Journal DOI: 10.36713/epra1013|SJIF Impact Factor (2020): 7.035 ISSN: 2347-4378
EPRA International Journal of Economics, Business and Management Studies (EBMS)
Volume: 7 | Issue: 2| September 2020 -Peer-reviewed Journal

DRIVERS RENEWABLE ENERGY FOR SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT

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ABSTRACT

The world economy is changing, the imperative climate change and achieve sustainable growth is strengthening the push of the global energy transformation. Development of renewable energy is improved "smart" technologies as well. Countries around the world are striving for inventing transformation in the way produce and use energy to increase living standard of society. This is movement the world from the consumption of fossil fuels which cause increasing to the air CO_2 to cleaner renewable source of energy. Currently, renewable energy is market-ready (in some countries) and price competitive with conventional sources in the world.

KEY WORDS: ***renewable energy, fossil fuels, sustainable development, global energy, energy transition.***

INTRODUCTION

Renewable energy is an important resource based on natural processes. Their use as an alternative traditional forms of energy supply has long attracted the attention of specialists. Today, at least 20 percent of the world's electricity is produced using these technologies. Renewable energy comes from natural sources, the resource of which is practically endless. They are able to constantly recover and replenish with a natural way. The characteristic of the use of renewable energy comes from natural processes and transfer to the consumer for use. Renewable energy technologies provide energy services, including lighting and electricity, heating and cooling, mechanical energy and mobility. Further, relative to other types of energy (from fossil fuels, nuclear power, and traditional biomass), moderns renewables provide a variety of additional socio-economic benefits. Renewable energy benefits have been categorized in a variety of ways, for example, opportunities and benefits of renewable energy into environmental (climate change mitigation and reduction of environmental and health impacts), energy access, energy security (diversity of fuel supply; fuel imports; balance of trade), and social and economic development (job creation, rural development).

Increase volume of global GDP and population growth, exacerbation environmental problems caused by the negative impact of mankind on the global environment and the limited world energy resources make the transition to the concept of "sustainable socio-economic development" in many countries of the world. This concept and approach allow the world community to radically reduce its dependence on carbon energy sources and increase the use of renewable energy sources.

Energy is redistributed from the warm equator to the colder poles through large-scale atmospheric and oceanic processes driving the Earth's weather and climate. Biomes are adapted to regional climates and may shift as climate, land surface characteristics, CO_2 fertilization and fire interact.[1]

An increase in the use of renewable energy sources in all sectors of the economy will help, in the face of GDP and population growth, reduce the growing demand for fossil fuel and energy resources, reduce the dependence of developing countries on imported energy resources, allow the supply of energy resources for new sectors of the economy, and also reduce air emissions CO_2 and other harmful substances, as a result of which the effects of climate change will be mitigated.

Government plans still fall far short of emission reduction needs. Under current and planned policies, the world would exhaust its energy-related "carbon budget" (CO_2) in under 20 years to keep the global temperate rise to well below 2°C (with 66% probability), while fossil fuels such as oil, natural gas and coal would continue to dominate the global energy mix for decades to come.[2]

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Impacts renewable energy to the economy

Sustainable socio-economic development depends on quality and stability of energy. Renewable energy is salvation to shift the economy and solving problems of luck the resources for some countries. This type of producing energy technology changes for climate impact and satisfaction of ever-growing energy needs. Global consumption of commercial forms of energy has increased steadily over the last four decades and has been recently marked by especially dramatic growth rates in many developing countries. Reserves are limited and are often sourced from countries lacking the appropriate environmental and social safeguards. Yet, stark inequalities persist throughout the world in the access to modern energy services. Between 1970 and 1988, the developing countries' share of global primary energy consumption rose from approximately 13 percent to about 30 percent. In 2005, the non-OECD countries accounted for just over half (52 percent) of global primary energy consumption.[3]

Transformation globally to renewable energy costs of the comprehensive, long-term energy transition would amount to USD (United States Dollars) 1.7 trillion annually in 2050. However, cost-savings from reduced **air pollution**, better **health** and lower **environmental damage** would far outweigh these costs. The REmap Case suggests that savings in these three areas alone would average USD 6 trillion annually by 2050. The extraction, transport, refining and use of fossil and nuclear fuels result in a host of significant environmental impacts, including damage to land from mining; pollution of air and water; consumption of vast amounts of fresh water, particularly for cooling at power plants; loss of biodiversity; risk of nuclear accidents; global climate change; and associated impacts on human health. [4] In addition, the energy transition would significantly improve the energy system's global socio-economic footprint compared with business-as-usual, improving global welfare, GDP (Gross Domestic Product) and employment.[5]

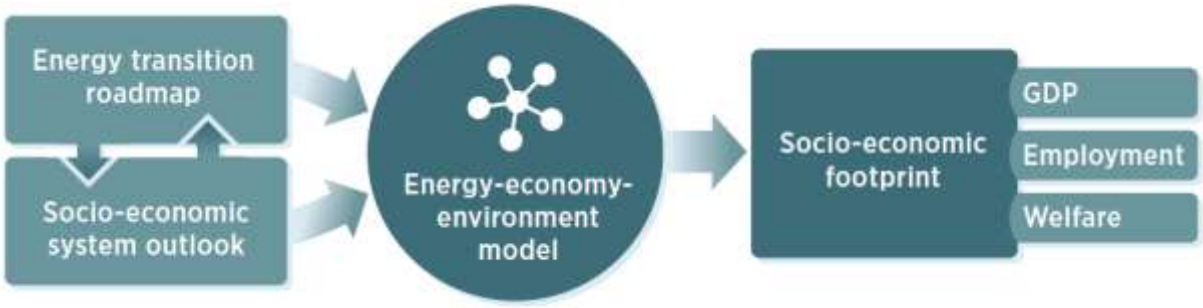

Figure 1. Obtaining the socio-economic footprint from a given combination of an energy transition roadmap and a socio-economic system structure and outlook.

Source: *IRENA (2018), Global Energy Transformation: A roadmap to 2050, International Renewable Energy Agency, Abu Dhabi.*

Economies all over the world stand to benefit from energy transformation, although the distribution of benefits varies according to socio-economic conditions and its depending on each country's or continent's socio-economic characteristics.

Rank	Country	CO_2 emissions (total)
1	China	10.06GT
2	United States	5.41GT
3	India	2.65GT
4	Russian Federation	1.71GT
5	Japan	1.16GT
6	Germany	0.75GT
7	Islamic Republic of Iran	0.72GT
8	South Korea	0.65GT
9	Saudi Arabia	0.62GT
10	Indonesia	0.61GT
11	Canada	0.56GT

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Rank	Country	CO_2 emissions (total)
12	Mexico	0.47GT
13	South Africa	0.46GT
14	Brazil	0.45GT
15	Turkey	0.42GT

Figure 2. The 15 countries that emitted the most carbon dioxide in 2018 (All emissions from 2018. Fuel combustion only. GT = Metric gigatons)

Source: *https://www.ucsusa.org/resources/each-countrys-share-co2-emissions*

The transition to renewable energy provides socio-economic benefits that go well beyond what GDP can measure. Regarding **employment** outcomes, details are also presented for the energy sector, and its components. A **welfare indicator** encompassing economic, social and environmental dimensions is used to quantify the broader transition impact. Financing the transition is a cornerstone of the socio-economic system's outlook. An analysis of the role of **finance** is presented, highlighting its interactions with the socio-economic system, as well as the potential finance-related transition barriers and how to address them.

Challenges for development of renewable energy

The International Renewable Energy Agency worked out the concept long term scenarios for the energy transition a roadmap to 2050. In March 2017, IRENA and the IEA (International Energy Agency) issued a report, Perspectives for the Energy Transition: Investment needs for a low-carbon energy system (IEA and IRENA, 2017). This agenda is directed to countries that they have been used for many decades as vital planning tool for governments, can also serve to guide the transition to a clean, sustainable and increasingly renewable-based energy system. According to IRENA the world economy, GDP increases from 2018 to 2050 in both the reference and transition scenarios. However, the energy transition stimulates economic activity additional to the growth that could be expected under a business as usual approach. The cumulative gain through increased GDP from 2018 till 2050 will amount to USD 52 trillion. In recent years, energy intensity has been falling at around 1.8% per year. The rate of fall would need to increase one-and-a-half times, to 2.8% per year. In recent years, the annual increase in the percentage share of renewable energy has been around 0.2 percentage point per year.

In terms of welfare, the strongest overall improvements are found in Mexico, closely followed by Brazil, India and the countries and territories of Oceania. Other regions, including rest of East Asia, Southern Africa, Southern Europe, and Western Europe also record high welfare gains. Environmental benefits are similar in all countries, because they are dominated by reduced greenhouse gas (GHG) emissions given its global nature. Regional net gains in employment fluctuate over time, but the impact is positive in almost all regions and countries.[5]

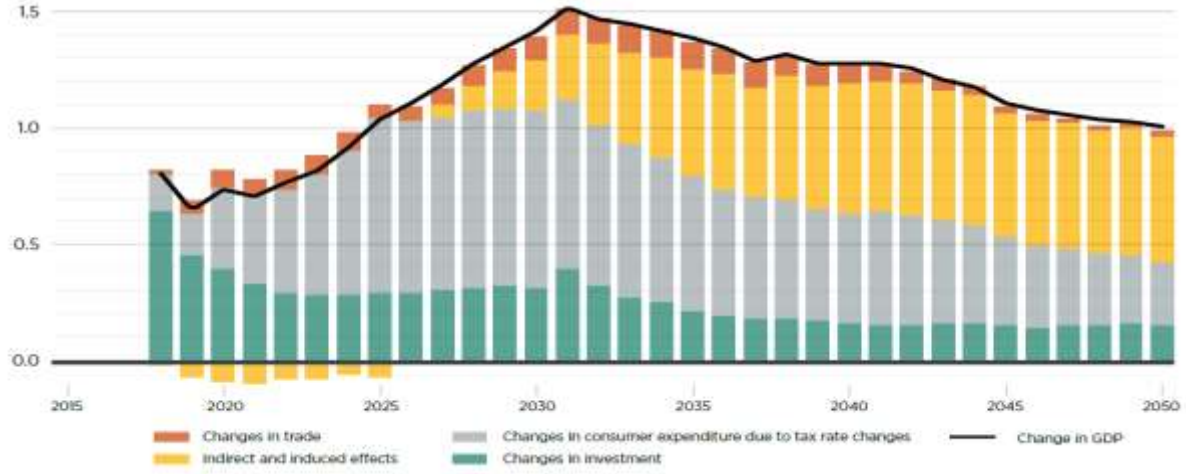

Figure 3. The energy transition results in GDP growth higher than the Reference Case between 2018 and 2050 (Relative difference of global GDP between the Renewable energy map Case and the Reference Case, 2018-2050)

% difference in GDP from Reference Case

Source: *IRENA (2018), Global Energy Transformation: A roadmap to 2050, International Renewable Energy Agency, Abu Dhabi.*

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In Figure 3 shows the net investment effect with respect to three main sub-drivers: energy efficiency, the power sector, including generation, transmission and distribution grids, and energy flexibility, other investment in the economy, including investments required for upstream supply of fossil fuels, and the impact of crowding out of capital.

The employment results are less significant than GDP results because additional demand in the economy also pushes up real wages. The additional wages available in the sector as a result of additional demand can be realized as increases in wages for all workers, or increases in the number of workers.

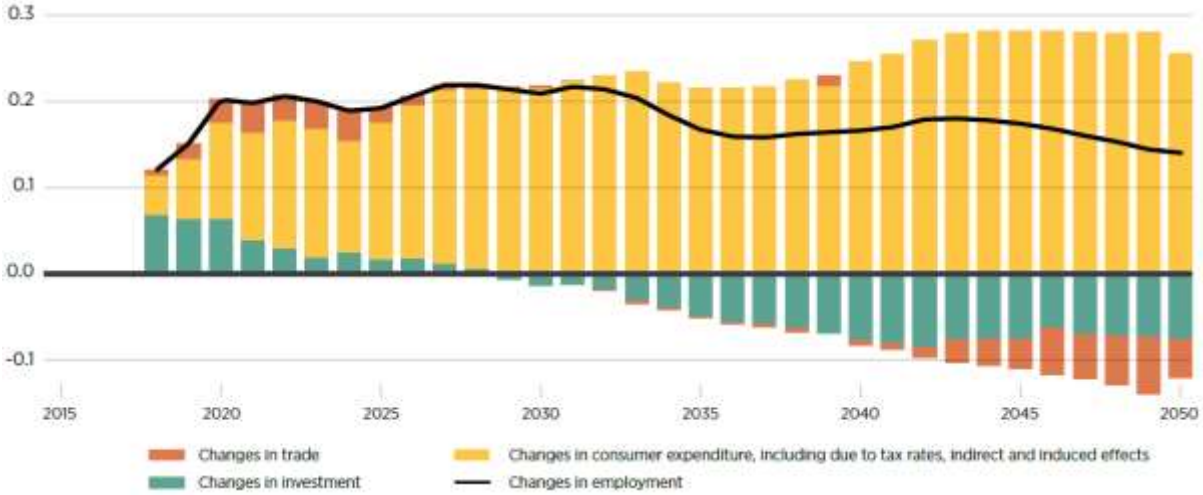

Figure 4. The energy transition results in employment growth higher than the Reference case between 2018 and 2050

% difference in GDP from Reference Case

Source: *IRENA (2018), Global Energy Transformation: A roadmap to 2050, International Renewable Energy Agency, Abu Dhabi.*

Figure 4 shows the drivers behind the stronger growth in employment under the renewable energy map case relative to the reference case. These include investment, trade and consumer expenditure.

A transformation of the global energy system compatible with internationally agreed climate and development objectives will require a significant scale-up of energy investment. But instead of rising, renewable energy investment dropped slightly in the first quarter of 2020, down 2.6% from the same period in 2019.

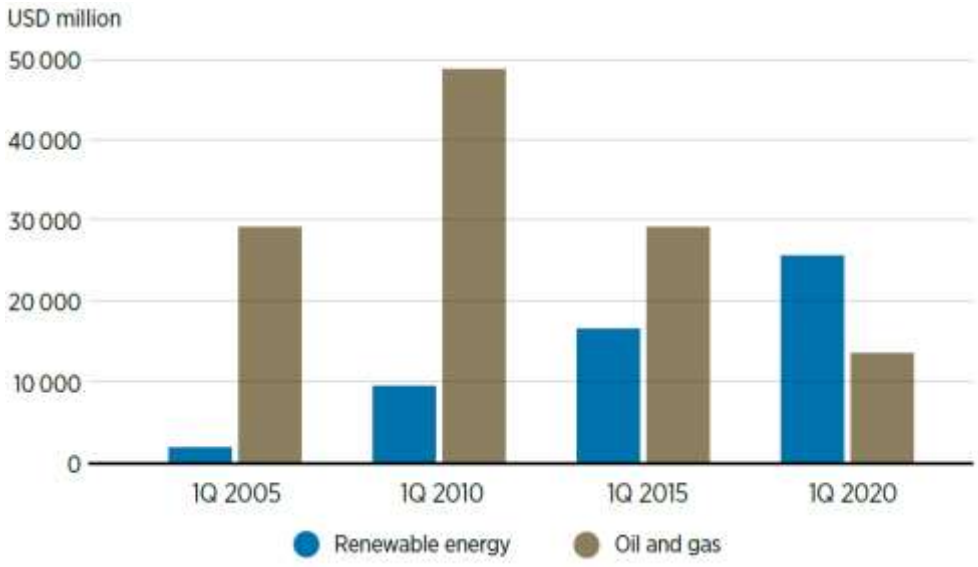

Figure 5. Announced foreign direct investments in renewables and oil and gas sector, first quarter 2005 to first quarter 2020 (USD million)

Source: *IRENA (2020), The post-COVID recovery: An agenda for resilience, development and equality, International Renewable Energy Agency, Abu Dhabi, ISBN 978-92-9260-245-1*

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Despite the uncertainty caused by the pandemic, foreign direct investment in renewable energy reached an all-time high in the first quarter of 2020, while investments in fossil fuels plummeted. According to FDI Markets (2020), foreign investors have already announced over USD 23 billion of cross-border renewable energy investment this year, the highest quarterly performance recorded over the past decade (see Figure 5). Placing renewable energy at the core of green recovery plans can signal long-term public commitment to the industry, boosting investor confidence and attracting private capital.

Establishment socio-economic frameworks for Renewable Energy

The clean energy transition will require broad participation and stronger coordination across different government institutions. Below you can find out the following countries which set up aims and goals:

Finland. In Finland, the Government has set an ambitious climate target to become carbon neutral by 2035 and carbon negative after that (Ministry of the Environment of Finland, 2020). The Technical Research Center of Finland Ltd (VTT) has coordinated multidisciplinary research projects to create alternative narratives and quantitative scenario assessments to inform the Energy and Climate Roadmap 2050 (The Ministry of Employment and Economy of Finland, 2014) and Long Term Energy and Climate Strategies (REF).[7]

Denmark. In Denmark, the Danish Energy Agency (DEA) leads Denmarkʼs Energy and Climate Outlook, an annual technical assessment of how the countryʼs supply and demand of energy will evolve until 2030 (DEA, 2020a). The methodology behind the scenarios is based primarily on technological costs, as well as rational options and financial viability requirements for players in the energy market.[8]

Brazil. In Brazil, the Ministry of Mines and Energy (MME), with the support of the Energy Research Office (EPE), develops two scenario-based studies with different time horizons: Brazil's National Energy Plan (PNE) (MME and EPE, 2020, 2007) with a long-term time horizon (2030–2050) and the 10-year Expansion Plan (PDE) with a time horizon of 2029 (MME and EPE, 2020). [9]

United Kingdom. In the United Kingdom (UK) the power system operator, National Grid, produces the Future Energy Scenarios (FES) publication with a horizon of 2050 (National Grid ESO, 2020a). During 2019, National Gird engaged widely with stakeholders to discuss with them the design of the 2020 FES and collect feedback. Almost 600 individual stakeholders representing 548 unique organizations from nine different stakeholder categories like 'energy industry', 'innovators' and 'regulators', participated in the process.[10]

Germany. In Germany, the biannual transmission expansion planning process is coordinated between the Transmission System Operators (TSO) and the Federal Network Agency (Bundesnetzagentur). Every four years the German Parliament decides on priorities for future transmission investment (Bundesnetzagentur, 2017). First, the TSOs draw up a draft scenario framework. The scenarios take account of all factors relevant to the development of transmission network infrastructure, including assumptions about developments in power production, consumption and about ongoing investments in networks. [11]

In the global context, the World Energy Council has been expertly facilitating the participatory design, development and effective use of plausibility-based global energy scenarios for more than two decades, drawing on the deep energy expertise of its diverse global community in nearly 90 countries, represented by more than 3 000 organizations across the entire energy value chain and its sectors. The World Energy Council engages with diverse stakeholders – firms, policy makers, the public sector, consumers – in every stage of the process.

CONCLUSIONS

The analyses in this work confirm that sustainable socio-economic development benefits increasingly
are gaining importance in producing energy in the future. An important implication is the clear message it sends that all future investment in the energy sector is headed for renewables and efficiency – and infrastructure that supports them – providing greater certainty for investors.

As a result, key stakeholders have confidence that is required to make large investments, whether in power plants or transmission and distribution grids. Increased certainty also can attract investment from new sources, domestic and international, ultimately making the target easier to achieve. [12]

To sum up, Renewable energy give more achievments to human as health, job, reduction of air pollution, scarcity of recourses which refer to sustainable socio-economic development. It is similar to Sustainable Development Goals 13, 14, 15 which declared since 2015 and focuses on protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably forest management, combating desertification, and halting and reversing land degradation and halting biodiversity loss by United Nations. Therefore, sustainability is the significant concept in current world economy.

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