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ENERGY ACCOUNTING AND PERFORMANCE: A THEORETICAL PERSPECTIVE

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ABSTRACT. People have relied on biomass as their primary source of renewable energy (RE) for thousands of years. Fossil fuels (FFs) have completely replaced renewable energy sources during the previous century and allowed for a twofold increase in global energy consumption. FF's dominance has changed how we think about and accounts for energy use. Suppose the world continues to ignore climate change. Eventually, renewable energy will be required, and nuclear power may once again be required to meet most of the world's energy requirements. However, the shift is likely to occur because of the urgent need to mitigate the effects of climate change. Renewable energy is now mostly accounted for simply calculating the FF power necessary to produce it. When the MS components decrease, this strategy becomes more inconvenient. The most abundant renewable energy sources, wind and solar, are intermittent. Hence a new approach to energy accounting is necessary. The energy accounting process may be more difficult if excess intermittent renewable energy is converted to H2. Passive solar, which is expected to grow in importance over the next few decades, is another potential source of energy savings that will need to be addressed. This research synthesizes previous efforts to determine the most effective means of tracking and disclosing future energy use.

JEL Classification: example D02, O17, P31

Keywords: energy accounting, energy performance, renewable energy, emissions

Introduction

Most businesses in developing countries, and the industrial enterprises listed on the Iraqi stock exchange in particular (as part of the study sample), are hampered by a lack of access to sustainable energy sources and systems. In a clean environment, renewable and non-renewable energy sources may be found, including solar energy, wind power, hydropower, geothermal energy, natural gas, coal, oil, and uranium. Without adopting steps to limit greenhouse gas emissions, increasing the number of fossil fuels used without taking action would have a detrimental impact on the global climate. To lessen the effects of global warming and pollution, we are working to improve energy efficiency and increase our reliance on renewable energy

sources. With these influences in the business environment, it became necessary to use a balanced set of financial and non-financial measures (integrated lists) that are characterized by quality and flexibility, as well as lower cost, and the impact of all of this on the competitive advantage of the economic unit. Traditionally, the financial success of an economic unit has been documented via disclosure. Non-financial information or measurements measured in non-monetary units cannot be entered into the accounting books under the standard accounting method. As a result, we propose models on the use of energy indicators and how to regulate energy sources and measure indicators that assess the economic, social, and environmental aspects.

The facility's energy accounting system is essential to create a clear image and improve its competitiveness. Some facilities, including industrial, have excessive energy consumption and excessive discharge of pollutants, which affect the economic benefits of the facility, as well as damage the reputation of the brand, and there can also be more severe penalties from the government and professional organizations for non-compliance of some facilities with environmental standards. The environment suffers in all its aspects from many dangers as a result of the excessive use of traditional energy resources, which is the leading cause of environmental problems in the world, such as global warming and climatic changes threatening the ecological system in the earth, which had a clear negative impact on human daily life and biodiversity in all fields. That is why attention must be paid and the search for new alternatives to replace traditional energy, such as sustainable energy, which is one of the essential main energy sources because it is clean and environmentally friendly, which makes it of great importance in protecting the environment and achieving sustainable development.

1. Energy Accounting

Two centuries ago, beginning with the Industrial Revolution, when (fossil) energy sources were discovered, the trend toward providing cheap energy to achieve the highest productivity and social welfare at the lowest cost became more than in the past. Therefore, the problems of energy savings and the increase in pollution due to emissions of fossil fuel consumption have been more critical in recent years than the main challenges in the energy consumption of economic activities and thus their intensity (Dargahi & Khameneh, 2019). Amuakwa-Mensah and Adom (2017) argue that a decrease in energy intensity versus increased economic activities increases carbon dioxide emissions and harms environmental sustainability. Where energy density is used as a measure of energy efficiency, and another defined it as The parameter that measures the energy efficiency of the economy of a country or geographic area: the ratio between total energy consumption and GDP, in the sense that it refers to the amount of energy consumed per unit of GDP generated. Therefore, energy efficiency improvements through environmentally friendly measures or by increasing the orientation of national production towards products that consume less energy - can be considered as a goal to reduce energy intensity Energy (increasing efficiency) and improve environmental quality (Mahmood & Ahmad, 2018). In the same context, it has been shown that achieving energy sustainability is essential to achieving sustainable development, as decision-makers and energy experts systematically plan to implement necessary policies such as reducing the use of fossil fuels over time and replacing them with renewable energy (Razmjoo, Sumper, & Davarpanah, 2019). It is increasingly being considered to energy pattern and their use that can be sustainable in the future as necessary, given the growing problems regarding the potential social and economic impacts of climate change due to the combustion of fossil fuels. Accordingly, consideration was directed towards the prospects of non-fossil energy options, such as nuclear and renewable energy, and the possibilities of preserving fossil energy and sequestering carbon. The economic,

social, and environmental implications of developing a sustainable energy system are then explored. Some strategic technological options that await us in the future are identified (Elliott, 2003). The term sustainability is one of the widely spread terms in the current era and has It was put forward by international institutions (the International Monetary Fund and the World Bank) for developed and developing countries alike to address the problems facing the economies of countries, especially as they relate to the availability of clean energy sources mainly. Recent years have witnessed a growing interest by researchers, research centers, and international financial institutions in the topic of sustainable energy.

The rapid global economic growth in recent decades has become a heavy burden on the majority of countries in the world, creating two problems: an economic problem and an environmental problem. The first problem is that (fossil) energy sources may be exhausted shortly, and the other problem is the increase in emissions produced by fossil energy, which causes greenhouse gases. Here the relationship between energy and the environment began to take place in global energy policies, which helped in the emergence of the concept of environmental sustainability since sustainability requires considering the four pillars (economic, political, social, and environmental) of equal importance, so sustainable energy resources must be Economically viable, politically supported, socially just and environmentally acceptable (Mair-Bauernfeind et al., 2020). As a result, the global trend for countries and companies has been to focus on energy resources and emission reductions for sustainable development (Al-Fatlawi, Al Farttoosi, & Almagtome, 2021). That work to achieve sustainable energy leads to progress toward sustainable development goals. Therefore it has become essential to have a reporting system related to energy that combines theories and methods of accounting and economics to provide the necessary information for efficient energy management and to promote fully sustainable energy that the reporting system Energy (A. Almagtome, Khaghaany, & Önce, 2020). These measures report the facility's energy conservation and emission reduction activities to achieve sustainable economic development and protect natural resources. From the above, the researcher believes that the concept of energy accounting is a reporting system for the activities of the facility in the field of energy to provide information to stakeholders on energy efficiency and reduce emissions in line with the seventh goal of the sustainable development goals of the United Nations until 2030.

Energy accounting tracks energy flows into, through, and out of systems. The system can be defined at will: anything from the car to the US economy or the economies of several countries or the entire world. The more straightforward and specific the system, the more accurate the analysis. As the systems under study become more complex, generalized data must be used to reduce the computation size. If generalized data is unavailable, it should be estimated from indirect sources such as economic data and material flows. Resorting to generalized or estimated information causes errors of unknown magnitude and causes loss of detail (Energy accounting as a tool for policy analysis, 1976 book). Defined by Davis (2000) is a system for recording, analyzing, and reporting energy consumption and regular cost, which is critical to energy management and cost savings. Also, Bhattacharyya (2019) defined energy accounting as a balanced system that records, analyzes, and reports energy consumption and costs. It is necessary to effectively manage energy efficiency and know the components of energy costs. To help managers perform critical analyzes and develop effective cost management by sending data covering all energy-related elements, and he knew her. As a new branch of accounting, energy accounting comprehensively applies the theories and methods of economics and accounting. It accounts for and measures energy primarily for managing and controlling energy costs, spending on pollutant prevention and treatment, and energy conservation and emissions reduction benefits. Through accounting, to achieve the purpose of coordinating economic development and environmental protection. A. H. Almagtome, Al-Yasiri, Ali, Kadhim, and Heider (2020) defined it as an information system used to calculate, analyze and transmit energy

use daily in the facility's activities. The objective of this system is to improve the energy efficiency of the facility as well as to monitor the environmental impacts of all types of energy consumption activities. About what was mentioned in the definition of energy accounting, the researcher defined energy accounting as A regular information system for recording, classifying, measuring, analyzing, and reporting on energy use and improving its efficiency to monitor the environmental impacts (expenditures and benefits) of all types of energy consumption activities in the facility.

2. Functions of Energy Accounting

2.1 The function of managing and controlling energy costs

This function includes managing and controlling the cost of energy consumption within the economic unit, using modern tools and technologies, investing in energy, and using advanced management methods to achieve energy efficiency goals (DeCanio, 1993). At the end of the twentieth century, globalization, population increase, and the global trend toward sustainability had many adverse effects (Hameedi, Al-Fatlawi, Ali, & Almagtome, 2021). The provision of energy demand was the problem of modern humanity, as a result of which energy resources were exploited and needed to increase faster and searching for more efficient ways of energy, these problems led to the need to reconsider The unbalanced trend of energy consumption in a manner consistent with the concept of sustainable development, and the trend towards a new future of energy management with treatment directions through a clear identification to slow the depletion of fossil resources, use energy more efficiently, and increase the awareness of all energy users that they have to adapt to modern methods of work. These significant developments in energy management are highly complex, comprehensive, and interconnected with many different aspects of human activities. Therefore, it was necessary to reconsider the current regulatory laws and to adopt modern and appropriate administrative methods at the level of the economic unit and the national level in general. Social and economical). It keeps pace with modern science and management practices, which support the principles of sustainable development, and therefore indicate the need to develop special mechanisms for sound management of energy at all stages and levels in all time frames. Thus, modern energy management is “a kind of synthesis of the three exact sciences: energy industry, sustainable development, and management, which are interdependent and mutually conditioned” (Thollander & Palm, 2012). Another definition is: “A strategy of energy modification and improvement, using systems and procedures to reduce the energy requirements per unit of output while maintaining or reducing the total production costs from these systems (Krishna, Manickam, Shah, & Davergave, 2017). It turns out that the main purpose of energy management is to provide and maintain an optimum level of energy purchase and use in the activities of the economic unit, to reduce energy costs without affecting the volume of production and product quality (energy efficiency), and to reduce the environmental impacts resulting from energy consumption. It is worth mentioning here the definition of one of the essential critical tools of energy management, energy monitoring, as “the verification, monitoring, and analysis of energy use, including the submission of a technical report containing recommendations for improving energy efficiency with cost-benefit analysis and a plan of action to reduce energy consumption (Krishna et al., 2017). Here energy control will give direction to energy cost reduction, preventive maintenance, and quality control programs, which are essential for the production and ancillary activities. It also helps focus on variations in energy costs, the availability of energy supplies, decide on an appropriate energy mix, and

identify energy conservation techniques. Therefore, the importance of the link between energy management and one of its tools (energy control) to achieve energy efficiency and reduce emissions by defining energy expenditures and treating its emissions.

2.2 Energy expenditures and the prevention and treatment of pollutants.

` Energy costs and the percentage of pollutants generated by its activities. This function requires the accounting system to provide stakeholders with information on the economic, environmental, and social benefits that the company offers to society as part of its commitment to sustainable development and energy efficiency (Jassim & Challoob, 2021). Promoting energy conservation and reducing emissions is critical to achieving sustainable development worldwide. Where sustainable development strategies are considered, and it is an important policy, to achieve the objectives of the economic unit represented in saving energy and reducing emissions for its success in light of competition and the current changes in sustainable development. Since rising energy consumption is a significant cause of increased carbon dioxide emissions, managing energy efficiency is crucial to achieving sustainable economic growth while mitigating environmental and social impacts.

On the one hand, energy is the main driver of economic activities, and energy consumption has traditionally been viewed as an indicator of economic growth. On the other hand, "evidence indicates that there are causal links between energy consumption and the deterioration of environmental and social health, as a result of an imbalance between economic growth and the well-being of citizens and the environment" (the effects of energy management practices on energy efficiency and the reduction of carbon emissions). Energy consumption depends on growth and living standards, while economic reasons primarily drive energy efficiency. However, energy conservation is often less expensive than finding a new energy source. The economic proverb is that the cheapest way to produce a unit of energy is to conserve it. Recently, environmental quality deterioration has negatively impacted social welfare and can lead to economic decline due to global warming and climate change. This has reduced productivity and reignited interest in energy management (the effects of energy management practices on energy efficiency and reducing carbon emissions). Therefore, it was essential to find accounting systems for energy efficiency focusing on the analytical framework. And exploiting the advantage of a relationship between two leading energy indicators, the energy efficiency indicator and saving energy as a result of improving efficiency. Relying on the proposal of a technology that possesses several desirable characteristics and leads to the reduction of energy cost (accounting frameworks for tracking energy efficiency trends). It is a comprehensive critical performance. Without a report, it will be challenging to improve the economic unit because the user cannot see what is changing, where, and why it has changed. However, even with the reports, many things are considered to make the reporting system an easy-to-use tool so that users benefit from it and not just as a 'routine' measure from the energy team. B. Ang and Goh (2019) referred to two forms of modern accounting systems such as "Energy Efficiency Accounting Systems" (EEAS), which are used to track progress in energy efficiency at the economic level through a consistent framework that allows analysts to study energy efficiency at the sector level and aggregate the results on the level of the economy as a whole as well as "energy management accounting systems," which are distinguished from their predecessors as modified energy systems. The Energy Emissions Accounting System (EMAS) is presented in light of the growing interest in emissions accounting and pollution mitigation, as it quantifies changes in the sustainable energy share of total energy and separates transmission and distribution losses in the energy sector.

2.3 The function of saving energy benefits and reducing emissions.

This function involves disclosing information and the company's investments in pollution management and prevention, such as environmental management systems, environmental incentives, etc. Regardless of what information the energy accounting system provides, this system performs the steps that the accounting cycle would perform in the traditional accounting system. Of course, energy accounting includes all accounting procedures needed to measure and control energy costs and record expenditures related to pollutant prevention and disposal. Moreover, energy accounting is concerned with providing information on the benefits of environmental protection activities and reducing the level of emissions of energy consumption. An energy-efficient accounting system can encourage companies to take an interest in measuring the social and environmental activities of the organization in conjunction to maximize profits. This topic is challenging for the energy team. If there is power management software, make sure there are associated reports. The goal is to show results to those who work to get them. Due to the diversified development of the economy and the trend towards a sustainable economy, the needs of information users for the information of the economic unit are gradually diversifying, and the disclosure of energy accounting information can meet the needs of different stakeholders. One of the stakeholder engagement tools is sustainability disclosure, often in the form of a report. Tiago Alberto (2012) argues that the report submitted to senior management will not be the same as the report sent to the OSB product line operator. Reports must be personalized, simple, and concise and contain pictures, graphics, benchmarks, and simple results. The goal is to create an everyday tool for those who want to be effective, using the re-dependence on the resources of different stakeholders, which leads to the development of different relationships with stakeholders and, therefore, appropriate resources within the economic unit to implement the participatory strategies that are being formed, responding to or engaging. Such a government entity should assess the capital and economic strength of the economic units and know its orientation in energy conservation, emission reduction, and environmental protection. To comprehensively measure energy efficiency, emissions reduction, and profit creation efficiency. An orientation toward developing an interest in energy and a willingness to improve over time. Economic unit customers also need to know if their products are "environmentally friendly" by obtaining energy accounting information (Maznan, 2021). On the other hand, the disclosure process will lead to the following five characteristics; (1) direct communication with (2) a broad and clearly defined set of primary and secondary stakeholders, (3) direct feedback collection, and (4) inclusive of a wide range of stakeholders, and (5) Therefore, in-depth use of stakeholder engagement for learning. Since the evidence points to high energy consumption as the main reason for the increase in carbon dioxide production. Delmas and Montes-Sancho (2011) argue that the Environmental Management System issued by the International Standards Organization (DIS14001/ISO). The Environmental Management and Audit System issued by the European Union (EMAS/ EU) is one of the most important and common environmental management systems. Also, energy efficiency management is one way to achieve more sustainable economic growth while simultaneously reducing environmental and social impacts. On the one hand, energy has been a critical driver of economic activities, and high energy consumption has traditionally been seen as a sign of strong national economic growth (Tugcu, Ozturk, & Aslan, 2012). On the other hand, evidence suggests causal links between energy consumption and environmental and social health deterioration. Some countries have been wary of making sharp changes that upset the balance between economic growth, the well-being of their citizens, and the environment (J. B. Ang, 2008). There are many investment opportunities in the energy sector. Their impacts can reduce energy consumption, reduce pollution and waste generation, manage time and traffic issues, and invest in more compact cities. This will lead to an increase

in energy efficiency, money generation, and sustainable growth in ESDM. The cost benefits of ESDM can be achieved by switching to alternative energy sources such as wind and solar. This would help reduce carbon emissions. expert input Relevant Environmental Indicators Reducing resource consumption and related impacts (e.g., materials, fuels, land, etc.). Sustainable development in ESDM can help reduce resource (raw material) consumption and manage negative environmental impacts such as fossil fuel conservation and land management (Abed, 2021; Alsafar, 2021). Carbon performance metrics are influenced by the scope and quality of the accounting approach, the input data, and the accounting standard applied. Currently, there are several carbon management accounting approaches for organizations facing the complexity of developing carbon measurement and accounting systems.

Carbon management accounting includes the recognition, non-critical assessment, and monitoring of greenhouse gas emissions at all levels of the value chain and the recognition, assessment, and monitoring of the impacts of these emissions on the carbon cycle of ecosystems (AL-BSHERAWY, 2021; Al-Hadrawi & Al-zurfi, 2021). More specifically, we identify three main types of carbon management accounting used for various purposes: corporate carbon accounting, product carbon accounting, and project carbon accounting (for a discussion of the scopes of carbon accounting. Enterprise carbon accounting was developed to measure and analyze a company's carbon emissions as a legal entity and to help set carbon emissions reduction targets (Burritt et al., 2011). The first regulatory carbon accounting standard was issued in 2001 under the GHG Protocol, revised in 2004, and completed in 2011 (GHG Protocol, 2001; GHG Protocol, 2004; GHG Protocol, 2011a). It is the most widely used to date. In parallel with the prevailing standard, several other regulatory carbon accounting approaches have emerged: An EU (2010) report finds 30 “key” accounting approaches for greenhouse gases in use globally (Enterprise Risk Management, 2010). Among these other 30 primary methods, you can Find the French ISO 14064 "Bilan Carbone" or later "company life-cycle assessment" used in Puma's "Environmental Profit and Loss Calculation" and Accor's carbon footprint. These methods are based on location-focused accounting or carbon emissions streams such as mobile combustion emissions. This regulatory carbon accounting approaches attempt to capture direct and indirect emissions from Scope 1 to 3 (as defined in the Company's Greenhouse Gas Protocol standard). The numerous attempts to account for carbon clearly show that although the corporate standard for the GHG protocol is currently the dominant carbon accounting standard for external carbon reporting (carbon management accounting and reporting in practice).

3- Importance of Energy Accounting

Due to globalization, rapid development, and population increase, environmental pollution has become a concern in all parts of the world. In addition, the increasing demand for fossil fuels and the price of fuel extracted from them is rising, so sustainable energy has become more critical. Due to the different sources of fuel, as well as the number of carbon emissions according to energy sources, it has become essential to provide a system for energy consumption and measure its efficiency, that is, use Optimizing energy, measuring local pollution, and reducing emissions, consistent with the standards of the Global Sustainability Reporting Initiative (GRI) (302 and 305) to meet the needs of management and increase the competitiveness of the facility in the business market by providing appropriate information to the needs of stakeholders. The problem of energy and environmental pollution has recently increased since energy is one of the fundamental sources of economic development and the cornerstone of economic and social sustainability. But with the financial and population growth, the energy problem and the increasing environmental pressure became more serious.

Table 1. Global Energy Consumption (2000-2020)

Year	Oil	Gaz	Coal	Nuclear Energy	Hydropower	Bioenergy	Other sustainable energy
2000	36.4	20.9	22.8	6.7	2.4	10.3	0.5
2005	34.9	20.5	25.3	6.3	2.4	10	0.6
2010	32.3	21.5	27.2	5.6	2.5	10	0.9
2015	31.3	21.6	28.1	4.9	2.5	10.1	1.5
2018	31	23	26	5,1	2.6	10	1.8
2020	33	23.2	26	4.3	2.4	8.2	1.9

Oil ranked first in the world's primary energy consumption in 2020 with 33%; secondly, coal, which accounts for 26%; Third natural gas, with 23%. The three conventional fossil energy sources accounted for 82% of the world's total primary energy consumption in 2020. More importantly, compared to 2010, the proportion of oil, coal, and natural gas in the world's primary energy consumption has not changed significantly. The percentage remained at 80% after only ten years. The increase in oil consumption was 0.7 percentage points, but the rate of coal decreased by 1.2 percentage points, and the percentage of natural gas increased by 1.7 percentage points. Compared to the same year, there is a higher consumption of coal and natural gas and a decrease in the consumption of nuclear and hydropower. Therefore, with all its emissions and environmental impacts, fossil energy remains the world's main energy source. Oil, coal, and natural gas are the core of energy and development in the global economy. The dominance of fossil energy sources is expected to continue in the short term, with a gradual shift in dependence on sustainable energy sources in the long term. Table 2 shows a forecast of global energy demand up to 2040.

Table 2. Forecast of global energy demand to 2040

power source	2010	2019	2030	2040
oil	4117	4525	3963	3006
Natural gas	2755	3340	3312	2943
coal	3650	3775	2243	1295
nuclear	719	727	895	1126
aquatic	296	370	475	575
Biomass	1205	1354	1283	1682
Other renewable resources	110	314	1207	2393
sum	12852	14406	13378	13020
fossil fuel ratio	81.8%	80.80%	71.14%	55.63%
Nuclear Power Ratio	5.59%	5.04%	6.69%	8.65%
Percentage of other renewable energy sources	12.61%	14.16%	22.17%	35.72%

From the observation of Table 2 above, it is clear that oil, natural gas, and coal (fossil sources) are currently the main sources of human consumption of energy. This shows that the world's energy is still in the age of conventional fossil energy. A lot of effort is saved to achieve a fundamental change in the structure of global energy consumption. In addition, there is a slight change toward using sustainable energy sources, but this change is prolonged. Therefore, many countries impose strict environmental policies toward reducing emissions and increasing energy efficiency. The shift toward using sustainable energy is part of the policies of the sustainable development goals in the world. As it is known that industrial facilities are the largest consumer of energy, therefore, a policy of energy conservation and emission reduction must be imposed on them. As an essential part of energy efficiency management, the accounting function reflects the measurement and control involved in decision-making. Therefore, combining energy issues with accounting issues is necessary to build a theoretical framework for energy accounting.

On the other hand, a development in the implementation of energy accounting can obtain the available information about the energy consumption of the facilities so that emissions reduction goals can be formulated by recording and classifying the most relevant and scientific data and a more comprehensive roadmap for energy conservation and saving, and reducing the number of emissions more reasonably to achieve sustainability goals. Therefore, the state of sacrificing environmental resources for economic growth can be changed, and the sustainable development of environmental protection and economic growth can be promoted, which leads to the development of the national economy and the creation of health resources for the community. In particular, the standards relating to measuring and reporting energy resources and striving for the accounting system to accommodate the various aspects of the organization's activities, including energy issues.

4. Renewable Energy Performance

With high energy consumption, nearly 80% of global energy demand is still supplied by fossil fuels, which is estimated to grow significantly in the future, meeting the UN Sustainable Development Goals Until 2030 (Child, Koskinen, Linnanen, & Breyer, 2018). It has become essential to provide energy security and demand, reduce waste of resources, achieve social welfare and also reduce or prevent emissions because they are the main cause of global warming and pollution, so this was the time to work on energy systems to meet energy requirements by enhancing The three buildings (economic, environmental and social performance). The energy system takes a prominent role in determining the economic progress of developing economies such as Iraq, the failure of economic units to address issues of energy conservation and reduce its production costs means its extinction, so economic units must work to control the security of energy and energy management while striving to reduce emissions and enhance energy in the long term.

In this sense, it is becoming increasingly important for policymakers and professional organizations to have an orientation toward sustainable development of energy systems in their use and management of energy consumption and demand aspects in developing economies (Santoyo-Castelazo & Azapagic, 2014). To understand sustainable development in energy systems, present and future generations' demands for energy development and management must be met (Shortall, Davidsdottir, & Axelsson, 2015). Thus, it has become essential to know the concept of sustainability in energy system development and management (ESDM) to replace energy from fossils with sources of Appropriate sustainable energy by enhancing infrastructure capacity (Kumar et al., 2017). Moreover, embedding sustainability in energy use and management of energy systems not only helps in improving energy efficiency but also helps

in the production of energy from waste using diverse, advanced, and innovative methods and processes in modern manufacturing as in circular economy systems. The latter works to conserve resources in the economy for the longest possible period. Changing the energy mix, such as reducing fossil energy consumption and shifting towards renewable energy, recycling waste, reducing emissions, etc. (Ghosh, 2020). The sustainable growth scenario produced by Shell International in 1995 was very impressive. He suggested by about 2060. Renewable energy sources could meet about half of the global energy needs. Other studies have indicated that, by the year 2100, renewable energy sources may complete more than 80% of global energy (Elliott, 2003). In the same context, renewable energy is the most significant part of the circular economy activity. The circular economy provides opportunities for economic units to improve their business activities while promoting the 12 Sustainable Development Goals (Kravchenko, McAloone, & Pigosso, 2019). Fear that the symptoms of unsustainable energy practices will haunt us from the environmental damage caused by excessive energy use in the future (Bhattacharyya, 2019).

Sustainable energy refers to using energy in a way that "meets the needs of the present without compromising the ability of future generations to meet their own needs." Jefferson also defined it as a living harmony between the equitable availability of energy services for all people and the preservation of the earth for future generations. Sustainable energy Effectively provides energy to meet the needs of the future without compromising the ability of future generations to meet their own needs. (See sustainable development). Sustainable energy consists of two main components; Renewable Energy and Energy Efficiency. Robert Solo defined sustainable energy as "not harming the productive energy of future generations and leaving it as the current generation inherited it." But we must pay sufficient attention to the quality of the environment it leaves for the future. (The strategy of renewable energy in Algeria and its role in achieving sustainable development, Sanaa Samaid,)

Sustainable energy can be defined as a form of energy that can be used multiple times without putting the source at risk of depletion, expiration, or disappearance. Cohen et al. (2018) defined Sustainable energy as energy sources that are not expected to be exhausted in a time frame relevant to humankind; Therefore, it contributes to the sustainability of all species. This definition of sustainable energy and the previous definition of renewable capable energy are typical definitions of both terms. It closely matches the definitions given by the Internet encyclopedia Wikipedia. However, these definitions reveal a difference in the significance of the two terms. More importantly, Wikipedia (2008) includes the word nuclear in the sources identified as sustainable energy sources. However, as Wikipedia adds, there is debate about whether nuclear sources should be considered sustainable for social and political reasons. However, nuclear energy is not sustainable at the current technological stage because it needs uranium, a scarce resource within the appropriate time frame. The researcher believes that sustainable energy is the source of inexhaustible energy that does not cause long-term damage to the environment, responds to the needs of the current generation without compromising the ability of future generations to meet their needs, and is not expected to be exhausted within a specific time frame, such as hydroelectricity, solar energy, wind energy, wave energy, Geothermal energy, artificial photosynthesis, tidal energy, as well as energy efficiency technology. The sustainable energy systems discussed in the following sections consist of:

1. Sustainable energy consumption is understood as conserving energy and reducing energy use and efficiency.
2. Sustainable energy generation is understood as the provision of renewable energy.
3. The sustainable energy distribution is understood as equal and safe access to energy resources.

The future of sustainable energy sees the spread of energy services to reach disadvantaged populations, the practice of rational pricing strategy, and structural reform

measures to ensure that technology transfer is facilitated and financed (2). In addition, the social component of sustainable energy can be expanded to include community participation, affordability, social acceptability, lifestyles, and aesthetics 3) (2018, Sayed Faleh 3).

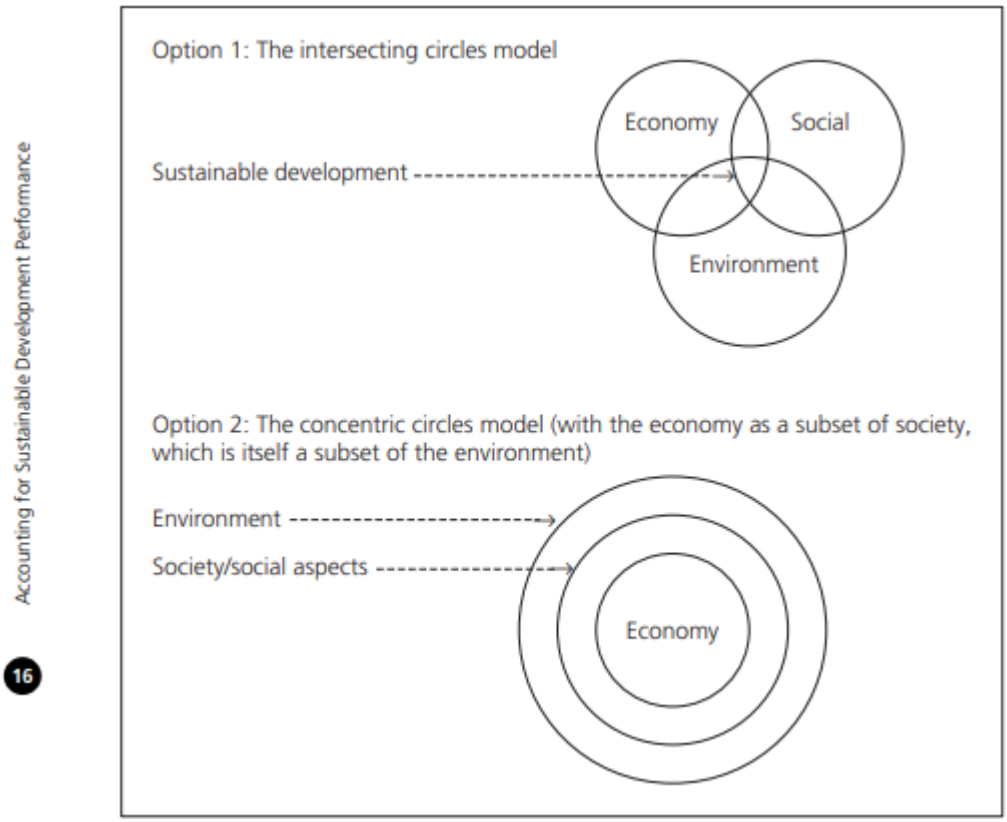

Figure 1. Components of Sustainable Development

Renewable energy is a term describing a large group of energy sources that do not run out with use, such as (solar energy, wind, and tidal energy, as well as bioenergy), which is energy that comes from natural, renewable, and non-exhaustive as it is called green energy and differs fundamentally from fossil fuels (oil, gas, coal or nuclear fuel). It is clean and renewable energy, as it does not result in waste that harms the environment, such as carbon dioxide emissions or any harmful gases that increase global warming, as happens in the combustion of fossil fuels. The increasing demand for energy consumption, avoiding the global energy crisis, preserving its diminishing sources, and protecting the environment from emissions from fossil energy consumption (Kadhim & Al-Ghezi, 2021). Providing the global needs for sustainable energy (heating, electricity, etc.) is considered one of the biggest challenges facing man in the current century. About one billion people worldwide lack access to electricity, and about 3 billion people depend on other types of fuel (smoke) such as wood or animal waste for cooking. These species, in addition to fossil fuels, are the main contributors to carbon emissions, which cause the death of about seven million people annually. Energy production and consumption emit more than 70% of human-caused carbon dioxide emissions. The proposed methods describe ways to reduce global warming to approximately 1.5 degrees, a rapid transition to clean energy for electricity production, and a shift towards more electricity use in other sectors such as transportation. The avenues also include reducing energy consumption; and using low-carbon fuels, such as renewable electricity or carbon dioxide capture and storage. Reaching these goals requires policy changes at the micro and macro levels (economic units and

countries), including carbon pricing, energy policies, and the phasing out of fossil fuels. The term "sustainable energy" when referring to methods of energy production is used interchangeably with the term "renewable energy." Generally, renewable energy sources (such as wind, solar, and hydropower) are sustainable. There is much debate about whether nuclear energy is sustainable. Moderate amounts of wind and solar energy - non-continuous sources - can be integrated into the electric grid without additional infrastructure such as grid energy storage. These sources generated 7.5% of electricity worldwide in 2018, which has grown exponentially. As of 2019, wind, solar, and battery costs were expected to continue to decline. From the researcher's point of view, the pursuit of this is worth it, but the journey will be long and arduous, with many challenges, doubts, and errors that will teach us valuable lessons for the pursuit of energy sustainability while promoting local, national, regional and global responsibility for a sustainable future.

Conclusion

The issue of sustainable energy occupies prominent and continuous importance due to several factors that constitute the environment as one of the three interrelated pillars of sustainable development, namely, environmental protection, ecosystem management, clean energy, sustainable production and consumption patterns, mitigation and adaptation to the effects of climate change, are broad goals of sustainable development and requirements its essential. Environmental considerations are fully rooted in the United Nations 2030 Agenda. They are reflected in the set of goals, targets, and indicators, both as a cross-cutting issue and a development priority. Over half of the SDGs have an environmental focus or address sustainability concerns. In contrast, more than 86 of the 169 SDGs relate directly to the environment, including at least one in each of the 17 SDGs. This means that No single goal can be achieved significantly without paying particular attention to implementing the environmental dimension. A sustainable environment is a prerequisite for social and economic development. The natural environment provides direct sources of food that support human health and well-being, income, job creation, poverty alleviation, and inequity reduction. An environment that increases the effects of climate change can reverse the adverse effects and reduce or negate the development gains achieved over previous periods. Hence, at a later stage, it enables the management of these companies to take appropriate decisions in enhancing the strengths in their work and addressing weaknesses in financial performance, and the positive role that an integrated report presents (financial and non-financial indicators) in achieving sustainable development throughout the country. Therefore, the impact of sustainable energy indicators on the financial performance in developing countries to achieve sustainable development has become very important.

Therefore, the establishment and improvement of the energy accounting system lead to achieving the overall balance of the facility in production and business activities. Enterprises no longer only take direct production costs but also consider all aspects of production costs, environmental management costs, resource use, etc., which can effectively enhance the accounting treatment of enterprises to become more rational, scientific, and objective. Therefore, enterprises must establish and improve a system for Energy Accounting, which helps facilities better monitor energy consumption, implement energy conservation measures, and reduce emissions. At the same time, the facilities can control the consumption of energy costs to reduce the cost against achieving the facility's objectives. In general, better data quality can enable better cost management, a clearer picture of the organization, and better strategic decision-making, thus improving the company's competitiveness.

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