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Indicators of the Iraqi economy between the abundance of fossil energy and the potential of alternative energy (An analytical study)

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Abstract

Iraq has enormous potential in the field of renewable energy, and the process of transition to renewable energies is still in its early stages in Iraq. The Iraqi electricity sector has struggled to exploit its renewable resources appropriately, and the electricity infrastructure in Iraq requires large investments to rebuild, modernize, expand and improve its total capacity. Efficiency, and it seems that Iraq's path towards renewable energies is arduous. This is due to the lack of political stability in the country and the dominant economic role played by the fossil fuel sector, where revenues from oil represent about 99% of total Iraqi exports, as war and violence have created very difficult conditions compared to some other countries, while the integrated national energy strategy constitutes an attempt to set a short-term vision, it needs to be amended to better focus on existing realities. Therefore, Iraq currently does not have a clear and specific strategy, and there is no clear approach to transitioning to renewable energy, as the dominant role played by fossil fuels in the economy, the state, insufficient legislation, the lack of population efficiency, and political factors are all barriers that hinder the path of energy transition in Iraq.

But Iraq should improve the framework conditions for renewable energies and raise awareness about their benefits If this opportunity is to be seized, regulations on renewable energy should be adopted, market development supported, a realistic time frame for the transition process and an appropriate and reliable legal framework established.

Keywords: *characteristics of the Iraqi economy, alternative energy in Iraq, fossil fuels, sustainable development, licensing rounds.*

INTRODUCTION

Iraq faces many challenges, starting from drawing up a clear national policy for spreading renewable energy to the challenges of financing, which is an important pillar of the economic development process in Iraq in light of the absence of diversity in the economic structure, structural imbalances between the basic sectors, the dominance of the oil sector over the rest of the sectors, and semi-dependence. Total revenues from crude oil exports, which led to a decline in production in the industrial and agricultural sectors, and caused an expansion of the phenomenon of poverty and unemployment, allow standard of living for the population, and a large disparity in income and wealth. Therefore, the need arises to attract foreign investments by providing an appropriate investment climate and stimulating investment in the sectors All economic.

The process of transition from an economy that depends on fossil energy to an economy that depends on renewable energy sources must be in line with the growing volume of demand for goods and services in markets that support the latest energy sources, innovations, and technical and technological knowledge, in addition to correcting taxes or supporting prices to be appropriate. The inter-costs, as well as the process of inter-deterioration and the unsustainability of natural resources put Iraq in a dilemma of keeping up with the development challenges of the third millennium and not keeping pace with the process of sustainable development that it is trying to achieve by achieving significant development rates in production that depends on clean renewable energy technologies, and we will try in this chapter. Learn about the future of renewable energy in Iraq and the possibility of its availability to reach the sustainable development process while preserving the fossil energy sources it possesses, and we highlight solar and wind energy.

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Research importance

There is a need for Iraq to shift towards the use of alternative energy (oil) and try to diversify energy sources that are dominated by fossil sources. This is consistent with the global trend led by regional and international organizations in the field of preserving the environment and reducing the phenomenon of global warming.

Research objective: The research aims to highlight the necessity of using renewable energy sources in energy production and providing raw materials for the country's manufacturing industries so that Iraq can achieve progress in meeting the requirements of sustainable development.

Research problem: Can Iraq succeed in establishing alternative energy projects instead of relying heavily on fossil energy sources, especially crude oil, to meet the increase in energy consumption, especially electrical energy for domestic and productive uses?

Research hypothesis: Renewable energy (oil) represents, at the global level, a qualitative shift from fossil energy sources, the main cause of global warming, to renewable energy, which is the main guarantor of achieving sustainable development.

Research structure: The inductive approach was adopted in the research and through the research structure, which included the theoretical framework of the reality of traditional energy, and then arriving at the actual reality of energy in Iraq, as well as conclusions, recommendations, and a list of sources.

The first topic: the traditional energy sector in the Iraqi economy.

Since the beginning of the fifties of the last century, the Iraqi economy has witnessed several transformations in its system and performance. In the early seventies of the last century, it was able to control its national wealth, most notably oil security in the years 1973 and 1979, which was helped in this by the availability of economic resources, especially fossil energies represented by oil. The production capacity for crude oil exceeded (3,600) thousand barrels per day and exports (32,000) thousand barrels per day in (1980), and it was hoped to achieve an industrial and urban achievement in infrastructure and services on a large scale, as well as increasing the capabilities of generating, transmitting and distributing electricity as well as other services. Such as education and health **(Ali,2013:5).**

Iraq's long history of conflict and instability has undermined growth and development. In particular since the Second Gulf War in 1991 and the stringent sanctions imposed on Iraq until 2003 saw stalled oil revenues, the decline of non-oil sectors and agriculture, and reduced investment in services, which in turn led to deteriorating development outcomes. Post-2003 insecurity and security instability, combined with the conflict with criminal gangs (ISIS) in 2014, led to the loss of infrastructure as well as making it very difficult for the government to focus on reconstruction and attract investment**(World Bank Group,2017).**

First: The role of the oil sector in the gross domestic product.

Oil has been and still is the focus of the energy sector and the national economy, which depends on the volume of its imports as well as their management. It is logical to focus on Iraq's relative economic advantages in the abundance of crude oil and gas and to benefit from this abundance in expanding and employing local energy and industries that use oil and gas as a raw material. The emergence of activity Extracting and exporting oil, especially in the mid-fifties of the last century, and focusing on the importance of extractive industries, which led to a decrease in the contributions of other economic sectors to the gross domestic product. Not only that, but also to the creation of a distorted economic structure, as agricultural activity began to decline following successive and continuous migrations from the countryside to the city, where job opportunities are provided, and the government sector has become the largest user of labor and the emergence of consumerism due to rentier government revenues.

It is noted from Table No (1) the percentage of contribution of oil sector production to the formation of Iraq's gross domestic product. The percentage in 2003 reached about (45.0%), which is larger than the size of the same percentage in 2002, which amounted to about () as a result of Iraq's openness to the outside after the occupation of Iraq by Before the United States of America and its allies, the export of Iraqi crude oil began after the lifting of international sanctions, which was quickly reflected in the percentage of the oil sector's contribution to the formation of Iraq's gross domestic product, but it witnessed a decline in 2009 due to the impact of the Iraqi economy, like the rest of the world's countries, with the global financial crisis in 2008. The decline in the level of economic activity and the decline in global demand for oil, as this year witnessed the contribution of oil to about (40.2%) compared to 2008, and after 2009, the gross domestic product at current prices returned to rise, with high growth rates, reaching about (184,192) million dollars in 2012. The reason for the increase is due to the increase in the contribution of the oil sector by about (52.4%), that is, the increase in demand for crude oil, which led to a recovery in the gross domestic product.

Table (1) The size of the gross domestic product at current prices with the contribution of crude oil to the Iraqi gross domestic product for the period (2003-2021)

Years	Size of Gross Domestic Product (Million dollars)	Contribution of oil to GDP (Million dollars)	Percentage of oil's contribution to GDP (%)
2003	10621	4779.5	45.0
2004	24700	16549.0	67.0

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2005	33327	21096.0	63.3
2006	54886	27497.9	50.1
2007	72486	38925.0	53.7
2008	110423	61726.5	55.9
2009	97302	39115.4	40.2
2010	117138	50135.1	42.8
2011	157553	81139.8	51.5
2012	184192	79755.1	52.4
2013	195382	81083.5	41.5
2014	222042	114795.7	43.5
2015	164506	98539.1	55.1
2016	158050	95462.2	60.4
2017	175652	108026.0	61.5
2018	211146	131966.3	62.5
2019	215268	133896.7	62.2
2020	175134	103329.1	59.0
2021	209924	118607.1	56.5

Source: Prepared based on:

- Arab Monetary Fund, Unified Arab Economic Report, for various years.
- Central Bank of Iraq, Annual Economic Report, General Directorate of Statistics and Research, various issues, various pages.

It is clear from the previous table that the percentage of the oil sector's contribution to the GDP began to decline, reaching about (41.5%) in 2013, and the GDP declined further to record negative growth rates of about (13.6%) and (-25.9%) in the years (2014) (2015), due to the decline in oil prices as a result of imposing high taxes on oil and the deterioration of demand for Iraqi oil as a result of the war against (ISIS terrorist gangs) and the destruction and sabotage that resulted in oil transportation lines, as it amounted to about (43.5%) (55.1%) in successive years (2014) (2015) After these declines, the GDP began to improve to achieve a positive growth rate (11.1%), and the GDP reached (175,652) million dollars, and the percentage of oil's contribution to the GDP reached (61.5%) In 2017, as a result of the increase in the contribution of the oil sector, the relative improvement in prices, and the reduction in the tax rate due to the victory in the war against the terrorist ISIS gangs, the growth rate in the gross domestic product returned to recording positive growth rates, and the percentage of oil's contribution to the gross domestic product reached about (62.5%) and (62.2%) in the years (2018) and (2019) respectively, as a result of the improvement in global oil prices after the signing of the OPEC agreement to reduce oil production, reduce the tax rates imposed on crude oil, improve the demand for Iraqi oil, and increase the volume of oil exports. As for the percentage of oil's contribution to the gross domestic product, it was estimated at about (59.0%) in 2020, as a result of the contraction in global economies in light of the health, economic and social crises that the world experienced as a result of the outbreak of the (Covid-19) epidemic.

Second: Oil reserves.

Iraq is one of the countries that possess large and proven oil reserves. It has 115 billion barrels of proven reserves of crude oil and 220 billion barrels of unproven reserves. The third internationally (1), while specialists estimate the presence of potential reserves ranging between (45-100) milliliters. A barrel of what could be raised the ceiling of those reserves will be approximately 215 billion barrels or more, and perhaps it will Iraq exported the oil countries**(Musa,2010:301).**

Table No (2) shows these reserves compared to the reserves of the OPEC countries and at the global level, as it is noted that the Iraqi oil reserve possesses a large amount of reserve as a percentage of the global reserve, which makes it able to influence the oil market, and the increase in the Iraqi reserve is due after the year 2003 to new evaluations of the fields by oil companies in light of recent studies of old information carried out by the Ministry of Oil with oil companies, which led to an increase in the recovery factor, and thus an increase in the existing oil, especially in the West Qurna field**(Al-Amir,2012:63).**

The relative contribution of Iraq's crude oil reserves to OPEC reserves during the years (2005-2009) amounted to (12.83%) at a gradual rate of decline until the year (2009) to become (12.07%), with crude oil in Iraq remaining stable during the years (2005-2009) respectively.

Table (2) The size of Iraq's crude oil reserves for the period (2003-2021)

Years	(1) The size of Iraq's reserves (Billion barrels)	(2) OPEC reserve size (Billion barrels)	(3) Global reserve size (Billion barrels)	(4) rate % 1/2	(5) rate% 1/3
2003	115.00	890.73	1126.59	12.91	10.19
2004	115.00	896.67	1128.62	12.83	10.19
2005	115.00	896.57	1131.54	12.83	10.19
2006	115.00	935.83	1151.56	12.29	10.19
2007	115.00	948.06	1170.84	12.13	10.19
2008	115.00	950.47	1169.08	12.10	10.19
2009	115.00	953.12	1185.09	12.07	10.19
2010	142.30	952.51	1188.73	14.94	10.19
2011	141.40	1000.00	1241.60	14.14	10.19
2012	145.30	1009.60	1268.80	14.39	10.19
2013	145.30	1009.90	1283.80	14.39	10.19

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2014	143.07	1008.10	1284.30	14.19	10.19
2015	143.10	1003.70	1284.70	14.26	10.19
2016	143.10	1008.60	1278.20	14.19	10.19
2017	147.20	922.27	1269.00	15.96	10.19
2018	145.02	920.35	1276.00	15.76	10.19
2019	148.40	915.07	1272.00	16.22	10.19
2020	148.40	980.72	1317.00	15.13	10.19
2021	148.40	979.08	1304.00	15.16	10.19

Source: Prepared based on: Arab Monetary Fund, Unified Arab Economic Report, various issues.

It will continue to rise during the year 2016 and beyond, raising its relative importance globally and regionally. It is also hoped that production will increase in the coming years as stipulated in licensing contracts.

Third: The volume of production of crude oil

One of the important indicators that show Iraq's position on the international oil map is the volume of oil production and its percentage in the total global oil production. Iraqi oil production has increased significantly since the licensing rounds for the main fields in Iraq were granted, starting from 2009 to the present day. However, there is still a lot What needs to be done to increase oil production even more, as well as develop the necessary infrastructure, meet local and international energy demand, develop related industries, and restructure the sector**(Al-Issawi,2020:173).**

Table No (3) indicates that the development of Iraqi oil production was affected during the war that Iraq went through and its occupation by the United States of America in 2003. Its production this year reached about (1,328) thousand barrels per day, which is a lower percentage than in previous years as a result of the lack of the stability of the security situation, the collapse of infrastructure, and acts of sabotage and looting led to a partial cessation of oil production, which led to a decrease in OPEC production and a decrease in the percentage of its contribution to OPEC.

Table (3) Development of Iraqi oil production, OPEC production, and contribution percentage for the period (2003-2021)(Thousand barrels/day)

Years	Production of Iraq	Annual growth rate (%)	OPEC production	Contribution of Iraqi oil production to OPEC (%)
2003	1328	.....	26255	5.1
2004	2106	58.6	29577	7.1
2005	1840	-12.6	30224	6.1
2006	1952	6.1	31841	6.1
2007	2035	4.3	31342	6.5
2008	2281	12.1	31570	7.2
2009	2336	2.4	28927	8.1
2010	2340	0.2	29477	7.9
2011	2653	13.4	30322	8.7
2012	2942	10.9	32676	9.0
2013	2980	1.3	31841	9.4
2014	3110	4.4	30905	10.1
2015	3482	12.0	31809	10.9
2016	4630	33.0	33291	13.9
2017	4469	-3.5	31756	14.1
2018	4110	-8.0	31165	13.2
2019	4576	11.3	29291	15.6
2020	3998	-12.6	25436	15.7
2021	3998	58.6	26575	15.0

Source: Prepared based on: Arab Monetary Fund, Unified Arab Economic Report, various issues.

The previous table shows an increase in oil production in 2004 to reach (2106) thousand barrels per day, with a growth rate of about (58.6%) and a contribution rate of about (7.1%), as a result of Iraq's return to the international oil market after the lifting of sanctions that lasted thirteen years and over As a result, the daily production rate increased for that period, while the percentage of Iraqi oil production decreased in 2005 to (1840) thousand barrels per day, with a negative growth rate of (12.6%) compared to the year 2004. This decrease was caused by smuggling operations that targeted pipelines transporting crude oil, and then Production began to rise until oil production increased in 2008, but it was quickly affected by the global financial crisis, as demand for oil decreased as a result of it being affected by the low level of employment and unemployment. The price of a barrel of Iraqi oil decreased until it reached (40) dollars after it was (110) dollars per barrel, and then Production began to rise gradually until it reached about (2,340) thousand barrels per day in 2010, with a growth rate of (0.2%). Then the Iraqi government decided to make agreements with foreign investing companies for the purpose of increasing oil production in what are called (licensing rounds).

Iraq's production in 2011 amounted to about (2,653) thousand barrels per day, with an annual growth rate of (13.4%) and a percentage contribution of (8.7%), as work was implemented on contracts for the first and second licensing round in the fields of West Qurna, Zubair and Majnoon, which led to a continued increase in Production It is believed that this increase in production will lead Iraq to occupy advanced ranks among the countries exporting crude oil. Despite the

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circumstances that Iraq went through, oil production continued to continue to increase until it reached (3110) thousand barrels per day in 2014, despite the sharp decline. In global crude oil prices, the rate of increase in oil production during the year increased by (3.1%) compared to the year 2013. The reason for the increase in oil production is attributed to the need to fill the deficit in the state's general budget through the financial returns that oil production provides after the increase in oil exports.

Fourth: The volume of oil exports to Iraq.

One of the most important indicators that clarify Iraq's potential and its effective role in the international oil map is the extent of its participation in international oil trade, as the ability to meet and sustain additional demand in the oil market by increasing the contribution of the volume of oil exports will provide Iraq to be an important source in the process of stabilizing oil markets. International.

The volume of oil exports depends directly on production rates, the volume of domestic consumption, levels of global demand for crude oil, oil market conditions, and the policy followed by OPEC+ towards the existing conditions, but there are some local determinants, which are the infrastructure for exporting and transporting crude oil, and one of the most important challenges is The face of the increase in crude oil exports after the expansion of Iraqi oil production within the framework of licensing rounds is the scaling and deterioration that occurred in export outlets, after Iraq had five pipelines, namely (the Iraqi-Turkish line, the Iraqi-Syrian line, the strategic line, the Haifa line, The Iraqi-Saudi line for exporting oil now has one strategic error, which is the Iraqi-Turkish line, in addition to the southern ports. The Iraqi-Turkish line extends from the city of Kirkuk to the Turkish city of Ceyhan, and in turn consists of two lines with a design capacity of about 1,650 million barrels / day**(Abdel Reda,2011:218)** .This shrinkage of export outlets has represented an obstacle to the flexibility and capacity of exporting Iraqi crude oil, as the limited export capacity of pipelines and the high volume of crude oil production led the Ministry of Oil to install nine hundred oil pontoons on the coast of Basra and increase the export capacity of the ports to (4.6). Millions of barrels per day, but weak storage and pumping capacity and weather conditions reduce the actual export capacity, and the export capacity expansion project aims to increase the capacity to (5.4) million barrels per day. The developments taking place in the expansion of Iraq's supplies after 2011 were accompanied by an increase in the volume of exports Oil **(Mills,2018:81)**. Oil exports occupy an important place in the structure of Iraqi exports due to the low degree of diversification in its total exports and the revenues generated from them. They are considered a major source in supplying the gross domestic product and its general budget. When following Table No (4), it is noted that the development of Iraqi oil exports during the years (2003-2018) is observed. In 2003, oil exports suffered a setback due to the war on Iraq and regime change, and oil revenues suffered a setback, as exports decreased to (8627) million dollars, with a contribution rate of (81.2%). After 2003, oil exports began to increase, as did families. generated from it, and during the years (2005-2009) crude oil exports began at a fluctuating rate of increase and decrease until the year 2009 to become (43895) million dollars, with a contribution rate of (45.1%), and Iraqi crude oil exports began to rise and increase significantly and continuously from the year 2011 and reached To record levels that had never been reached in previous years, as it amounted to about (83,768) million dollars, with an annual growth rate of (54.4%) and a contribution rate of (53.2%) as a result of the rise in the gross domestic product at current prices. As for the year 2020, the volume of exports reached about (41,756) million dollars, with a negative annual growth rate of (-46.8%) as a result of the international oil markets being affected by the (Covid-19) pandemic, and a contribution rate of (23.8%), and Iraqi crude oil exports returned to an increase in 2021, which led to the increase reaching Iraq is ranked highly among the countries exporting crude oil. Iraq ranked fourth among the top ten countries exporting crude oil, coming after the Kingdom of Saudi Arabia, the Russian Federation, and Canada.

Table (4) The value of crude oil exports and their percentage contribution to output for the period (2003-2021)

Years	The value of oil exports (Million dollars)	Annual growth rate (%)	gross domestic product (Million dollars)	Contribution of oil exports to GDP (%)
2003	8627	-----	10621	81.2
2004	17751	105.8	24700	71.9
2005	24058	35.5	33327	72.2
2006	32242	34.0	54886	58.7
2007	33712	4.6	72486	46.5
2008	63000	86.9	110423	57.1
2009	43895	-30.3	97302	45.1
2010	54248	23.6	117138	46.3
2011	83768	54.4	157553	53.2
2012	92685	10.6	184192	50.3
2013	90411	-2.5	195382	46.3
2014	81740	-9.6	222042	36.8
2015	49695	-39.2	164506	30.2
2016	58023	16.8	158050	36.7
2017	46513	-19.8	175652	26.5
2018	72924	56.8	211146	34.5
2019	78527	7.7	215268	36.5
2020	41756	-46.8	175134	23.8

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2021	75651	81.2	209924	36.0

Source: Prepared based on: Arab Monetary Fund, Unified Arab Economic Report, various issues.

The second section: The reality and expectations of the transition to alternative energy in Iraq

First: reality

The energy system in Iraq relies heavily on forms of energy based on fossil fuels because it possesses fossil fuel resources. Iraq is currently the third largest oil exporting country in the world, and is likely to remain one of the three largest oil exporting countries in the future, but Iraq is one of the main countries in the Organization of Petroleum Exporting Countries (OPEC) joined in 1961, and which did not ratify the Paris Climate Agreement. However, Iraq has developed its own Nationally Determined Contributions (NDCS) scheme that aims to reduce carbon emissions per capita by (6%) by 2030 compared to the levels of 2010, and since Iraq has realized the potential of renewable energies, it plans to increase its share of renewable energy by (10%) by the year 2030**(Renewable Energy Policy Network,2019)**, However, regulations related to the use of renewable energy are still at a minimum, while priority must be given to reforms in the renewable energy framework and energy efficiency measures. Iraq finds itself forced by the continuous rise in demand for energy, and in the future to work on expanding and developing its local energy infrastructure from in order to meet current and future demand, Iraq faces a changing global energy system that will disrupt the economy based on fossil fuels and change the future path of energy. Therefore, the long-term efforts to decarbonize the international community under the framework of the Paris Climate Agreement may encourage Iraq to implement its plans to develop a system The energy it has, in addition to the fluctuation of global oil prices and the change in energy markets, and as a result, a decrease in state **revenues (International Energy Agency,2019)**.

There is no doubt that most of the policies and procedures in Iraq come from the Ministry of Finance in the first place, and then the development measures carried out by the Central Bank from time to time, as the Ministry of Finance is the one that allocates the amounts at the request of the rest of the ministries concerned with energy projects, and the Central Bank is the one that He is undertaking development initiatives to improve the economic situation of the country, but this is not enough due to the instability that the country is witnessing from time to time. In particular, a number of ministries are primarily concerned with promoting and developing the renewable energy industry in Iraq, namely (the Ministry of Oil and its affiliated departments and institutions, and the Ministry of Electricity and its affiliated institutions, the Ministry of Industry and Minerals, the Ministry of Water Resources, in addition to the Ministry of Transport. These ministries have financial (investment) allocations in the general budget, and these allocations can be used to work projects within the scope of renewable energies in the country, and the process of improving and supporting renewable energies has an impact. The major and important impact on the economic, social, and political reality of the country. These allocations come primarily from the Ministry of Oil, as it is in important contact with renewable energies. We believe that the shift towards renewable energy in Iraq must pass through the Ministry of Oil, by including the addition of items within the licensing rounds for specialized companies. Especially those companies that have great experience in the fields of depleted and renewable energy, and the process of preparing a renewable energy policy carries with it the necessity of paying attention to alternative energy sources, manufacturing and benefiting from them, and emphasizing the specificity of implementing the policy of managing demand for this clean energy, thus shifting from the traditional tasks of companies. The production and industry of renewable energy to energy service companies that require providing consulting services to customers and following up on developments in the technologies used in this field, thus introducing new legislation that makes the renewable energy sector more transparent, as well as guaranteeing the rights of investors in the process of selling renewable energy (electricity) at prices that cover their costs. And achieve normal profits for them**(Central Bank of Iraq).**

Second: Local and international initiatives to support

(1)1 Local initiatives:

A - Environmental initiatives: These initiatives seek to preserve natural resources and optimize their use on a sustainable basis, and work to reduce environmental damage resulting from the activities of institutions, as the following was done**(Central Bank of Iraq,2020):**

- Initiating the production and planting of (200) thousand seedlings throughout Iraq, funded by the Empowerment Fund and in cooperation with the Ministry of Agriculture / Department of Forestry and Combating Desertification.
- Rehabilitation of (10) squares in the city of Baghdad.
- Granting the administration of the tourist city in Habbaniyah an amount of (900) million dinars for its development.
- Supporting the AkfaelNakhla project with an amount of (110) million dinars.
- Rehabilitation and development of July 14 Park in the holy city of Kadhimiya through the Tamkeen initiative.
- Purchasing waste compactors for the governorates of (Basra and Najaf) in the amount of (1,491,750,000) dinars.

B - The Central Bank of Iraq Initiative: In line with international commitments towards reducing heat emissions, the Paris Climate Agreement, and reducing fuel use, the Central Bank of Iraq decided to work towards encouraging the adoption of energy production tools from renewable sources, and to work with the Supreme Lending Committee to ensure that a proportion of the generated electrical energy is processed. One of the sources is renewable energy (solar

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panels) in the residential investment complexes benefiting from the initiative.

In addition to coordinating with the Industrial Bank to finance the purchase of electricity generation systems from the sun for citizens' homes or projects, and in order to provide the electrical energy required by the work of the Central Bank, it decided to acquire electrical energy generation systems and install them on its buildings in Baghdad and its branches. The Central Bank encourages all licensed banks and institutions wishing to equip clean energy systems to interact with this trend and present their offers and expertise to this bank and the rest of the state institutions and the private sector**(Central Bank of Iraq).**

2 - International initiatives:

At the level of cooperation with international institutions, the following was done**(Central Bank of Iraq,2020): -**

A- The Central Bank of Iraq joined the Sustainability Network affiliated with the International Finance Corporation in order to ensure the application of sustainability principles.

B- Establishing a banking relationship with the Reserves Management Advisory Program (RAMP) of the World Bank, which aims to develop asset and reserve management in developing countries and international institutions to enable them to maximize their financial resources.

C- T - Signing a memorandum of understanding with (UnionPay International) to contribute to the development of smart technologies for payments and electronic payment services in Iraq.

D- Beginning the steps to join the Official Forum for Monetary and Financial Institutions, which is an independent global intellectual institution for central banks, pension funds, and financial institutions with investable assets worth $36.2 trillion.

E- Signing memorandums of understanding with a number of international financial institutions (such as the International Bank for Reconstruction and Development and the Arab Monetary Fund).

Among the international initiatives were Iraq and Total Energies.The French oil giant, on Monday, announced a long-postponed agreement worth $27 billion, which aims to increase oil production and enhance the country's ability to produce electricity, through the implementation of 4 oil, gas and renewable energy projects. The agreement was signed in 2021, with initial investments amounting to 10 billion. dollar in southern Iraq for 25 years, but it was postponed due to disagreements between Iraqi politicians regarding its terms. The Chairman and CEO of Total Energies, Patrick Pouyanne, signed the agreement with the current Iraqi Oil Minister (Hayan Abdul Ghani), during a ceremony held in Baghdad, where he praised Bouyan agreed, saying that it was a "historic day," while the Minister of Oil said, in a statement reported by the Iraq News Agency, that "signing these contracts with the French company Total and its partners is important, as these efforts fall within the Integrated South Project, which includes 4 major and large projects for the two sectors." Oil and Gas," pointing out that "the first of these projects is to use seawater for reservoir support purposes, and it is one of the projects with great economic feasibility, and aims to provide seawater to support reservoir pressure in various oil fields" **(https://aawsat.com).**

Third: Renewable energy plans and projects - application possibilities

In the eighties of the last century, Iraq developed an ambitious plan to develop the use of solar energy in generating electricity. The Renewable Energy Law was issued in 1982, and the first solar panels were installed on the roof of the Solar Energy Research Center in Al-Jadriya in Baghdad in 1986. Since 2003, and for a long time, the defect in The Iraqi economic reality and developing plans and strategies for sustainable development in Iraq is necessary and necessary in order to get out of improvisation and confusion in making economic decisions. This matter requires diagnosing the challenges facing the strategy, and the most prominent of these challenges is the dominance of the oil sector (rentierism) as a primary source for financing. Development plans in Iraq, as well as other economic, environmental, social and political challenges that seriously threaten sustainable development projects in Iraq (**http://www.mof.gov.iq /pages/ar/Federal Budgetlaw.aspx).**

The concept of sustainable development appeared on a small scale in Iraq in 2003, and the Iraqi governments and their agencies concerned with the economy, in cooperation with companies and international organizations, issued a large number of general national plans and sectoral strategies that herald sustainable development, including the five-year development plan and the anti-poverty strategy from the Ministry of Agriculture. Planning, the National Energy Strategy from the Ministry of Oil and others. However, these plans and strategies were concerned with aspects of sustainable development and did not encompass the entire concept, and the contents of some of these plans and others of these plans and strategies were not implemented at all, which leads to the perception that the parties that it issued these plans and strategies that did not rise to the level of effective professional economic institutions**(Al-Jawrani,2015:240).**

But the circumstances that Iraq went through, including wars and an economic blockade for three decades, negated the country's renewable energy plans until 2009, when the Ministry of Electricity announced a plan to install six thousand solar-powered lamps to light the streets as part of a larger plan to spend up to $1.6 billion. To add (400) megawatt units of solar and wind energy stations by 2016, but the plan was abandoned after the collapse of global oil prices and the emergence of the ISIS terrorist organization in 2014. Government interest in solar energy returned as one of the solutions to address the lack of production from solar energy. Electrical energy for economic reasons related to reducing dependence on fossil fuels and energy imports, as well as energy security and

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sustainability**(https://spectrum.iee.org/energy/renwables/rooftop-solar-takes-hold-in-iraq-in-the-aftermatoisis)**.

The plans of the National Renewable Energy Strategy include generating (2 gigawatts of renewable energy sources by 2030, including power generation from new hydroelectric stations. After the defeat of (ISIS terrorist gangs), the Iraqi government issued a long list of projects for international investment and reconstruction including This includes generating 410 megawatts of solar energy and establishing a solar energy research and manufacturing center. The plan of the Ministry of Electricity at that time was to install stations operating on solar energy with a capacity of (2.7) gigawatts between the years (2017-2020), with the exception of the Kurdistan region and (the provinces). The projects were awarded to some regional companies to generate 465 megawatts in five different sites for the Sama Baghdad Company, as well as 230 megawatts in four other sites for the Kuwait-based Dana International Company, but in the absence of a plan and priorities. These plans did not go ahead with a clear and defined investment **model(Mills and Salman,2020:23).**

In addition to the above, Iraq, like the oil-producing countries, has been involved in many development projects, programs and plans, and a lot of resources and capabilities have been allocated to them. However, the return of these programs was not in line with the resources and capabilities spent, in addition to the presence of multiple problems in these programs and plans, the most prominent of which are: Poor selection and numbers, delay in implementation, high costs, and poor implementation. The reasons behind the deficiencies can also be multiple, the most prominent of which is weak administrative capabilities in studying alternatives and making the right decision, and the information available to them is minimal (**Rahman,1982:76)**. The failures in sustainable development policies are closely related to the presence of several conditions, some of which are objective and subjective. The objective conditions mean the necessity and the utmost need for sustainable development in Iraq, and this need has existed for decades. As for the subjective conditions, they represent the absence of awareness, intercultural culture, and political administration. And competent professionalism, and these conditions are still not met**(http://iraqreconomists.net).**

The Iraqi government is interested in appropriate studies for the development of alternative energy to crude oil, as solar energy (yellow energy) is considered the most appropriate and appropriate alternative to the nature of Iraq's climate because it is located within the high solar belt, and requires benefiting from solar energy as it is characterized by a high number of hours of sunshine, and the ease of installing its systems on roofs. Houses, buildings, or any investment location in the country. Desert and remote areas are a strategic place for installing and producing yellow electricity that is not connected to distribution networks, which will end about (90%) of the electricity crisis in Iraq, as the cost of investing in solar energy is estimated at about (7500) dollars per year. One kilowatt, and the operating cost is estimated at about $100 per kilowatt. According to studies, Anbar Governorate or the banks of the Tigris and Euphrates rivers or the Samawah Desert are the best geographical locations suitable for building integrated solar energy plants. The cost of construction and engineering procurement for one station ranges about (4 -5) million dollars**(Daadoush2021:268)**and there are small and large renewable energy projects within the plans prepared by the Iraqi government in this field, including: -

1- Solar energy projects: Al-Zawraa General Company, affiliated with the Ministry of Industry and Minerals, announced in 2016 the manufacture of an electrical system based on solar cells, which is the first of its kind in the country, in agreement with the Ministry of Electricity, where the system's capacity was estimated at about (15) kilowatts, which It is installed in state departments and is gradually connected simultaneously with the national grid to form a source of support for national electricity in the country**(Al-Khatib2023:106).**

The Ministry of Electricity Law No. 53 of 2017 stipulates that it aims to support and encourage the use of renewable energies in various fields and localize their industries. This law is still in draft form, but the Ministry of Electricity, which is both the regulating body and the executive authority, decided to achieve a goal of generating (1000) Megawatts of solar energy, and a pilot project will be started to generate (8) megawatts through solar energy projects on the roofs of government buildings (**Al-Maliki, 2020).** In 2019, the Ministry of Electricity embarked on a future plan to establish and build a number of solar energy stations with a total of (755) megawatts, and Table (5) shows this: -

Table (5): Solar power plants planned in Iraq

Project Name	Location (governorate)	Design power (MW)
Sawa1	Al-Muthanna	30 MW
Sawa2	Al-Muthanna	50 MW
Alkther	Al-Muthanna	50 MW
Alexandria	Babylon	225 MW
Jasan	Wasit	50 MW
Karbala	Karbala	300 MW
Diwaniyah	Diwaniyah	50 MW
Total		**755 MW**

Source: From the researcher's work based on the Ministry of Electricity, Informatics Center, Statistics Department, Annual Statistical Report, Iraq, 2019.

The low cost of renewable energy technology encouraged private companies to invest in Iraq, and although the initial investment cost in Iraq is about 5 to 7 times higher than in

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other countries, ACWA Power(*) expressed its interest in establishing a huge photovoltaic energy station. In southern Iraq near the Saudi border, Siemens also signed a contract to implement projects according to a road map worth (14) billion US dollars, which includes developing a wind atlas in Iraq. In addition, plans are underway to install flat solar collectors for water heating made by foreign companies. While some smaller companies have recently begun manufacturing solar cells, solar photovoltaic energy is also used to light many city streets, but despite the challenges facing the Iraqi energy sector, no plans have been put forward to promote the establishment of small projects such as photovoltaic energy systems on rooftops **(Ersoy and others,2021:54).** Since the beginning of 2019, the federal government, through the Ministry of Electricity, the Ministry of Finance, and the Energy Council, has built the technical and financial mechanism to enable citizens to obtain small loans to purchase and install solar energy units on rooftops. In addition, technical surveys were conducted for a number of government buildings to assess the extent of Suitability for generating solar energy. The Ministry of Finance and the Central Bank of Iraq have concluded a mechanism for soft loans at a maximum interest rate of (4%) through public and private banks to finance capital investment and installation costs for families who have solar units on the roofs of homes whose capacity ranges between (3 and 5). and 10 kilowatts) from manufacturers and suppliers approved by the Ministry of Electricity, and the Ministry will provide smart metering solutions for consumers to become net producers of energy from this initiative(**Al-Khatib,2023:106).**

However, the huge budget deficit that the Iraqi economy fell into due to (Covid-19) has somewhat discouraged renewable energy from gaining momentum, with the significant decline that occurred in global oil prices narrowing the opportunity for the Iraqi government to advance the process of transition to renewable energy supplies, but This matter depends greatly on political will, and introducing renewable resources into the market constitutes an important step to reach the stage of (releasing renewable energy) in Iraq.

2 - Hydroelectric energy: Hydroelectric energy projects in the Ministry of Electricity are focused on specific stations, which have been in existence since the nineties of the last century, and the authorities concerned with investing or developing these stations have not expanded except with slight increases in production rates, noting that most of the production of these stations supplies electricity to the Kurdistan Region of Iraq, as two stations (Dokan and Darbandikhan), which contribute 69% of the total hydroelectric energy produced in Iraq, and in September 2020, strategic cooperation took place between the Iraqi Engineers Association, the General Company for Iraqi Exhibitions and Commercial Services, and the Baghdad Center for Energy and Sustainability to develop renewable energy in Iraq, but the Corona pandemic hindered This cooperation.

In this field, the Ministry of Electricity prepared a national road map for renewable energy projects, with the idea of involving many major energy companies in projects to rehabilitate the energy sector in Iraq, including Siemens and General Electric. In May 2019, Siemens signed an agreement. To implement a number of projects worth $14 billion, as Siemens has solid experience in creating a wind atlas for Iraq, as well as implementing a wind farm with a capacity of 400 megawatts, and the proposal is still under discussion by Iraq.

Since the beginning of 2019, the federal government, through the Ministries of Electricity and Finance and the Energy Council, has built the technical and financial mechanism to enable citizens to obtain small loans to purchase and install solar energy units on rooftops. In addition, technical surveys have been conducted for several government departments and buildings to assess their suitability for generating electricity. Solar energy. The Ministry of Finance and the Central Bank of Iraq have developed a mechanism for soft loans at a maximum interest rate of (4%) through public and private banks to finance capital investment and installation costs for families who have solar units on rooftops with a capacity of (3-10) kilowatts, from companies. Manufacturers and suppliers approved by the Ministry of Electricity. The Ministry will provide smart metering solutions to consumers to become net producers of energy from this initiative **(Al-Khalidi,2019).**

As for major utility projects (above 10 kilowatts), Iraq has abandoned imposing renewable fees amounting to (3.5) US cents per kilowatt hour as a precondition for building solar power plants. These fees are considered illogical and unattractive to investors, and with the new licensing rounds (starting with a round The first licenses), Iraq began to take a free market approach by allowing investors to submit different price offers, with projects awarded to investors who offer the lowest prices for build, own and operate (B00) projects (*), and independent power production (IPP) projects, and the winning companies will be dealt with Under the Federal Investment Law of 2006 and the approved revisions, renewable energy developers will therefore be able to use government-owned land for free as investors, benefit from reduced customs duties, and the ability to obtain profits without paying taxes. Permits have been granted that are valid for (20-50) years depending on the type. Investment projects **(Al-Zalzali,2018)**, and Table No (6) shows the possibility of establishing hydropower stations after building dams through Iraq's future plans.

*)*ACWA Power is a companyconcernedwithdeveloping, investing and operating a group of power generation plants, renewableenergy plants and water desalination plants in the Kingdom of SaudiArabia.*

)It is a contractthroughwhich the projectcompany holding the concession supervises the operationwithouttransferringownership of the projectat the end of the contract. Rather, the concession isrenewed for anotherperiod of time duringwhich the state receives a share of the revenues generated by the project in exchange for granting the concession.

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Table (6): Future plans and design capacity for establishing hydroelectric power stations in Iraq

Dam	Design power/MW
Bakhma Dam	1500
Tick-tack dam	300
Khazar - Kummel Dam	24
Badush Dam	171
Al-Baghdadi Dam	300
Mandawa Dam	620
Adhaim Dam	27

Source: Abdul Latif Jamal Rasheed, Energy and Energy Sources, Technical and EconomicDevelopments: Arab and InternationalOn the website: www.hamoudi.org/dialogue-of-intellenct/15/04.htm.

Conclusions

1. Iraq is still and will remain an important energy center in the world due to its large production capacity and huge reserves, but at the same time it suffers from a shortage of some other types of fuel, such as gas. This has prompted the adoption of new strategies that work to fill that shortage, ensuring diversification. Fossil energy sources.
2. The Iraqi economy is characterized by its rentier character as a result of its almost complete dependence on the oil sector, which contributes approximately 95% of public revenues, which reflects negatively on all economic sectors.
3. The Iraqi GDP fluctuated throughout the study period due to fluctuations in crude oil prices in the international market, or due to the political and security events that Iraq went through, including the wars and the change in its political system in 2003 and the political and security vacuum it created, all of which led to a reduction in production and exports. Iraqi oil has a negative impact on the gross domestic product and its average per capita share due to its excessive dependence on this resource, which was and still occupies the largest percentage of its composition.
4. Iraq has potential for renewable energy, for which the Iraqi government has developed small projects, including large ones, distributed between solar and hydroelectric projects.
5. The Iraqi government sought to conclude agreements with international companies that have expertise and interest in renewable energy projects, such as Siemens and General Electric. This confirms the approach that the government seeks towards diversifying energy sources and gradually shifting towards clean energy.

Recommendations

1. Alleviating the impact of the rentier economy in Iraq, which relies heavily on fossil energy sources (oil and gas), which is the main obstacle to achieving sustainable development. This is done by working to encourage other sectors, which can achieve real growth and contribute to achieving development. Sustainable. At the forefront of these sectors is the renewable energy sector, as well as other sectors such as the agricultural and industrial sectors, transportation and tourism.
2. Moving towards renewable energy to provide electrical energy, especially solar energy, which has a great comparative advantage, and moving away from building electrical stations that use dry gas as fuel.
3. Reforming and modernizing the electricity sector, rationalizing the use of electrical energy, organizing collections, and expanding its coverage.
4. Imposing high customs duties on the import of electrical appliances that consume large amounts of electrical energy, which are carried out by the private sector.

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