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Renewable energy: review of the competition, challenges and solutions and achieving the sustainable use

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ABSTRACT
Recently, the encourage to use of renewable energies sources like solar radiation, wind and hydro-power has become more wide. Currently experiencing a worldwide competition to develop the techniques that are used to convert renewable energy sources into electrical energy, ventilators PV panels, wind parks and solar applications and others techniques. Renewable energy is refer to energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves,
and geothermal heat [13]. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services [18]. REN21's 2014 report shows that renewable contributed 19% to humans' global energy consumption and 22% to generate the electricity between 2012 and 2013, respectively. This consumption can be divided as 9% coming from usual and traditional biofuel , 4.2% as heat energy (non-biofuel), 3.8% hydro electricity and 2% is wind`s electricity, solar, geothermal, and biofuel.

I-INTRODUCTION

The global energy landscape is undergoing a profound transformation, driven by the twin imperatives of climate change mitigation and energy security. Renewable energy, derived from inexhaustible natural resources, has emerged as a cornerstone in this shift. This paper delves into the competitive dynamics, challenges, and potential solutions within the renewable energy sector, ultimately exploring the path towards its sustainable utilization.

The escalating concerns over greenhouse gas emissions and the finite nature of fossil fuels have catalyzed a surge in investments and research into renewable energy technologies. Solar, wind, hydro, geothermal, and biomass power have witnessed significant advancements, making them increasingly viable alternatives to traditional energy sources. However, the transition to a renewable energy-dominated future is not without its hurdles.

This paper aims to provide a comprehensive overview of the competitive landscape within the renewable energy industry, identifying key players, their strategies, and emerging trends. It will also scrutinize the multifaceted challenges hindering the widespread adoption of renewable energy, including technological limitations, economic constraints, grid integration issues, and policy barriers.

Crucially, this study will explore innovative solutions and strategies to overcome these challenges, fostering a conducive environment for the growth of renewable energy. It will delve into technological breakthroughs, policy frameworks, financial incentives, and collaborative efforts that can accelerate the transition to a sustainable energy future.

Ultimately, the paper will examine the broader implications of renewable energy adoption for achieving sustainable development goals. By analyzing the environmental, economic, and social benefits of renewable energy, it will highlight the critical role it plays in building a resilient and equitable society.

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In conclusion, this paper seeks to contribute to the ongoing discourse on renewable energy by providing a nuanced understanding of the competitive dynamics, challenges, and opportunities within the sector. By identifying potential solutions and emphasizing the importance of sustainable utilization, this study aims to inform policymakers, industry stakeholders, and researchers in their pursuit of a cleaner and more sustainable energy future.

II . MATERIAL AND METHODS

1.1 Hydro dams power:

Hydropower is the energy (electrical energy) that generated from hydroelectric power potential and turbines . It is a clean energy eco-friendly and widely used in the global scale. Hydroelectric energy is a term usually reserved for large-scale hydroelectric dams fig. (1). Moreover, Micro hydro systems are hydroelectric power installations that typically produce up to 100 kW of power. It can be also used in water rich areas as a remote area power supply . 19th century, hydropower became a source for generating electricity. Cragside in Northumberland was the first house powered by hydro-electricity in 1878 [5]. Hydropower is produced in 150 countries, with the Asia-Pacific region generating 32 percent of global hydropower in 2010. For counties having the largest percentage of electricity from renewable, the top 50 are primarily hydroelectric. China is the largest hydroelectricity producer, with 721 terawatt-hours of production in 2010, representing around 17 percent of domestic electricity use. There are now three hydroelectricity stations larger than 10 GW: the Three Gorges Dam in China, Itaipu Dam across the Brazil/Paraguay border, and Guri Dam in Venezuela [27].

Figure (1): hydro dam electricity project.

1.2 Biofuels or biomass:

Nowadays, several materials and methods were being study investigate their validity and characteristics to be a good alternative to fossil fuels , especially petroleum derived fuels. Some of the most popular ones being investigated are various oils either pure, or as admixtures in suitable proportions with conventional fuels, ethanol, glycerol, biodiesel, and hydrogen. Liquid fuels generated from coal via the Coal to Liquid (CTL) technology can also serves viable alternative to the conventional gasoline or diesel [16].

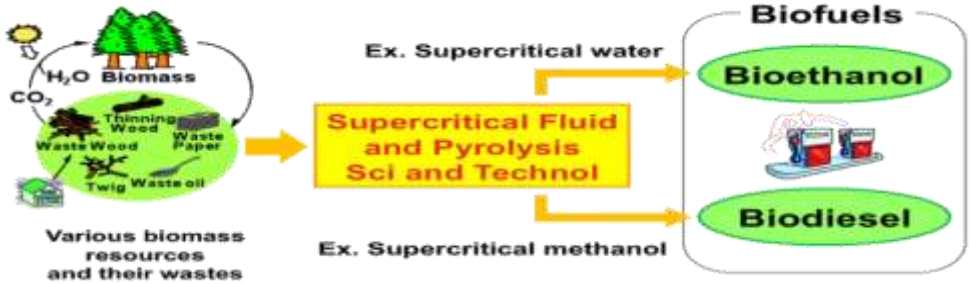

Figure (2): the creation of biofuel from waste

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Vegetable oils (various kinds of vegetables) are lipids derived from the plants. Unpolluted vegetable oils, also blends of these vegetable oils with conventional fuels, have attained importance as possible alternatives to the conventional fuels on account of the triglycerides of fatty acids content present in these oils, which can give useful hydrocarbons upon thermal cracking [10].

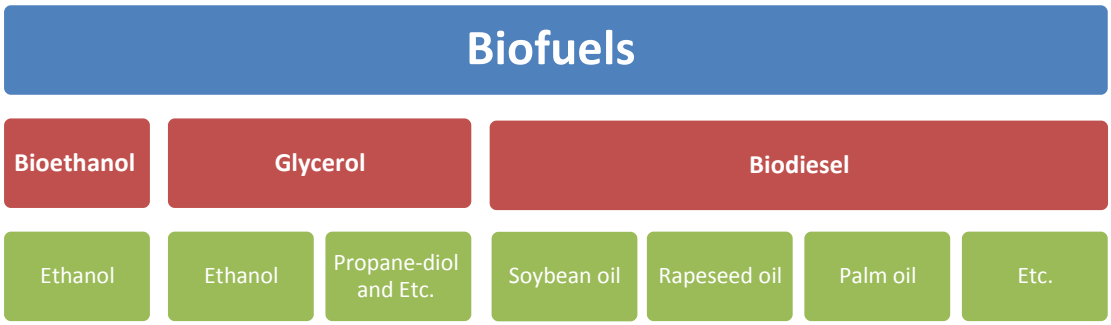

Figure (3): biofuel production sources.

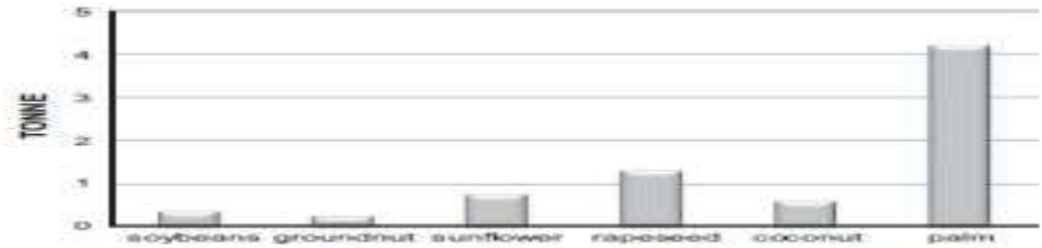

Figure (4): Yields of selected vegetable oils (oil/ha/year, 2004–2006 average) [22]

The raw materials for the preparation of biodiesel can be divided into three types:

- Vegetable oils;
- Waste frying oils, and
- Animal fats.

Of these, waste frying oils are one of the best sources. Biodiesel with 4% fatty acid value can be prepared from waste frying oils by a two step transesterification and purification process using ion-exchange resins. The biodiesel so produced meets the standards set by EN14214 (European standards set by European Committee for Standardization) [3].

2.0 The challenges of renewable energy applications:

In general, many challenges and Barriers that face in the renewable energy sector. The direct and indirect challenges will affect on the renewable energy`s future. The degree of people awareness and acceptance of the product can be one of the difficulties that face. The legal system and policies also play a significance role as a one of the main challenges. Some of these challenges will discuss in details:

2.1 The degree of people awareness and acceptance:

From 1992 onwards, renewable energy has become a top priority for the governments in all the European countries due to the increasing global concerns about climate change and scarcity of fossil fuels [26]. The need of assessing social acceptability of renewable energy technology is fundamental for understanding a community's social perspectives in terms of using renewable energy technology and climate change issues [21].

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The wave of panic and anger of environmentalists about the use of natural resources, environment, and convince them to use these alternatives to the environment cleaner and more purity not easy at all.

2.2 Energy storage:

Some of the technologies applications provide short-term energy storage, while others can endure for much longer. A wind-up clock stores potential energy (in this case mechanical, in the spring tension), a rechargeable battery stores readily convertible chemical energy to operate a mobile phone, and a hydroelectric dam stores energy in a reservoir as gravitational potential energy. Fossil fuels such as coal and gasoline store ancient energy derived from sunlight by organisms that later died, became buried and over time were then converted into these fuels. Food (which is made by the same process as fossil fuels) is a form of energy stored in chemical form.

2.3 Commercialization challenges:

Marketing and commercialization play a significant ways to increase the cognizance about renewable energy. Be a competitor against mature fossil fuel and renewable technologies must overcome two major challenges to commercialization: rudimentary infrastructure and buildings and deficiency of economies:

2.3.1 Rudimentary infrastructure and buildings:

Evolve new alternatives resources will require large initial investments to build infrastructure or buildings. These investments increase the cost of providing renewable electricity, especially during early years. Produce energy form the nature needs to increase the developing infrastructures such as dams, forest and etc.

2.4 Energy return on investment [6]:

The complexity of our economy and society is a function of the amount of net energy we have available. “Net energy” is, simply, the amount of energy remaining after we consume energy to produce energy. Consuming energy to produce energy is unavoidable, but only that which is not consumed to produce energy is available to sustain our industrial, transport, residential, commercial, agricultural, and military activities. The ratio of the amount of energy we put into energy production and the amount of energy we produce is called “energy return on investment” (EROI).

3.0 The Solutions of those challenges of renewable energy production:

The renewable energy technologies for energy generation are diverse, encompassing solar

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photovoltaic panels; wind turbines of different scale, designs and on offshore location; energy from waste plants; biomass fuelled plant at scales from small combined heat and power plant to large scale power stations; hydro schemes and ocean technologies (e.g. tidal and wave devices). Since each technology captures different natural resources in different ways, the environmental, economic and social impacts of each technology vary [14].

3.1 Increase the people knowledge and awareness:

The people acceptance for renewable energy programs is not easy. It is necessary to convince people about the importance of renewable energy and increase their knowledge about previous method`s effects on the environment and human activities. Media, press, scientific symposiums, as well as the efforts of the environmentalists and environmentalisms plays a large role in this area. As well as the role of Non-Government Organizations (NGO) to support and supplement this area.

In other hand, Absorption wave of panic and anger of environmentalists and the people which not satisfy with kinds of projects by convince them to use these alternatives to the environment cleaner and more purity.

3.2 The encouraging of international and local and legal framework for the production of renewable energy:

International policies levels and cooperation work to encourage to innovation new techniques and developing the old one.

3.2.1 UNCTAD Biofuels Initiative:

In 2006, the UNCTAD bioFuels initiative provides countries with access to sound economic, legal and trade policy analysis, capacity building activities and consensus building tools. The Initiative is committed to be flexible and based on specific national circumstances and needs. It attempts to share lessons from successful cases, as well as to illustrate problems encountered by developed and developing countries alike in dealing with the technical, policy and economic aspects of biofuels. It provides policy guidance, ideas and examples on how to address possible shortcomings that countries might face when engaging in this new market.

UNCTAD BioFuels Initiative works closely with other intergovernmental organizations, civil society, academia and the private sector. It participates in the activities carried out by UN-Energy; on the Nairobi Framework of Activities; on the Global Bio-Energy Partnership (GBEP); and on the Roundtable on Sustainable Biofuels (RSB).

3.3 Innovation and developing new technology:

Developing old techniques and thinking to find new one to utilize the renewable energy sources would create new and diverse benefits. Several countries work to develop wind power, geothermal, biofuel techniques and others methods to use the renewable energy. Wind power is widely used in Europe, China, and the United States. The period between 2004 to 2014, worldwide installed capacity of wind power has been growing from 47 GW to 369 GW—a more than 7 fold increase within ten years with 2014 breaking a new record in global installations (51 GW).

3.4 Emphasis on renewable energy benefits:

Derived from oil, gasoline and diesel are the major fuels for ICEVs. Although the development of biofuels has taken on an accelerated pace in recent years, our present transportation means are still heavily dependent on crude oil. EVs are an excellent solution to regulate this unhealthy dependence because electricity can be generated by almost any kind of energy resource in the world. Figure (5) illustrates the merit of energy diversification for two types of HEVs (namely the PHEV and REV) in which electrical energy can be obtained from the power grid via thermal, solar, nuclear, hydropower, wind, geothermal, oceanic, and biomass power generation, as well as from a generator coupled with an engine [2].

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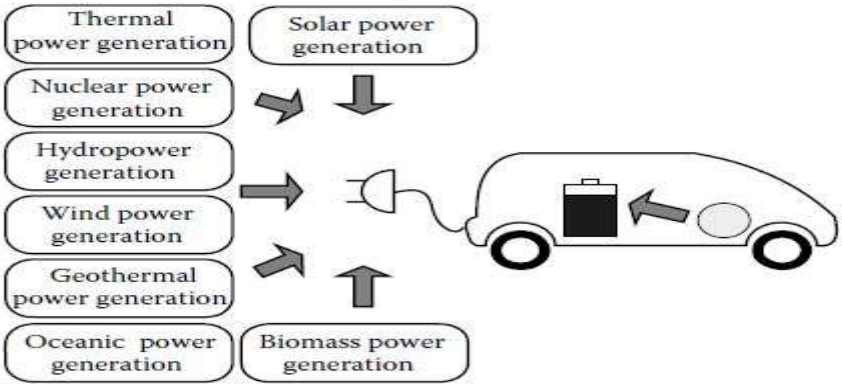

Figure (5) Power generations of electricity for two types of HEVs—PHEV and REV [2].

III-CONCLUSION

Renewable energy is being championed as a potentially significant new source of jobs and rural growth in many countries. The global deployment of renewable energy has been expanding rapidly. For instance, the renewable energy electricity sector grew by 26% between 2005 and 2010 globally and currently provides about 20% of the world's total power (including hydro-power). Rural and natural areas attract a large part of investment related to renewable energy deployment, tending to be sparsely populated but with abundant sources of renewable energy. Renewable energy for heating, cooling and transport fuels is also steadily growing. In 2011, the global public and private investment in renewable energy amounted to USD 211 billion [14]. In addition to that, excessive use of renewable energy could contribute to many problems around the world.

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