects of climate and the environment on photovoltaic energy production.
8. Address the topic of site planning and guidance at the beginning of the design phase.
9. Using cell systems relatively new, it is important to make sure that those who work in the projects are a good trainer and those with experience in solar cells and equipment.

There are many considerations to consider when designing solar cell covers. For example, the balance between the issues of design and construction of solar systems is very important because it varies greatly according to the circumstances of each project, which requires consideration of a number of design considerations when designing cells and include the following [109-111]:

Solar considerations include: Maximizing the number of solar panels in the applications of the building walls in the sense of increasing the number of solar panels in the building in order to absorb the ideal directions of the sun, and solar collectors can provide energy revenues beyond the electricity generated by the production of a load of cooling or solar heat negative. Slanted solar assemblies installed as youth openings or as circumference of the overhead illuminations will shade the interior spaces from direct sunlight while simultaneously combining energy from the sunlight and can also reduce or eliminate the need for electric lighting during the day.

B - Design considerations: include show, display, aesthetics, economics, engineering, and product development.

C) Considerations of the site: High rise buildings are often included in an urban environment with high real estate costs and a dense surrounding environment. The shadows received by high buildings reduce the efficiency of solar collectors. Here, the upper floors can only be covered with solar cells, which increase space between them and which can be fully exploited by solar systems.

D) Climatic considerations: The site includes climate, insulation, water, wind loads, ice and earthquakes.

C) Structural Considerations: For both new and old construction, the method of installation is important for the cost effectiveness of the system. For example, does the installation of solar panels require the construction of external scaffolding or not.

(H) Mechanical and electrical considerations such as ventilation of the perimeter of the building and electrical wiring.

Maintenance considerations include cleaning, maintenance, and repairs.

D. Environmental Considerations: The assessment of the utilization of solar cells on the environment is not limited to reducing the need for traditional grid electricity only, but other considerations include reuse considerations as well as pollution risks.

5. How to erect solar cells in different buildings and integrate them with different elements

The solar cells are installed and integrated into the building by means of two parts, through which the formation of the cells on the roof of the building, which are represented in the ceilings and facades, is shown. Here are also many ways to install the cells on roofs and facades, both on the roofs of flat or sloping or interfaces of all kinds .otnksm installation methods of each type of roofs and facades by installation and construction angle to the closed layers and layers open in one direction and layers open in two directions and that for the Bishop of flat, while for roofs sloping structure is divided cells in which ways to vehicle cells on the roofs Alordwageh cells vehicle roofs tiled roofs unfolded wide, and the cells of the vehicle above the layers, and for facades Here facades are closed and will destroy open.

Advantages of connecting the solar cells with the architectural configuration of the building, here are many benefits and advantages of this system which appear in the following points [112-114]:

1. These systems operate with high efficiency and unlimited capacity.
2 - These systems have many architectural benefits whether they are structural or structural or on the scale of modernization and innovation in ideas and innovations of architecture, as these systems can be used for certain devices independent without the work of an integrated network of the building.
3 - These systems to provide raw materials
4. Solar systems integrated with buildings in the long run to reduce the cost of electricity.
5. Reduce the use of fossil fuels and ozone-damaging emissions.
6. We can replace traditional building materials with solar cell systems, such as glass and others.
7 - When increasing the amount of electrical energy produced can be returned to the network and use.

Sites and methods of solar cell integration with the building:

It is necessary not to deal with the design of the various elements, including external termination separately materials for some, containing buildings on the multiple and diverse systems connected to each other in relationships differ in overlapping and usability in harmony and compatibility levels based on system type and location within the building. The complementary relationship between solar systems and architectural form is influenced by:

-Installation sites of solar systems.
- Formal levels of integration between solar and architectural systems.
- The functional diversity of solar systems as external finishing materials in architectural form.

The location and space of the solar systems used in the buildings depends on the shape and orientation of the building's cover and prefer not to be shaded. In general, there are five main sites in the building that can be integrated with the solar systems, including horizontal surfaces. Here the horizontal surfaces in the buildings are exposed to the effect of solar radiation in the summer more than the vertical dimensions of the building, most often integrated solar panels with the horizontal surfaces are not visible in The outer shape, however, can appear in indoor spaces when transparent panels are used to roof the spaces or in the denture surfaces. Horizontal surfaces can provide a good possibility to provide the required space for the installation of systems. Here are several different ways to integrate solar panels with horizontal surfaces such as slanted solar modules designed for horizontal surfaces, which are slanted at fixed angles, which are fixed on the chassis of the holder. There are also solar thermal insulation units with horizontal position, as some types of solar panels contain special materials for thermal insulation, which is within the solar module and helps to increase thermal insulation of the building because of the insulation contained in this type is most often used in horizontal surfaces and can be used in the slanted surfaces are also used in the remodeling of old surfaces because it does not require mechanical installation methods. Solar modules can be used as natural roofing lights as they are used to cover large spaces with horizontal surfaces or toothpick. When used, the solar panels are placed in the direction that receives the largest possible amount of solar energy, which is often the southern orientation, while the north comes to receive the natural light. Therefore, the sloping ceilings with the largest surface area are directed towards the south and the smaller sloping roofs head towards the north. When using horizontal surfaces, translucent or translucent solar panels are used to allow daytime lighting. In this case, this type of design is shown in the use of the internal Atriums, particularly in the middle and double layers in the composition [115-117].

As for the sloping surfaces, this type of surface faces south or south-west, and this does not mean that solar modules cannot be placed on other directions, but the optimal design decision is one of these two directions because they are the most efficient in receiving direct solar radiation on which the solar units depend on Power generation. This type has the ability to install solar units without the need to use the slanting structures used in horizontal lines, and sloping surfaces facilitate the process of cleaning units and prevent the collection of water on them and preferably there are spaces here

A comma points between the solar rows to prevent accumulation of dust, tree leaves or snow [118,119]. There are several different ways to integrate solar modules with sloping surfaces, such as adding solar modules to the slanted surface as units that compensate for the original surface finish materials. Solar units used in this type have the characteristics of the usual termination materials for weather conditions, acoustic insulation and water resistance in addition to the generation of energy and the back of the solar units is the roof of the interior space, so take care of the appearance of pieces located on the interior space. These panels are lightweight and may be of a type that allows for natural or semi-transparent lighting. Solar modules sometimes need to be darkened to ventilate their internal surfaces to reduce their ambient temperature. Some methods of integration with solar systems to take advantage of this heat in cold periods is advised [120-126].

The sections of iron or aluminum are added to form the grid on which they will be installed. The electrical connections are hidden within the structural sections of the solar modules. The standard ceilings carrying the solar units are divided into two types depending on the method of construction. The ceiling is either constructed at the site or then installed on it solar modules or ceiling to be with pre-manufactured solar modules. The use of solar systems as external termination units will compensate for building materials used for surfaces and this is in line with strategies to reduce costs for energy efficient buildings. As recommended. Solar modules are installed on the termination materials which are the roof of the internal space and thus will be the basis on which the units will be based. These are two ways of integration. Solar modules either directly mounted on panels or a distance between the ceiling panels and solar modules is extended by extending sections of aluminum or iron. The second method provides ventilation for the solar modules from the bottom. The monocrystalline solar cells perform more efficiently when ventilation is available, so it is better to separate them from the surface to improve their performance. This increases thermal insulation of the roof [127-131].

The addition of solar modules, which are small pieces within traditional surface finish materials, is important for the integrated system and is of two types, either small solar modules that are installed with external finishing materials or manufactured from within the unit, ie with the traditional finishing material. Many of the new developments have been introduced to world markets of this type. One of the most important things is their aesthetics, ease of design and light weight. They range from small to small units to sloping surfaces instead of traditional materials.

The solar module techniques have recently begun to provide design possibilities for folded surfaces and curved surfaces using thin-film solar modules. The thin solar modules are a type of solar modules that are flexible and can be replaced with traditional external finishing materials. They are lightweight, good insulation for water and therefore are best used in countries with a rainy climate. It also has applications on slanted and horizontal surfaces. Units with fixed dimensions (1.5m) or rounded coil shape that can be up to 12m in dark blue. Some species have the advantage of reflecting the colors of the solar spectrum in a light light when the direct sunlight falls on it [132].

Of the new types of solar cells are panels with curved surfaces, which can be designed arched surfaces using traditional solar units are flexible and used in curved surfaces [133].

The integrated solar panels with the building façades are clearly formed and larger than other types of integration. Large areas of these façades are exploited and invested in the generation of electric power provided that they are proven within the correct direction. Facades are sometimes exposed to shading for longer periods than other surfaces. Therefore, the assessment of the utilization of the systems is dependent on the amount of surface space available on the different directions of the building's facades and the amount of solar radiation received in the region. Solar modules can replace and integrate external finishing materials used in facades, so the important features of the solar modules used in the facades are the general appearance, which must be architecturally acceptable. The units used in the facades shall be resistant to hardening, stiffness and high durability to protect them from vandalism [134-136].

Vertical walls with outer cover: In this case, the solar panels cover the whole or part of the building, or sometimes a second layer on an internal first layer containing insulating materials and with the use of waterproofing materials to prevent condensation. This layer should be sealed and the air spaces And non-ventilated facades are dependent on the types of cells that withstand a high temperature environment such as cladding facades, with aluminum sections placed on the front to be used as solar modules or the sections are pre-installed on the units. Condition Solar units are subject to ventilation [137].

The solar cells can be added unseen. This is achieved when the designer uses the solar panels in the building in an invisible or invisible manner, trying to take advantage of its technical function only and avoid as far as possible from the employment of a distinctive architectural character. This is due to the designer's desire not to change the architectural character of the building, which often occurs in buildings with architectural features [138].

Solar cells can be added to the design of a pre-built building or buildings under construction when there is a lack of functionality for some spaces due to functional changes within the building or there is a need here to improve the levels of comfort within certain spaces while at the same time there is a need to increase the capacity of the building , and here are added solar systems as shading devices to look as part of the building in the case of the designer to control the natural lighting and reduce the impact of direct solar radiation in the building or be added instead of glass as transparent elements have the ability to provide the building energy in the Guet himself [133].

Adding solar cells to the building's architectural expression is through the use of solar modules to add a contemporary character to the building. That is, the technique is used to make changes to the architectural image of the building but without affecting or dominating the visual presence of the main blocks of design. This level of integration can be employed in prefabricated buildings that have lost the character of regeneration over time and by adding solar modules it will be possible to show them in a contemporary nature again and are usually used in large areas to increase the physical value of the building.

The use of solar panels to be a dominant part of the overall appearance in the form of the building and therefore determine the character of the architectural work. Hence, the idea of integration with solar systems is influential in the overall architectural ideas of the designer, since it works to apply the concepts designed for the environmental treatments. This level of architectural design is readily available in architectural designs based on the utilization of the diversity possibilities available in technology.

The solar panels today are characterized by a sense of calmness and simplicity of this advanced technology, in addition to that it can offer the idea of contemporary and coexist with the spirit of the times through the possibilities of interaction with architecture, yet the panels can all appear after they need from architects something Of courage or daring to start dealing with it and discover its influence in architectural form. The architect may face a problem in achieving the consistency and the outward appearance of space exposed to solar radiation, which must have the same appearance. Some parts of surfaces You may need small items that can not operate economically like solar panels because of their shaded location. In this case, the use of elements known as panels imaginary cells, which are inefficient elements are the same appearance of solar panels used to achieve the architectural consistency of the different areas that will require certain parts of the outer shell. Another way to obtain the surfaces are consistent is the addition of solar panels with similar external finishing materials to her. The shape of the building contributes to determining the relationship between the elements of the external climate and the nature of the internal conditions. The shape of the building and its horizontal and vertical elements, transparent and dark, all point to the need to pay attention to the performance of the building.

6. Conclusions

The potential of solar systems is beyond the function of converting buildings from traditional buildings to efficient buildings in energy consumption through the ability of the designer to make them integrated as architectural elements that have an impact on the design of the building. The aesthetic value or acceptance that needs to be achieved is a very important issue, Today, technology is trying to provide the potential for architectural design, but it depends on how the designer uses these techniques to add to the building the aesthetic character that had been designed for him in advance as a mental image of what the building wants to look like. The choice of the designer for the way he wishes to employ solar systems will depend mainly on the specifications of the solar system. Its tools include technical capabilities; it is exciting to accept the final form of design.

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