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The Macroeconomic Role of New Energy Sources in the Transition of Global Energy Structure

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Abstract: This paper looks into the changing world scene of energy with respect to shifts from traditional to new energy sources. When the trends are examined against the backdrop of rapid industrialization, technological breakthroughs, and globalization, it is noticeable that traditional energy sources have major environmental impacts, including greenhouse gas pollution and various health risks. The study demonstrates that new and renewable energy options such as solar, wind, hydro, and geothermal power could play a leading role in reducing climate change effects and improving air and water quality. The discussion on the macroeconomic influences of these new energy sources, particularly on power generation and the automotive sector, can be seen as having transformative potential in supporting sustainable development objectives. Although the article acknowledges the growth in this sector, it also pinpoints impediments that hinder the new energy technologies, including technological youthfulness, limited infrastructure, and intermittent supply of energy. The strategy recommended as a whole consists of enhanced investment in research and development; a joined approach of politics; edification programs; and public promotion with an aim to solve these difficulties and to hasten the process of global transition into a sustainable energy sphere. The study indicates that while environmental concerns should be balanced against economic development and societal benefits when shaping future global energy systems.

Keywords: new energy sources, traditional energy sources, electric vehicles, energy transition

1. Introduction

In an era defined by rapid industrialization, technological advancements, and globalization, environmental protection becomes a vital issue in the earth. One of the main topics people are familiar with is new energy sources. Many traditional energy sources, such as coal and natural gas, release significant amounts of greenhouse gasses when burned for energy production. New and renewable energy sources, such as solar, wind, hydro, and geothermal power, produce electricity with lower or zero emissions, helping to mitigate climate change by reducing the overall greenhouse gas footprint. Also, traditional energy sources can lead to air and water pollution through the release of pollutants such as sulfur dioxide, nitrogen oxides, and mercury. Thus, transitioning to cleaner energy sources reduces these pollutants and improves air and water quality, which, in turn, has positive effects on human health and ecosystems [1]. Also, the growth of new technology of also motivates economics which is shown in different aspects microscopically and macroscopically. Now, the seventh of the

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United Nations' seventeen Sustainable Development Goals specifies what energy people need. Goal 7 revolves around making clean and affordable energy accessible for everyone because this is one of the prerequisites to bring agriculture, commerce, communications, education, healthcare, and transportation to the desired level. [2]. Also, different government in different countries implement laws and policies to motivate civilians to use clean energy and buy new energy products. The effort to create and enforce laws and policies on clean energy use is supported by many governments. The aim of such regulatory measures is, in most cases, to encourage the public to take up clean energy options and other innovative energy products. In addition, these initiatives may include the provision of financial incentives such as tax credits or subsidies for clean energy installations, requirements for stringent emissions standards to incentivize eco-friendly technology adoption, and mandates promoting the integration of renewable sources with the national power grid. The essay posits that government intervention plays a central role in steering societal behavior towards sustainable energy practices, which is also consistent with a global trend towards environmental stewardship and the search for more efficient alternative energy forms [3, 4].

2. Traditional Energy Sources

Most of the time, fossil fuels like coal, which are extracted from mines and burnt to provide power to much of the planet, crude oil sourced by drilling holes into the earth's crust and then separating it by refining into different types of oils we use as fuel, and natural gas such as methane make up traditional energy sources. Those traditional energy sources not only have pushed the industrial revolution massively, but played a vital role in the development of global economy by providing consistent and abundant energy supply. However, traditional energy sources are nonrenewable and detrimental to the environment, which is one of the reasons why companies, enterprises and countries are urge to change it to new energy sources. What's more, mining is a dangerous industry, which a lot of people died from producing traditional energy sources accidentally every year. Despite as the development of mining technology, machines have been updated and techniques have been renewed, there are still some potential dangers and hazard causing by human element or inevitable factors. For example, mining disasters caused by gas and dust explosions, human error and natural factors is always happening all over the world, like the Inner Mongolia mining disaster in China in February 23, 2023. This accident caused more than 50 people missing and four people died [5]. What's more, in mines, there are toxic gases like carbon monoxide. Miners will thus be poisoned by those toxic gases. Also, dusts in mines may cause a disease called coal workers' Pneumoconiosis, which is a lung function impairment, can easily kill miners within a period [6].

Moreover, the reliance on traditional energy sources has contributed significantly to the development of nations and the expansion of global trade. Fossil fuels have powered transportation systems, enabling the movement of goods and people on a massive scale. The petrochemical industry, dependent on fossil fuels, has been a cornerstone for manufacturing various products, including plastics, fertilizers, and chemicals, which have become indispensable to modern economies.

3. New Energy Sources

3.1. Macroeconomic Impact

Now, new energy has greatly affected people's lifestyles in various aspects. With the popularity of Sustainable Development Goals, environmental protection has become a living habit of people, and people are therefore more inclined to clean energy. For example, with the increase in global environmental awareness and the restrictive policies implemented by countries around the world on traditional fuel vehicles, new energy has become an important development trend in the future automobile industry. In addition, changes in the international energy situation, such as rising oil prices,

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have prompted governments of various countries to take measures to protect natural gas companies and also promoted the development of new energy. In order to cope with climate change and enhance the security of new energy, countries around the world are actively developing and promoting new energy. New energy vehicles have become the main development direction due to their environmental protection characteristics. China has become the world's largest new energy vehicle market, with a huge number of new energy vehicles. European countries and the United States are also gradually increasing investment and support for new energy vehicles, especially the promotion of electric vehicles. Moreover, the share of the Ministry of Renewable Energy in new global power generation is increasing year by year, showing the strong momentum of new energy development. The rapid popularization of new energy vehicles not only improves residents' lives, but also creates problems in energy, environmental protection and other aspects. Based on the study, it was found that the consumption of oil in the global transport sector makes up nearly 60% of its demand. Taking China as an example, its dependence on foreign crude oil reaches 50%, and more than 60% of the crude oil consumption in the United States comes from imports. This fact positively shows the development prospects of new energy sources because they are affected by various factors such as environmental awareness, international energy policy, and technological innovation. At present, new energy vehicles have become one of the main directions for the development of the global automobile industry [7]. With technological innovation and changes in social understanding, the prospects of new energy are very broad.

New energy vehicles' development will generally follow the two major trends of energy conservation, which is basically reducing total energy consumption and environmental protection by reducing pollutant emissions, and gradually replacing traditional energy sources. For example, The car population in China is anticipated to peak at 140 million by 2020. Through this process, the potential amount of oil saved will be about 32.29 million tons. By replacing that used by 31.1 million tonnes, the net result will be a total saving of 63.39 million tons of oil. This is estimated to reduce the consumption of automobile oil by approximately 22.7%. One forceful example is the emissions level of the Toyota Prius hybrid vehicle, which has sold more than 3 million units worldwide and has also reached the ultra-low emission level standard. Moreover, the overall fuel consumption is only 5.1L/100km, which is only 2/3 of an internal combustion engine vehicle with the same displacement [8]. For severe hybrid models, the ratio of the peak power of the motor to the total power is generally greater than 30%. Compared with the two types of mild hybrid models and moderate hybrid models, the heavy hybrid model has a more obvious effect in reducing carbon dioxide emissions and saving fuel. The fuel consumption of a heavy hybrid vehicle is about 30% to 40% lower than that of a gasoline engine of the same performance; while the carbon dioxide emissions are reduced by up to 30%. Therefore, new energy vehicles have brought great improvements to humans' lives. Comparing new energy vehicles and traditional internal combustion engine vehicles by the battery types, battery costs, production costs, technology costs, auto parts costs, vehicle usage and mobility, infrastructure, energy costs and international carbon dioxide prices, it is concluded that pure electric vehicles cost more than internal combustion engine vehicles, which means in order to make profit, the prices of pure electric cars will not be as low as people expected in several years. However, there are still some positive outlooks for the future new energy vehicle industry by new energy vehicles' strong potential of electric vehicles due to the development trend of battery technology, the gradual improvement of infrastructure such as charging piles, the support of national policies, and the higher efficiency of its vehicle power system [9].

The new sources of energy have also led to a rise in employment and unemployment worldwide. The shift towards new energy innovations has an effect on the labor market that is real and will be felt strongly. As renewable sources gain preference, the demand for fossil fuels may drop, resulting

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in job cuts from coal, oil, and gas sectors. In renewable energies, the application of sophisticated automation systems ensures improved work processes with minimal manual labor requirements.

The increased competition that clean energy might introduce to the market could reduce the profits made by traditional power generation companies, resulting in smaller scales and fewer employees. Additionally, government policies aimed at promoting clean energy and reducing carbon emissions could potentially involve regulations or incentives that may harm the traditional energy sector and lead to job losses. Even more importantly, a reallocation of investor preferences toward sustainable investment could result in less financing for the energy sector, with a domino effect leading to fewer job opportunities in the field. Moreover, in the renewable energy sphere, there is an emerging demand for skilled technicians and engineers who are needed to implement and maintain solar panels and wind turbines. The numbers continue to rise for professionals in energy audits and smart grid implementation as governments and businesses invest in their goals towards achieving efficiency in energy programs such as building retrofits. Additionally, jobs are also created in the manufacturing industry, research and development, and infrastructure deployment of charging stations through the electric vehicles sector. Energy storage is a new area that calls for skills in battery technologies and creates a job market for scientists and engineers. While the old fossil fuel industry is struggling, it has been suggested that there should be workforce transformation programs to provide people with the skills needed in this evolving energy field. It is argued that the transition to the new energy sources is contributing to the increase of employment possibilities in a range of different skills and sectors. By 2030, with full-scale utilization of all new energy sources, the greatest growth in employment will occur in the sectors of electrical efficiency, power generation, and automotive industries. These three areas, along with grid modernization, are projected to create 75% of the total 13.3 million jobs. In contrast, the use of other energy resources like bio-energy and end-use renewable energy also promotes job creation along the supply chain, from innovative technologies to critical minerals, which amounted to 3.3 million jobs altogether, compensating for the 2.7 million losses in the fossil fuel sector, plus another 300,000 anticipated job losses in the power generation industry [10].

3.2. Challenges

Nowadays, new energy technology is not very mature. The cost of most new energy vehicles on the market is about 10% higher than that of fuel vehicles. The production of new energy vehicle parts is weak, the infrastructure is not perfect, and new energy is intermittent and volatile. Storage and transmission are different problems. For example, in China, the number of charging piles for new energy vehicles cannot meet the demand. In this way, the cost of producing new energy vehicles should be decreased while boosting the new energy vehicles' sustainability and utilization capabilities, which are the most essential ways to solve these problems. Moreover, energy conversion is very challenging, because for some large-scale projects, factories, and equipment, it is very complicated to convert to new energy in a short time and use it effectively. This may lead to delays in work progress, economic losses, loss of talent, major mistakes caused by people's unfamiliarity with new energy systems, and some more far-reaching effects.

3.3. Suggestions

One of the ways in which new energy sources can be rapidly and effectively harnessed globally is through the following ideas. First and foremost, an increased amount of money should go into research and development, which will ultimately facilitate breakthroughs in renewable technologies, energy storage systems, as well as grid infrastructure. The governments and industry stakeholders ought to work together in order to design enabling policies such as incentives, subsidies, and regulatory frameworks to enhance adoption of clean energy solutions. As part of the approach, there

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should be priority given to education and training programs for fields in renewable energy so that such industries will produce a skilled labor force that can drive innovation and implementation.

In addition, public campaigns can also be effective in mobilizing support for clean energy projects and in popularizing a broad sense of the ecological, as well as economic advantages. Furthermore, the development of international cooperation and knowledge exchange will increase the pace of the global shift to sustainable energy. Ultimately, a holistic, collaborative approach involving technology, policy, education, and public engagement efforts is critical to the success and widespread development of new energy sources.

4. Conclusion

To summarize, this paper seeks to study how the world is shifting from old to new energy sources during this phase of fast industrialization, technological developments, and globalization. The research highlights the strong environmental impact of traditional energy, mainly focusing on their emission of greenhouse gas pollution and many health problems. The study supports the implementation of alternative and renewable energy resources such as solar, wind, hydroelectricity, or geothermal power stations that are important stakeholders in combating the effects of climate change as well as in enhancing air and water quality.

The macroeconomic repercussions of these innovations in the field of power generation and transportation are explained through a lens of how they can contribute to sustainable development. After highlighting their evolution, the paper addresses various obstacles, including their lack of technological maturity, weak infrastructure, and unstable energy supply. In order to address these issues and accelerate the pace at which the world is transitioning into a sustainable energy sphere, the recommended path entails an increased level of research and development funding, a collaborative political approach, educational programs, as well as public promotion. The essay concludes by stating that there should be a fine balance between taking environment-related considerations into account while planning future global energy systems along with societal benefits from such a system.

To put it all together, the major shift towards new energy resources in the world is a fundamental answer to the great risks created by the use of traditional energy systems. Fossil fuels can result in negative outcomes on the environment with emissions such as greenhouse gases and pollution, which, in turn, require the utilization of cleaner and renewable sources. The macroeconomic effect of new energy sources, especially within the automotive industry and power generation system, is the changeability as well as the capability of these technologies. Nonetheless, obstacles such as new energy technology immaturity, infrastructure constraints, and intermittent issues remain to be studied so that improvement can be sustained. Adopting these recommendations will not only reduce the environmental impact of energy production, but will also help economic growth, create jobs and improve the quality of life in communities around the world.

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