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Zero Energy Building Strategy in New Cities Using Revit software powered by an AI feature (Case Study: Coastal Villa in New Damietta)

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Abstract-

In the past ten years, the field of green architecture has been developed to create zero-energy buildings, which can produce the necessary energy for them in the year, in addition to not causing any damage to the surrounding environment . In other words, these buildings are able to achieve energy self-sufficiency, and also do not negatively affect the surrounding environment, as they have become a productive element and not only a consumer element [1]. The problem of research came in increasing the consumption of non-renewable energy in new cities, especially coastal cities in Egypt, with the increasing global climate change and the decrease in the efficiency of renewable energy generation, as the stages of benefiting from it are still uncommon in Egypt, as well as expectations of depletion and disruption of some non-renewable energy sources as a result of climate changes. The importance of the research lies in the use of clean energies, which are sustainable sources of energy that do not produce greenhouse gas emissions, and this makes the project environmentally friendly and also provides a viable model for the use of zero-energy building strategy in new cities, and also the importance of research came in that the great risks that will be exposed to Cities in Egypt due to the increase in carbon emissions are the sinking of coastal areas, so the priority was to implement the strategy in the buildings of new coastal cities [2]. The research aims to study the possibility of applying the zero-energy buildings strategy in new cities, assess energy efficiency in buildings using Revit software supported by artificial intelligence, propose solutions to improve energy efficiency in buildings and achieve four goals for sustainable development in Egypt 2030. The research suggested designing a residential model for green buildings using Revit software with Insight-Addin. It supports an AI-powered visualization medium called Veras (LAB Evolve), which can be used to improve the energy efficiency of buildings. The energy consumed and energy savings throughout the year needed for the building's electricity was estimated Gold LEED Certificate), and the research concluded that it is possible to implement zero-energy buildings in New Damietta efficiently.

Keywords* : *Green architecture, sustainability, energy conservation, zero-energy construction, Revit** with Insight-Addin**, Veras program LAB Evolve.

1. Introduction

sustainability, and this interest has become one of the most important factors affecting the design and construction of buildings [1]. One of the most important objectives of the zero-energy building strategy is to balance energy consumption with the renewable energy produced, so that the building does not need to rely on traditional energy sources [2].

New cities are an ideal opportunity to implement a zero-energy building strategy, for the following reasons: the availability of vast land that can be allocated for sustainable buildings, the possibility of applying green building standards to most buildings in the city, and the possibility of using renewable energy sources, such as solar and wind, on a large scale.

Zero-energy buildings are a revolutionary concept in architecture, aiming to significantly reduce the carbon footprint associated with the operation of buildings. These structures use renewable energy sources to generate the electricity needed to meet their needs [3].

The research reviews the green architecture strategies applied in the development of zero-energy buildings. A case study will be conducted on the villa of New Damietta, and Revit software will be used to design the villa and calculate its energy consumption. The AI feature will also be used to suggest solutions to improve the villa's energy efficiency .

2. Problem

- Increasing the consumption of non-renewable energy in Egypt with new cities, especially coastal cities in increasing global climate change.
- The low efficiency of renewable energy generation, as the stages of benefiting from it are still uncommon in .Egypt
- Forecast of depletion and disruption of some non-renewable energy sources as a result of climate change [4].

3. Aims

This research aims to achieve the following objectives:

1. Study the feasibility of applying the zero-energy building strategy in new cities.

2. Assess the energy efficiency of buildings using Revit software powered by an artificial intelligence feature and LEED standards.

3. Proposing solutions to improve energy efficiency in buildings.

4. Achieving the following sustainable development goals.

• *Goal 3:* Good health of the population through thermal and visual comfort.

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• *Goal 7:* Clean and affordable energy: clean energy can help provide sustainable and environmentally friendly energy.

• *Goal 11:* Sustainable cities and communities: Clean energy can help reduce the carbon footprint of buildings and improve the overall safety of residents and the environment.

• *Goal 13:* Climate action: Clean energy can help reduce greenhouse gas emissions.

4. IMPORTANCE OF RESEARCH:

1.The use of clean energies, which are sustainable sources of energy that do not produce greenhouse gas emissions, and this makes the project environmentally friendly and contributes to achieving environmental sustainability goals.

2.It provides a viable model for using the zero-energy building strategy in new cities.

3. The greatest risks that cities in Egypt will be exposed to due to the increase in carbon emissions are the sinking of coastal areas, so the priority was to implement the strategy in the buildings of new coastal cities [4].

5. TRACK TOPICS

Applications of BIM in Architecture in Revit powered by AI feature (*LAB Evolve).*

6. METHODOLOGY:

Preparing some studies that support the achievement of objectives through a specific methodology, through:

• *Theoretical part:*

using the descriptive-causal approach, through:

o Reviewing most of what has been written in this field, whether research - scientific journals - scientific theses - published articles - books and previous studies.

o Studying the concepts and principles of climate change and renewable energy and considerations related to residential buildings in general, taking into account the environmental conditions of the new coastal city of Damietta.

o Then a comprehensive review of the data and research related to the research topic was conducted to gain insight into the concepts on which the requirements of renewable energy of all kinds are based.

• *Practical part :*

o Field studies for the selected residential area were prepared through cadastral maps at an appropriate scale as well as aerial drawings and photographs.

o Application of computer software to simulate reality, allowing a comparison of the actual performance of these programs against LEED standards.

o Analyze and evaluate the outputs of simulation programs, available data and documents such as architectural drawings and technical specifications.

Apply the selected computer programs by searching on the case of the study, where:

1. The research initially touched on the use of Google earth Pro. To determine the coordinates of the location on a cadastral map .

2.Then create a three-dimensional model using the program: 2020 Revit and apply Insight-Addin to perform energy analyzes.

3. Veras by Evolve Lab uses Revit's AI-powered visualization add-on, which uses three-dimensional model geometry. ®

7. RESEARCH HYPOTHESIS:

One of the main mechanisms to deal with the phenomenon of increasing greenhouse gas emissions in Egypt in the energy sector is to maximize the use of renewable energy of all kinds.

8. RESEARCH QUESTION:

-Does renewable solar energy provide clean electrical energy for buildings that exceed other renewable energies available in new Damietta?

9. PREVIOUS STUDIES:

Here are some specific examples of the potential economic benefits of project, through clean energy as follows:

-In a case study of a similar project in residential area in the United States, it was estimated that the project would save up to $100 million on energy bills over a 20-year period [5].

-In another case study, it was estimated that the project would lead to a 10% increase in customer satisfaction with the quality of life in cities, especially coastal areas [6].

Of course, the actual economic benefits of a residential building project through clean energy will vary depending on the size of the project and local conditions. However, the project is likely to have a positive impact on the economy wherever it is implemented.

Theoretical study:

- Zero Energy Building Strategy:

The zero-energy building strategy is one of the most important strategies that seek to achieve environmental sustainability in the construction sector. This strategy is to balance energy consumption with the renewable energy produced, so that the building does not need to rely on traditional energy sources [7].

- Energy-free buildings, also known as zero-energy buildings, are becoming increasingly needed due to their sustainability and environmental benefits. These buildings are designed to produce the same amount of clean energy they consume, resulting in net energy consumption from conventional energy sources falling to zero. [8]. shown in figure (1).

- *Solar PV Systems (Photo Voltic Cells) :*

Solar energy is the main source of renewable energy in energy-free buildings. Installing photovoltaic panels on rooftops or open areas generates electricity from sunlight. [9]

❖ New Damietta Villa uses solar panels to exploit the abundant solar energy available in the area. These

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photovoltaic systems are integrated into the building's design to maximize sun exposure, ensuring optimal power generation throughout the day. •*Revit Program with Insight-Addin:*

Revit is one of the most popular computer-aided design and construction programs in BIM. This program features a wide range of tools that can be used for building design and engineering construction especially ***Insight-Addin*** which analysis energy .

• *LAB Evolve (Veras) characterize powered AI,*

Artificial intelligence is one of the latest technologies that can be used to improve the energy efficiency of buildings to suggest a perception of building materials, area, type of openings and diverse architectural styles in the villa.

This feature consists in using artificial intelligence algorithms to analyze building data and propose solutions to improve energy efficiency [9]. shown in figure (3).

• *Energy Saving Building Shell (Building Envelope):*

One of the basic strategies for achieving energy-free buildings is by implementing an energy-efficient building casing. This includes well-insulated walls, ceilings, windows and high-performance windows. By reducing heat transfer and minimizing air leakage, the building is able to retain heat during the winter and maintain a cooler indoor environment during the summer [10].

Wall insulation acts as a blanket that prevents heat from escaping through the walls of your home. It can also help to stop your home getting too hot in summer. *Construction casing improvement:*

Improving the building envelope includes various strategies such as thermal insulation, exterior shading systems, and the use of high-performance glass. In the New Damietta case study, adopting energy-efficient materials, such as insulated walls, can help reduce heat transfer while outdoor shading devices, such as the rising sun, reduce penetration of direct sunlight. Installing double-glazed windows with low-emission coatings can also reduce heat loss in winter and prevent heat gain during the summer [10].

•*Energy Recovery Systems (Recover Energy):*

Efficient energy recovery systems are critical to achieving zero-energy buildings. By capturing and reusing waste heat from various sources, such as ventilation systems and equipment, buildings can significantly reduce their energy consumption.

- ❖ The proposed New Damietta Villa project incorporates advanced heat recovery technologies, including heat exchange and power wheels, to recover and redistribute wasted heat energy for heating or cooling purposes. [11]

• *Natural and LED lighting and ventilation:*

To further enhance energy efficiency, energy-free buildings prioritize natural lighting and ventilation. The design includes many windows, skylights, and light solar breakers to improve the penetration of natural sunlight, reducing reliance on artificial daytime lighting.

In addition, the integration of natural ventilation systems, such as operable windows and roads, enhances airflow and reduces the need for mechanical cooling [11].

- LED Artificial light bulbs are extremely energy efficient and long-lasting; an LED bulb can cut energy consumption by over 80% when compared to conventional light bulbs and can last up to 25 longer.

• *Building management system (Building Automation System):*

To maintain the energy balance in energy-free buildings, robust energy monitoring and management systems are vital. These systems track and optimize energy consumption by providing real-time data on electricity usage, solar energy production, and overall building performance.

- ❖ The New Damietta project uses smart meters and building automation systems to monitor energy usage patterns, allowing for efficient energy management and sound decision-making [12].

- *Green architecture and sustainable design:*

Green architecture, also known as sustainable design, includes a set of principles that aim to minimize the negative environmental impacts of buildings by improving their energy efficiency, indoor air quality, and the use of renewable materials. It involves the application of passive and positive design techniques that meet local climatic conditions, building orientation, passenger behavior patterns, and other variables. Some notable green architecture strategies include incorporating passive solar design, increasing natural ventilation, and using cost-saving materials. For energy, the integration of renewable energy systems such as solar panels or geothermal installations, and the adoption of green roofs [13].

- *Passive design techniques:*

Passive design techniques are crucial for maximizing the energy efficiency of buildings. These strategies generally focus on the use of natural resources such as sunlight and wind to achieve optimal heating, cooling, and lighting in structures.

- ❖ In the New Damietta case study, the use of passive solar design through proper building guidance can improve daylight utilization while minimizing heat gains from direct sunlight. In addition, strategically positioning windows ensures mutual ventilation and reduces dependence. On mechanical cooling systems [13].

- ❖ *Active Systems Integration:*

Active systems integration is another vital strategy for achieving energy-free buildings. This includes integrating advanced technology to enhance the efficiency of mechanical equipment or harnessing renewable energy sources such as solar or wind energy.

- Reuse greywater for indoor toilet flush, laundry machine, fire protection, building cleaning, car wash etc. and outdoor garden irrigation. New Damietta could benefit from installing photovoltaic panels on rooftops to generate electricity, and solar water heaters to meet domestic hot water *green roofs and gardens:*

Green roofs are an innovative approach to green architecture, contributing to energy savings through excellent thermal

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insulation properties. In addition, they strengthen sewage systems, reduce the impacts of urban heat islands, and enhance biodiversity. Incorporate green roofs or vertical gardens [13].

The following table shows the rates of change in temperature and rainfall rates in the Mediterranean countries, and Egypt is shown in three places in the table in places of high risk [12].

Practical Study

Case Study:

A case study was conducted on the villa of New Damietta. Revit software was used to design the villa and calculate its energy consumption. The AI feature was also used to suggest a visualization of the building materials, the area and type of openings and the various architectural styles in the villa. The villa is proposed next to the Mediterranean coast in New Damietta. n the following figure (1)

Figure (1) shows Case Study: Coastal Villa in New Damietta Implementing Zero Energy Building Strategy

The following maps of the site and realistic pictures of it are as follows - shown in figure (2 a-b) and (3 a-b).

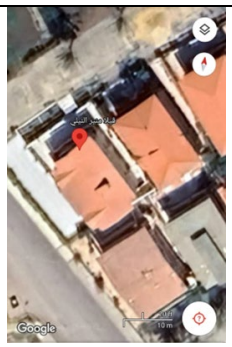

Figure (2 a) shows the general location of the proposed villa location

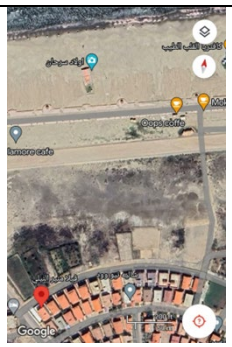

Figure (2 b) shows the general location of the place around Proposed Villa

Figure (3 a) shows the general location.

of the proposed villa location

Figure (3 b) shows the general location of the proposed villa location

The following figures illustrate the drawings of the building and pictures of the scenes of the rural to access energy analysis: shown In figures from (4) to (11) .

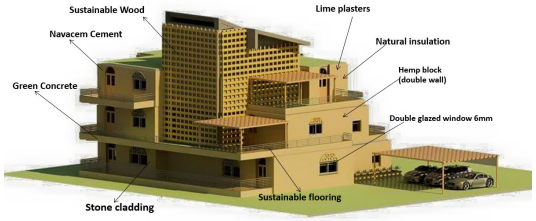

Figure (4) shows a green materials which use in model

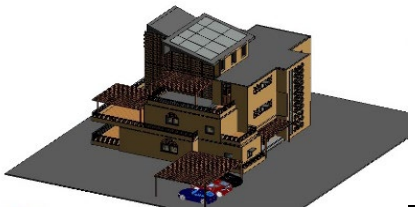

Figure (5) shows a three-dimensional model of the proposed villa in Revit

Figure (6) shows 3d box of the proposed villa in Revit

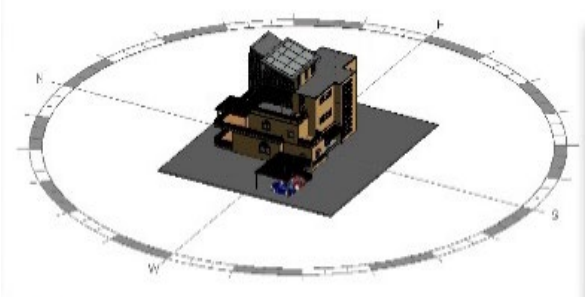

Figure (7) shows the path of the sun around a three-dimensional model of the proposed villa in Revit

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Figure (8) shows the second floor of the proposed villa in Revit

Figure (9) shows the first floor of the proposed villa in Revit

Figure (10) shows the northern façade of the proposed villa in Revit

Figure (11) shows the southern façade of the proposed villa in Revit

Energy Analytics:

By making the energy model on the program, then doing heating and cooling analyzes, sunlight analyzes, and general lighting analysis in the building, then Optimization work, shown In figures from (12) to (15) .

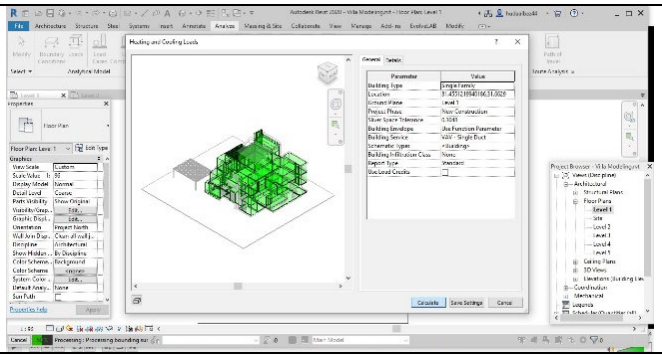

Figure (12) shows the model of heat and cold loads for the proposed villa in Revit

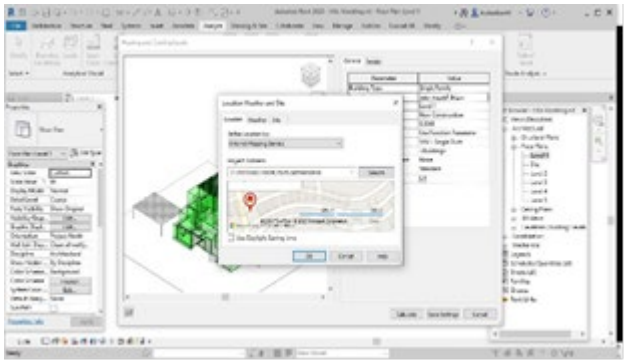

Figure (13) shows adjust location in the simulation for the proposed villa in Revit

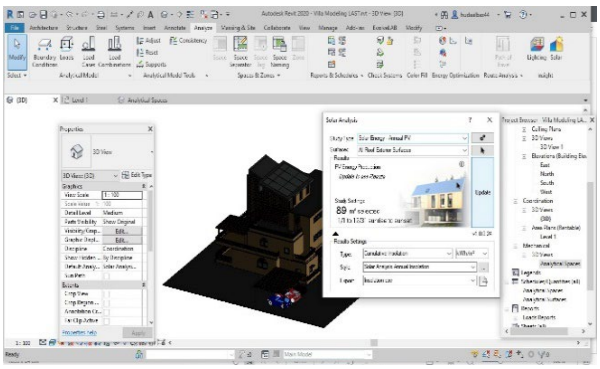

Figure (14) shows a table of analyzes for the proposed villa in Revit

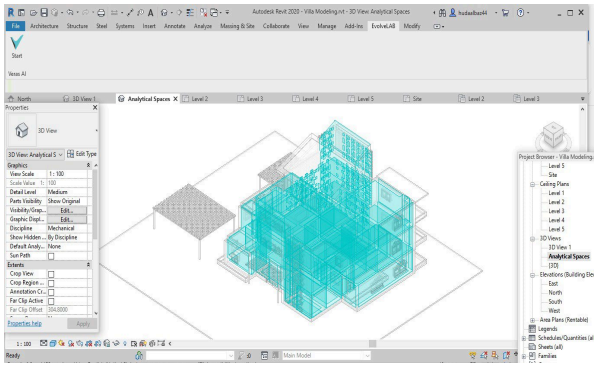

Figure (15) shows the simulation of lighting for the proposed villa in Revit

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Then ,I enter the Insight website, so the simulation of the energy analyzes of the model is completed, showing them in detail, proposing modifications in them . shown In figures (16) to (33).

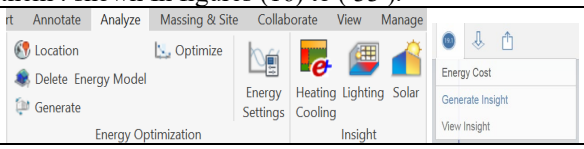

Figure (16) shows Energy optimization panel in Revit

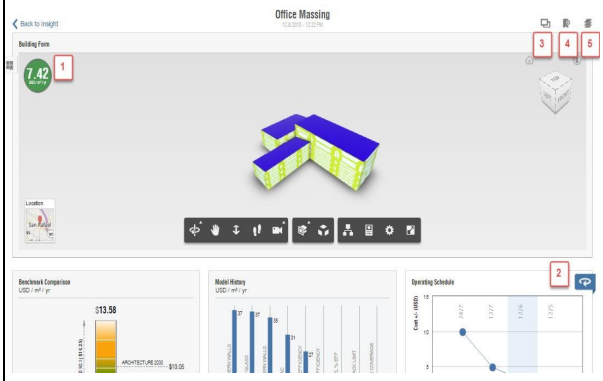

Figure (17) shows sample of building energy analysis in insight interface

design's Energy Cost or EUI [1] and the key factors driving building energy performance [2]. Use the factor ranges [2] to explore different outcomes and sensitivity. Save scenarios [4] and compare those scenarios [3] to visualize potential energy savings. Visualize PV energy generation potential and heating and cooling loads in your model context [5].

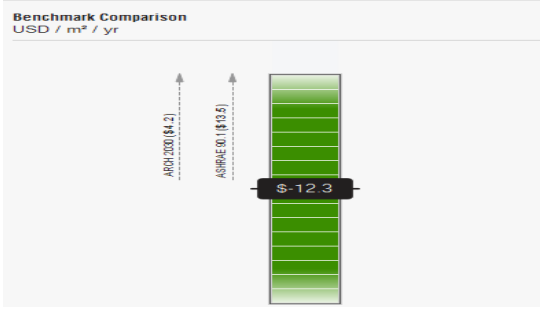

Figure (18) shows Benchmark Comparison and its economics for the proposed villa in Insight by Revit

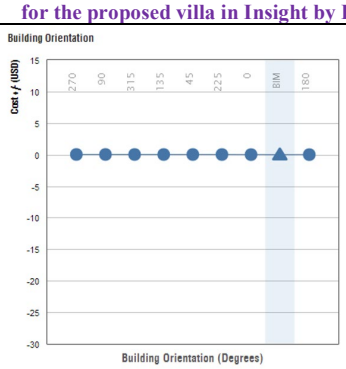

Figure (19) shows the energy simulation (building orientation) of steering and its economics for the proposed villa in Insight by Revit

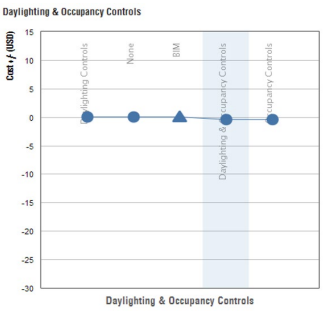

Figure (20) shows the simulation (Daylighting and occupancy control) of the energy of the roof and its economics for the proposed villa in Insight by Revit

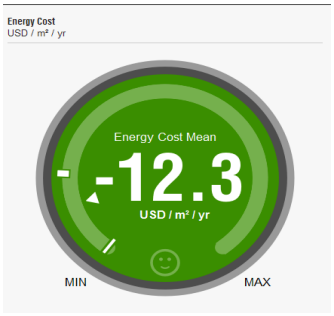

Figure (21) shows mean energy cost number per year for the proposed villa in Insight by Revit

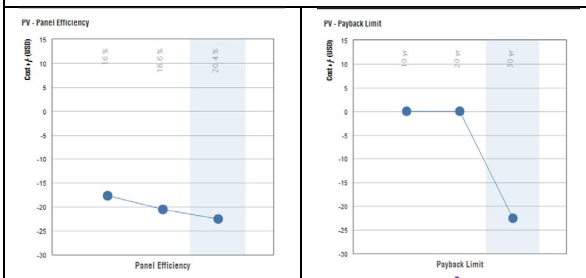

Figure (22 a-b) shown the energy simulation of solar cells (PV- Panel) Efficiency and payback limit

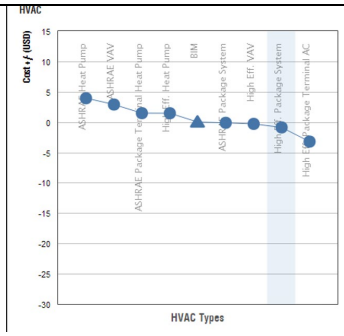

Figure (23) shows the HVAC energy simulation and economics of the proposed villa in Insight by Revit

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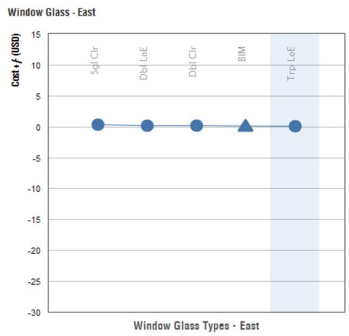

Figure (24) shows the energy simulation of east window glass and their economics for the proposed villa in Insight by Revit

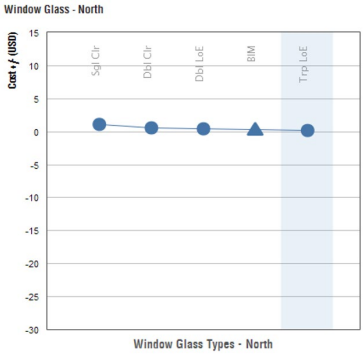

Figure (25) shows the energy simulation of north window glass and its economics for the proposed villa in Insight by Revit

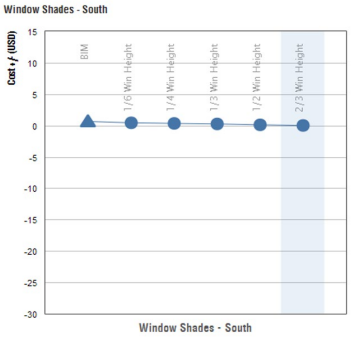

Figure (26) shows the energy simulation of the southern

Window shade and its economics for the proposed villa in Insight

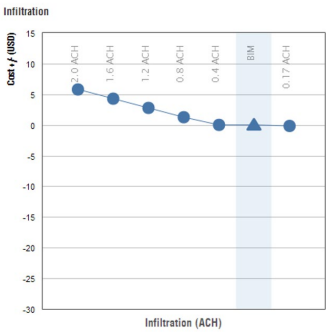

Figure (27) shows the energy simulation of the infiltration and its economics for the proposed villa in Insight

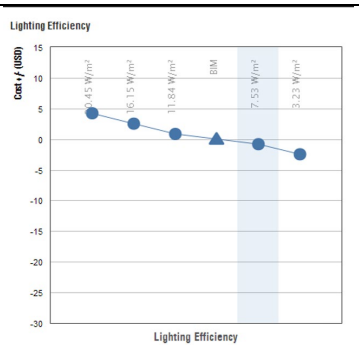

Figure (28) shows the energy simulation of the Lighting efficiency and its economics for the proposed villa in Insight

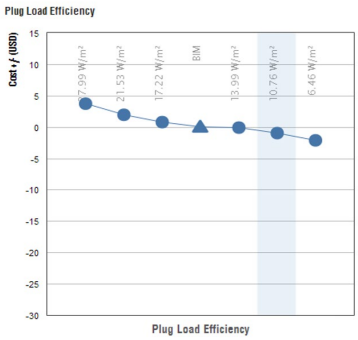

Figure (29) shows the energy simulation of the plug load Efficiency and its economics for the proposed villa in Insight

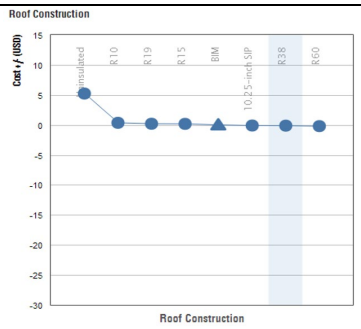

Figure (30) shows the energy simulation(Roof Construction) and its economics for the proposed villa in Insight

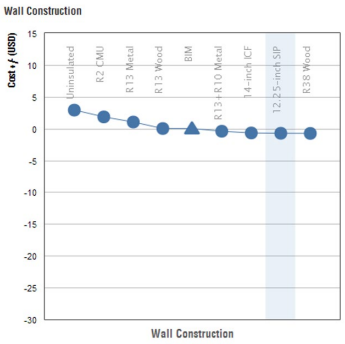

Figure (31) shows the energy simulation (Wall Construction) and its economics for the proposed villa in Insight

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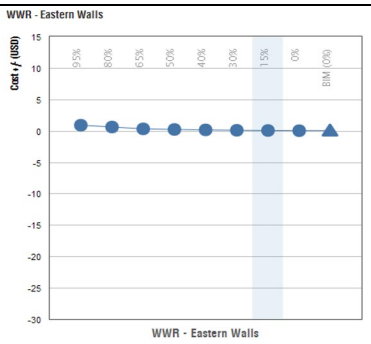

Figure (32) shows the energy simulation(WWR-Eastern Wall) and its economics for the proposed villa in Insight

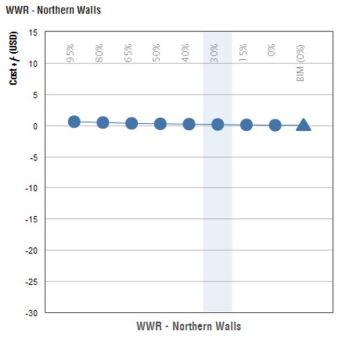

Figure (33) shows the energy simulation (WWR-northern wall) and its economics for the proposed villa in Insight

The following part illustrates the outputs of the artificial intelligence tool: Veras, LAB Evolve:

Exterior forms of Render three-dimensional building and the Prompt description of the artificial intelligence tool supported by Revit, which aims to display different environmentally friendly building materials and different architectural styles that give diversity in the application of the proposed villa model according to the location in which it will be implemented, which gives flexibility and compatibility with the general character of each area:

- *Realistic Forest Rain :*
  Prompt: "A hut in the forest with big windows, in the rain, and a tall grass" | Wave Power: 86 | Geometry Override: 19 | Material Overflow: 100 | Nature | Atmosphere.

- *Timber By the car of reality.*
  Mentor: "Modern design with large windows, wooden building, during autumn" | Wave Power: 60 | Geometry Override: 0 | Material Bypass
- Introducing the creative concept
  Prompt: "Exterior shot of Utopia architectural building" | Wave Power: 60 | Geometry Override: 45 | Overflow Material: 100
- *Winter Cabin Creative*
  prompt: "modern design with large windows, interior lights, timber building, during winter, ((snow)), blizzard, golden hour" | prompt strength: 86 | geometry. All In figures following exterior and from (34) to (36) .

Figure (34) shows a realistic (rain forest) simulation of the proposed villa in Veras, LAB Evolve

Figure (35) shows a realistic (winter cabin) style simulation of the proposed villa in Veras, LAB Evolve

Figure (36) shows a realistic (Autumn Timber 1) style simulation of the proposed villa in Veras, LAB Evolve

The following photo to same Villa but another view : In figures from (37) to (40).

Figure (37) shows the Render of the proposed villa in Revit on the Autodesk website

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Figure (38) shows a realistic parametric simulation of the proposed exterior villa in Veras, LAB Evolve

Figure (39) shows a realistic (iron architecture) simulation of the proposed exterior villa in Veras, LAB Evolve

Figure (40) shows a realistic simulation of the proposed villa in Veras, LAB Evolve

The following part also illustrates the outputs of the artificial intelligence tool: Veras, LAB Evolve:

figures following some interior design styles (41) to (42) .

Figure (41) shows a realistic simulation interior 1 of the proposed villa in Veras, LAB Evolve

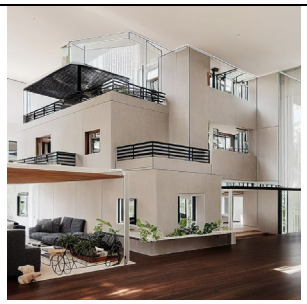

Figure (42) shows a realistic simulation interior 2 of the proposed villa in Veras, LAB Evolve

One ideal case study that illustrates the success of zero energy buildings in Egypt is a proposed villa project in New Damietta, the proposed villa project in New Damietta is a prime example of innovative green architecture strategies that have been implemented to achieve zero energy consumption. Located in Damietta Governorate, this project has taken into account the principles of sustainable design and energy efficiency features of the selected site [14]..

One of the main strategies used in the New Damietta project is passive design. Passive design involves exploiting natural elements such as sunlight and shade and maximizing daylight to reduce the need for mechanical systems and for artificial lighting. The buildings in Damietta project are designed to maximize sun exposure while providing wide shading to keep interior spaces cool during the hot summer months and heating in the cold winter months... This passive design style reduces reliance on artificial lighting and air conditioning, thus significantly reducing energy consumption.

The passive design also includes improving the direction and layout of the building as the direction of the building is carefully planned in the direction of the winds in New Damietta as shown by the PD:3D Sun-path website in the following figure (43) to improve solar energy gain during the winter months while reducing heat gain during the summer.

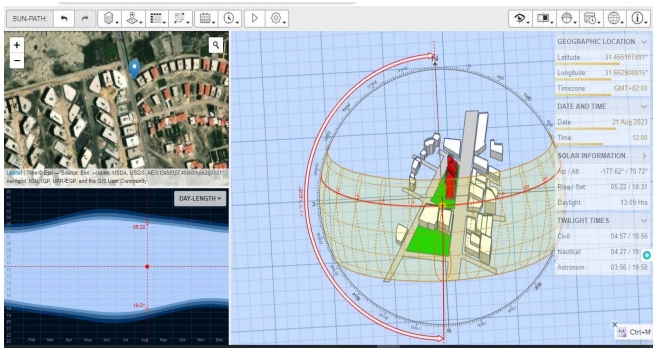

Figure (43) shows the path of the sun and environmental studies of the winds of the chosen site

Another important aspect of the Damietta project is the integration of renewable energy sources. The building is equipped with solar panels that convert sunlight into electricity and also the lighting poles on the site contain a wind fan, a solar cell and a canopy that protects the population from weather factors as follows (44), which the electricity issued by it is then used to operate various lighting devices and installations, which contributes more to energy production in general and ensures synergy between passive design and renewable energy sources. Buildings not only achieve net energy consumption, but also contribute to the return of excess energy to the public grid.

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Figure (44) shows the proposed lighting pole at the location of the villa

Moreover, the proposed New Damietta Villa project focuses heavily on energy-saving building and insulation materials to enhance energy efficiency. The use of high-quality insulating materials in the construction of buildings helps to maintain a constant internal temperature, reducing the need for heating and cooling systems. The New Damietta project emphasizes the use of advanced insulation materials, such as expanded polystyrene (EPS) and aerogel [15]., to enhance energy efficiency. The environmentally friendly building materials used in the proposed project have low energy These materials not only reduce the environmental impact, but also improve the overall indoor air quality. In addition, effective insulation and glazing systems are installed to reduce thermal bridges and heat loss/gain.
In addition, energy-saving devices and lighting fixtures have been installed throughout the project, reducing energy waste.
To monitor and optimize energy consumption, the Damietta project uses advanced building management systems using an AI-powered tool. These smart systems enable real-time monitoring of energy usage and provide data-driven insights to enhance energy efficiency. By analyzing energy consumption patterns and making the necessary adjustments, the building in the New Damietta project is constantly striving to increase energy efficiency.
The Damietta project integrates different sources of renewable energy such as solar panels and wind. These systems are strategically placed throughout the building to capture and harness energy from natural resources.
The generated energy is used to power various electrical systems, heating and cooling. Energy-efficient HVAC systems play a vital role in reducing a building's overall energy consumption. Damietta uses advanced HVAC technologies and equipment such as heat recovery ventilation, high-efficiency heat pumps from the air source, and natural ventilation strategies. These systems not only ensure optimal interior comfort, but also contribute significantly to the energy efficiency of the building [15].
Smart monitoring and optimization systems have been installed in the Damietta project to track and control energy consumption. This allows adjusting energy consumption patterns and identifying areas that need further improvement. The data collected helps in optimizing the building's energy use and identifying any potential energy waste or inefficiency.

10. RESULTS:

The results of this research yield the following results:
- The possibility of applying the zero-energy building strategy in new cities.
- Improve energy efficiency in buildings with Revit software powered by an AI feature.
- Proposing solutions to improve energy efficiency in buildings. in the following figure (45).

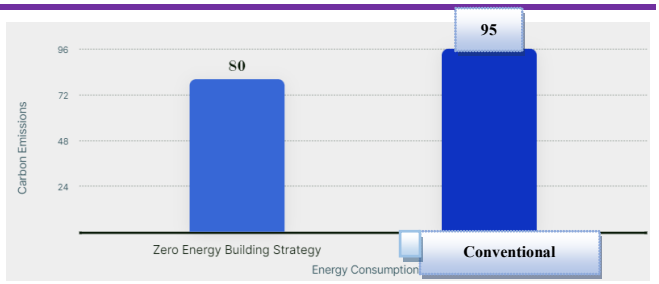

Figure (45) shows Energy Performance Analysis Comparing Zero Energy Building Strategy vs. Conventional Buildings

- The answer to the hypothesis:

Solar energy already provides clean electricity to residential buildings, and in some respects, it surpasses other renewable energies. This type of energy is used as it is renewable and sustainable and has a smaller environmental footprint compared to other sources such as fossil fuels.
One of the main advantages of energy is its consistency. Unlike wind energy. The sun's heat is a constant source of energy that can be utilized around the clock, seven days a week, providing a reliable and uninterruptible source of energy for residential buildings. This distinguishes it from other renewable energies that may suffer fluctuations in their production due to different wind speeds.
Moreover, energy heating and cooling systems are highly efficient, which reduces energy consumption and utility costs for homeowners. These systems use a constant temperature to maintain a comfortable indoor environment without relying on the energy-intensive use of traditional HVAC systems. As a result, homes that use energy systems usually have lower monthly utility bills compared to those with conventional heating and cooling systems.

In addition, power plants use minimal land use, taking up little space compared to wind farms. These low-lying land use requirements make solar an attractive option for densely populated areas where land is scarce.
Another advantage of energy is that it is low emissions. Power plants emit far fewer greenhouse gases than their fossil-fuel counterparts – about 1% of carbon dioxide emissions from coal plants and 5% from natural gas plants.
The proposed project is one of the case studies that presents a proposal for the successful design of green architecture strategies to achieve an energy-efficient building. The Damietta project, Egypt's desired reality, illustrates how a holistic approach to sustainable design can lead to a fully self-sustaining and environmentally friendly construction. As shown in Figure (46) gold LEED Certificate.

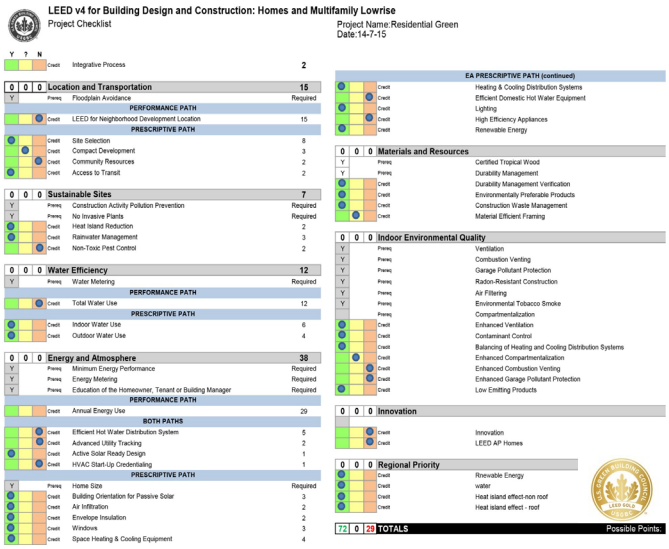

Figure (46) shows gold LEED Certificate

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• CONCLUSION & SUMMARY :

This research will contribute to the development of a zero-energy building strategy in new cities. This research will also contribute to the development of artificial intelligence techniques to improve the energy efficiency of buildings.
Zero-energy buildings pave the way towards a sustainable future by incorporating green architecture strategies that reduce environmental impact and dependence on fossil fuels. The proposed New Damietta project embodies the successful implementation of such strategies, demonstrating that zero-energy buildings are not only environmentally friendly but also economically viable. These architectural developments provide a blueprint for future developments to adopt a carbon-neutral approach and contribute to a greener world.
The proposed New Damietta project embodies the successful implementation of green architecture strategies to achieve zero energy consumption. Through passive design, integration of renewable energy sources, energy-efficient building materials, and smart building management systems, the project sets a new standard for sustainable building practices. The success of the Damietta project serves as inspiration for future developments aimed at creating zero-energy buildings and paving the way for a greener and more sustainable future.
The New Damietta project is a great case study for achieving energy-free buildings through green architecture strategies. It highlights the importance of passive design, renewable energy systems, energy-efficient HVAC, sustainable materials, and monitoring of optimal energy consumption. With a growing global focus on sustainability, projects like Damietta are paving the way for a greener, more energy-efficient future. The results of this study indicate that the zero-energy building strategy in new cities can achieve positive results in terms of reducing energy consumption and contributing to environmental protection. The study also showed that Revit's program powered by an AI feature can help design and build sustainable buildings efficiently and effectively.

11. RECOMMENDATIONS

Based on the results of the study, the following recommendations were made:
- Governments and businesses should support the zero-energy building strategy in new cities.
- Revit software backed by an AI feature should be used in the design and construction of sustainable buildings.

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CONFLICTS OF INTEREST: The authors declare that there is no conflict of interest.

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