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# IRAQI ECONOMY AND RENEWABLE ENERGY PROJECTS BETWEEN ECONOMIC NECESSITY AND INVESTMENT CHALLENGES

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**ABSTRACT**

**Purpose**: Given Iraq's current excessive fossil fuel output, this article seeks to investigate the country's potential for future renewable energy sources. The report also endeavors to foresee Iraq's future position in clean energy production in Iraq and throughout the globe and the rate at which the global energy market will shift towards renewable energy sources.

**Theoretical framework:** Iraq's reliance on oil earnings and the country's overburdened public sector poses serious economic issues. There is a domination of state-owned firms, stringent laws, a need for more access to finance, a shortage of competent labor, and poor infrastructure that limits the expansion of numerous industries. Growth in recent years has not led to decreased poverty since the economy has changed greatly since 2014.

**Design/Methodology/Approach:** The study included both retrospective and prospective approaches. The most pressing problems in implementing and making use of renewable energy sources were described and analyzed descriptively. Future outcomes for the Iraqi economy were envisioned using a prospective approach in the form of development scenarios.

**Findings:** A significant source of international capital flows and a key source of funding for economic growth, foreign direct investment (FDI) has mostly focused on the oil industry and certain tourism projects. As a result of the country's outdated energy grid, investors are interested in something other than investing in Iraq's electrical industry.

**Research, practical & social implications:** We describe the current issues confronting Iraqi economic development, including the need for more diversity in the economy, structural imbalances between the main sectors, and the near-total dependence on crude oil export revenues, resulting in a decline in industrial production.

**Originality/Value:** We describe the reality of the Iraqi economy, analyze the structure of Iraq's energy sector based on conventional energy, and then find out about the progress made in renewable energy and existing and future projects under fossil fuels.

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## ECONOMIA IRAQUIANA E PROJETOS DE ENERGIA RENOVÁVEL ENTRE NECESSIDADE ECONÔMICA E DESAFIOS DE INVESTIMENTO

**RESUMO**

**Propósito:** Dado o excesso atual de produção de combustíveis fósseis no Iraque, este artigo busca investigar o potencial do país para futuras fontes de energia renovável. O relatório também se esforça por prever a posição futura do Iraque na produção de energia limpa no Iraque e em todo o mundo, bem como o ritmo a que o mercado global de energia irá mudar para fontes de energia renováveis.

**Quadro teórico:** A dependência do Iraque dos rendimentos do petróleo e do setor público sobrecarregado do país coloca sérias questões econômicas. Há um domínio das empresas estatais, leis rigorosas, a necessidade de mais acesso ao financiamento, a falta de mão de obra competente e infraestruturas pobres que limitam a expansão de numerosas indústrias. O crescimento nos últimos anos não levou à diminuição da pobreza, uma vez que a economia mudou muito desde 2014.

**Projeto/Metodologia/Abordagem:** O estudo incluiu abordagens retrospectivas e prospetivas. Os problemas mais prementes na implementação e utilização de fontes de energia renováveis foram descritos e analisados de forma descritiva. Os resultados futuros para a economia iraquiana foram previstos usando uma abordagem prospetiva na forma de cenários de desenvolvimento.

**Conclusões:** Uma fonte significativa de fluxos de capital internacionais e uma fonte fundamental de financiamento para o crescimento econômico, o investimento direto estrangeiro (IDE) tem-se concentrado principalmente na indústria petrolífera e em certos projetos turísticos. Como resultado da ultrapassada rede de energia do país, os investidores estão interessados em algo além de investir na indústria elétrica do Iraque.

**Investigação, implicações práticas e sociais:** Descrevemos as questões atuais que confrontam o desenvolvimento econômico iraquiano, incluindo a necessidade de maior diversidade na economia, os desequilíbrios estruturais entre os principais setores e a dependência quase total das receitas das exportações de petróleo bruto, resultando num declínio na produção industrial.

**Originalidade/Valor:** Descrevemos a realidade da economia iraquiana, analisamos a estrutura do setor de energia do Iraque com base em energia convencional e, em seguida, descobrimos os progressos feitos em energia renovável e projetos existentes e futuros no âmbito de combustíveis fósseis.

**Palavras-chave:** Energias Renováveis, Economia Iraquiana, Energia Fóssil, Mercado da Energia, Preço do Petróleo.

## LA ECONOMÍA IRAQUÍ Y LOS PROYECTOS DE ENERGÍA RENOVABLE ENTRE LA NECESIDAD ECONÓMICA Y LOS DESAFÍOS DE INVERSIÓN

**RESUMEN**

**Propósito:** Dada la actual producción excesiva de combustibles fósiles de Iraq, este artículo busca investigar el potencial del país para futuras fuentes de energía renovables. En el informe también se trata de prever la posición futura del Iraq en la producción de energía limpia en el Iraq y en todo el mundo y el ritmo al que el mercado mundial de la energía se orientará hacia las fuentes de energía renovables.

**Marco teórico:** la dependencia del Iraq de los ingresos procedentes del petróleo y la sobrecarga del sector público del país plantean graves problemas económicos. Hay una dominación de las empresas estatales, leyes estrictas, una necesidad de más acceso a la financiación, una escasez de mano de obra competente y una infraestructura deficiente que limita la expansión de numerosas industrias. El crecimiento de los últimos años no ha llevado a una disminución de la pobreza, ya que la economía ha cambiado mucho desde 2014.

**Diseño/Metodología/Enfoque:** El estudio incluyó enfoques tanto retrospectivos como prospectivos. Se describieron y analizaron descriptivamente los problemas más acuciantes en la implementación y utilización de fuentes de energía renovables. Los resultados futuros para la economía iraquí se previeron utilizando un enfoque prospectivo en forma de hipótesis de desarrollo.

**Hallazgos:** La inversión extranjera directa (IED), una fuente importante de flujos internacionales de capital y una fuente clave de financiación para el crecimiento económico, se ha centrado principalmente en la industria petrolera y ciertos proyectos turísticos. Como resultado de la obsoleta red energética del país, los inversionistas están interesados en algo más que invertir en la industria eléctrica de Irak.

**Investigación, implicaciones prácticas y sociales:** Describimos los problemas actuales que enfrenta el desarrollo económico iraquí, incluyendo la necesidad de una mayor diversidad en la economía, desequilibrios estructurales entre los principales sectores y la dependencia casi total de los ingresos de exportación de petróleo crudo, lo que resulta en una disminución de la producción industrial.

**Originalidad/Valor:** Describimos la realidad de la economía iraquí, analizamos la estructura del sector energético iraquí basado en la energía convencional, y luego nos enteramos de los avances realizados en energía renovable y proyectos existentes y futuros bajo combustibles fósiles.

**Palabras clave:** Energía Renovable, Economía Iraquí, Energía Fósil, Mercado de la Energía, Precio del Petróleo.

## INTRODUCTION

Many issues confront Iraqi economic development, including the need for more diversity in the economy, structural imbalances between the main sectors, and the near-total dependence on crude oil export revenues, resulting in a decline in industrial production. There needs to be more earnings and wealth among the people. As a result, attracting foreign investment necessitates creating a favorable investment climate and encouraging investment across the board. A clear picture of the reality of the Iraqi economy has been provided by the research, which indicates the most important investment challenges facing the deployment and use of renewable energy and its most important sources suitable for Iraq, as well as demonstrating the most important economic benefits of its use and its expected role in resolving the energy crisis. As a result of this research, we may learn more about diversifying our energy sources and reducing our reliance on fossil fuels, which damage our natural resources and threaten the rights of future generations. Because Iraq's government is heavily dependent on oil and fossil fuel earnings, it is unable to solve the problem of electricity shortages, which is compounded by the difficulties faced by investment in renewable energy sources. The study's goal is to examine Iraq's current energy situation in light of a variety of global factors, including a shift toward renewable and alternative energy sources and efforts to reduce pollution. It also aims to identify Iraq's most pressing needs for energy diversification and decreased reliance on fossil fuels. Because of this, the government aims to invest and utilize its resources in accordance with the present variables that are affecting the country at large. According to this report, Iraq will continue to rely on depleting energy, notably gas, for the foreseeable future, and renewable energy will play a complementary role for the time being and in the future. Descriptive techniques were used to analyze the most critical problems facing investment in renewable energy projects, while the second was used to characterize the realities of Iraq's economy, the traditional and fossil energy structure, and their economic contributions.

## THE REALITY OF THE IRAQI ECONOMY

Iraq's reliance on oil earnings and the country's overburdened public sector pose serious economic issues. There is a domination of state-owned firms, stringent laws, a need for more

access to finance, a shortage of competent labor, and poor infrastructure that limits the expansion of numerous industries. Growth in recent years has not led to a decrease in poverty since the economy has changed greatly since 2014. Macroeconomic prospects improved when ISIS was defeated and oil prices rose; nevertheless, this did not translate into broad growth; poverty and inequality remain high in Iraq. Displaced people, young people, and women are the hardest affected by the differences in growth and development (poverty is higher in the southern regions). An unstable and violent past has hampered economic progress in Iraq. In particular, the 1991 Gulf War and the severe sanctions placed on Iraq until 2003 saw stagnated oil earnings, dropping non-oil sectors, including agriculture, and reduced investment in services, contributing to worsening development results. Conflicts with ISIS, which began in 2014, have made it impossible for Iraq's government to focus on rehabilitation and dissuade investment in the country, which has destroyed infrastructure. In 2015, oil accounted for 58% of Iraq's gross domestic product (GDP) [(1).] However, this does not provide the basis for large-scale economic growth for the following reasons. First, it generates only 1% of total employment and cannot meet the needs of the country's population growth, and secondly, oil wealth is not invested effectively (but it is used to expand an already bloated and inefficient public sector). Diversification and growth in the private sector are threatened when the government is so reliant on a single resource (oil). Weak government and widespread corruption are hallmarks of Iraqi society. Oil riches, demographic and geographic variety, and persistent corruption, viewed in surveys as the country's most pressing problem, are all issues that need to be addressed. Human capacity issues, such as the long-term brain drain from the country and security concerns, and political rivalry, contribute to the country's poor governance. Nearly half of all jobs are employed by the public sector, which consumes 61.1% of GDP and is wasteful. After 2003, the government viewed public sector employment as one of the few perks it could provide its citizens. Access to and the quality of fundamental services, which are often perceived as severely lacking, are not directly proportional to the size or quality of the public sector [(2).]

[(2)] Krishnan , N., Olivieri, S., & Lima, L. (2014). IRAQ: The Unfulfilled Promise of Oil and Growth - Poverty, Inclusion and Welfare in Iraq , 2007-2012. The World Bank . http://wwwwds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2015/02/12/000477144_20150212104819/Rendered/PDF/926810v10ESW0P0C0disclosed020110150.pdf.

**Iraqi Economy Challenges and Opportunities**

Dependence on oil, ethnic and sectarian fragmentation, weak governance, and insecurity have left their mark on all aspects of Iraqi society and economy. This section focuses on key challenges, as well as some opportunities, that must be taken into account if sustainable and inclusive growth and poverty reduction are possible:

A- Focusing economic management on long-term objectives to ensure the sustainability of the benefits of Iraq's oil wealth.

Strengthening the country's weak institutions to increase their legitimacy, transparency, and accountability.

B- Revitalizing the private sector to enable it to play a greater role in job creation and diversification.

Protecting and upgrading human capital, which has deteriorated dramatically during decades of conflict.

C- Rebuilding the infrastructure to support the economy and reduce poverty and decisively.

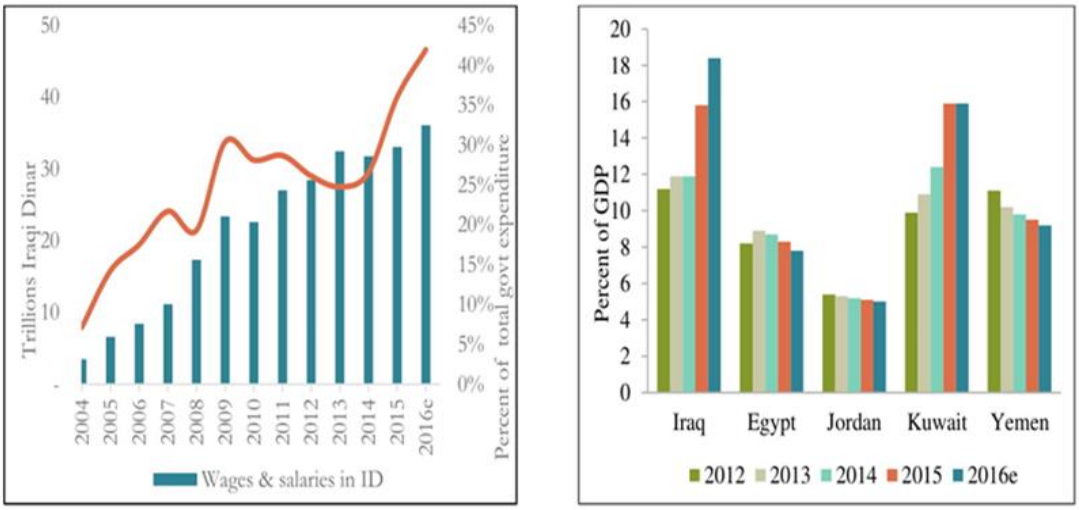
Protecting and ensuring the sustainability of natural resources to ensure the livelihoods and well-being of the population in the coming years.

Progress in any of these areas, however, would necessitate enhancing security circumstances and building institutions in order to properly offer essential basic services. Rebuilding trust in institutions and resolving the failures of governance that have led to a state where ethnic and sectarian disintegration impedes any efforts to produce any meaningful long-term results for Iraq is essential. All of Iraq's economic decisions are based on the short-term demands of a continuing spending program that has little to do with long-term diversification. As a result, the company has been unable to diversify its investments and has had to cut back on current expenses. Aside from the present severe economic conditions arising from the dramatic decrease in oil prices and increasing spending on security, this defined the Iraqi economy even during the boom years leading up to the global financial crisis. It is the result of weak state institutions and a policy-making methodology that sees oil money and the public sector as a reward for power.

A significant public sector has had a direct and indirect impact on the economy due to the utilization of oil earnings. As a result of the generous public sector wage measure, huge salary increases, and an expansion in staff, wages and compensation now account for almost 40% of total spending. Iraq's public sector payroll bill is one of the largest in the Middle East

and North Africa area as a percentage of GDP, as seen in figure 1. Adding to the problem, there is a serious shortcoming in the administration of salaries, which is exacerbated by the shortcomings of HR information systems. The heavy commodities industry has been paralyzed by the ubiquity of this sort of spending [(1).]

Figure 1 Growth of public sector wages and comparison of public sector wages in the Middle East and North Africa




*Sources*: Ministry of Finance, Iraq, and IMF staff estimates and projections.

*Sources:* Iraqi authorities and IMF staff estimates

Source: World Bank Group, IRAQ SYSTEMATIC COUNTRY DIAGNOSTIC. Report No. 112333-IQ, February 3, 2017, p52.

Imports provide the majority of the population's requirements. Hence government expenditure on the provision of products and services has little effect on the actual economy. In addition to wages, public spending includes a number of other important components. In addition to the PDS, pensions, and fuel subsidies, remittances and subsidies account for an extra five per year of total consumption. As labor and security costs have risen, public investment has decreased and has taken the burden of lower oil prices. As a result, public investment has been severely limited in its ability to have an influence on the economy because of poor project selection, execution, and administration. However, a less well-known component in the budget, which has stifled private sector growth, is the funding of state-owned firms [(1).]

[(1)] World Bank (IMF) . Oil Revenue Management for Economic Diversification. Report No. 69852-IQ.2012 .

## MISMANAGEMENT OF OIL REVENUES AND EXPENDITURES

It is impossible to shield Iraq's economy from oil price volatility because Iraq's financial institutions lack the capacity to handle the intricacies of its oil-dominated budget. Diversification is hindered by the lack of consistent revenue management rules, which further mimics the volatility of government expenditure. Since there are no bumpers or financial mechanisms to promote expenditure, since Iraq has no capital market access, revenue fluctuation translates into spending variability.." For the non-oil industry, a lack of funding means that capital expenditures are often underfunded, leading to an unsustainable cycle of stoppage and start-up activity that is detrimental to the country's long-term economic growth and diversification prospects. We may expect the non-oil industry to become a part of the oil sector. As a result of these trends, Non-oil sector growth is more erratic and starts from a lesser base than oil sector growth. Smaller and less established than oil, it is unable to match the incentives and capabilities that draw resources away from oil's supply chain [(1).] Because Iraq's official economy is heavily reliant on oil and the government sector, all other activities are driven into the informal sector. The dominance of the state sector over formal employment, the low quality of private-sector jobs, the low growth in the non-oil sector, and Iraq's non-integration into the global economy are all examples. Due to a heavy reliance on imports, Iraq now spends the majority of its income on public sector jobs and pay as well as remittances. This has helped the country's short-term consumption but has also distorted the labor market and paralyzed the private sector. Public sector wages and remittances serve as an essential safety net for many Iraqi families, but it is also important to guarantee that the country's expenditure demands can be met in the long term. For example, World Bank research found that future usage decisions will have a major influence on economic development. Iraq's oil income might be put to four different uses in the future, according to the research: public sector wages and payments, public capital, transfers, and foreign savings. Tradeoffs between consumption and investment were a central feature of the model, and the results of this bartering on many economic sectors were examined in depth. According to the study's findings, the domestic investment will continue to be predominantly sponsored by the government in the foreseeable future. To reap the most benefits of diversification in terms of jobs and money, oil earnings should be invested in public infrastructure. Due to Iraq's public investment management system flaws or adjustment costs, the short-term beneficial impact of this alternative is likely to be diluted. As a result of the absence of capital accumulation in the economy, allocating oil income for remittances or overseas savings would raise consumption,

but it will not improve the economy. Investing in public capital will enhance labor productivity, raise wages, and boost output and consumption over the long term. Transitional savings funds or parking funds can be set up to save money in the short term by retaining a portion of revenue during the increase in public capital. This fund will save taxpayers from having to spend more than half of every dinar they spend on public investment in the most difficult phase of adjustment. Assumption: Improvements in both public investment and spending management are expected to occur simultaneously. Because of the challenges inherent in reacting to a quickly changing structural environment, the financial foundation has been restricted in resource-exporting nations with stronger institutions than Iraq. In the light of Iraq's considerable structural changes and fluctuating oil prices, the introduction of a binding yearly financial base targeting deficits or debt connected with medium-term income predictions looks impossible. Some argue that a long-term functioning fiscal plan with debt management strategies and a robust public financial system may be more beneficial. Characterized by major structural changes and erratic oil prices A medium-term functional financial framework, a debt management plan, and a solid public financial management system may be preferable options. Structural changes and variable oil prices define this period. Developing a medium-term functional financial framework, a debt management plan, and a solid public financial management system may be preferable options [(1).]

Expectations were not met because of the fragmented policies and short-term achievements in Iraq's governance structure during the early and mid-2000s oil boom. The Iraqi state's role is mostly economic in this circumstance. Security, water, and power are just some of the fundamental services the government is battling to deliver while simultaneously developing and maintaining a strong private sector. Private sector participation in Iraq's economy and growth must be encouraged. Only a flexible and non-oil economy can meet the task of encouraging expenditure, productive investment, and diversification in fiscal policy and public investment. Financial sector that can diversify investment finance and function as a shock absorber, (ii) labor market and a private sector capable of providing adequate numbers of high-quality employment, and (iii) an investment climate that fosters private-sector activity are all necessary components. The state sector, which is massive, the bad business climate, and the financial sector are all crowding out the private sector, which has no bearing on economic growth.

**Second: The Reality of Energy in the Iraqi Economy**

Iraq's non-oil infrastructure has been neglected by the country's government. As a result of bad public investment management, public investment has fallen substantially in recent years. With the exception of a few notable outliers, the private sector has little effect on the economy. Many of Iraq's economic constraints may be alleviated by improving infrastructure, which includes everything from schools and hospitals to water supply, irrigation, and electricity generation and delivery. National wealth is frequently assessed in terms of three components: human resources and investments in them; fixed social capital (road networks and utilities; health care and legal systems; education and banking systems); and finally, natural resources and stockpiles. Repairing infrastructure and addressing a $250 billion budget deficit [(1).]

As a result, 18.79 percent of Iraq's population was living below the poverty line in 2012, with a 31.9 percent rise in their inclination to spend on family food [(2).]

There has been a rise in citizen dissatisfaction with the government's failure to deliver fundamental services, such as electricity and water, that are required not just by the public but also by the private sector in order to spur growth and diversification. After 30 years of international sanctions and warfare, Iraq's economy and energy sector have suffered from underinvestment and chronic infrastructure degradation in particular. With just 7.6 hours of electricity per day provided by the grid, Iraqis are compelled to utilize polluting diesel generators. This is a major source of concern for the government, businesses, and individuals alike. When asked in the 2011 Enterprise Survey about their top challenges to conducting business, most businesses said access to energy and dependability, rather than informality or political instability, had improved in recent years. Fifty-four percent of electricity providers cited it as a major limitation, which is understandable considering the frequency of power outages that take place on a monthly basis. Iraq's integrated national energy plan (Boozand Co, 2013) projected the annual cost of power outages at roughly US$40 billion, with summer demand typically exceeding it by nearly 50%. As a result of the frequent outages, the general public is becoming frustrated, and businesses are suffering as a result [(1).]

Iraq's budget is burdened by the country's energy industry. Public expenditure review estimates that explicit assistance for energy usage accounted for 66% of all budget subsidies in Iraq in 2010 and 3% of overall budget spending. But the true cost of energy assistance is far more expensive than that. End-user prices in the U.S. are significantly cheaper than those in other nations, as well as lower than the supply's potential cost. Including oil, natural gas, and electricity, pre-tax energy subsidies totaled 11% of GDP in 2011 [(2).]

Iraq's power industry is dealing with a variety of issues at once. All steps of the supply chain are affected, from obstetrics through distribution. Total technical and commercial losses amounted to nearly 40% of the total power generated due to low operational efficiency, large electrical losses, and outdated grid equipment. This means that roughly half of the energy that is delivered to the distribution network after generation is wasted before any income can be collected. As a result, the Ministry of Electricity estimates that total revenue covers just roughly 10% of operational expenditures. Iraq has a severe financial and economic burden as a result of its energy sector's deficiencies. Due to a lack of natural gas, Iraq is the fourth-largest gas-consuming country in the world, which has substantial financial and balance-of-payments consequences. About 60% of the country's gas production is used in the fields. As a result, more than half of the fuel used to run gas turbines consists of gas oil, crude oil, and heavy fuel oil, all of which are more expensive than natural gas and have a negative impact on the equipment's performance and product life. An energy-rich country is forced to acquire expensive and imported fuels to generate power at the cost of up to US$ 8 billion per year as a result of this policy. The use of alternative fuels (primarily diesel and heavy fuel oil) creates domestic pollution and greenhouse gas emissions than gas, which is expensive and wasteful. With Iraq's excellent solar density and wind potential, there is a huge chance to diversify the energy mix, especially by expanding the focus on renewable energy sources. With an eye on 2020, the administration hopes to generate 10% of the country's total energy needs from renewable sources, including solar and wind power.

**Third: The reality of Traditional Energy in the Iraqi Economy**

In Iraq, the term "traditional energy" refers to the country's reliance on fossil fuels, which are the primary exporters of oil and natural gas and hence the primary sources of conventional energy. While Iraq's economy relies heavily on oil earnings, the country possesses a vast oil and natural gas reserve that may be used to offer a high standard of living for its people if properly managed. Despite the fact that oil was found and mined at the beginning of the twentieth century for a variety of reasons, the worldwide oil cartel held sway over these riches until the 1970s, and devastating conflicts followed the state's takeover, the resources of this wealth were depleted. It will deal with the realities of Iraq's two main economic sectors.:

The economic reality of the oil sector in Iraq

**A. Reserves and the contribution of the oil sector to GDP:**

It is the third-largest internationally [(1),] while specialists are guessing that there are potential reserves ranging from (45-100) billion barrels, which may raise the ceiling of those reserves to what Iraq may lead the oil countries [(2).] This large reserve is characterized by a low cost of production. It is very natural that the oil sector ranks first with its contribution to GDP and contributes more than two-thirds of GDP, or about 76% of the economic sectors, which is much larger than Kuwait, its oil-dependent neighbor, where oil accounts for less than 40% of GDP, and less than 45% in Saudi Arabia [(1)]. The oil sector is also the main source of public revenues in the Iraqi economy, accounting for almost all of its revenues, accounting for more than 90% of the central government's revenues and 98% of exports, in addition to the fact that this sector is the main factor in stimulating the economy, financing government activity and the state budget, which is the main tool in that financing to the extent that the movement of economic development is dependent on the movement of oil revenues, yet the oil sector has continued to be separate from the sectors of that financing. The national economy, where its industries were growing in a modern economy in terms of advanced technology as opposed to sectors suffering from underproduction, especially the agriculture and industry sectors, which represented a low share of GDP and therefore changes in the oil sector, particularly in the quantities of oil production and prices, will have an impact on GDP [(2).] In other words, Iraq is the country most affected in the region by any changes in the price of oil.

Iraq's non-industrial economy has become heavily dependent on imports as a result of the impact that oil revenue control has had on national revenues and their formation as the largest and first undisputed part, leading to an increase in the purchasing power of the Iraqi dinar, resulting in the economy of the so-called "Dutch disease," where oil sector contributions increase in exchange for low contributions. An imbalance in the Iraqi economic structure indicates that the consumer rent economy, despite all reforms that have been implemented, has strengthened its position and contributed significantly to the expulsion of many emerging industries and the transformation of their workers into unemployed workers [(3).]

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[(1)] (BP) , Statistical Review of World Energy, June 2009, P6 .
http://www.nubukeinvestments.com/downloads .
[(2)] Abdul Sattar Abdul Jabbar Musa, An Analytical Study of the Reality of the Oil Sector in Iraq and Its Future Prospects, Journal of Management and Economics, Issue 85 , 2010 AM301 .
[(1)] Ibrahim Jabbar Jassim al- Yasiri, sources of internal and foreign funding and their impact on the Iraqi economy, doctoral thesis, Kufa University, 2017 AM 100 .
[(2)] Frank Canter, Iraq's political economy ، Post-conflict rebalancing, translated by Muhannad Taleb al-Hamdi, Banks Publications, Beirut, 2015 , AM167 .

### B. Oil revenues and their contribution to the general budget:

The percentage of oil revenues contributing from public revenues in Iraq is very high, ranging from oil revenues to total revenues on average 90%for the period(2009-2013).

Table 1. The ratio of oil revenues to the total for the period 2009-2013 ($1 billion)

| Structure of public revenue | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|
| Total revenue | 40.404 | 50.946 | 93.317 | 102.487 | 96.972 |
| Oil revenues | 37.143 | 48.992 | 75.143 | 94.103 | 89.765 |
| Total oil revenue ratio | 91 % | 96 % | 80 % | 91 % | 92 % |

Source: Ministry of Planning, Central Bureau of Statistics, Indicators of The Economic Situation of Iraq(2009-2013).

During this time, Iraq's economy was nearly entirely dependent on oil imports, which has maintained in its current proportions due to a lack of economic strategies to broaden the country's import base. As a result of the fall in oil prices and subsequent loss in oil earnings on the general government's budget, which is closely tied to world oil prices, in 2015, the expected budget revenues reduced from (119.5 trillion dinars) to (94.048 trillion dinars), a 26% decrease. There was a deficit of 25,401 trillion dinars when oil prices plummeted from 96 dollars in 2014 to 52 dollars in 2015 [(1).]

### C. Iraq's oil exports under OPEC:

A combination of factors, including the loss of production in OPEC countries following the internal war in Libya and the sanctions imposed on Iran, and the impact of the region on civil conflicts in Syria and Yemen, had led to a significant rise in oil prices since 2009 to the beginning of 2011 and a stabilization of prices until mid-2014 when they peaked at $110 per barrel. Iraq's and Saudi Arabia's increased gas production between 2009 and 2016, which compensated for the loss of Iranian and Libyan output and a moderate drop of Venezuela's production, although OPEC lost market share from 41.3 percent in 2009 to 40.9 percent in 2015. 2011-2013). While the price of oil has remained at roughly $110 a barrel, the United States has accounted for most of the increase in worldwide production, resulting in excess of global stockpiles. In mid-2014, the market became more sensitive to the increase in Libya's production, AD resulting in a sharp drop in oil prices, as well as the failure of the OPEC meeting in November 2014 to agree to cut production, but Saudi Arabia sought to regain its share, which led to the doubling of some OPEC countries production in response [(2).]

[(1)] Presidency of the Republic of Iraq, Federal Budget Act of the Year 2015 .
[(2)] Robin Mills, Future of Iraqi Oil, Bayan Center for Studies and Planning16First edition, Baghdad, 2018 AM29-30 .

It was in August 2014 that Iraq exported (2.375 million barrels per day) for an average price of 97 dollars per day (excluding sales from the Kurdistan area), with shipments increasing by December 2014. By December 2015, Iraq's exports were making 29 dollars a barrel, and the price of oil continued to plummet to 57 dollars per barrel in order to achieve (2.94) million barrels per day [(1).] This has worsened the economic shock created by the anti-ISIS attacks, the expense of military personnel, and the demands of displaced people. When OPEC decided to cut production in 2016, the amount of oil exported by Iraq was limited to (4.351 million barrels per day). The limits were enforced by Opec, although they did not completely prohibit Iraq. Although exports increased, revenue fell drastically from 2014 to 2015 and remained low from 2016 to 2017 despite the increase. Revenue jumped to $6 billion a month in late 2017, but it was still behind the $8 billion a month growth in early 2014, even if exports increased. Approximately 2 million barrels of crude oil are produced each day [(2).]

Because many countries, including those in OPEC, have responded in various ways to this drop in oil prices, most governments have cut their budgets and reduced investment in oil and other economic sectors while also reducing their workforce (in Iraq, they stopped government appointments) and reforming unsustainable subsidies in many countries, transportation prices have risen (as in the UAE), and electricity and water prices have risen. Energy-efficient options and equipment have been supported by governments in an effort to prevent excessive usage and smuggling. It is important to highlight that many of these steps have not been implemented in Iraq as a result of a distortion of the economy and the difficulties of implementing such actions by political decision-makers since many economic sectors are weak and ineffective.

After Iraq committed to the production cut agreement adopted by OPEC+, which affected the country's export volume in normal conditions, nearly 107 million barrels per month, Iraq's crude oil exports in December 2021 reached 88.922 million barrels per month(2.9 barrels per day), according to a statement issued by the Iraqi Oil Ministry. A) at (3.4 barrels per day). In January, the average price of a barrel of oil was $53,586 [(1).] In spite of the International Energy Agency's prediction that OPEC production will grow to about 5.1 million barrels per day in 2022, we note that exports have been low. This is despite the fact that Iraq has been able to maintain reasonable political and financial stability while making Kirkuk fields fully

(1) https://www.iraqoilreport.com/news/federal-exports-climb-revenues-hit .
(2) https://www.ecb.europa.eu/pub/pdf/other/eb201608_focus01.en.pdf?84e6b1f .
(1) Statement by the Iraqi Ministry of Oil, Arab Jerusalem, 1/2/2021 . source available on Link next : https://www.alquds.co.uk

available and continuing a moderate investment program. Kurdistan's dismal geological and economic challenges. Oil revenues in Iraq are being squeezed even further because service contract companies can collect all of their costs immediately, which has prompted the Oil Ministry to call for a 30 percent reduction in value costs, which is one of the reasons for the high costs to be misunderstood by contractors and the bad contract model [(2),] increasing the load on Iraq's government as it attempts to overcome the effects of low oil prices and the war against ISIS.

Due to severe technical and security constraints, as well as low oil prices and OPEC limits, Iraq's integrated national strategy aimed at 9.3 million barrels per day (BPD) has not been met. The volume of global demand, which determines Iraq's OPEC export share, limits Iraq's capacity to increase exports, even if it increases the volume of exports due to restrictions on the extractive costs of service companies. This would have an impact on Iraq even if it increased the volume of exports.

**D. The reality of refining capacity and its domestic contribution:**

Refining capacity in Iraq has been set at 760,000 barrels per day since 2012, while the Ministry of Oil expects to achieve 1.5 million barrels per day in 2012 [(2)]. Excluding Kurdistan province and the refineries of energy, output capacity in 2018 was around 500,000 barrels a day; The president's rehabilitation is shown in Table 2, and in order to meet the goal, several refineries now under construction must be completed, as must the rehabilitation of refineries that are already in operation.

Table 2. Production capacity of Iraq's main refineries

| Safi's ad | Production capacity | Observations |
|---|---|---|
| Peggy | 310 | Out of service |
| Session | 210 | |
| Basra | 210 | |
| Total | 420 | Except for a hospital that's out of service. |
| you are all Nineveh | 140 | Kurdistan |
| Bazian | 34 | Kurdistan |

[(2)]https://aawsat.com/english/home/article/1120766/iraq-starts-taking-over-majnoon-oilfield-operations-shell?amp.

[(1)] Strategy Energy National Committee Iraqi ، Studies Statistics Energy International which Conducted by A company Oil British British PB year 2017 , The bulletin Statistics OPEC ، base Data International Oil "JODI"، Survey Economic To the East. Middle East .

[(2)] https://inspectioneering.com/news/2017-06-12/6579/iraq-hopes-to-triple-refining-capacity-by-2021 .

| | | |
|---|---|---|
| Total | 904 | |

Source: Prepared by the researcher based on the global oil database "JODI."

With the exception of direct crude oil consumption in power plants (which do not require refining), domestic demand for oil derivatives varies weekly, rising to roughly 600,000 barrels per day in 2013 before falling sharply during the fight on ISIS. Petrol and diesel used in transportation, as well as kerosene and cooking oil used in the heating of homes, as well as crude oil used in the generation of electricity and industry, have lately dropped due to the increased availability of gas [(3).] The current refineries produce a lot of fuel oil but only a little diesel and gasoline, and Iraq exports fuel oil by about a surplus (which increased significantly in 2017 due to increased gas supplies, which reduces the need for fuel oil in power plants), but imports of gasoline and diesel were largely stable and reached an aesthetic import level. Fuel oil used will be reduced due to restrictions on the shipment of high-sulfur oil beginning in 2020 and its replacement with gas for power generation in addition to taking into account changes in the pattern of global demand for petroleum products (LPG, CNs, gasoline, and gas/diesel oil), growing growth for transport fuels and petrochemical raw materials (LPG, CNs).

## GAS PRODUCTION AND USE IN IRAQ

The Khor Moore field in the Kurdistan region, which also produces condensate and liquefied petroleum gas, as well as the Sabba field in Basra and the fields under development in Diyala (al-Sakka) in Anbar, are the only unaccompanied gas fields in Iraq that have yet to begin production. Oil fields' byproduct gas accounts for the rest of the output. Additional gas supplies for 2019, as well as Iranian gas imports, have contributed to a greater supply of gas for power plants, as well as its environmental advantages. There are a number of problems with Iraq's central electricity generation processes, including malfunctions, supply shortages, transportation, and security concerns. The majority of the energy processed relies on gas turbine engines, which can run on either diesel, fuel oil, or crude oil, but these turbines become ineffective with the diversity of fuels, as most of the renewable energies being processed are a more efficient composite cycle (and seek to convert the currently operating plants to operate them). As a result of the new energies, but also because of the need for more gas, Iraqi gas production is critical for both domestic consumption and export. This means that significant investments in Iraqi gas production are required, which are just as important, if not more so, than investments in oil restricted to OPEC share and maintained at fair prices. Table 3

demonstrates that gas turbines are responsible for the vast majority of the energy used in the United States up to 2016.

Table 3. Iraq's GW capacity (excluding Kurdistan)to generate electricity by type

| Station type | Equipped 2016 | Available 2016 | Under construction | Planned |
|---|---|---|---|---|
| **Gas turbines** | 14.97 | 10.85 | 0.32 | |
| **Steam turbines** | 7.31 | 4.79 | | 1.4 |
| **Composite cycle** | | | 9.89 | |
| **Diesel** | 2.03 | 0.68 | | |
| **Hydroelectric** | 1.84 | 0.59 | | |
| **Solar** | | | | 0.06 |
| **Imports and energy supply** | 2 | 2 | | |
| **Total** | 28.15 | 18.91 | 10.21 | 1.46 |

Source: Middle East Economic Survey 18/12/2017, Volume 60, Issue 49, p.11.

For such times when there is no electricity available, tiny diesel generators are commonly utilized. However, they require enormous amounts of subsidized diesel and have limited energy production as well as a high level of noise and pollution. It has been estimated that by 2022, the Iraqi Oil Ministry will have completed 60 percent of the investment in gas associated with oil operations, and the ministry's plan states that by that time, 2,000 million cubic feet of gas investment will have been completed and gas-burning operations will be stopped, allowing for adequate supplies to meet the local demand despite increased domestic consumption. If this level of production is achieved, Iraq will no longer need to import (28 million cubic meters) of natural gas daily from Iran to supply power plants with 1,200 megawatts of energy. In 2019, Iraq produced 26 billion cubic meters of gas-related with 2020, a decrease of 19 billion cubic meters owing to OPEC oil production limitations [(1).]

**Fourth: The Reality of Renewable Energy in the Iraqi Economy**

Global demand for energy, particularly clean energy, is growing rapidly, and protecting the environment through pollution control, particularly greenhouse gas emissions, has become a major concern worldwide. Although energy from fossil fuels is still available and will not disappear any time soon, the era of low-cost, abundant energy will not last long. It has become necessary to explore alternative energy sources, particularly renewable energy, and to address environmental issues associated with energy sources [(2).] By 2040, renewable energy generation

(1) Robin Mills, Maryam Salman, Powering Iraq: Challenges facing Iraq's Electricity Sector, Bayan Center for Studies and Planning, October, 2020 AM13.
(2) Boukelia, T.; Mecibah, M. Parabolic trough solar thermal power plant: Potential, and projects development

is expected to account for 50% in the EU, about 30% in China and Japan, and more than 25% in the United States and India; Power plants use coal, conventional gas, or some oil derivatives, as in Iraq, to generate basic electricity, leading to pollution and contributing to the impact of global warming.

The environmental impact of the use of conventional energy is not the main motivation, but there are many reasons pushing towards renewable energy, the most important of which is sustainability and energy safety, as well as the economic reasons that, including the dam in energy production, especially with regard to the generation of electricity suffered by Iraq and chronically for various reasons and structural reasons, including in relation to the increase in the prices of carbon fossil fuels that occurred after the global economic crisis in 2008 to escalate the need to Sustainable energy, which is subject to price fluctuations and supply under political influences. Solar energy is an option to provide a low-carbon renewable source and is expected to become a competitive source of energy for traditional peak times by 2020. The transition to renewable energy sources is one of the main strategic paths. Therefore, we will try to show the reality of renewable energy in Iraq, analyze and discuss the reality and the possibility of using renewable energy sources in general, energy and the type of sources suitable for Iraq, and determine the potential of available sources.

## RENEWABLE ENERGY SOURCES IN IRAQ

May God bless Iraq with natural resources, whether in the underground oil, gas, and other minerals or on its surface of water resources and fertile soils, with regard to renewable energies, we find that water resources that have been exploited in power generation and can be exploited and expanded in the future to the great solar brightness that contributes and helps in the establishment of solar power plants PV and thermal enormous that help to provide Iraq with sustainable energy, diversify the energy mix, create permanent jobs and achieve sustainable development. In addition to the rapid winds, in addition to significant amounts of biomass, but despite all these opportunities, Iraq still loves the development of research and the transfer of technology and scientific applications, which are still much lower than required under timid projects and investment support almost negligible in light of the huge shortage of energy production and the large gap between supply and demand, especially peak times. Exploited or could be exploited in the future.

in Algeria. Renew. Sustain. Energy Rev. 2013,p 288–297.

### A. Hydropower

Hydropower is one of the most important and oldest renewable energy sources in Iraq, and it is one of the three main power plants in addition to gas and steam plants, as production from hydropower plants increased from 151 migawatts in 1980 to 632 MW in 1990 and then to 2,620 mgwattsin 2000, and Which represented its ratio to the total electricity produced from 13%to 19%and then 40%for thethree years in a row, which depended on the rise of water levels in the Tigris and Euphrates rivers as well as the rise of the levels of dams and reservoirs that generate hydropower, but in 2010 it decreased to 12%due to thescarcity of water from the source in Turkey in general with lower Chinese expenditures on plants Hydroelectric dams, while the ratio increased to 14.8%in 2012, which varies according to the amount of water contained,which supplies most of the production of these plants to the northern region from the two main plants, the Dokan plant established in 1959 and the Derbandkhan station, which together generate about 649 miGWin 2009, i.e. they are They contribute 69percent of iraq's total hydropower production [(1).] Despite the advantages enjoyed by such plants of productive longevity and the lack of maintenance expenses and spare materials, as well as being environmentally friendly, Iraq has not expanded by investing in them for various reasons related to the imbalance of investment planning and, therefore, lack of funds and security and geopolitical conditions and other reasons. Production at hydropower plants fell in 2017 to 2,176,083 mi-Giga wat/h. while (3,141,234) mw/h in 2016, and the total capacity of the stations was estimated at about 1,674 MW, reflected in their ability to fill part of the shortage of electricity generation, and table 4 shows the spatial distribution of hydroelectric plants.

Table 4. Spatial distribution of hydropower plants in Iraq for 2016-2017 (MW/h)

| Province | The station | Working units | Design capability | Production 2016 | Production 2017 | Contribution ratio |
|---|---|---|---|---|---|---|
| Salads | Samarra | 3 | 84 | 379.100 | 350.140 | 16% |
| Diyala | red | 2 | 50 | 247.067 | 181.405 | 8% |
| Al, Anbar | Modern | 6 | 660 | 572.814 | 998.904 | 46% |
| Karbala | Hindi | 4 | 15 | 40.132 | 42.188 | 2% |
| Najaf | Kufa | 2 | 2.5 | 1.102 | 2.045 | 0 |
| Nineveh | Mosul main dam | 3 | 562.5 | 1.875.713 | 290.363 | 13% |
| | Mosul Regulatory Dam | 4 | 60 | 255.306 | 311.038 | 14% |
| | Pumping | 2 | 240 | 0 | 0 | 0 |
| Total | | 26 | 1674 | 3.141.234 | 2.176.083 | 99 |

Source: Ministry of Electricity, Information Center, Statistics Department, Annual Statistical Report, 2017.

(1) Haitham Abdullah Salman, Prospects for renewable energy production in Iraq: Wind Energy Model, Basra University, Basra Studies Center, Gulf, Without A Year, P 17.

There is great potential for expanding the potential for hydropower in the Kurdistan region as well as some opportunities in the rest of Iraq [(1).] Table 5 shows the possibility of establishing hydropower plants after the construction of dams through Iraq's future plans.

Table 5. future plans and design energy for the construction of hydropower plants

| Dam | Design power/MW |
|---|---|
| Khumma Dam | 1500 |
| To close | 300 |
| Al-Khasr Dam - Komal | 24 |
| Badoush Dam | 171 |
| Al , Baghdadi Dam | 300 |
| Mandaveh Dam | 620 |
| Great Dam | 27 |

Source: Abdul Latif Jamal Rashid, Energy and Energy Sources, Technical and Economic Developments: Arab and International, Ali [(2):]

The contribution of hydropower in Iraq to the total production of electricity is relatively large despite the fluctuation of production due to the variation of water levels that have changed for reasons related to climate change and the measures followed by Turkey, the source country of the Tigris and Euphrates rivers, from the construction of many dams and reservoirs, as well as maintenance and maintenance of plants, most of which are relatively old. I still contributed. Energy General Hydroelectric 1996 about 30% Then it went down to 17% general 2001 Then it started rising a year ago. 2003 Only Circumstances Wish The terrorist sabotage targeting power transmission lines added to the above factors.

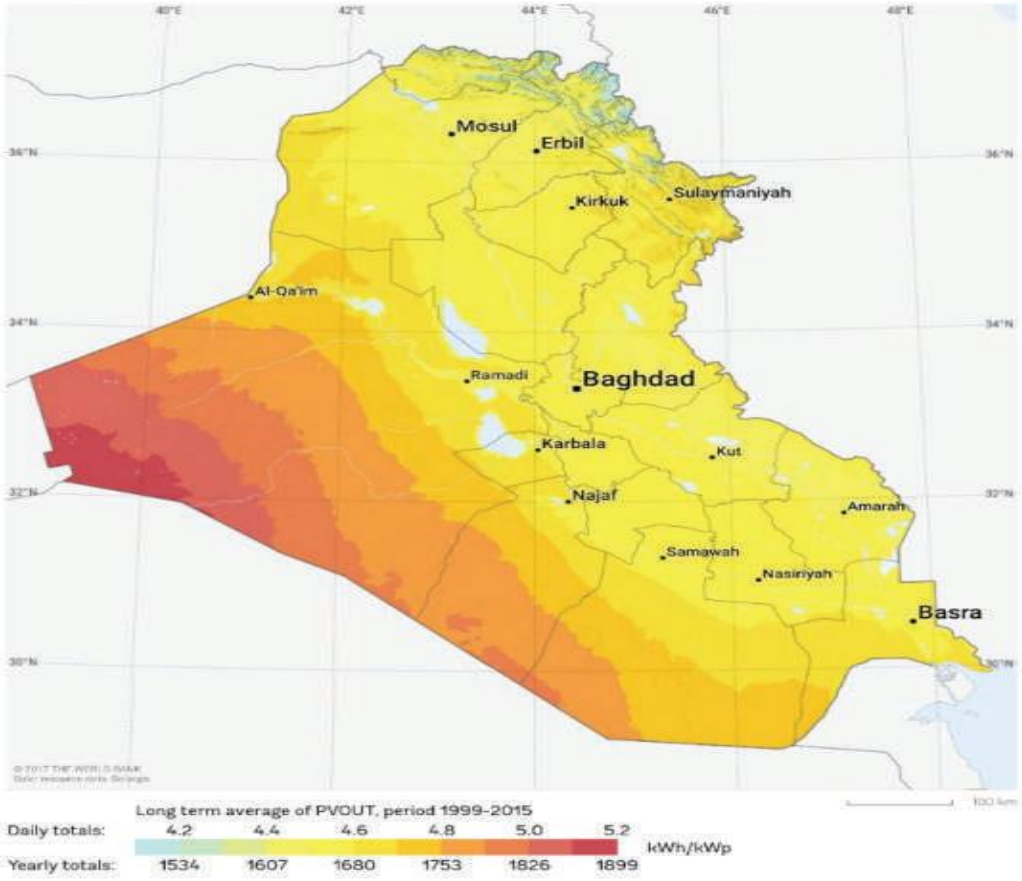
**B. Solar energy**

Iraq is characterized by diversity in the forms of terrain and enjoys a warm sunny atmosphere most days of the year due to the nature of its astronomical location as it is located in the global solar belt as shown in figure (2) below, the annual rate of solar radiation amount is estimated at (407.6)price/cm 2/day, this rate varies between different regions and reaches the maximum in (al-Nakhib) in western Iraq about (645 prices / cm2 / day), It decreases as we head north and south, and Iraq is characterized by a high annual rate of solar radiation of up to 3,700 sunny hours per year [(1).] Every 100 square kilometers of Western and Southern Sahara has the capacity to produce energy equivalent to 30 million tons of oil equivalent per

(1) Ahmed Jassim Jabbar al-Yassiri, Iraqi economy and the future of depleted and renewable energy, Doctoral thesis, Kufa University, 2015 AM 123 .
(2) www.hamoudi.org/dialogue-of-intellrnct/15/04.htm .
(1) Sawsan Sobeih Hamdan, climate elements available in Iraq and the possibility of benefiting from them in the production of alternative energy, Al-Mustansiriyah Magazine for Arab and International Studies, Mustansiriyah University, Baghdad, Issue 42 , 2013 AM168 .

year using PV panels, making Iraq a place of place to invest in solar energy, which could be a solution to long-term electricity shortages [2].

Figure 2. Map of Iraq according to the annual global horizontal radiation of solar energy




Source: the world bank, solargis .com

In the 1980s, Iraq developed an ambitious plan to develop the use of solar energy in electricity generation, and the Renewable Energy Act was passed in 1982 and installed the first solar panels on the roof of the Solar Research Center in Al-Jadriya, Baghdad, in 1986, but the conditions that Iraq went through from wars and economic blockades for three decades undermined the country's renewable energy plans until 2009 when the Ministry of Electricity announced the plan to install 6,000 solar lamps to light the streets as part of a plan to light the streets. Larger to spend up to $1.6 billion on the addition of 400-megawatt units of solar power plants and wind power by 2016, but the plan was abandoned after the collapse of global oil prices and the emergence of ISIS in 2014, government interest in solar energy has returned as one solution to address the lack of electricity production and economic reasons related to

[2] Harry Estebanian, Solar Energy in Iraq: From the beginning to compensation, Al Bayan Center for Studies and Planning, 2018 AM 8 .

reducing dependence on fossil fuels Energy import as well as energy safety and sustainability, the government announced in 2017 its interest in the public-private partnership project to build about 700 MW of solar power plants by 2018 as part of a plan outlined by Table6based on a 75%drop in the price of PV units in the global market that encouraged the public to install solar panels on rooftops outside the system. Network to replace private generators [(1).]

Table 6. Iraq Plan for Independent Renewable Energy Product System (2017)

| Province | Project | Production capacity (MW) |
|---|---|---|
| Al , Muthanna | First Sawah | 30 |
| Al , Muthanna | Second saw | 50 |
| Al , Muthanna | greens | 50 |
| Najaf | Al , Haidariya | 100 |
| Anbar | Gray | 100 |
| Anbar | Fallujah | 40 |
| Anbar | Ameriya Al , Samoud | 50 |
| Anbar | Karma | 50 |
| Babylon | Alexandria | 225 |
| Total | | 695 |

Source: Harry Estebanian, Solar Power in Iraq: From Start to Compensation, Bayan Center for Studies and Planning, 2018, p. 11.

Plans for the National Renewable Energy Strategy include generating 2 gigawatts of renewable energy sources by 2030, including power generation from new hydropower plants. The ministry's plan at the time was that solar power plants with a capacity of 2.7 GIGAwatts would be installed between 2017and2020 (excluding the Kurdistan region and northern provinces), and projects were awarded to some regional companies to generate 465 MW in five different locations of Baghdad's Sama Sama, as well as 230 MW in a quarter of the sites. But in the absence of a clear plan, priorities, and specific investment model, these plans have not moved forward. Solar PV technology is suitable for the production of kebbe throughout Iraq, whether by connecting to the grid or using it as independent generating units in remote rural desert areas.

### C. Wind power

Iraq extends the northeastern Arabian Peninsula within the continent of Asia and is affected by the geographical impact of the middle of the sea region (The Mediterranean Sea, the Red Sea, the Arabian Gulf, the Caspian Sea, and the Black Sea) to become the link between the low pressures in the Mediterranean sea and the Arabian Gulf as well as the impact on wind movement and speed trends. As for the longitude, Iraq extends between lines of length of 38

[(1)] https://spectrum.iee.org/energy/renwables/rooftop-solar-takes-hold-in-iraq-in-the-aftermatoisis.
[(1)] Robin Mills , Maryam Salman , An earlier source, P.23 .

and 48 east, which exceeded the supply circles in most parts of Iraq, which made most of the types of wind pass through the northern and southern areas, which facilitated the incursion of wind into Iraqi territory, both from the north, northwest, and west [2]. As for Iraq's location south of the high-pressure zone above the Turkish mountainous land, it is offset southward by the low-pressure zone over the Arabian Gulf region, which has made Iraq a regular passage for wind gusts during the summer, but in winter, another type of wind prevails over the land of Iraq, and, namely the east and northeast winds [3].

We conclude from the above the concern of the impact of both the Mediterranean sea and the Arabian Gulf, especially in the summer, on Iraq, which is the frequency of dry northwest wind gusts on the study area. When reviewing wind speed in various regions of Iraq according to monthly and annual wind speed rates (M/Tha) [1], spatial variations in wind speed rates across the seasons between study stations accounted for the climatic stations in the cities of Amara, Al-Hama, Nasiriyah, Al-Nakhib, Najaf, Diwaniyah, Baghdad, Basra, and Wet with the highest monthly wind speed rates. While the lowest annual rate was recorded at Kirkuk station at1.5m/tha, as well as a decrease in the rate in the winter and autumn months [2], based on the above, the investment of wind speed to generate electricity in Iraq is minimal, but with the development of modern technological developments and the low costs of moving turbines at a minimum wind speed of (3m/second) wind power can be invested in (Architecture, neighborhood, Nasiriyah, Al-Nakhib, Najaf, Diwaniyah, Baghdad, Basra, and Damp) and within the summer month (June, July, and August), some climatic stations can be relied upon to work throughout the months of the year in the event of the availability of modern technology.

Despite these difficulties, which need the real will to overcome the obstacles facing this type of energy in Iraq, but whereas those who rely on the importance of investing in wind energy projects as a vital engine that is not polluted to produce energy, as well as the use of wind energy in the production of electricity in Iraq will contribute to solving some of the problems of shortages in the production of electricity, especially since the use of a sucker Renewable energy is generally used in villages and remote areas as well as areas far from the centers of major cities, which are not reached by distribution networks or the high cost of establishing and maintaining carrier lines as well as lost energy. Therefore, one of the main

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[2] ali husein The Shawn , climate Iraq , Translate majid Mr patron muhammad , university Basra . 1988 , 13ص.
[3] The speech of Sakkar al-Ani, the geography of Iraq, land, population and economic resources, Dar al-Hikma printing and publishing. Baghdad University, 1990 AM47.
[1] See: Rahman Rabat Hussein, Wind Energy in Iraq Between Investment Possibilities and Constraints, Al-Qadissiya Journal of Humanities, Volume 11 Number 3 , 2008 AM 190 .
[2] Same source, p. 191 .

considerations that surround the importance of wind energy is not only for environmental considerations but also for economic, political, and social considerations alike, as well as the scourge of environmental pollution that has occupied the world in the twenty-first century and to the extent that it has become a measure of the progress or backwardness of states, it is entrusted with the criterion of protecting human beings from environmental risks and protecting them from encroachment(3). In addition to the positive effects of investing in the wasteland and deserts with zero benefits in many cases, thus creating productivity for large areas of land that have long been neglected over the past decades.

In addition to the above natural constraints that make it difficult to exploit this energy, there are also economic barriers that must be taken into account and which apply to a large extent to other renewable energy sources, including:

- Despite the existence of an institutional system represented by the Electricity Act No. (53)of 2017, which adopts renewable energy and its activities under the management of the Ministry of Electricity, but the law makes the Ministry of Electricity the executive authority that controls the development and financing of renewable energy projects in the country, which calls for the ministry to bear the burden of financing and development, which cannot carry out that task under the conditions of financing and problems of the sector multiple. Renewed through the Ministry of Electricity to the Iraqi Ministerial Council for Energy, the highest energy executive body in the country. The law was passed with the help of the UNDP Regional Renewable Energy Centre,

This enables enterprises and individuals to generate electricity for their own use with the place of access to the national grid or sell it to the Ministry of Electricity under the energy purchase agreement, as well as raise the electricity tariff and provide low-interest loans for the construction of solar panels on roofs [(1).]

- Iraq does not have an industrial and technological base that can provide the renewable energy sector with modern wind power systems or some parts of it.
- All the world countries that have turned to renewable energy sources have been supported by governments through many incentives, financial facilities, and guarantees and have not left this emerging sector to the market alone.

(3) Mohammed Saber, human and environmental pollution, King Abdulaziz City of Science and Technology, Riyadh, 2000 AM6 .
(1) Robin Mayaz, Maryam Salman, source mentioned earlier, p 23.

- As long as the market for pollution rights in Iraq is based on the theory (Ronald Kwaz in 1360), which stipulates that no market value for environmental degradation [(2)] is included.
- No funds have been allocated to invest in wind power, either for manufacturing or construction, in the budget of the relevant ministries, whether electricity or industry.
- The reliance of this type of energy on changing and unpredictable and controllable climatic conditions remains the cause that does not encourage investment and exploitation of this type of energy in Iraq.

**D. Other sources of renewable energies:**

For other sources of renewable energies such as biomass, hydrogen energy, fuel cells, tidal, solar thermal, and subterranean heat energy, they're not much different from other renewable energy sources in terms of limited use in Iraq, as most renewable energy technologies used in other countries are not compatible with Iraq's environment and are therefore not effective[(1).] Since the technology for the exploitation of renewable energies continues to develop and overcome obstacles, the Iraqi Ministry of Electricity's vision of the development of this sector is to achieve energy supply through the participation of renewable energies in the energy mix at the lowest possible cost and with the best specifications and keep pace with scientific progress in energy transformation and reduce emissions according to the approved standards and introduce the latest technologies to generate clean energy as well as the development of relations with relevant international institutions and local and scientific and cultural exchange[(2).]

## THE ECONOMIC NECESSITY OF INVESTING IN RENEWABLE ENERGY IN IRAQ

It is not possible to confirm the economic necessity of investing in renewable energy projects in Iraq without diagnosing the energy crisis in Iraq starting from analyzing the situation of fossil energy on which Iraq depends on both sides of revenues and filling the domestic need of energy of all kinds, that the diagnosis of the imbalances and shortages of the type of energy required locally and then how the government contributed to addressing the crisis of energy

[(2)] Orléans Bernier, combating climate change hostage to the financial situation, the world's situation series, the Arab Thought Foundation, first edition, Beirut, 2010 AM239 .
[(1)] Ahmed Jasim almighty Al , Yasiri An earlier source, P. 125 .
[(2)] The website of the Iraqi Ministry of Electricity:
https://www.moelc.gov.iq/home/page/sustainable_energy?lang=ar

shortages and the nature of government investment in fossil energy through which we can identify the economic necessity of spreading renewable energy sources that Contributes to solving the energy supply in Iraq.

If we want to diagnose the energy crisis in Iraq locally, we will note from all of the above in this research that the investment that has taken place in the oil extraction sector through the rounds of licenses and the efforts of the Iraqi national oil companies that Iraq is able to reach the production of more than five million barrels per day and when completing all projects may easily reach the possibility of producing six million barrels per day in this case and within the guarantee of restricting Iraq's share in OPEC, which Iraq is in a more flexible position to control production according to oil market data and OPEC decisions for at least the next decade. Iraq's largest supplier of financial imports, the decline in financial imports has withdrawn on investment plans for other economic sectors, including energy investment for domestic consumption. The crisis has been identified in several areas, including a shortage of refining products such as gasoline, which has resulted in not being in international standards, forcing the government to import not a few quantities, imbalance in the quality of refined oil products as needed locally and problems of building refineries at the required level sufficient to produce to meet the local needs and the reason is poor planning and lack of financial resources to invest in integrated refinery construction projects. The gas produced, despite the presence of special gas fields as well as associated gas, but the quantities of gas production do not meet the local need, especially with regard to the quantities needed to operate power plants, forcing Iraq to import gas from neighboring Iran, and the rounds of licenses did not include mostly the exploitation of the accompanying gas, which prompted the government to develop a new strategy of gas production to reach self-sufficiency, and we separated in numbers in the progress of the volume of production, and the volume of importers, The lack of funding and the volume of large investments needed by the Gaza strip in light of the lack of financial resources prevented the construction of large projects that contribute to the production of sufficient quantities of gas to meet the domestic need.

Iraq's energy problems are not new. This sector has suffered for decades from mismanagement, weak policies and a lack of proper planning for the future, violence, security and political instability, and poor economic planning have exacerbated the problem, and that the priorities of government spending have shifted to the security side, the government must realize that defeating ISIS will require more than confronting direct security threats, Progress towards greater security and political stability should be accompanied by the rapid development

of local economies and the restoration of basic services, and the return on government investment must be remarkable for the population, in order to realize the rapid benefits. Investments in power plants and power grids in Iraq would provide such a return. The dynamics of Iraq's basic electricity crisis are simple: the widening gap between supply and demand, there is no accurate estimate of the size of real demand, given the fact that this is limited by institutional and economic restrictions on consumption and the lack of accurate historical data since the 1990s. 70% higher than originally expected according to the main plans prepared by the Ministry of Electricity, taking into account factors such as demographic shifts and the volume of demand revealed [(1).] Peak demand is likely to reach between 50,000 and 60,000 MW by 2030, while the ministry expects peak demand to be only 35,000 MW[(2).] This trend will undoubtedly recede, and investments in the electricity sector will be reduced, owing to the costs of the security dispute and the fall in oil prices below $60 per barrel. The International Monetary Fund (IMF) has predicted that Iraq's economy is likely to shrink[(3).]

Through the foregoing, electricity can be diagnosed as one of the dilemmas facing the energy sector. In Iraq, despite all the funds allocated for investment and development of this sector from 2003 to the present, a complex problem based on the volume of oil exports that provide the money needed to invest in this sector. The electricity sector's reliance on fossil energy to provide fuel, whether from diesel, heavy fuel, or gas, suffers from a shortage of investments and the exploitation of associated and unaccompanied gas, thus relying on the import of gas to operate power plants.

Consider exploiting the renewable energy sources in Iraq, which are mainly and technically represented in my hydropower, old-used energy that needs to develop, maintain and construct new dams and reservoirs that require not a few government investments, and PV, i.e., the use of solar energy because of Iraq's solar brightness and throughout the year, as well as the tremendous development in solar technology, low prices, and high efficiency, Many of the economic drivers and imperatives resulting from the deployment of renewable energy use in Iraq can be identified in light of the challenges of financing:

A. The trend to use renewable energy sources initiated by the Ministry of Electricity in many solar projects in different capacities contributes to addressing the shortage of

[(1)] Harry Estebanian, Louay Al Khatib, Presentation: Middle East Power Generation Conference, Abu Dhabi, 2014 Electricity Magazine, Issue 27 , 2014 AM51 .
[(2)] Same source, p.51 .
[(3)] ADNAN AL JANABI AND LUAY AL KHATTEEB , The 2015 Budget : Financial Challenges and opportunities , and Opportunities for Economic Reform , 2014. https://www.brookings.edu/opinions/the-2015-budget-financial-challenges-and-opportunities-for-economic-reform/

energy processing in specific areas that can be self-sufficient from electricity outside the grid or with its connection with the national electricity grid and the consequent economic incentives and social stability.

B. Since 2018, the government has launched four-year pilot programs to install 8,000 kilowatts of solar panels on rooftops and government buildings, including schools and hospitals inB.G. and other provinces. Many international donors, such as the World Bank, have been invited. These rooftop solar PV systems provide consumers with the potential to reduce electricity bills and are part of the solution to fill the shortage of electricity production.

C. ¦N Project ¦The product of photovoltaic energy on Surfaces Houses can ¦N be a sustainable source of free energy for families under government electricity subsidies, which are among the highest in the region which represents in absolute terms (7.86 % of the total federal budget, That's the size ofNosufferings that do not motivate consumers to take energy-saving measures or orientation for alternative energy as well Consumes most of the money allocated to the development of the energy sector.

D. The Ministry of Electricity has not been able to draw up stable legal and administrative policies for renewable energy in accordance with the integrated national energy strategy due to a lack of cooperation with the private sector and citizens to promote the use of alternative energy, the absence of regulations that allow the private sector and citizens to install renewable energy sources on the grid, and the sale of excess energy to public utilities to achieve a coherent market for renewable energy, Helps strengthen funding and expand private and public sector projects.

E. To achieve a deal of energy, solutions are needed to diversify Iraq's energy production sources using renewable energy sources available in Iraq (e.g., solar, water, and wind energy) and to support environmentally sustainable technology.

**Fifth: The motives and challenges of investing in renewable energy projects under fossil energy**

Globally, according to studies and scenarios of the International Energy Agency, the increase in global energy demand was growing by 30%until Until 2040, and global trends towards change and significant transformation between different types of fuels, natural gas recorded the best rate among different types of fossil fuels, with its consumption rising by 50%, the growth of oil demand grew and slowed in this scenario, Coal is also declining sharply due

to environmental concerns. In the same context as the IEA scenario, global energy needs cumulative investment supplies of $44 trillion, 60%of which goes to investment in oil, gas, and coal extraction and supply, including power plants that use these types of fuel, while about 20%go to invest in renewable energies, and an additional 23 trillion are needed to invest in improving energy technology and efficiency Use. These values represent a significant reallocation of capital, particularly as the cost of major renewable energy technologies is expected to continue to decline. The electricity sector is at the center of many pledges under the Paris Agreement, about 60%of all new generating capacity until 2040 in the IEA's Snarioat comes from new energy sources, by 2040, the majority of electricity projects generated from competitive renewable sources become without any support' as rapid deployment reduces costs (1).

There has been no major investment in the construction of renewable energy projects for the past period, and for many reasons, we will try to highlight its predominance and try to show the impact of fossil energy acidizing on Iraq's economic landscape. Starting with the defect in the legal and administrative procedures in the incompatibility of the provisions of the investment law with the objectives of the Ministry of Electricity and the needs of investors to significant obstacles in the process of developing the nutrition tariff in order to take into account the costs and returns of investment. In addition, the lack of adequate protection for investors through the sovereign guarantee of government, which led to the reduction of the desire of investors to set up and develop projects and thus reduce these levels of investment. In addition, no strict laws have been enacted with regard to the external environmental costs of pollution due to the use of Fossil energy and the emphasis on the importance of sustainable renewable energy in line with the global trend for the future of this type of energy. It is hoped that a new law will be passed in 2021 that will facilitate the financing, construction, and operation of renewable energy projects and overcome investor concerns about the slow bureaucracy of obtaining land investment authorization, financing, and the existence of transport infrastructure.

In light of this global trend to reduce investment in fossil energy and increase investment by 20%in renewable energies under the commitments of countries in the Paris Agreement to reduce pollution, especially carbon dioxide to reduce the earth's temperature below 2 degrees Celsius, here Iraq must be in line with the global trend for economic and social reasons in addition to the main goal of resolving pollution from fossil energy, but there are many objectives, including to fill the chronic shortage of electricity generated as well as to provide

(1) IEA, executive summary, Arabic translator, 2016 , 4-1 .

fuel In addition to the impact of the provision of electricity in other economic sectors, starting from the industrial sector to the tourism and services sector, and the accompanying social and psychological effects of the shortage of electricity supplies that Iraqi society has suffered since the early 1990s, particularly Iraq from very hot countries in the summer and the disruption of the main services of society, both At the level of the health sector and other services.

From all of the above, Iraq must develop a strategic plan for an asset with the rest of the world and even neighboring and nearby countries with enormous fossil resources, but nevertheless, these countries have gone towards investing in renewable energies because of their economic advantages and keeping pace with global technological developments in this field in order to achieve the above goals and diversify energy sources to reach safe and sustainable energy. 20%of the volume of investments in major sources of renewable energies in Iraq.

**a) Motives For Investing In Renewable Energy Under Fossil Energy**

In light of the global trend towards the development and use of clean energy observatories and its main pillar renewable energies, which are concentrated in the generation of electricity in various areas, whether in domestic use in heating, cooling and internal and external lighting to other and promising uses in the industrial and transport sectors, which has witnessed a major qualitative boom both in the field of modern rail transport and using electric cars, for example, Germany's ambitious plan to reach the use of electric cars balk I hope for early 2030. The motives for the use of renewable energies are multiple, and the first goal is to eliminate environmental pollution and diaper on nature and reduce global warming of the planet, and the approach that the use of renewable energies is an alternative to fossil fuels in light of global fluctuations at high or low prices is the wrong approach, but the use of renewable energies is for integration and diversity of energy sources to reduce the reliance on fossil fuels in the generation of mixed-use electricity to form an integrated mix of fuel sources. It leads to the achievement of global goals to protect nature and access to safe, clean, and sustainable energy that keeps pace with the steady growth of energy demand, thereby filling the shortage between supply and demand for electricity.

There is a question of whether the remarkable growth in the renewable energy sector and the trend towards building a more integrated energy mix will continue or will be stopped by the availability of oil and gas at affordable prices? To answer this question, several reasons must be addressed to reinforce the belief that the growth of this sector will continue, including the following:

- All indicators show that global energy demand continues, and the need to generate more electricity will be the main driver behind this rise in demand. However, global production of electricity production depends only on 5%onoil on electricity generation [(1). S]oils are not a competitor to renewable energy sources but a complement to it. Cost is no longer an obstacle to progress in the development of solar energy sources.
- Investing in renewable energy projects is directly proportional to world oil prices. The higher the prices, the greater the competitiveness of renewable energy, the higher the marginal adequacy of investment in them, and the greater the global investment in renewable energy. But in the event of lower oil prices, the opposite cannot be considered true because in the case of lower oil prices, fossil fuel consumption, which leads to more pollution, will increase, requiring many restrictions to reduce this consumption, especially in the future.
- Because it depends on the changing nature, the wind blows intermittently, and the sun does not shine permanently, but it has been proven that these are not a concern and do not rise to the level of being considered a problem because technological development has eliminated a large proportion of these risks. For the Gulf region, for example, including Iraq, the peak demand for electricity is often during the middle of the day, and the modern network can absorb at least 40%of the additional renewable energy within its total load before requiring new modifications and can address the disruption in renewable sources, the increasing role of gas use in the electricity market provides an ideal complement to the generating capacity of renewable energy technologies. In addition, energy storage technologies have seen rapid progress, and technological developments continue to overcome obstacles and find solutions for service facilities that help dispel the sources of concern that until recently constituted a major barrier to the adoption of large-scale renewable energy technologies in electricity generation.
- The world's energy policies and future are aimed at reducing the carbon emissions of economies to address climate change and reduce environmental pollution. The application of these policies needs to bridge the gap between supply and demand by increasing electricity generation capacity in response to increased demand growth and relying on renewable energy sources is not easy given the challenge of managing

(1) Same source, p.5 .

limited or difficult-to-reach resources, but governments' desire to secure adequate domestic supplies and not to succumb to fluctuations in oil prices where possible, It greatly helps to encourage and use the renewable energy sources available in light of the efficiency and low costs of the technology of using these energies.

- The costs of producing electricity in Iraq mainly include the expenses of production, transportation, distribution, and maintenance, in addition to the wages and salaries of employees and purchases of materials such as (fuel and oils for generation), and expenses related to wages and salaries constitute the bulk of the ministry's operational spending, which increases the amount of support required, as well as the expenses of importing electricity from neighboring countries. From all of the above, we find that the use of renewable energy technologies eliminates many of these expenses, the elimination of fuel, the low cost of maintenance and the need for small numbers of employees, as well as the decrease in production expenses in general, as well as the medical of renewable power plants, are close to places of consumption, thereby reducing transportation costs and waste.
- International concern about climate change and global warming has begun, especially after the increased concentration of carbon dioxide from fossil fuel combustion, which threatens to raise temperatures and consequent climate changes that cast a negative shadow over nature. This has accelerated many countries around the world to follow through on their commitments under the Paris Climate Agreement. This is a good thing to reduce carbon dioxide emissions and reduce fossil fuel use in many economic and service sectors. But this is not enough to reduce the rise of the temperature to less than 2 degrees Celsius. Despite the diversification of energy sources in the major industrialized countries, reducing carbon dioxide rates does not meet the Paris agreement's objectives of reaching the lowest emissions as soon as possible. It is certainly his responsibility to abide by global commitments sooner or later and must keep up with the global developments with regard to the technology of clean energy for the market, as well as Iraq's problems of pollution, high temperatures, and drought, in addition to the external costs of pollution and its effects on the environment and human health. Economically, the global commitment to reduce carbon dioxide emissions from fossil fuel consumption (crude oil) will affect, as pledged by countries in the Kyoto Protocol in Japan in 1997, as for developing countries or those that depend on their exports for crude oil such as Iraq as they shift towards emission reduction paths

and continue to grow in order to meet development and climate challenges that would involve unprecedented adjustments and cost-effective economic adjustments. And social. These policies contribute to reducing the volume of oil revenues for oil-producing countries, including Iraq, and hence strategic plans are needed to redistribute future energy investments and then look for alternative energy sources.

a) Investment challenges in renewable energy projects:

Iraq has suffered from a high marginal tendency to consume, with a significant proportion of the poor living below the poverty line and 18.79 percent of the total population in 2012, and this percentage is still at this limit, as well as the suspension of many sectors of domestic production and high unemployment. However, the state pays salaries and a monthly wage of up to four billion dollars in oil revenues for a month, as well as current expenses that include employee compensation (goods and services, debt interest, subsidies, grants, social benefits, other expenses) formed in light of the decline in oil prices a large proportion of Iraq's financial imports, and has greatly affected investment expenditures and even affected projects that reached the ratios of Advanced achievement, which led to its suspension. With regard to private investment, the absence of the law, investor protection, and abhorrent bureaucracy, as well as the deterioration of the security and economic situation and political instability, have resulted in capital flight and investors abroad.

If we focus on investing in the energy sector despite all the investment funds in the electricity sector since 2003, we find that Iraq imports electricity and that domestic production does not meet 50%of the domestic need in prime time, as well as the continued annual growth in demand for electricity, and with regard to the huge investments of the oil sector, we find that Iraq has lost a large percentage of its oil revenues due to partnership contracts with foreign companies and Iraq continues to import some oil and gas derivatives. Millions of meters of associated gas are wasted, causing millions of dollars in losses and pollution caused by daily gas burning and rising toxic gases that damage the climate and rise temperatures.

In light of this situation of lack of resources to invest or allocate funds to invest in renewable energies, possible solutions must be found to help solve the energy crisis in Iraq and within mechanisms and laws that help provide the required investments in this sector. Before going into the required solutions, the most important economic, social, political, and security challenges that are a major obstacle to investment in infrastructure must be identified:

- The continued rise in the population of the challenges facing the government in Iraq because of its demand for the provision of necessary services in the field of

infrastructure, where the population of Iraq increased from 26 million in 2003 to 34 million in 2012 and to nearly 40 million people in 2020, which is one of the high growth rates globally. The government's investment spending is enormous, especially in the areas of infrastructure, which are constantly deteriorating due to the economic, security, and political situation.

- The decline in domestic savings and Iraq from developing countries where the phenomenon of low savings is the characteristic of their economies, which is manifested due to the lack of security stability, weak banking services, and lack of banking awareness among savers, which caused the lack of financial resources directed to investment, which depends heavily on loans granted by banks.
- Low oil and non-oil revenues, Iraq is known to rely heavily on oil revenues, which represent about 93% of total revenue in spending coverage has been significantly affected by the decline in oil prices a year ago 2014 وInvestment spending has been hugely affected, and many projects, particularly infrastructure, have been halted. As for revenue, The other one. That represents 7-8%, it's very low, and it's The challenges facing Iraq's unilateral economy have emerged.
- According to reports issued by Transparency International, Iraq ranks late in 171 out of 177 countries included in the 2014 report. Financial and administrative corruption leads to higher costs of projects and lower quality.
- High rates of domestic and external debt, which leads to higher interest rates that increase the cost of investing, which is lighter than the external debt due to debt services (premium + interest) which poses a threat in the case of delayed repayment.
- Security instability since 2003 and the legacy of the ISIS wars since 2014 have displaced large numbers of people and from different regions, putting considerable pressure on cities, service delivery, and significant infrastructure impacts, requiring more investment spending in light of the shortage of imports, which is hampering economic growth plans rather than progressing them.
- There is a clear imbalance in the laws and administrative procedures with regard to the regulation of economic life, which contributes to attracting foreign investors or encouraging the local investor, as well as the role of the government in confronting unexpected risks, whether in relation to financial risks, exchange rate changes and inflation, or in relation to the development and activation of financial markets and political risks.

- The presence of sober and professional institutions, whether at the level of management of the economic sectors or financial management and supervision at the required and professional level, where we clearly note the confusion of the country's financial policy, which has a significant impact on economic stability and is reflected in the delay in the decision of the general budget and its significant impact in delaying the disbursement of investment expenditures, which causes significant confusion for the work of infrastructure projects and reflects on the services provided One m.
- The right planning and investment decision according to a solid economic logic that takes into account the need and resources available. Iraq suffers from clear confusion in making sound investment decisions according to approved economic feasibility studies, which have shown additional costs that clearly showed the lack of priorities and the necessary need for projects with background and front ties to drive economic growth in other sectors. The energy sector is a clear example, both in terms of investment in oil extractive projects and in electricity generation as well as in other sectors.

This is with regard to the most important challenges that are an obstacle to investment in general, and it necessarily includes investment in renewable energy projects, which represent a new trend to invest in new projects with different requirements, whether legal or administrative as well as technical in the first place, if renewable energy projects need technical and knowledge introductions with a social dimension, of which we will try to cover a large part of them. These introductions are essential determinants for encouraging and successfully investing in renewable energy projects that will undermine the feasibility and purpose of these projects, including:

- Continued government support for fossil fuels used to generate electricity from fossil fuels in light of the market's failure to calculate external costs associated with the environment and public health prevents the strengthening of the competitiveness of renewable energy projects versus fossil energy, thereby reducing the opportunities for investment, especially by the private sector, which is heavily dependent in light of the lack of government financial resources.
- In most developing countries, renewable energy projects are financed by the public sector and local and foreign specialized investors, and in light of the lack of funding, private domestic investment is encouraged due to the decline in foreign and government investment for known reasons, and that local finance companies are often

looking for projects with rapid and guaranteed profitability and here must make appropriate adjustments to the receipt and cost of tariffs, according to annual reports issued by the Ministry of Electricity that revenues to collect bills according to the tariff The current situation covers only a small fraction of the actual costs (up to 10% of total production costs) and Iraq is ranked among the cheapest countries in the Middle East in terms of electricity prices. The low cost and acquisition of tariffs are some of the main determinants for investors.

- Adapting infrastructure (especially the electricity distribution network) to suit the process of linking the electrical production of renewable energy plants with the national grid to develop new services that contribute to safe energy supply (demand-side management).
- There is a significant lack of community awareness about renewable energy technologies and the benefits they can provide to communities due to the lack and inadequacy of awareness programs that contribute to educating the public about the advantages of installing PV panels on roofs compared to the monthly payment of generators scattered in residential neighborhoods, as well as awareness about energy efficiency and rationalization.
- Investing in renewable energy projects requires administrative and financial facilities that stimulate the entry of investors in this sector, and its absence is an obstacle in encouraging and spreading the use of renewable energies, including tax exemptions and customs duties on renewable energy equipment and the development of financial incentives for investors by selling certificates to reduce carbon dioxide emissions obtained from the establishment and operation of renewable energy projects, In addition, Aradi has allocated the appropriate for renewable energy generation projects and agreed with the government to buy energy produced from renewable energy plants.

## CONCLUSIONS

It is becoming increasingly more work for the government to invest in renewable energy and access the safe energy mix due to continued reliance on oil imports exposed to market instability, OPEC limits, and global turmoil. An increasing worldwide tendency to shift away from fossil fuels to more environmentally friendly forms of energy would be bad news for Iraq, both in terms of imports and diversifying its energy supply. Because of the rapid growth of renewable energy sources in the home, transportation, and heating sectors, it seems unlikely

that fossil fuels, particularly oil, will maintain global dominance until 2030 or later. Environmental degradation in Iraq resulted from the country's overreliance on fossil fuels. A significant source of international capital flows and a key source of funding for economic growth, foreign direct investment (FDI) has mostly focused on the oil industry and certain tourism projects. As a result of the country's outdated energy grid, investors are interested in something other than investing in Iraq's electrical industry. Transparency World reports indicate that administrative and financial corruption is widespread throughout the country, especially after 2030, as Iraq ranked low in the participating countries, indicating a high index of corruption in all institutions and departments of the state, which results in the loss of funds allocated to the establishment of investment projects. The private sector's position in Iraq remains ambiguous and weak because of inadequate financial and administrative structures and weak activation of key laws. This is owing to its low economic contribution, reflected in its low activation of the relevant investment and national product laws. Changing the trajectory of public expenditures by reorganizing the general budget in favor of investment spending targeted at increasing industrial capacity and infrastructure development. Using the investments of multinational oil corporations and contracts to develop power plants utilizing renewable energy sources. It is important to remember that fixing the electricity shortage and increasing output will require investing money to upgrade, renovate, and expand the electric grid. Encouragement of private sector involvement in electric power generation projects, which has a favorable impact on the national economy, and giving all the necessary legal, administrative, and financial assurances to achieve this. By providing government assistance, guaranteeing that productive energy is purchased, and localizing renewable energy technology, Iraq is focusing on solar technology, an ideal energy source for Iraq. A strategic plan that incorporates increasing gas production for electricity generation and increasing the contribution of renewable energy to electricity generation from an integrative process is needed to solve the problem of high current and future demand due to economic and population growth in order to address the issue. There are many reasons why solar power plants in rural regions and districts that are not primarily off-grid would be a good option for connecting solar electricity to the grid. Still, the most important is that it would limit the number of people moving from rural areas to cities. Take advantage of international collaboration in the renewable energy sector, learn from the top nations' experiences, build relationships, and transfer technological know-how and expertise.

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