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Renewable Energy and its role in sustainability (from an economic development perspective)

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Abstract

Renewable energy is necessity to achieve sustainability, and the issue of investing in it is an economically and environmentally imperative need. Fossil energy, which is threatened with depletion within 100 years at most. It is matched by an increasing global demand for energy, if people rely for hundreds of years in industries on fossil fuels. Alternative energy is expensive and requires major changes in existing systems, such as changing the ways in which cars and large engines operate, etc. Therefore, switching to renewable energy requires large-scale changes by governments and companies, providing support and assistance in providing funds for alternatives.Sustainability according to the use of alternative energy is based on a new, deeper understanding of the role of sustainable development and alternative energy in the progress of society, as well as being a real way to preserve the environment. The importance of research comes according to the following premises:
Dealing with an important and vital issue that constitutes a cornerstone in the world of sustainability and development.
The theoretical and applied approach in studying the effects of renewable energy and development in Iraq by employing opportunities in the orientation towards sustainability
While the research problem comes in the following question: (How can renewable energy affect economic development from the perspective of sustainability in Iraq)
The research was divided into four axes, dealing with the first axis (the theoretical and conceptual rooting of renewable energy), while the second axis came (renewable energy in Iraq: reality and challenges according to an economic perspective), and the third axis dealt with (the pioneering Chinese experience in investing in renewable energy), and the axis The fourth (building a phased model for the transition to renewable energy) and conclusions and recommendations were reached.

Keywords: *Renewable energy, sustainability, economic development.*

Introduction

Renewable energy plays a distinct role in sustainability and achieving more growth and economic development, as renewable energy helps the economy to obtain clean, sustainable and economically affordable energy, and also contributes to helpe economies reconcile the need to protect environmental resources with the requirements of technical development that the world is going through satisfying and meeting the needs of people in the developed and developing world alike, and applications at the project level in different countries such as (Germany, China, Morocco and the United Arab Emirates) which have demonstrated the cost-competitiveness of

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these technologies if they are evaluated in the light of off-grid renewable energy applications and efficiency.Renewable energy is derived from natural processes that are constantly renewed in its various forms, as it is derived directly from the sun or from the heat generated in the depths of the earth. The definition includes electricity and heat generated from solar, wind, ocean, hydro, biomass, geothermal resources, biofuels, and hydrogen derived from renewable resources (Janssen 2002, 9). Renewable energy often provides the energy for grid electricity generation, heating and cooling of air and water. and independent power systems. About 20% of global human energy consumption is from renewable sources, including nearly 30% of electricity, and about 8% of energy consumption is a conventional biomass, but this is declining, and more than 4% of energy consumption. It is thermal energy from modern renewable sources such as solar water heating, and more than 6% electricity (Ranalder 2021). Renewable energy, represented by solar energy, is one of the most important sources of renewable energy, especially since Iraq possesses success factors, starting with inputs such as silica and petrochemicals, and ending with huge material capabilities. With the increasing producers of solar energy technologies on the one hand, and the expansion of the solar energy market on the other hand, as a result of the increasing desire of many countries to use clean and sustainable energy, What enhances the means of success is Iraq's possession of distinct geographical elements, such as the vast area, long hours of sunshine, in addition to the strategic geographical location, the availability of raw materials and the great financial capabilities. Accordingly, the development of solar energy should be among the development priorities for Iraq to occupy the leadership not only as a producer, but a source of solar energy technologies on the one hand, and solar energy itself on the other hand, for the following characteristics:

The development of solar energy contributes to decoupling dependence on fossil fuels, especially with the increase in domestic consumption, which provides a larger amount of oil for export, and then benefiting from oil revenues to support investments and development projects.

Solar energy is the field in which Iraq is unique to compete, especially with the vast area and geographical location that gives it long hours of brightness, as well as the availability of raw materials, and the great material potential for investment in this field after achieving financial surpluses due to the rise in oil prices.

Increasing the use of solar energy helps in caring for the environment and protecting it from pollution, and this in turn supports the goals of Vision 2030 in the field of renewable energy.

The use of the sun as a source of energy constitutes an essential element among renewable and alternative energy sources for fossil fuels, and the sun is the main source for most other renewable energy sources, and this is what prompted scientists and researchers to increase interest in it in the middle of the industrial revolution to intensify efforts and scientific research in order to reach the best ways which is possible to benefit from solar energy. Solar energy is the product of thermonuclear nuclear reactions that occur in the sun and whose thermal energy reaches the earth

in the form of radiation energy forming ultraviolet rays, and perhaps a small amount of solar energy is sufficient to cover the needs of the entire world of electricity. (Mubarak 2019, 20)

The importance of the research: The importance of the research is evident from the following points

The importance of the research lies in the fact that it deals with an important and vital topic, which is the study of the impact of renewable energy on economic development in Iraq.

The theoretical and applied approach in studying the effects of renewable energy and economic development in Iraq by employing opportunities and facing challenges.

Building a phased model for the transition to renewable energy

Research problem The research problem appears through the following question: Is there an impact of renewable energy on economic development?

Research hypothesis: The research hypothesis stems from the impact of renewable energy on economic development through the expansion of capabilities, skills and the wide use of information related to the process of transition to renewable energy, which enhances the chances of sustainability for economic development.

Research objective This research aims to identify the renewable energy as a new trend in the global economy, which is based mainly on preserving the environment in Iraq.

Research methodology The research adopted the two analytical descriptive approaches, as well as graphic figures and statistical tables.

Research Structure The research was divided into four axes, dealing with the first axis (theoretical and conceptual rooting of renewable energy), while the second axis came (renewable energy in Iraq: reality and challenges according to an economic perspective), and the third axis dealt with (the pioneering Chinese experience in investing in renewable energy), and the fourth axis (building a phased model for the transition to renewable energy) and conclusions and recommendations were reached

First: Solar energy It is an energy resource sourced from the sun, which has a constant power outside the atmosphere (1370 watts / square meter) and its value varies between (0-1100 watts / square meter) on Earth (Bozkurt 2010, 331).

Second: Renewable energy and the advantages of using it.

The use of renewable energy is growing and solar energy is at the heart of the group supporting electricity generation technologies. Supportive policies and advanced technologies allow access to user capital in leading markets at a low price with shrinking costs, as solar photovoltaic energy which has become less expensive and solar energy projects are expected to cover electricity. Renewable energy meets 80% of the growth in global demand for electricity until the year 2030.

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Solar energy is mainly an engine of growth, as it is expected to record records in terms of deployment after 2022, followed by offshore and onshore wind energy. Progress in the use of renewable resources to generate

Energy, especially solar energy, (World Bank 2020, 6), and solar energy has a positive impact on the environment, as it produces clean electric energy that is used in various fields and human activities, whether by installing solar thermal systems or installing photovoltaic panels, and it is use to help in reducing reliance on energy produced from fossil sources, which is environmentally harmful and economically costly, and solar energy reduces air pollution and carbon dioxide emissions. Thus, reducing greenhouse gases, as they do not cause environmental or noise pollution, as is the case in stations that depend on traditional energy sources in the production of electricity. The heat reaches the surface when it is placed on the roofs of the houses and thus reduces the severity of the heat. There are a number of advantages of renewable energy, including: (Dubai Report 2022, 2)

It is characterized by permanence and impermeability.

Availability of sources of environmental security, as it is a clean energy that does not have polluting accumulations resulting from production and consumption processes.

It represents a renewable and inexhaustible resource, which in turn contributes to provide sustainable possibilities for establishing projects based on solar energy to meet its needs.

Renewable energy is not exposed to external shocks and fluctuations, and this makes it possible to expand its exploitation optimally.

Renewable energy is available in all places and depends on the issue of the intensity of solar radiation, and this allows for effective exploitation in all places.

The technology used in converting solar energy is relatively simple and this enables it to be used in various forms, in addition to the availability of a safety factor compared to other sources. (Buachir 2011, 169)

Environmentally friendly, as it contains high levels of carbon, which has become one of the air pollutants in the world, this waste (Bozkurt 2010, 329)

Renewable energy resources have the lowest environmental impact of all their sources. Renewable energy technology has a very small impact on the environment compared to fossil fuels.

Renewable energy resources promote diversification in the use of energy rather than the country's dependence on a specific type of fuel.

Enhancing energy security and reducing the price of conventional fuels in the long term.

Achieving access to clean energy sources and conversion technologies will help achieve the Millennium Development Goals by taking advantage of the local availability of renewable energy.

Reducing dependence on imported fuel and reducing spending on it.

Reducing conflicts related to mining and the use of the limited natural resources available, as most renewable energy sources are well distributed.

Stimulating economic development, creating new job opportunities and local employment, especially in rural areas, where most renewable energy technologies can be applied in small, medium and large systems in subsidiary and central applications

New or renewable energies are relatively cheap in terms of cost because they do not require large costs of maintenance or the cost of maintenance is relatively low. For example, the cost of solar energy is half the cost of lighting with kerosene, as it is estimated that 3 million homes obtain energy from small solar units. (Kenya) is the first in the world in the number of solar energy systems per capita, and more than 30 thousand small solar units are sold annually in (Kenya) and each produces 12 to 30 watts. In terms of providing safety, all types of new or green energy are considered safe for humans, just as it saves money, in addition to achieving the required environmental dimension, as it does not produce greenhouse gases such as carbon dioxide, which helps eliminate global warming.

Green energy has several drawbacks, foremost of which is that the electrical energy produced from it is less than what is expected to be produced and therefore insufficient for human consumption, and some of its types and sources are closely linked to timing, such as solar energy that disappears at night or is significantly less effective in winter. It is the country that uses green energy the most, and according to the International Energy Agency, it has more than half of the renewable and new energy capacity in the world China and India which are large markets for renewable energy, and renewable energy markets are growing at high rates in several countries (such as Argentina, Costa Rica, Egypt, Indonesia, Kenya, Tanzania, Thailand, Tunisia and Uruguay). They have access to the electric grid, and although they are usually very poor. They have to pay much more for lighting than people in rich countries because they use useless kerosene lamps. Also, the use of renewable energy sources has some drawbacks and disadvantages, part of which is essential and part of which is due to the state of technology development. The energy intensity of renewable energy sources is often low compared to most sources of fossil fuels and nuclear energy. So it needs large areas of land. However, this may create competition with other land use requirements, including food production, ecosystem protection, and biodiversity conservation. Strategies to mitigate these concerns include multi-purpose land use, and technologies with high conversion efficiencies, and a combination of renewable energy with measures to improve energy efficiency. Although renewable energy is often freely available (which reduces the volatility associated with fossil fuel price volatility). Renewable energy conversion technologies are often capital-intensive, including operating costs

(costs fuel) are replaced by compound capital costs. This makes renewables less attractive, especially when high discount rates are applied, depending on the level of required investments as well as government interventions.The cost of renewable energy is often not able to compete in the market, however, this may change as the costs of renewable energy decrease through technological progress, in addition to use traditional energy sources will become more expensive due to the depletion of resources and policies to absorb external costs.

There are environmental, social and political obstacles to the exploitation of renewable energy sources, for example, the production of electricity from hydroelectric power through the construction of dams on river courses, which may sometimes cause tension in international relations between riparian countries, as well as wind energy and the use of biomass resources, the intermittent nature of production Energy from wind, solar, and tidal energy. It may specify specific requirements for the overall energy system to achieve a reliable energy supply. It may require methods to forecast renewable energy supplies, energy management requirements, backup energy availability, develop storage options, and enhance the resilience of energy systems.

Iraq has good potential for solar energy, as the amount of solar radiation is (5.6 kilowatt-hours per square meter per day over 3000 hours per year), meaning that the introduction of solar energy to Iraq will provide energy security by compensating for the shortage of fuel, especially natural gas, and disposing of burdens of obtaining gas and electricity from neighboring countries, and it secures energy independence in Iraq, as Iraq needs a plan to implement the transition process and with the support of the private sector to meet the growing demand for electricity. It is expected that the demand for electricity will increase and will reach about (55,000) megawatts by 2023, and renewable energy sources, primarily solar energy, will occupy what Approximately (20-30%) of the electricity mix by 2030 (Estebanian, Solar Energy in Iraq from Dawn to Dusk 2020, 10).

The electricity sector constitutes the backbone of life through the provision of energy services to society at all levels, as well as the infrastructure for electricity production and distribution stations. It is a measure in determining the elements of economic development and generating private sector job opportunities. The process of developing the electric sector has a role in raising the level of economic growth of the country. The more energy is available, the more it pushes the country to progress, as is indicated by the challenges that confronted this sector and led to the weakening of its institutions, the decline in investment rates and the chronic deterioration of the infrastructure. 2009.

The reason for this is due to the high volume of demand for energy to reach (19972) megawatts in 2015, and despite Iraq achieving remarkable progress in improving its capabilities in generating electric power. The volume of supply reached at the end of 2018 about (18150) megawatts to reach (19200) megawatts in 2019, and despite this expansion in supply. It faces the challenge of large and increasing demand growth at a rate exceeding (10%) annually, and the volume of supply

reached (21000) megawatts in 2020, while it rose to 2300 megawatts in the year 2021. (World Bank Report 2018, 5).

The electricity sector recorded a poor performance and imposed huge financial burdens on the public budget, posing a major social and economic challenge. Citizens were forced to resort to private and private generators. The gap widened between the peak demand for electricity and the maximum supply to the grid despite the increase in the available supply by a third. These pressures are quickly amplified due to the increasing population growth, which leads to an increase in the demand for electricity, and electricity production which is affected by the high percentage of losses that sometimes reach (50%) due to the weakness and old distribution networks and the lack of production inputs, while in some countries the losses do not exceed (8.5%). Approximately %), in addition to the high cost of the production process, which consumes large amounts of financial resources that are allocated to maintenance and maintenance operations. (Al-Turkawi 2020, 3-7). The features of renewable energy in Iraq are still the same as they were in the period before 2003, with the exception of traditional electric energy. Filling part of the deficit in electricity production despite the plans and projects announced regarding the establishment of new stations that depend on clean energy sources in the future, as reliance is made on two important sources that form the basis of energy in Iraq, namely oil and gas, in generating electric power for local consumption and feeding local industries. It is worth noting that an agreement was concluded with some organizations in the European Union regarding the provision of a permanent partnership on energy, including the initiative to formulate energy policy in Iraq and the production of renewable energy. Iraq also approved in 2013 the launch of the first strategy in cooperation with the World Bank, which pledged to provide funds Finance has provided an amount of (7) million dollars to develop strategies about the renewable energy system in Iraq. Fo exploit all places where energy types are available, in addition to extending remote areas far from the national energy networks, and it has been set for the period from (2013-2030) to implement this, except the reality of the situation does not indicate a tangible improvement in energy production in general, and the reason is the failure to establish giant energy production stations to meet the immediate need and the future need resulting from the annual increase in demand not to mention the weakness or lack of a serious tendency to rely on renewable energy as a backup source to meet the local need for energy in Iraq. All the solutions that the Ministry of Electricity has taken are patchwork solutions that include the establishment of small stations here and there that only fill the annual increase in demand with the remaining. The energy gap is close to 58% during peak summer times. Iraq is one of the first countries that paid attention to renewable energy, as it dates back to the fifties of the last century by building dams and installing hydroelectric stations, but it remained low compared to the growing demand for electricity and the tendency of successive governments to generate electricity from fossil fuels due to the presence of a higher comparative advantage. Table (1) shows Below is that renewable energy generation in Iraq for the period (2003-2020) is in continuous. However, in general, it is

in a continuous decline, as the average generation of electricity from renewable energy in Iraq for the period (2003-2020) reached (3.58 terawatts / hour), and an annual growth rate for the average period (2003-2020) amounted to (-0.97%), and this is the result of the government's approval Iraq after 2003 on the use of oil and gas to generate electric power and the occurrence of climate change, which severely affected the generation of hydroelectric power in Iraq. fluctuation and with fluctuating annual growth rates.

Table1. Renewable energy and annual growth rate in Iraq for the period (2003-2020)

Years	Annual Growth Rate % (2)	Renewable Energy TWh (1)
2003	/	4.76
2004	20.90	5.75
2005	-14.89	4.89
2006	1.98	4.99
2007	-8.50	4.57
2008	-35.79	2.93
2009	-3.47	2.83
2010	27.73	3.62
2011	-5.96	3.40
2012	29.34	4.40
2013	4.82	4.61
2014	-38.48	2.84
2015	-10.20	2.55
2016	32.41	3.37
2017	-35.45	2.18
2018	-16.47	1.82
2019	36.31	2.48
2020	-0.69	2.46
average	-0.97	3.58

Source: (1) BP (www.bp.com).

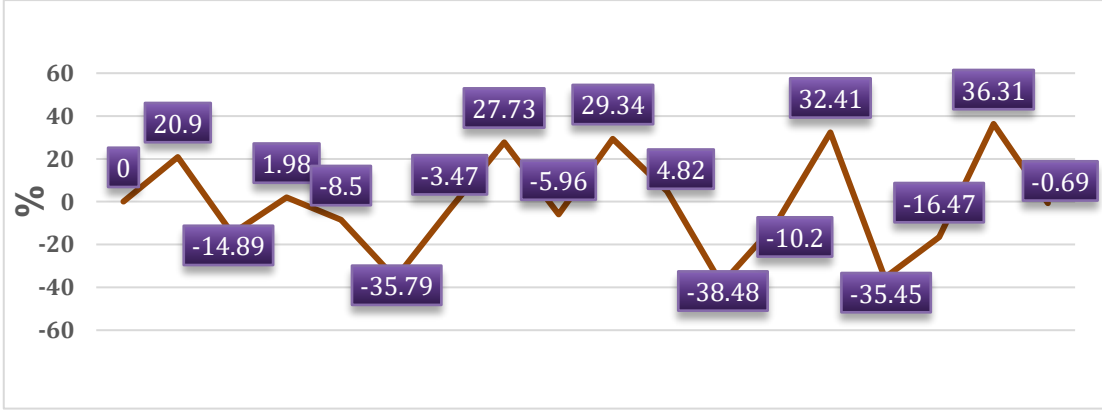

Figure 1 The annual growth rate of renewable energy generation in Iraq

Source: Ammar Naeem Zughair, Analysis of the relationship between renewable energy and the resource curse in Iraq for the period 2003-2020, Kirkuk Economic Journal. A special issue of the Diyala University Conference, 2022.

Second: Procedures for the purpose of transformations in the use of renewable energy

There is a set of packages and measures that ensure the process of shifting energy use towards sustainable energy, which are: (United Nations (UNESCO) 2018, 130-139)

Developing proactive policies This is a key factor in Iraq's transition towards the sustainable use of natural resources, primarily energy. The existence of imbalances in energy markets limits the ability of economies to change their method of producing and consuming energy in a sustainable manner based on market signals. This includes the lack of information available to consumers and energy producers alike, and the lack of price signals in the absence of competition. Iraqi economy spends financial resources every year to support more resources that are lost due to wasteful consumption and production patterns and behaviors, and the provision of subsidies that are not directed to consumers, and the market's lack of price signals and energy efficiency regulations, and the inability to find appropriate solutions to some problems such as incomplete access to electricity, and proactive policies are drawn up through the use of quantifiable goals and objectives that help members of society understand the progress made. More sustainable management of natural resources and clarify the relationship between a particular policy such as setting higher standards for the economy in the field of transportation, and the public interest Pursuing broad policy support for development goals leads to practical policies in accordance with regulatory frameworks in order to ensure that the goals which are an integral part at the government level and that they are realistic and credible. Concrete goals and objectives within the framework of carrying out clear mandates for the professional bodies to achieve and sustain these goals.

Transparency and accountability (and building institutional capacity Building institutions and building capacities within institutions) is an important element in managing sustainable energy policy towards achieving long-term development Policy development is hampered by the conflicting interests of different interest groups, unclear mandates, weak implementation capacity, and shortcomings institutions through weak competence, assignment, and financial and human resources, as they constitute a challenge that prevents the possibility of achieving social and economic development. The complexity of policies and regulations directed at energy efficiency across all different sectors and changing market dynamics requires the implementation of policies that significant changes have been made to existing market structures, such as increasing the possibility of private sector participation and reforming energy pricing, institutions Effective, capable of obtaining sufficient information and data, knowledge of skilled human resources in their field of work, and political mandate to design, implement and monitor policies.

Civil society institutions strengthen the process of change, as civil society can be a catalyst for government regulations aimed at significantly improving environmental sustainability and consumer well-being, and civil society institutions can gradually change policy and regulatory, including assigning consumer interest groups and the media to highlight exciting issues for concern in the areas of transportation, energy efficiency and increasing the use of renewable energy, in addition to protecting the environment and reducing waste of water and public resources in the economy.

Environmental awareness through the dissemination and deepening of environmental knowledge among all segments and groups of society with appropriate environmental means and messages for each of them and motivating them to contribute and participate individually and collectively in protecting the environment and its resources, given that climate change is the problem of the age and that women and children are more vulnerable than men to the problem of climate change. This necessitates full environmental awareness of climate change and the development of strategies, programmers, plans, laws and legislation for environmental awareness among all segments of society, especially vulnerable groups.

Research and development, as it requires the promotion of scientific research and technological development in several fields, including technology transfer and economic aspects, and related industry, oil, energy, development of transportation and other fields related to climate change and the livelihood of citizens in order to mitigate the effects of climate change and adapt to it. It is necessary to give importance to this aspect and provide an opportunity to prepare extensive studies on climate change and its multifaceted effects, support postgraduate students in approving research and studies on climate change topics, and increase the knowledge aspect in which new and advanced research can be embodied that can be transformed into projects that serve the environmental, economic and social reality. Iraqi. (United Nations 2020, 5)

The third axis / the pioneering Chinese experience in investing in renewable energy

China is like other developing countries emerging in the field of investment for renewable energies, but it was able to rank first in the world, surpassing the United States of America, Germany and Japan, by adopting stimulus and support policies for renewable energy projects and transferring tax and electricity revenues to finance these projects, and benefiting from Public banks granting them loans at interest rates lower than the rate recognized in the Chinese financial market, and renewable energy projects benefit from the state's policy of exploiting foreign direct investment in transferring renewable energy technology to China. And providing its factories with production expertise, which made it a well-deserved international competitor, and China has been leading the global solar energy sector over the past ten years, according to the International Energy Agency. China has set up new projects with a production capacity of solar energy amounting to 35 gigawatts. Despite the high production capacity of solar energy in China, it only constitutes about 1% of the total energy demand. Coal still accounts for 66% of energy demand,

and the Energy Administration plans China's National Institute for Renewable Energy provides 86% of the country's energy needs. So that solar energy represents about a third of this percentage by 2050. Japan came in second place, but it is expected that it will not maintain this position for a long time due to the limited number of solar energy facilities in it. Germany has established new solar energy facilities with a production capacity of only 1.5 gigawatts. However, it comes in third place, followed by the United States in fourth place, and the country is expected to increase its cumulative production capacity to reach about 85 gigawatts.

The largest solar energy producing countries

No.	Country	Total production capacity in gigawatts
1	China	78.07
2	Japan	42.72
3	Germany	41.22
4	UK	40.30
5	Italy	19.28
6	UK	11.63
7	India	9.01
8	France	7.13
9	Australia	5.90
10	Spain	5.49

Source: BNEF; 2020: Transforming China's Electric Power Future (IBM); EY analysis

First: the pillars of success in Chinese experience

China has developed a ten-year plan aimed at increasing its installed capacity in several sectors of renewable energy, including: raising the capacity of heating water using solar energy to 1.1 million cubic meters, and raising the cumulative production capacity of solar cells to 3.5 megawatts. To achieve these goals in 2030, the country has Enact the Renewable Energy Promotion Law and regulate the incentive policies into law, to encourage renewable technology, provide market opportunities for renewable energy companies in order to allow local governments, institutions and individuals to promote and use renewable energy, and the Chinese government's financing support for renewable energy China has also used several models whose revenues can be used to support the production of renewable energies, as China has put in place four main measures: surcharges on electricity, cost recovery from electricity consumers, tax revenues and auctions, and foregone tax revenues as well as general government spending. (Bank 2018)

The Chinese public policy relied on moving towards several paths, in which the full responsibility was not on the government alone, but many parties were involved, foremost of which were investors, businessmen, and citizens through awareness of the use of renewable energy, and China tended to invest in many areas related to renewable energy and the goal was Preserving wasted

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energy and reducing production costs by developing more efficient technologies. According to the United Nations Renewable Energy Investment Agency, China has become the world's largest investor in the field of renewable energy. In 2018 alone, China's investments in this sector amounted to $91.2 billion (i.e. one-third of global investments in this field), and China's production increased. In this field, in 2019, the production of solar panels amounted to 136 million watts, or (7.4%) of the total global production, and China has become the largest exporter of solar panels, and Chinese researchers expect that the Chinese production of solar energy will rise to 500 gigawatts in 2025. Compared with 204 GW at the end of 2019, in general, there has been a significant improvement in the production of renewable energy in China.

Part of the success in achieving an important position in the global renewable energy market is related to the extent of Chinese technological development in this field, which has witnessed significant improvement in recent years, as many local components necessary for this industry have been localized, and China has become the largest number of patents in this field. In this regard, even an integrated industry chain has been established in this field, and there are some Chinese provinces that have become playing a major role in this sector, which has contributed to the creation of job opportunities in those provinces.

The state's general policy has moved over the past years through an integrated set of policies at home and abroad to reduce dependence on fossil fuels and replace them with renewable energy. (Arafah 2021)

The fourth axis / building a phased model for the transition to renewable energy

First: Diagnosing and eliminating failure factors. The failure of the solar energy policy during the past decade in Iraq is attributed to the lack of a vision and strategy supported by effective legal legislation that allows private investments to access the technology market, as well as the lack of an institutional and environmental structure, which negatively affected Iraq's ability to invest in this type of energy and thus affect the energy sector.

Second: success factors of the model. There are a number of factors on which the model depends, as shown in the figure below:

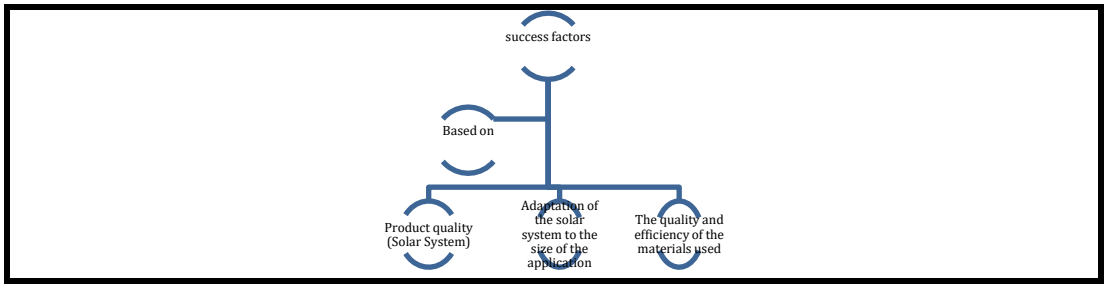

Figure 2 success factors of the transition to renewable energy

Source: from the researcher's work.

As for the importance of switching to renewable energy, Figure (3) shows that

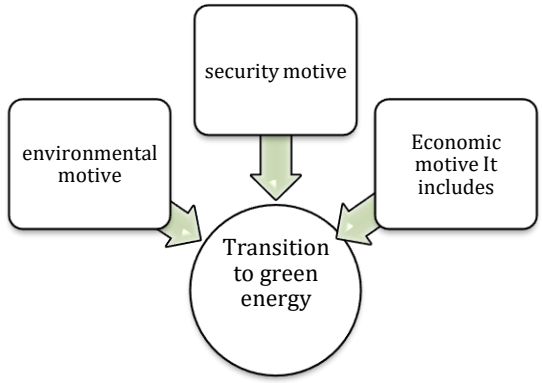

Figure 3 the importance of switching to renewable energy in Iraq

Source: from the researcher's work

The economic motive, as the implementation of the program helps to compensate for renewable energy, by increasing power generation by using renewable energy, in a way that keeps pace with the increase in demand for electricity, which will continue to rise (at a rate of 6 to 7%). It will require large investments in power generation and new infrastructure to meet annual demand in meeting Iraq's energy needs.

Energy Security Motivation

The implementation of the Renewable Energy Compensation Program will give Iraq an opportunity to increase energy security and reduce dependence on foreign energy sources by taking advantage of local solar energy resources, as well as available land for investment in the western and southern parts of the country.

The environmental motive

This is through reducing the levels of carbon dioxide emissions in proportion to the expansion of generation capacities. So the country will need green energy to generate electricity to reduce these emissions (Estebanian, Solar Energy in Iraq: From Beginning to Compensation 2018, 20-21).

Conclusions

Although Iraq has all the ingredients to benefit from renewable energy sources. This is difficult in light of the following challenges:

The lack of detailed network maps for the relevant renewable energy sites.

There is no policy to provide financial guarantee to private sector investors to guarantee payment under the PPA.

There is no exemption from customs duties or internal tax benefits for renewable energy projects, and there are no self-producers of energy from renewable sources.

Supporting the institutional structures working on the climate change file, in a way that contributes to enabling them to prepare and implement climate policies and make national decisions that are consistent with international requirements to ensure the transparent implementation of this document.

Support work to reduce emissions from the various sectors emitting them, using the various paths and technologies used, according to the national need and in a way that achieves balance.

Achieving sustainable development of energy by increasing the efficiency of traditional energy sources currently used, preparing renewable sources for future generations, increasing the participation of renewable energy in providing energy and participating in energy security, protecting the environment and mitigating climate change.

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