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Measuring the Costs of Renewable Resources and Their Role in Reducing the Costs of Available Resources in The Iraqi Economic Units

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Abstract:

As a result of the developments witnessed by the world and technological progress in all fields and its trend towards preserving the environment and its resources and reducing pollution in it, which required the economic units to search for resources to help them reduce costs and protect the environment from pollution while preserving its non-renewable resources, and in order to address this problem, the researcher determined the costs of available resources (non-renewable) for the production of electrical energy, which constitutes the largest proportion of indirect costs, Therefore, the research was launched to reduce these costs by replacing non-renewable resources with renewable resources in order to reduce costs on the one hand, protect the environment on the other hand, and help preserve non-renewable resources for future generations. To achieve this goal, the researcher carried out the field pension for Al-Mamoon factory in order to determine energy costs Electric using non-renewable resources, as well as field visits to obtain information from the Free Lights Company for Solar Energy and General Trading in order to determine the costs of renewable resources represented by solar energy. One of the most important results of the research was the is that the best resource of the six resources for generating electrical energy is the solar energy resource, it is safe and available in abundance and does not pose a threat to humans and the environment, Also, the findings of the current research revealed that investing in solar cells leads to an increase in investment costs, but at the same time leads to reducing the costs of use over its life of 30 years as a result leads to reducing the costs of producing electrical energy.

Paper Type : Research Paper
Keywords : Renewable Resources, Cost Reduction

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1. Introduction:

Energy is one of the basics of human life and its continued survival and may come from a non-renewable resource such as (oil, natural gas, coal) or a renewable resource such as (sun, wind, water, geothermal heat, biomass, hydrogen) and that human dependence on non-renewable resources leads to damage to the environment (during the extraction and use processes) as the process of extracting them leads to the production of toxic gases that pollute the environment, which leads to an increase in environmental costs for the extraction process, The process of using them in production affects the environment where pollution(air, water, soil), as well as the possibility of penetration within the short or medium time range because it is threatened with depletion. All these reasons prompted the economic units to search for other resources to reduce the costs caused by the resources used and protect the environment at the same time, so the problem of research was to answer the following questions, what are the costs borne by the economic unit as a result of the use of non-renewable resources, what are the environmental effects associated with the use, and can renewable resources reduce these costs and at the same time protect the environment.

1.1 Literature Review:

There are numerous studies that dealt with the renewable resources and Cost Reduction as this part of the research included some of those studies as follows:

Roncallo (2020) proposed to evaluate the integration of variable renewable technologies and resilience options in national energy systems, taking into account scenarios that could allow a successful transition towards a low-carbon and more efficient system, and this work aims to focus its attention on the energy system in Colombia, and one of the most important findings of the study is to know and understand the analysis of the integration of renewable energy sources, The shift towards safer, more sustainable and affordable energy systems is one of the major challenges, and therefore a comprehensive analysis of the impacts of integrating intermittent sources of power generation into the existing system is required.

Bogdanov et al (2021) demonstrated global Sustainable Development Goals has demonstrated unprecedented economic and social transformations taking place across the world. 50% energy savings, universal access to fresh water and low-cost energy. One of the most important results is that the infrastructure of the global energy system will change from the traditional combustion of low-efficiency extracted fuels to clean energy (solar energy, wind energy and other natural energy resources) at low costs. This transformation will significantly increase the efficiency of the system and enable it to reduce gas emissions that affect the environment.

Helihel (2021) demonstrated calculating the costs of the environmental, social and economic effects of producing electrical energy from renewable energy (solar energy), and measuring the costs of the environmental, social and economic effects of producing electrical energy from traditional energy, and one of the most important conclusions is that the increasing use of fossil fuels is one of the reasons for the high emission of toxic gases and thus affects the environment and the use of other alternatives, which are renewable energy, the most important of which is solar energy, is the real alternative to getting rid of global warming, Renewable energy contributes to promoting and supporting sustainable development represented by its economic, environmental and social dimensions.

Pfeifer et al (2021) proved of the impact of each of the flexibility options on the economic capabilities of generating renewable energy sources and storage technologies and responding to demand in order to finally reach a certain share of renewable energy. One of the most important results is the spread of planning criteria values (energy, costs, emissions, biomass) for the fixed flexibility index that was reached for the energy planning process, which indicates that renewable energy investments have reasonable economic flexibility.

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Khalaf (2021) proved that most Iraqi economic units suffer from a problem of high costs of their products as a result of several reasons, including the high prices of fossil fuels, and the lack of exploitation of green and available energy, and aims to measure and manage the green energy necessary to reduce costs and achieve competitive advantage, and reduce pollution and reduce it. One of the most important results is that the measurement and management of green energy contributes to reducing production costs by reducing the element of improvement. The Iraqi government does not support green energy systems, such as the tax exemption for green energy systems, which help reduce pressure on local electricity generation networks and help reduce environmental pollution, such as solar cells.

Elia et al ((2021) proposed an analytical framework that describes the path of cost reductions along the stages of technology development with a focus on two specific technologies for renewable energy, wind and solar photovoltaic. The most important findings of the study How cost reduction affects the role of elements in the system (such as (the amount of renewable resources and cooperation between stakeholders), and shows that training by stakeholders by studying the stages of research and development One of the important stages is the marketing stage through which knowledge of market demand and chain dynamics Sales.

Esmaeili et al (2022) used the net present value method of economic valuation of investment in the development of gas reserves and new inventory variables, and analyzed the impact of the penetration of renewable energy sources on the behavior of gas markets and vice versa from the point of view of the policymaker, and one of the most important results is the analysis of the long-term impact of the penetration of renewable energy resources on natural gas prices, a dynamic approach was used to illustrate the dynamic performance of the natural gas market, and the interaction of two markets was illustrated under the graph.

Fleih and Abdullah (2022) Suggest setting foundations for solar energy, reducing costs, improving the environment, and how to improve the environment and reduce costs when using solar energy. The study indicates the results that solar energy is a clean and environmentally friendly energy that is available most days of the year, which enjoys durability and a competitive cost, when establishing a solar power station that works simultaneously with a conventional station that contributes to reducing costs and reducing carbon emissions.

The research problem is that the Iraqi economic units use resources to produce electrical energy characterized by its high cost as well as being affected by global economic conditions because its source (oil, natural gas, coal) and its extraction and use results in significant environmental effects represented by pollution and therefore the research problem can be formulated with the following questions :

- Can the use of renewable resources reduce costs.
- Does the use of renewable resources reduce the environmental costs caused by non-renewable resources?

The objectives of the research are the following:

- Increase energy efficiency by investing in clean energy technology.
- The use of renewable resources helps to reduce the use of non-renewable resources and preserve them for future generations.
- The use of solar energy in economic units helps to reduce the costs of producing electrical energy and reduce environmental costs as well.

2. Materials and Methods:

The research deals with a detailed presentation including the research hypotheses, research population and sample, data collection methods.

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2.1 Research Hypotheses:

The research is based on a main premise:

Costs can be reduced by replacing non-renewable resources with renewable resources, and the following hypotheses are branched out of them:

- The use of renewable resources reduces costs.
- The use of renewable resources reduces the costs of non-renewable resources on the environment.

2.2 Research population and sample:

1.Research Community: State Company for Food Products / Iraqi Ministry of Industry and Minerals . 2. Research sample: Al-Mamoun factory of vegetable oil factories for the production of liquid and solid oils and cosmetics , for the year 2022.

2.3 Data collection :

By relying on the information obtained from Al-Mamoun factory (research sample) through field pensions and personal interviews of the researcher with officials and engineers in the factory, in addition to the data obtained from the records of the Costs Division and the planned and actual production capacities and sales from the Planning and Marketing Department, the Electricity Division and the Maintenance Department.

2.4 Renewable Resources :

2.4.1 The concept of renewable resources :

Man has developed in the modern era the possibilities of benefiting from renewable energies, which are characterized as permanent, clean and inexhaustible energies, which can be obtained from the sun, wind, water or other natural phenomena, are natural and clean sources are inexhaustible and their use does not result in any pollution, the most important of which (solar energy, wind energy and others) do not emit any pollutants from their use, As for the combustion of biomass, it emits pollutant gases, but it is less than the combustion of fossil fuels (Kiyimba, 2020). It faces further economic and social challenges and difficulties as a result of the global consumption of non-renewable resources.

(Ezzat, 2011) They are resources that increase and grow over time and their current rate of consumption does not affect their future production rate, and there are many mechanisms that allow converting them into kinetic or thermal energy and then into electrical energy using different technologies that allow the provision of energy services. (Benedek, et al, 2018) Economic units have begun to spend huge sums to reduce and control environmental pollution, and environmental care is one of the most important issues of concern to developing countries in recent times. (Abdullah et al ,2018) Iraq at present must be stable and able to progress through business creation and accounting-related education, although it constitutes a major obstacle in the Iraqi accounting environment (Mohammed et al, 2020) .

2.4.2 Renewable sources of resources:

Renewable resources include six types of energies (solar, wind, biomass, hydropower, geothermal energy, hydrogen energy), where solar energy is a real renewable resource that is inaccessible and the most abundant on our planet and solar energy is used to produce steam, which in turn produces electricity (Trindade, 2018), and it has low operating costs and high efficiency and can produce a reliable source By leveraging thermal storage, the cost of photovoltaic energy decreases if the photovoltaic industry continues to grow and technically improve (Sampaio and Gonzalez, 2017).

Solar energy can be converted into electrical energy either directly through photovoltaic panels that produce a continuous electric current that is characterized by a long life cycle and does not require high-tech maintenance operations, or indirectly by converting first into thermal energy and then into mechanical energy, which in turn converts into electrical energy, it has the possibility of thermal storage, unlike photovoltaic energy, it needs batteries for storage (Weir and Twidell, 2015).

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2.5 Cost Reduction:

Cost is the main element in all responsibility centers and one of the most important responsible accounting tools is the elements of modern cost management that are used to achieve the department's goals of planning, organization, production and control, and it is also used to enhance competitiveness (Aljanabi and Nouri, 2020). It is the planned method aimed at improving efficiency through the optimal use of cost elements and speed in completing operations, or increasing production, which leads to reducing the cost of the produced unit without affecting its quality or function (Al-Hamdani and Abdul Hussein, 2013) .

of operations The task in the economic units in which all employees contribute to the economic unit at different levels, where the economic unit works to direct its expenses and improve the exploitation of its resources in order to increase its market share, which leads to an increase in its profits by providing a product at a lower cost than competitors (Sorour and Abdul Redha, 2017). In the contemporary environment, insufficient information and indicators were provided to management to make decisions related to the company's activity.

Because the cost structure has been affected by the modern manufacturing environment, resulting in an increase in indirect industrial costs (Rahman et al, 2019). Determining environmental costs helps in decision-making by preserving or disposing of a product or process that causes environmental pollution or high environmental costs, investing money in green process technology to preserve available resources without waste or loss and helps reduce costs (Abdul Razzaq, 2012).

2.6 Data Analysis:

2.6.1 Testing Research Hypothesis:

The researchers went to the General Company for Food Products and choose Al-Mamoun factory for practical application and go to the Free Lights Company for Solar Energy and General Trading to obtain information.

For the purpose of comparing the project of producing electrical energy according to renewable and non-renewable energy by calculating the cost of the energy level for each of it and evaluating the cost of energy production for it.

- Investment costs in non-renewable (generated) energy

Table (1) shows the total costs of using non-renewable energy (generated) during the investment period, which lasted (30 years) to be compared with the investment period in renewable energy

Table 1: Costs of using non-renewable energy (generated)

Paragraph	**Annually**	**Costs within 30 years**
Kerosene costs	202687500	6080625000
Generator maintenance costs	1000000	300000000
Rewarding workers for running the generator	300000	90000000
Fat replacement costs	24000000	720000000
Card costs	7500000	225000000
National electricity costs	65817000	1974510000
Total	313004500	9390135000

Source: Prepared by the researchers based on the company's data

Therefore, the table below shows the costs of investing in non-renewable energy

Table 2: Costs of investing in non-renewable energy

Usage costs	9390135000
Purchase and placement costs	399000000
Total	9789135000

Source: Prepared by the authors

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- Costs of investing in renewable energy (solar cells)

When investing in renewable energy, this requires paying amounts once when investing, which are each of (the cost of solar panels, the cost of inverters, the cost of installation) and accordingly Table (3) shows

Table 3: Costs of Investment in Renewable Energy

Paragraph	Investment cost	Costs within 30 years
Cost of solar panels	135700000	135700000
Inverter cost	29500000	29500000
Installation cost	12331000	12331000
National electricity cost	19745100	592353000
Total		769884000

Source: Prepared by the researchers based on the company's data

The researchers found that the total electrical energy generated from all investment annually is 230,000 and therefore the energy over the life of the project is 230,000 W× 30 = 6,900,000 W Through the data in Table (2), the cost of the energy level (generated) is calculated

Energy Level Cost = Total Project Life Cycle Cost / Total Electrical Power Generated Over Project Life

= 978913500/ 6900000

= 1419 JD/ W

Through the data in Table (3), the cost of the energy level is calculated according to investment in renewable energy

(solarcells)

Energy Level Cost = Total Project Life Cycle Cost / Total Electrical Power Generated Over Project Life

= 76988400/ 6900000

= 112 JD/ W

Through the results reached by the researchers, it was found that the cost of the energy level of non-renewable resources (generated) is (1419 dinars / watt) higher than the cost of the energy level of renewable resources (solar cells) is (112 dinars / watt) and this is due to several reasons, including the high costs of use in non-renewable energy due to the high costs of kerosene used, which is one of the depleted resources, which requires preservation for future generations. As well as being affected by changes in the global economy, where kerosene prices increase as a result of these changes, and the use of non-renewable energy in the generation of electrical energy leads to serious environmental effects, in the case of the use of renewable sources reduce the harmful effects on health and the environment .

3 . Discussion of results

The research focused on measuring the costs of investing in non-renewable resources in (General Company for Food Products / Al-Mamoun Factory) for the purpose of comparing them with the costs of investing in solar energy using systems connected to the main grid that are estimated to be 30 years old and calculating the cost equation of the energy level in order to reduce the costs of producing electrical energy for economic units, preserving non-renewable resources to future generations because they are likely to be depleted during the near term, As well as preserving the environment from air pollution, soil and noise. The generation of electric power using renewable resource sources leads to a reduction in the costs of producing electric power by eliminating the monthly kerosene costs, the periodic maintenance costs of generators, the costs of lubrication, the costs of the generator, and the annual national electricity costs, and thus leads to savings in production costs.

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4. Conclusions:

The investigation reached a number of conclusions, the most significant of which are:

- Investment costs are higher initially compared to conventional sources, Over time, renewable resource technology may improve and installation and maintenance costs may decrease, resulting in a lower total cost of renewable resources.
- Renewable resources contribute to the diversification of energy sources, This reduces the heavy dependence on traditional sources and increases the independence of countries in energy supply, It also reduces the impact of fluctuations in fuel prices.
- Renewable resources play an important role in achieving environmental sustainability and reducing environmental emissions, Instead of relying on fossil fuels, which are finite.

Authors Declaration:

Conflicts of Interest: None

-We Hereby Confirm That All The Figures and Tables In The Manuscript Are Mine and Ours. Besides, The Figures and Images, Which are Not Mine, Have Been Permitted Republication and Attached to The Manuscript.

- Ethical Clearance: The Research Was Approved By The Local Ethical Committee in The University.

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قياس تكاليف الموارد المتجددة ودورها في تخفيض تكاليف الموارد المتاحة في الوحدات الاقتصادية العراقية

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مستخلص البحث:
نتيجة للتطورات التي شهدها العالم والتقدم التكنولوجي في كافة المجالات واتجاهه نحو المحافظة على البيئة ومواردها وتقليل التلوث الحاصل فيها ، مما تطلب من الوحدات الاقتصادية البحث عن موارد تساعدها في تخفيض التكاليف وحماية البيئة من التلوث مع المحافظة على موارها غير المتجددة , وبهدف معالجة هذه المشكلة قامت الباحثة بتحديد تكاليف الموارد المتاحة (غير المتجددة) لإنتاج الطاقة الكهربائية والتي تشكل النسبة الاكبر من التكاليف غير المباشرة , لذا انطلق البحث لتخفيض هذه التكاليف باستبدال الموارد غير المتجددة بموارد متجددة بهدف تخفيض التكاليف من جهة وحماية البيئة من جهة اخرى والمساعدة في المحافظة على الموارد غير المتجددة للأجيال القادمة. ولتحقيق هذا الهدف قامت الباحثة بالمعاشية الميدانية لمصنع المأمون بهدف تحديد تكاليف الطاقة الكهربائية باستخدام الموارد غير المتجددة , فضلاً عن زياراتها الميدانية حصولها على المعلومات من شركة الاضواء الحرة للطاقة الشمسية والتجارة العامة بهدف تحديد تكاليف الموارد المتجددة المتمثلة بالطاقة الشمسية . من ابرز النتائج ان افضل مورد من الموارد الستة لتوليد الطاقة الكهربائية هو مورد الطاقة الشمسية فهو امن ومتوفر بكثرة ولا يشكل خطراً على الانسان والبيئة , كما وضحت النتائج ان الاستثمار في الخلايا الشمسية يؤدي الى زيادة تكاليف الاستثمار لكن يؤدي في وقت نفسه الى تخفيض تكاليف الاستخدام على مدار عمره البالغة 30 سنة بالنتيجة يؤدي الى تخفيض تكاليف انتاج الطاقة الكهربائية.

نوع الورقة : ورقة ابحاث
المصطلحات الرئيسة للبحث: الموارد المتجددة , تخفيض التكاليف

*البحث مستل من رسالة الماجستير