Greening ingredients for existing and new diplomatic buildings

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Abstract. Diplomatic buildings are considered a mirror that reflects the civilization and values of one country in the space of other countries, and therefore one of the most basic elements in planning these buildings in our time is related to achieving the environmental suitability of these buildings. As embassy buildings in different countries of the world should be a guest that respects the local context and environment in which it is present, and with the increasing number of diplomatic buildings in different countries, the need to adopt more attention has emerged to study their relationship with the environmental aspect, so this will be given. The research pays great attention to environmental standards in diplomatic buildings To become the research problem: the lack of knowledge in previous literature about the environmental planning and design indicators of diplomatic buildings in general, and how they deal with the host country's resources, The aim of the research is: to extract the most important vocabulary and indicators of greening decisions in diplomatic buildings, Where the research results confirm the role of treatments for greening diplomatic buildings in preserving the host country's natural resources from depletion, which in turn contributes to strengthening diplomacy between the two countries, in addition to achieving significant savings in the costs of paying bills for energy and resource use.

Keywords: diplomatic buildings, local natural resources, host and guest country, environmental suitability, greening ingredients.

1. Introduction

The global community, in our present time, has become aware of the damage to the natural environment and its dire economic and ecological consequences, which led those interested in the field of environment and development to think about the reasons that contributed to stressing the environment. Which showed that buildings represent the major consumers of depleted energy in the world. As serious studies began to revolve around developing appropriate solutions to reduce environmental pollution and depleting its depleted resources. In 1983 AD the United Nations established the Committee on Environment and Development to resolve disputes arising around the aspirations of the developed and developing countries on sustainable development, and in 1989 the report of the United Nations Committee was published. (Brundtland) on the definition of sustainability, which is the most famous interpretation of sustainability globally, namely: “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” The components of green architecture and the idea of greening buildings in general, and embassy buildings in particular, will be addressed, with the aim of diagnosing the most important design standards and guidelines in this field. This research relied on a group of United Nations (UN) reports and reports of the Intergovernmental Authority on Climate
Change (IPCC), as well as the directives of the United States Environmental Protection Agency (USEPA), where we will refer to the most important indicators and goals of the initiative to green diplomatic sites in general, and embassy buildings in particular, with an attempt to put forward the most important internationally accredited environmental diplomacy programs as a basis for local accreditation.

2. The research problem
Lack of knowledge in local studies about the environmental planning and design indicators of diplomatic buildings in general, and how they deal with the host country’s resources, in addition to the degree of their environmental compatibility with the local urban context.

3. Research methodology
The research relied on the descriptive and analytical approach to crystallize the knowledge framework and build an information base on the design and planning concepts of diplomatic buildings related to environmental determinants, by extracting the theoretical framework for vocabulary and indicators of design principles and facts from global and Arab experiences for the purposes of adopting them in assessing the level of sustainability and harmonization of the context in diplomatic buildings Local, and draw conclusions and recommendations, by means of comparisons and diagnostic observation.

4. Basic concepts
Before going into the details of the green embassy buildings, it is necessary to introduce green architecture in general, and its characteristics, in order to understand and understand green embassies and their environmental relationship, and accordingly a set of descriptions pertaining to them were taken from the viewpoints of their commentators, as follows:

Green architecture: It is defined as “architecture that is compatible with the surrounding environment, which integrates with all its surrounding environmental determinants and fills its deficiency or fixes its defect, and benefits from the phenomena and constituents of this ocean, and it is architecture that does not harm the environment with its waste, as it grows up to the stage of stability.” Green architecture is also seen as (a highly efficient system compatible with its surroundings with minimal damage, as it resembles a plant in terms of shape and composition and coexists and grows to restrict everything around it. It is a living organism that has a life with a beginning and an end, with an emphasis that its properties and qualities are present across generations, and evolve according to The influences to appear clearly in certain practices and different periods of time [4].

Green architecture seeks to reduce the negative environmental impacts in buildings in general and diplomatic buildings in particular, by enhancing the efficiency of the use of materials and renewable energy. It is a building system that fulfills all the principles of sustainability, and each seeks to preserve the environment and ensure the right of future generations to energy and resources [5]. Among the concepts and definitions developed in this field by senior architects interested in this field, on the level of ideas and application, we address the most important pioneers of architecture about their views on the concept of green architecture.

Architect Ken Yeang, a Malaysian architect, proposed the concept of green architecture from an environmental point of view. He criticizes the effect of buildings on natural systems, and asserts that green architecture, or sustainable architecture, must meet the needs of the present without neglecting the right of future generations, design decisions. Its effects are not limited to the contemporary environment only, but extend to future generations as well.

The architect William Reed, is an architect and thought leader who showed that green buildings are nothing but buildings that are designed, implemented and managed in a comparative manner that places the environment within its basic characteristics, and he believes that one of the concerns of green buildings appears to reduce the impact of the building on the surrounding environment besides Reducing the costs of its establishment and operation.
Greening: It means converting or renewing a building into a green building by planning, designing and using environmentally friendly materials, as this is a sustainable strategy in itself. Therefore, it is possible to recondition an existing structure and convert it into a new green building, while ensuring the use of less energy and materials, leading to a sustainable environmental practice. [10] Thus, re-greening of any building becomes a specific building approach, balanced and multifaceted in environmental contexts. It is a very new concept to reduce the impact of buildings on the ecosystem by adjusting energy outputs, technologies that in turn improve and enhance the overall energy efficiency of buildings, thus reducing carbon emissions.

5. Green architecture standards
After the spread of greening movements in contemporary architecture in abundance in the processes of construction and renovation, especially during the past decades, and its gaining more momentum around the world. It has become necessary to develop basic standards and approved standards for greening patterns and indicators, the most prominent of which is the Leadership for Energy Environment and Design program, or what is called for short (LEED). The LEED program has developed a strong set of standards for accrediting green architecture processes from the design stage to the last stage of the operations. [9] and these processes seek to achieve the goals of clean energy, and they can be set in mind for the purpose of ensuring the following standards in building green architecture in general, as green embassy buildings are part of that architecture and which are identical to some extent with the sustainability indicators, which we will refer to as the components of greening:

6. Green embassies and environmental diplomacy
The concept of green embassies: According to the regulations of the French project to interpret the green embassy, it represents a gradual and comprehensive initiative to reduce the environmental impact on diplomatic missions abroad. It aims to enhance adherence to international norms regarding sustainable development, in addition to making the diplomatic network a review of common experiences, improving the management and performance of embassies and achieving savings, and achieving the principle of carbon neutrality [12].

In short, it is a distinguished embassy that is a product of green design, which focuses on increasing the efficiency of the use of natural resources from energy, water and local materials to reduce the effects of buildings on human health and the environment in the host country during the life cycle of the diplomatic building, by improving design, construction, operation and maintenance.

Environmental diplomacy is defined as “the practice of managing international relations by facilitating and strengthening a common commitment to preserving depleted natural resources and promoting the use of renewable natural energies through sustainable operations and responsible environmental supervision.” It is one of the art of diplomatic negotiation and the practice of international relations for the purposes of preventing environmental degradation and protecting Depleted natural resources, sharing of common water and energy resources, and policy and practices reinforce the components of environmental diplomacy and standards of shared values among nations committed to reducing their greenhouse gas emissions, preserving depleted natural resources, and increasing biodiversity. Contemporary environmental diplomacy is increasingly used to support efforts to prevent environmental pollution, build international trust, environmental governance, and maximize technological capacity in identifying environmental crimes and threats [15].

7. Guiding greening ingredients
The elements of greening contribute to ensuring the availability of safe buildings and a diplomatic post that represents governments in host countries, and supports employees during their work, to achieve foreign policy goals. It should also represent the Ministry of Foreign Affairs facilities represented by the diplomatic buildings the best in excellence in architecture, design, engineering, technology, sustainability, art and culture. In order to improve the environmental footprint of the administration and increase efficiency, it also requires harnessing experiences in politics and public diplomacy, in order to develop sustainability efforts and institutionalize them, and to include the following
indicators: According to what is indicated on the official website of the World Green Building Council: [13]

- Implement best environmental practices in the design, construction and operation of diplomatic facilities.
- Utilizing the development of information technology to support high performance and efficiency.
- Reducing depleted energy consumption and increasing the use of renewable energy.
- Using local and environmentally friendly products, reducing waste flows and ensuring recycling.
- Protecting and preserving water resources and ensuring their recycling.

8. Climate change problems in the world

According to United Nations (UN) reports, the global average global temperature increased by 0.85 degrees Celsius during the time period from 1880 to 2012, and global sea level rise is expected to be 10 cm higher, with the possibility of a global temperature rise of 1.5 degrees Celsius by the year 2100. [2], and the 2013 IPCC report states that the construction sector has the broad potential to deliver rapid, deep and cost-effective efforts to mitigate greenhouse gas (GHG) greenhouse gases compared to any sector. Else. The depleted energy consumption in both new and existing buildings is expected to be reduced by between 30% and 50% by adopting readily available technological technologies, sustainable environmental design, appropriate equipment, smart management systems and ensuring alternative generation solutions. And in view of the vastness of the joints of the diplomatic bag, and the wide spread of its buildings within the host countries, so a great role falls on the shoulders of those buildings to preserve the environment in the host countries. For example, the US government alone owns approximately 445,000 buildings with a total floor area of more than 300 million square meters, and rents about 57,000 buildings with a total floor area of more than 34.7 million square meters, and these buildings constitute 37% of the host government's total energy use. . Below we will include a set of executive orders of the United States announced in 2013, which concern the greening of US embassies abroad, the most important of which are: [7]

- A comprehensive annual inventory of greenhouse gas emissions should be reported, which includes purchased energy stocks, employee travel and commuting miles, solid waste disposal, and wastewater treatment.
- Ensure that the use of depleted energy is reduced by 30% by the year 2015, relative to the 2007 baseline.
- Ensuring that drinking water consumption will be reduced by 26% by the year 2020 relative to the 2007 baseline, at a rate of (2% per year).
- Reducing irrigation water use by 20% by 2020 using the 2010 baseline (2%) annually.
- Recycling 50% of non-hazardous solid waste by 2015.
- Reducing fossil fuel consumption from fleet equipment by 30% by 2020, relative to the 2005 baseline.

The new US Embassy of Sofia was the first American diplomatic mission to obtain a Leadership in Energy and Diplomatic Environmental Design (LEED®) certification in 2007. The current research confirms the necessity of commitment to issuing executive orders similar to the reality of Iraqi diplomacy.

9. The most important indicators of greening the diplomatic buildings

In general, all the aforementioned calendar areas can provide multiple benefits for greening embassies. For example, it is possible to improve air quality, expand the use of natural light or the idea of merging with nature, or guarantee internal comforts, or the work environment or the larger environment of the host country. The most important indicators of environmental diplomacy to form a good embassy lie in asking the following questions: [11]

- Transportation: How can diplomatic functions manage fleets, air travel, and transportation options for their workers to reduce greenhouse gas emissions?
Site: What options are available for the ecosystem to manage, improve and display sustainable ocean landscapes, and irrigation practices to enhance biodiversity?

Water: How can programming diplomatic posts reduce annual water consumption and cost, while managing rainwater to protect water resources?

Energy: How can diplomatic jobs reduce annual spent energy consumption and costs? Also, how can we reduce dependence on fossil fuels and increase the use of renewable sources of energy?

Materials: What options are available for the diplomatic functions to reduce the effects of over-procurement, reduce waste, and support local and regional business?

Internal environment: How can diplomatic functions enhance internal environment indicators, maintain employee health, and improve productive work environments for their occupants?

The best example of the success of the principles of diplomatic greening occurred when the US embassy in Mongolia (Ulaan baatar) won in 2010 the GDI award, an award that the Greening Council of the US State Department prepares among the US embassies in the world. The first ever after obtaining the following achievements: [7]

- Calculating the carbon footprint, as it is the first US embassy to secure a carbon footprint.
- Conserving water, by drilling wells, resulting in a 16.94% availability in water bills.
- Recycling, resulting in a 22% savings in litter expenditures.
- Electrical improvements, resulting in 33.74% energy availability.

10. The goals of the Greening Diplomacy Initiative

The Greening Diplomacy Initiative (GDI), launched in 2009, aims to improve the environmental sustainability of global diplomatic management processes. The GDI challenges the diplomatic administration to develop and implement policies and procedures that reduce its overall environmental carbon footprint, reduce costs, and ensure sustainability at the forefront of foreign diplomatic policy in host countries. [16] The GDI initiative relies on specialized organizations such as the International Association for the Management of Diplomatic Facilities (IEMA) Institute of Environmental Management and Assessment by practicing training, as well as the League of Green Embassies network group, which consists mainly of US embassies. And the Green Embassies University (the university), a global network of more than 100 US and foreign diplomatic missions working to formulate a joint agenda for budgeting work for depleted energy efficiency, renewable energy and water conservation. Indeed, access to all of these diplomatic missions demonstrates concretely the strength of the link between environmental management and political will to strengthen the environmental diplomacy program. Member embassies undertake to provide innovative solutions, influence individuals and institutions in host countries, and play an important role in mobilizing public action, through the following principles: [19]

- The availability of environmental leadership in new and existing embassies.
- Work with appropriate government officials in seeking funding for embassy greening projects.
- Collaborate with counterparts and exchange ideas on energy conservation, and other strategies to reduce or reduce greenhouse gas emissions as much as possible.
- Encouraging dependence on increasing the use of renewable energy.
- Establishing recycling programs across embassies.

11. Strategic Reality of Environmental Diplomacy

11.1. Transport Strategies Program

Current transportation patterns globally generate significant economic, social and environmental damage, as transport consumes more than half of the liquid fossil fuels used, emits nearly a quarter of the energy-related carbon dioxide, and generates more than 80% of air pollution in urban areas in general and in Especially developing countries. This leads to more than 1.2 million fatal accidents annually, in addition to the suffocating traffic problems and harmful to humans and the environment
The ecological diplomatic functions of diplomatic buildings can be demonstrated by developing policies and implementing practices that support the goals of reducing transport emissions in their host countries. The most effective sequence to achieve the indicators of the environmental impact reduction strategy is as follows: [8]

1. **Pollution load reduction index:** It includes alternatives to using vehicles, using the transportation lines of large embassy employees instead of using small vehicles for each employee separately, or cycling, or even encouraging walking. Virtual meetings over the Internet can also reduce air travel by embassy personnel.

2. **Fuel Efficiency Index:** For the purpose of helping to achieve a clean embassy environment, it is assumed not to use old vehicles, which are not efficient because they consume more fuel than modern vehicles.

3. **Renewable fuel sources approval index:** The program includes the use of embassy building vehicles that use electricity, ethanol, biodiesel, natural gas, propane and hydrogen instead of the current fossil fuel vehicles available in the host country, which are cost-effective solutions.

11.2. A strategy program for reducing water consumption and recycling in the buildings of embassies and consulates

The locations of embassies and consulates provide opportunities to ensure that the citizens of the host country have a positive first impression of the guest country, to ensure the application of foundations based on respect for natural ecosystems, to promote biodiversity and to integrate technological innovations that demonstrate leadership in the wise use of resources in general and provide concrete examples of the principles of Environmental diplomacy. This is especially important in developing countries, which struggle to balance natural resource management and economic growth. The idea of preserving water represents one of the major diplomatic and development opportunities in the embassy building decisions. Therefore, the most effective sequence for monitoring water use efficiency indicators in buildings in general and in embassies in particular is: [7]

1. **Pollution load reduction indicator:** which could provide great benefits as a result of operational improvements to the existing water networks in embassy buildings. The base load of the systems can be greatly affected by consumer behavior, leakage problems, installation efficiency, and irrigation scheduling system, which do not take into account local climatic conditions.

2. **System efficiency index:** such as the use of high-efficiency, or double-flush toilets in embassy bathrooms, low-flow shower heads, and drip irrigation in embassy gardens, which can lead to significant water availability.

3. **Recycling Index:** Many final uses of water can be recycled by exploiting non-potable water sources, including rainwater or wastewater.

11.3. The program for the strategy of protecting the diplomatic site

Embassy sites usually consist of many elements, including buildings, green spaces, rainwater management infrastructure, parking lots, roads, patios, and a pedestrian sidewalk. The composition of the site varies greatly from country to country, and these differences in the proportions of the site elements, the total land area, the permeability of the surfaces, and the types of materials may result in a significant difference in the maintenance and operation needs. Therefore, the components of the embassy is an important factor in solving the problem of managing the site in general.

For example, small diplomatic sites with a high building density of a diplomatic building, as in the example of the US Embassy in Berlin, can be best served by structural solutions, such as green roofs or paved roads as in (Figure 1). The figure shows a comparison of the United States Embassy in Berlin with an area (13,721 square meters) and in Nairobi (37,350 square meters), which shows the division of construction areas and green spaces. In terms of the extensive on-site capabilities of the Nairobi Embassy, in promoting the Sustainable Landscape Index, and maximizing the foundations for environmental diplomacy [7]. So Large diplomatic sites with extensive landscapes, such as the United...
States Embassy in Nairobi, are a prime candidate for low environmental impact development strategies that use the principle of natural environmental alternatives, such as green lands, wetlands and water bodies, to reduce the environmental impact on the surrounding area, and reduce demand. On the added resources are the most effective indicators for monitoring the improvement of the site’s performance, as follows: [11]

1. **Infrastructure Load Reduction Indicator**: Non-native plants, weed areas, and large areas of solid areas can unnecessarily increase the demand for water loads at the site, which requires ensuring the availability of storage water more. Therefore, strategies must be devised to enhance landscape planning, and to reduce hard areas to reduce water demand.

2. **The indicator of choosing the least effective alternatives**: which includes alternatives to IPM methods, (Integrated pest management), external maintenance and cleaning, and sustainable landscaping works with low-impact technologies that require less water and fuel, and the speed of implementation compared to the non-sustainable traditional practices.

3. **Self-treatment on site indicator**: Self-treatment inside the diplomatic site can reduce the burden on the municipality's water treatment systems for the host country, for example by collecting rainwater from roofs and keeping it in tanks, as well as securing green roofs, and treating recycling of water Used, and discharged into ground water tanks. These technologies can reduce to a minimum or even eliminate the need to connect to the municipal water system, or even dependence on well water systems.

![Figure (1): Comparative situational aerial views of the United States Embassy in Berlin and in Nairobi.][1]
11.4. A strategy program to reduce the burden of external thermal loads on the diplomatic building

The benefit of the program is to reduce the burden of external thermal loads on the Heating, Ventilating and Air Conditioning (HVAC) systems, thus reducing associated fossil energy use and payment bills, and regulating the environmental footprint. The phenomenon of the influence of external thermal loads is one of the phenomena that make crowded urban areas hotter than surrounding areas in rural areas, due to the amount of areas paved with materials with high thermal conductivity and the density of buildings that have replaced vegetative and permeable surfaces. Generally, solid and unshaded urban roofs absorb high solar energy loads and then radiate heat back into the atmosphere causing heat island phenomena, which raises air temperatures in general. Thus, one of the most important design criteria for new and existing embassies projects are indicators of reducing the thermal loads of their buildings, where shading must be adopted, as well as the use of materials with a high white color (reflective or "cold") on the roofs of buildings and roofs. Various strategies can also be implemented to reduce heat in venues around existing buildings, and are particularly useful in locations with prolonged cold seasons. Therefore, the following indicators must be adhered to: [17]

1. The indicator of the use of types of local plants that are drought tolerant, while ensuring the availability of shade and organizing distinguished local agricultural projects on the territories of the embassies.
2. The indicator to ensure the installation of solar energy generation systems, such as photovoltaic (PV) or solar thermal cells, in the facades and rooftops of the building, as well as the surrounding exposed sites.
3. An indicator for installing green roofs and facades for the embassy buildings.
4. The use of natural and industrial lighting systems index: This means switching the lighting fixtures to the compact fluorescent lamp type (CFLs) or the LED type and returning the wires to smaller networks.
5. Daylight utilization index: This means architecturally designing the buildings of the embassy complex in order to increase the effectiveness of natural light in the workplace.

11.5. Strategies for Recycling Consumables Program

It is a very important program in support of green architecture and the concept of greening in embassies, as it includes all stages of the resource consumption life cycle, which starts with environmentally friendly procurement, reuse and recycling of consumed resources, and ends with waste disposal or recycling. For example, during the construction of the US Consulate in Dubai, 75% of the waste generated from landfills and incinerators was recycled. This abundant recycling was achieved by separating scraps of paper, plastic, wood and metals from each other, to be recycled separately. [14]

We refer to the most important indicators of embassy waste recycling [11]

1. **Review and audit indicator**: It is intended to ensure the availability of basic information about the procurement of materials needed for building embassies of all kinds, their consumption method and their waste specifications.
2. **The indicator of reducing resource consumption and ensuring reuse**: it is intended to reduce the consumption of resources used in embassies, and to reduce the quantities of purchasing products that are not environmentally friendly.
3. **Green Purchase Index**: It is intended to buy environmentally friendly materials.
4. **Recycling and fertilization index**: as it requires isolating organic materials from waste, and reusing them for fertilization and agricultural use.
5. **Hazardous waste disposal indicator**: it is intended to remove hazardous materials from landfills and reduce the impact of landfill waste on the environment.
11.6. The strategy program for reorganizing the internal environment of the embassy buildings

As it is known, the embassy employee spends an average of 90% of his time indoors during work, that is, in closed places. Consequently, IEQ Indoor Environmental Quality has a major impact on the health of employees, and thus affects their productivity and well-being. The indoor environment is formed as a result of the dynamic interactions between climate and site conditions, building regulations and activities conducted on site, indoor environment quality includes Indoor Air Quality (IAQ), thermal comfort, acoustic comfort, ergonomic ergonomics, visual quality, and connectivity. Naturally, through the principles of biophilia. [6]

For the purpose of implementing the program of reorganizing the internal environment of the embassy buildings and making the internal environment efficiency ((IEQ) high, the following practical steps must be followed: [11]

1. Reducing pollutants: that is, working to reduce the factors of internal pollution of embassy buildings.
2. Comfort improvements: that is, work to improve the operating efficiency of the HVAC system, and ensure the right amount of outside air in improving the most satisfying indoor climate conditions.
3. The use of low-emission materials: that is, setting up a policy to ensure the purchase of non-toxic and environmentally friendly building materials.
4. Ensure accuracy in designing interior decoration, so that rooms are of high acoustic quality, because background noise sources are a major contributor to affecting employee productivity and well-being in the workplace.
5. Adding interior decorations from nature that increases the association of embassy employees with nature (or the so-called biophilia) and this would positively affect the performance of embassy employees.

12. Examples of greening embassy buildings

12.1. An example of greening the existing Dutch embassy in Amman

Architect: Rudi Uittenhack

Location: Amman, Jordan, with an area of (1253 square meters)

Client: The Dutch Ministry of Foreign Affairs

Design team: Fumi Hoshino Frank Langhorst, Felix Reiter, Jaap Hikke, as well as the participation of a local consultant with the staff.

Project implementation year: 2010

The Dutch embassy in the Jordanian capital Amman is a unique example of the sustainability and green of the existing embassies after they were modified and opened in 2010, as this embassy is located on a total area of (1253 square meters) only with all its buildings and annexes, including a villa for the ambassador’s residence. It was the first building in Jordan to receive the prestigious international LEED-certification for green buildings with a silver rating. This environmentally-friendly building was constructed by transforming and renovating an old villa in Amman.

The design based on transforming and extending the one-story villa in inspiration from Jordanian architecture. The Dutch Rudy Uytenhaak, undertook structural changes before starting the greening work, including removing the walls and ceiling on the first floor of the villa, the central staircase and a small piece of the first floor, while strengthening the existing concrete structure. For the building by adding a row of tall modern columns in front of the building, then he carried out some works aimed at greening the embassy according to (Figure 2), including: According to [3]
1. Adding protection to the "umbrella" system at the facade of the new building to control the balance of thermal radiation loads in summer and winter.
2. Adding a number of natural ventilation holes in the ceiling of the new first floor, which also includes ceiling lighting to increase the effectiveness of daylight in the spaces of the building.
3. Laying floating stone panels to ensure that space is left between the old construction ceiling and the floor of the new floor, as each panel is tilted in different directions so that there are sufficient spaces between them for natural ventilation through mesh openings in the facade, allowing the moderate night breeze to pass through to bring out the thermal storage gathered during the day on the roof of the building.
4. Install solar thermal energy collectors above the car park to ensure the availability of hot water that is transferred directly to the building or stored in the thermal tank (the swimming pool previously after roofing) and confirm the structural umbrellas system.
5. Supplying a movable shading system "umbrella", referring to Bedouin tents in the Levant, and it has been adopted at the southern façade to control solar heat gain for the process of closing and opening through the different seasons.
6. Putting a canvas covering parts of the roof to reduce the impact of direct thermal loads in the building.
7. Converting the current use of the swimming pool after it is covered into an underground thermal tank to store energy for heating, ventilation and air conditioning systems.

The skylights is designed to increase daylight inside the building. The garden is mainly rendered with hard landscaping features, while the applied materials are of high solar reduction impact value. Xeriscape garden that includes water efficient landscaping is used to reduce the water consumption by 50%. A plan for storm water management was implemented by harvesting the rain water from the roof and hardscape in winter, and from the condensate water from air conditioning units in summer, and stored in special tanks. The project captures and treats 90% of the annual rain fall and the collected rain water is treated by a suitable filtration system then reused in toilets and flushing. Therefore, the estimated savings for the running cost equals to JDs 1,149 per year. Estimated annual energy produced from solar collectors equals 5,415 kWh/year, while the running cost for heating and cooling is about 7,086 JDs/year, compared with the annual cost without green features that is about 10,935 JDs/year. [18], The Dutch embassy in Amman was distinguished by some green indicators and strategies and was classified within the main sustainability departments, which are as follows:
1. Keeping small windows on the ground floor to reduce heat gain, in addition to reflecting the ancient traditions of Jordanian heritage.
2. Automatically controlled movable fabric shade features for first floor windows.
3. The surrounding landscape features materials of high SRI value.
4. Ensuring rooftop solar thermal energy (PV) units for securing water heaters.
5. Executing a high specification double smart glass on both floors.
6. The use of stone and concrete for the general exterior of the building envelope to increase the effectiveness of the building’s insulating thermal mass.
7. Providing a mechanical system for managing indoor air (heating and cooling) with individual self-control tools for thermal comfort (thermostats).
8. Using the original pool site after being covered as a thermal reservoir to support HVAC systems.
9. Providing natural and artificial lighting and electrical equipment needed for energy.
10. Insuring a reduction in water use.
11. Ensure low flow piping fittings.
12. Using natural plants that depend on collected rainwater in the rainy seasons, in order to reduce irrigation works from pure water.
13. Use plants with low water dependence.
14. A decrease in the embassy’s energy consumption rate, ranging between (20-30%), compared to any similar building.
The indicators referred to above have reduced greenhouse gas emissions (greenhouses), which cause the phenomenon of global warming, and are associated with the escalation of the consumption of fossil energies. The project was certified by the American Green Building Council (LEED), while preserving the old shape of the building, and it is the second diplomatic building in the world to be certified. Digital visas refer to the following details:

1. The old structure that was reused within the new design program.
2. A cloth covering parts of the new roof to reduce the effect of direct thermal loads on the building.
3. Ceiling photovoltaic panels availability approx. 3% of building lighting requirements.
4. A movable shading "umbrella" on the southern façade to control solar heat gain or block it.
5. The canopy structure and its interlock with the new concrete columns on the southern façade.
6. Solar thermal energy complexes (P.V.) for the availability of hot water that is transferred directly to the building or stored in a special underground storage (pool site) that is currently roofed.
7. Reuse the existing swimming pool after roofing as a thermal tank for heating, ventilation and air conditioning systems.

![Figure 2.](image)

**Figure 2.** the general shape of the embassy with details of the principles of greening, which includes shading and the use of solar cells to provide hot water. While ensuring a beautiful front façade [3].

![Figure 3.](image)

**Figure 3.** Steps of greening treatments used for the building of the Dutch embassy in Amman, starting from the work of adding the floor and reinforcing its old structure with concrete columns, and ending with the process of installing the canopies .[3]
The environmentally friendly Embassy of Finland in Washington turns green - and platinum

The decision of the Finnish Embassy in Washington to turn to the ideal environmentally friendly environment arose when, in the year 2000, the Director of Maintenance sought to address the reduction of the embassy’s high energy costs. "We already had a very good building, but we have very high bills for energy and water consumption," said Finnish Ambassador Ritva Koukku-Ronde at the time. "As our manager started replacing old bulbs with more energy efficient bulbs, he started looking at our cooling system and especially our heating systems, as well as water taps, etc., to see how we can be more energy efficient." Also, wide glass walls allow natural daylight to enter the embassy, symbolizing the country's commitment to diplomatic transparency. Ultimately, the elegant diplomatic milestone has not only become more energy efficient but has also emerged as a model for sustainable green design among embassies in Washington.

In 2008, Finland became the first embassy in the United States to receive an Energy Star from the Environmental Protection Agency for high energy efficiency. In 2010, the building became the first embassy in the United States to achieve the prestigious Leadership Certificate from the US Green Building Council in Energy and Environmental Design (LEED), and then at the gold level. In December 2014, it became the first embassy in the United States to obtain Platinum status, and only second in the world. [20]

This aesthetic translated into pioneering environmentally friendly design. Ambassador Koukku-Ronde said that the embassy’s greening - that is, making it more environmentally responsible - had been facilitated by the fact that it was well built in the beginning. Although the green building standards were not as widespread as they are now, some Finnish standards still apply.
When the embassy was built two decades ago, environmental aspects were not looked at as broadly as they are today, but the architects designed a building that not only met all the requirements in the capital and the United States, but was also using the normal sustainable Finnish method of building, ” she explains. Ambassador Coco Rond. “They were using local materials and designed the building so that we could use natural daylight.” This commitment to preserving the environment affected all the daily functions of the embassy. Toilets and faucets were equipped with water-saving devices, for example, and recycling became a top priority. [21]
To obtain the platinum certification, the embassy invested nearly $ 150,000, money the embassy recovered in the first year. A comparison of average annual energy spending between 2002 and 2004 showed an extraordinary decrease of $ 150,000 annually, electricity use in the building decreased by 50 percent and gas by 65 percent annually, and the embassy now blocks greenhouse gas emissions equivalent to consumption of 90 America's home of electricity ... and 30 percent less water compared to the mid-2000s. Renewable energy offsets 100 percent of the building’s total energy consumption.
Roger Platt, President of the United States Green Building Council, praised Finns’ dedication to achieving sustainability when he said, “This is the first embassy to receive an Energy Star from the US Environmental Protection Agency, the first in the United States to obtain LEED certification, and the first You will receive LEED Gold for an existing building. ”And because the Finns believe that a green building should be alive and still green, they are the first to design an embassy in the United States to achieve LEED platinum.” (Figure 5)

Figure 5. The Finnish Embassy in Washington, is the first in the United States to obtain an ENERGY STAR from the Environmental Protection Agency for superior energy efficiency. [20]
13. Conclusions
1. It requires maximizing the use of the components of the local natural energies to ensure the improvement of the internal climate efficiency and the reduction of the consumption of depleted energies.
2. Achieving sustainability, not only as a way to reduce the embassy’s influence on the foreign country, and create a comfortable living and work environment, but also to declare the guest country’s environmental protection standard.
3. Rationalizing consumption, relying on alternative energy, storing rainwater and using it later, reduces the costs of the bills paid, which are burdensome for the home country or the guest.
4. Diplomatic buildings are considered a guest in the host countries, which requires that this guest be a non-heavy burden on the host's resources, as a result of the reliance of diplomatic buildings on alternative energy, waste recycling, and rationalization of natural resources.
5. As a result of recent agreements related to climate and greenhouse gas emissions, the environmental aspect in diplomatic buildings represents an important trend, which has become in competition with the security and symbolic side, as developed countries took the initiative to pay attention to this aspect to produce green diplomatic buildings from the depth of nature and embrace it.
6. Environmental diplomacy is an exercise in managing international diplomatic relations, shared by a group of countries committed to reducing greenhouse gas emissions, preserving natural resources, and increasing biological diversity.
7. The materials and techniques used in greening the sovereign diplomatic buildings differed according to their suitability for their intended purpose, which all led to the production of buildings contributing to the preservation of natural resources, the use of clean energy and the preservation of the environment.
8. The greening of diplomatic buildings requires decision-making by the authority of the guest country or those who are the decision-makers in the building, such as ambassadors, so the greening process is directly affected by the decisions of the higher authority.

14. Recommendations
1. The engineers specialized in garden design should be involved during the design and implementation phase of diplomatic buildings to design the site perimeter in a way that suits the position of the guest and host country.
2. We must avoid choosing small sites that do not comply with the criteria for greening diplomatic buildings due to their small size.
3. You must take into account the selection of materials used in the implementation of the diplomatic building in order to achieve the largest thermal insulation to reduce energy consumption.
4. In the event that a country submits a request to the host country to open an embassy, this requires the adoption of a condition that cannot be waived, which is the submission of papers formulating its policy on the way to deal with the environment and climate of the host country for improvement, and a special focus on carbon emissions, and this applies to any ambassador when submitting His credentials include that ambassador’s policy towards the environment of the host country.

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