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Article

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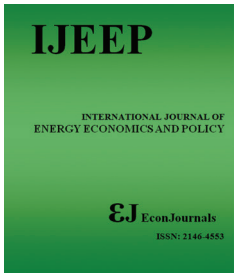

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A Comparative Systematic Literature Review and Bibliometric Analysis on Sustainability of Renewable Energy Sources

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ABSTRACT

The rapid growth of the human population of the planet has led to mounting energy demands; conventional sources of energies are not enough to fulfil the energy demand. Therefore, the search for alternative sources has become the most profuse challenge. Presently, many alternatives are being studied and implemented in literature—the renewable sources which are less harmful and environmentally acceptable for future generations. The current study aims to review the renewable resources which are highly examined in the last decade by the researcher. For this purpose, two databases, web of science and Scopus, are selected to extract the data. The data selection and rejection process are following the PRISMA statement that is an authentic eligibility criterion using by researchers. After a detailed function, the final fifty-two studies are selecting for the current review. The classification of data is mainly discussing biofuels, solar energy, wind energy, and renewable electricity. Literature is also showing that fossil fuels are environmentally very harmful, and developed countries are significantly replacing the renewable energies source. Bibliometric results are showing that research collaborations are exceptionally done in U.S. and European countries. The findings of the current study are a novel concept to evaluate and review the published literature on renewable energies in the last decade.

Keywords: Bibliometric Analysis, Sustainability, Renewable Energy Sources
JEL Classifications: P28, Q42, Q47

1. INTRODUCTION

Over the past decade, development in the generation of resources and demand for energy is consistently growing. Many countries are using traditional resources at an extreme level for fulfilling energy demand. The conventional sources of energy are widely using in societies; environmental and climate change is reasoning due to the excessive use of fossil fuels. Countries are consuming natural resources very rapidly, which creates severe issues for future generations (Jia et al., 2018). Economies are moving to find the other alternative resources that are less harmful to the environment and economically affordable. Renewable energy resources are widely reviewing the agenda for the researchers in the last decade (Qureshi et al., 2015). The consumption of renewable energy is significantly essential for the international scenario due to the consumption of energy is increasing. In the meantime, conventional energy sources are not sufficient to meet supply and demand, triggering an energy crisis (Guo et al., 2018). Different renewable energy sources have been extensively concerning researchers to replace the conventional source of

energy. One of the prevalent conceptions of renewable energy sources is solar and wind energy using for energy generation. Both are excessively discussing in the literature and still work in progress to evaluate the better options for replacing energy sources (Jurasz et al., 2020).

We have other renewable options, and literature is showing that concentration is needed to explore the better renewable options are required. Besides that, renewable energy resources are very much gaining a place in developed countries (Qureshi et al., 2019). For instance, the European Union maintains modified its 2030 compulsory goal of 27% that was set backwards in 2014 to 32% in June 2018 (Gielen et al., 2019). At the same time, the United States is also enhancing renewable energy resources. However, underdeveloped countries are still not in a position to improve the ability and adapt renewable resources due to economic positioning (Iammarino et al., 2019). The utilisation of renewable energy resources one of the primary reasons is considering environmentally friendly energy resources. During this period, environmental awareness is blue-eyed for the international community; it is thought that traditional dependency on fossil fuels produces led to carbon dioxide (CO_2) emissions, greenhouse gas (GHG) problems, and environmental pollution (Qazi et al., 2019).

This systematic literature review paper aims to study the worldwide need for renewable energies, types of renewable energies used, and draw useful conclusions on use and future agenda for the researchers. This research question aims to recognise the reasons for the benefit of renewable energies. The results taken will be useful to highlight the challenges with the use of energy sources other than renewable energies and bring awareness for the use of environmentally friendly energy sources such as renewable energy resources.

2. MATERIALS AND METHODS

The reporting of the results and developing of the research framework, authors around the world are using the PRISMA statement 2015. The systematic literature review (SLR) is a guide to enhance the integrity of the reviews and meta-analysis (Moher et al., 2009). The PRISMA statement template is using to explain the overall research process for the selection and rejection of articles in this SLR. This SLR base study is limited to published literature on the topic of virtual reality and tourism. The two actual databases, the web of science and Scopus, are using for the literature extraction. The keywords are used "Renewable Energies" in the search bar. The databases total results shown 134,130, for more purification of the effects the internal search option is using. In the inner search, the keyword renewable energy resources, wind power, solar power generation, and wind turbines. The databases shrink the results to 2868. For the other process, subjects are selected for the current study, Energy, Engineering, Environmental Sciences, Computer science, Mathematics, social science: Business, Management and Accounting, Environmental Science, Agricultural and biological science, Economics, Econometrics and finance, and multidisciplinary are selected. The results are narrow down to 209. Further on only articles, publishing stage final published paper, language English is chosen in the database. Results are narrowed down to 68, and after removing the duplication, and irrelevant literature, the final 52 studies are included for the review. Figure 1 is showing the detailed process of data selection.

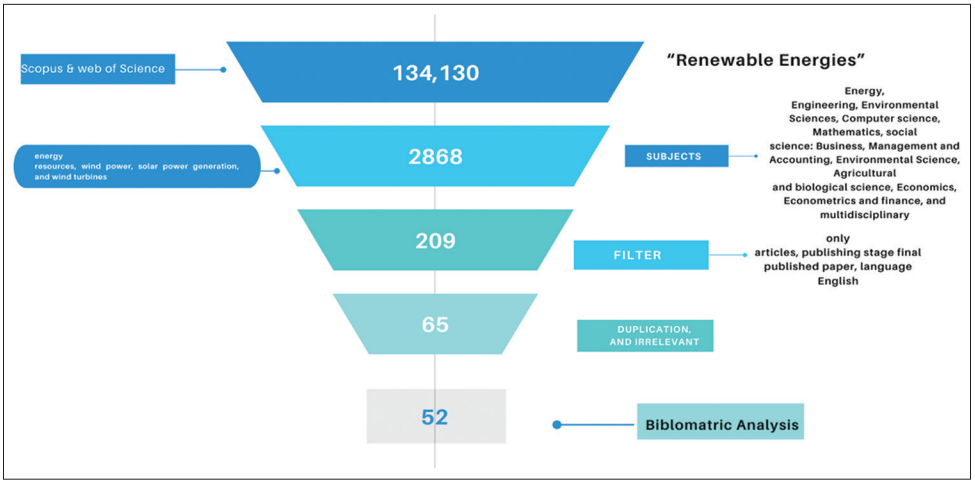
3. RESULTS

3.1. Descriptive Analysis

The study is focusing on the specific time frame for the articles published from 2010 to 2019. The primary purpose of the year-wise distribution is to understand the number of publications in a year selected and fulfil the criteria for the review. Figure 2 shows the year base graph of literature from 2010to 2019. The year 2015 contributing the highest number with the ten articles. The year 2014 and 2016 is second in the list with nine research papers on renewable energies. The year 2017 added the seven studies. So, the number of contributions in the recent past is high rather than in the past. Figure 2 is showing the detailed information of articles selected from different years.

Furthermore, the journal base publication analysis is conducted for the current study and finds that PLoS ONE and Environmental Research Letters journal with the eight publications. Second, most reviews are select from the Biotechnology for Biofuels

Figure 1: PRISMA statement 2015



with 7 in number. Gradually the name of the studies is going down for the current study. International Journal of Molecular Sciences contributes, has added four articles. Figure 3 is showing the results of the research article selected from each journal.

The citation report of the studies in the ten years from 2010 to 2019 is showing in Figure 4. The highest cited paper is from the journal the Advanced Functional Materials with 521 times, and the article name is "Efficient and Stable Bifunctional Electrocatalysts Ni/NixMy (M = P, S) for Overall Water Splitting." After that, the second most cited study is the Compositional analysis of lignocellulosic feedstocks. 1. Review and description of methods and cited 491 times in ten years. The study is cited seven times in the year 2011 and the Journal of Agricultural and Food Chemistry. The 293-time citation of the article name Cost-minimised combinations of wind power, solar power, and electrochemical storage, powering the grid up to 99.9% of the time cited a study in the last ten years. The study is published in the Journal of Power Sources. There are some other citation studies and showing in Figure 4.

The following cluster of keywords inside Figure 5 demonstrates either one that subject has been continuously discussed in the investigated articles over the entire considered time, and the keywords' be an average of publication year, or that the issue was of interest and published in the journal on average between 2010 and 2020. Thus, part of this group are keywords such as renewable energies, production, process, wind, wind energy, grid, turbine, methane, biomass, biogas, biofuel, energy system, energy storage, emission, and climate change. The result confirms the importance of all renewable energies, which require continuous inquiries to reach common frameworks that provide an overall improvement of energy sources.

Figure 2: Distribution of literature year base publications

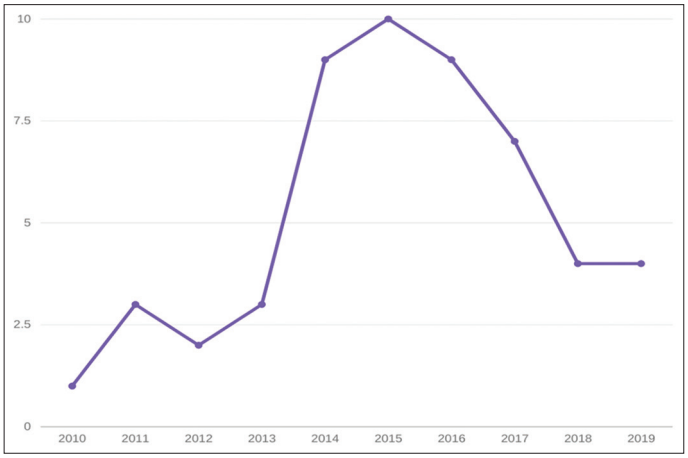


Figure 3: Distribution of literature journal base publications

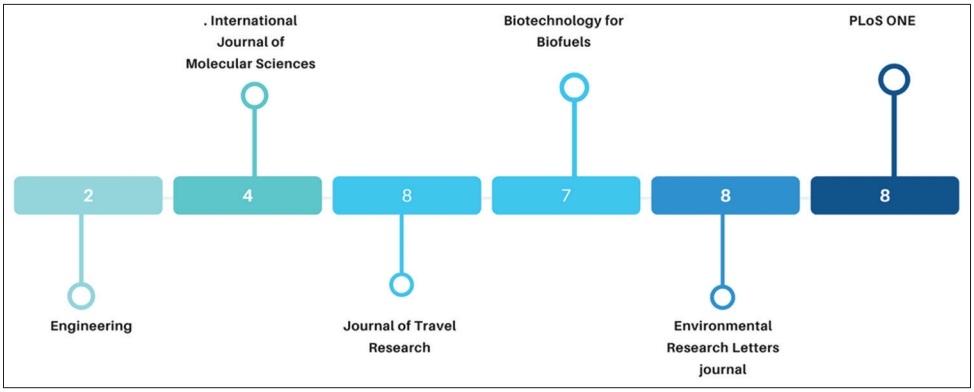


Figure 4: Citation report of published literature

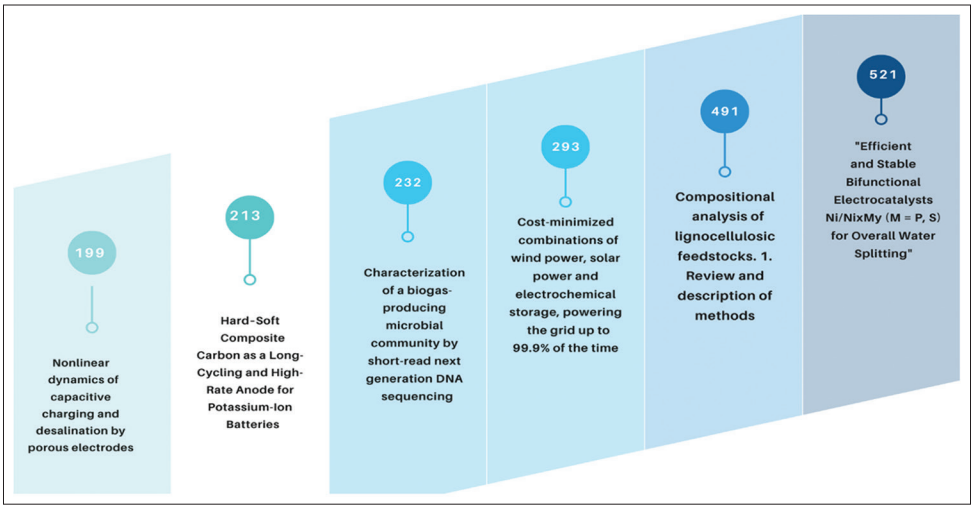
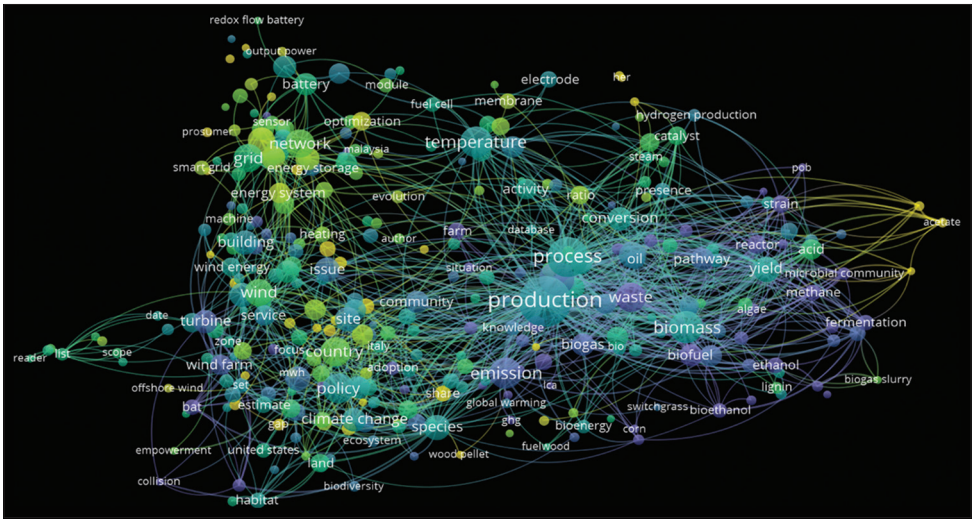


Figure 5: Keywords used in published literature



4. CLASSIFYING RENEWABLE ENERGY RESOURCES

Classification of data is a very critical process to find actual work done on the topic: this study overview detail and comprehensive approach to finding literature related to renewable energies in the last decade. For the more purification, duplication and irrelevant literature were removed. Renewables energise although scorching topic in researchers due to the importance and necessity of the world in modern-day problems. Past literature classification is explaining in detail in the below section under which every part is discussing in detail.

4.1. Biofuels and Biogas

In recent year's development of renewable energy sources is very difficult to sustain the economic growth for countries with protecting the natural environment. The economic wheel is moving with the energy and fuels that are directly linking with development. Achieving the low-price energy and fuels are the greatest challenge of current times. According to Scranton et al. (2015), demand is consistently higher for powers, and that creates a shrink in the availability of fossil fuels. That is automatically resulting in high pricing for energy. For future energy demand, biofuels play an essential role in recovering energy demand for the world. Biofuels and bio-products can fulfil the future directions of renewable energies.

However, the findings of the study Das et al. (2015) talks about biodiesel fuels supplied via transesterification of fatty acids with methanol or ethanol to yield long-chain methyl or ethyl esters of 16-18 carbon atoms, frequently with one or more CC double bonds. Findings of a study showing that firm reliance on the soothing leanings of these esters on their biochemical composition suggests the difficulty of the biochemical procedures engage. Table 1 is showing the details of the author, classification, setting, procedures, and findings of the literature. Although, Biofuels originated from lignocellulosic biomass present encouraging alternate renewable energy sources for transport fuels. Saccharomyces cerevisiae development is a significant contribution to efficiently ferment pentose sugars such as D-xylose and L-arabinose into biofuels. Systems biology simulations that can guess the possible conclusion of such straining engineering attempts are constructive for encouraging which forces are expected to be value the significant time investing (Ghosh et al., 2011). However, Sforza et al. (2012) study findings are showing that biofuels from algae are valuable replacing source, on the partial level to fossil fuels. Still, significant research is needed to optimise the large-scale cultivation for the system.

Besides, with biofuels, we have literature related to biogas in the current study. Sluiter et al., (2010), discussing in his research that the production of renewable energy is a severe issue in the world. Biogas is a significant source for renewable energy carriers as the technology of its manufacture merges the removal of organic waste with the creation of a flexible energy transporter, methane. The author uses a novel valuable technique to test the functional and taxonomical microbial consortia. The contribution and participation of microbial consortia are very limited in biogas processing, specifically in methane production. The methanogenic archaeal hamlets in six full-scale biogas plants provided together with various liquid composts and renewable unprocessed ingredients as substrata are exposing by a polyphasic method (Nettmann et al., 2010). Renewable energy production with microbial consortia is also discussing in by Wong et al. (2013) in his study. Provide a microbiological awareness of better biogas manufacture following a novel waste model.

The biogas production is a better renewable energy source. Worldwide substantial efforts are rendering for producing cost-effective renewable energy sources. However, industries are facing more significant challenges that are affecting their economic resources due to the high cost of fuels in the recent period. Already working infrastructure and technologies are not cost-effective due to the large requirement of energy in the industries. According to Muradov et al. (2015), fungal-assisted flocculation is presently getting enhanced interest as of his high-level harvesting productivity. Findings of the study showing the fungal-assisted flocculation have significant potential to reduce the

Table 1: biofuels and biogas classification of authors, classifications, and findings detail

Authors	Cited	Classification	Procedure	Settings
(Sluiter et al., 2010)	491	biofuels	biomass	biomass-to-biofuels processes
(Scranton et al., 2015)	96	biofuels	food crops	photosynthetic
(Das et al., 2015)	43	biofuels	structural features	emission
(Ghosh et al., 2011)	41	Biofuels	biomass	pentose sugars
(Sforza et al., 2012)	152	Biofuels	cultivation systems	photosynthetic
(Wirth et al., 2012)	232	Biogas	biotechnology	microbial community structure
(Nettmann et al., 2010)	131	biogas	plants	polyphasic approach
(Wong et al., 2013)	74	biogas	microbial composition	waste sludge pre-treatment
(Muradov et al., 2015)	73	biogas	harvesting efficiency	biomass
(Solli et al., 2014)	67	Biogas	heat and power production	energy carrier
(España-Gamboa et al., 2012)	57	Biogas	waste materials	organic loading
(Martinsson et al., 2015)	53	Biogas	wood stove	organic aerosol
(Kovács et al., 2013)	49	biogas	industrial waste products	pig blood protein
(Lucas et al., 2015)	46	Biogas	organic materials	biogas plants

economic limitations. That can be a more substantial commercial biotechnology for the industries in the coming time—biogas, one of the essential carriers of heat and energy. Biogas is in the form of pure methane is usable fuel in vehicles.

The production of methane is Carrie out by using organic materials and microbial communities within anaerobic conditions. According to Solli et al. (2014) description of the microbial communities shown in this research may be beneficial for the procedure of biogas plants, reducing substrates with high intensities of proteins. The microbial communities are also remarkably indicating efficient and stable in the identical environment and process parameters. The microbial communities will be frequently encountered with intermittent feeding intervals and changing feedstock characteristics, which consequence in short-term differing (Lucas et al., 2015). Biogas is a well-known renewable energy source; we have found a deficient number of studies related to mass and industrial-level production usage. The potential to use the biogas is still very high from a commercialisation point of view.

4.2. Solar and Wind Energy

Solar energy is one of the up-and-coming and sustainable sources of renewable energy that contributing to diverse energy needs in modern-day. Solar energy is utilising on a massive level in society to provide a better alternative energy source. According to Koo et al. (2014), solar panel installation on the rooftop of buildings for net-zero energy using facilities in the context of power use. This research model is using solar panels on the elementary schools locating in Korea. Findings of the study recommending that solar energy is a renewable source. This model can be applying in another part of the world that is not only supply the power. Also, environmental protection is possible by using solar energy. The energy reduction and environmental issues are placing the development of renewable energy resources for the interest of the public and environment. Solar energy is one of the significant sources of energy to enhance energy requirements and fulfil the demand for power in many sectors of society. One of study introduces the novel model of a dual-axis solar tracking P.V. system that is using feedback control theory with a four-quadrant light-dependent resistor (LDR) sensor and easy electric panel to supply strong performance. The results of the study are showing that one of the valuable references for future research on solar energy is related (Wang and Lu, 2013).

Besides this, Tzivanidis et al. (2015) using the solar concentrating tool, the parabolic trough collector, which is resulting efficiently and effectively at a higher temperature. The mechanism for simulation is using commercially available software that resolves complications in the system during the process. The final findings of the study are showing that the parabolic trough collector model is performing efficiently, and calculations are valid. Also, the usability of renewable energy resources depends on the financial condition of consumers. The empirical results of Ameli and Brandt (2015) suggesting that house attendees are like to spend on new energy technologies depend on homeownership. That based on income, social context, and household energy conservation practices.

The global need for energy is rising every single day, and the consistent rise of the population automatically creates more demand for energy. The legal resources are gradually decreasing, and societies demand an alternative source of energy for filling the needs. Researchers are proposing wind energy to install for the future potential demand for energy (Evans and Kiesecker, 2014). For storing the solar and wind power, using batteries is a very vital part, and potassium-ion batteries signify a favourable contender due to the profusion of potassium resources (Jian et al., 2017). Wind energy is also a very economical source of renewable energy, and many parts of the world are using this very efficiently for generating electricity. With the period, wind turbines installation cost is decreasing, and wind energy is competitive with traditionally producing energy. Samsatli et al. (2016) conducted a study about the wind turbine electricity providing in England and Wales. The results of the study are providing a significant role of wind electricity in the transportation part in a different part of the cities. The study also concludes the future electric vehicles and storage technologies can develop a more powerful source of energy. For details, Table 2 is showing the details of authors, year, classification, setting, procedures, and findings of the literature.

Recently it is finding that alternative energy sources or renewable energy are a risk the wildlife living around those areas. In the wind turbine, energy-producing power is recorded as a large number of bat casualties. The most bat is dying in Germany wind turbine areas. In this perspective, Lehnert et al. (2014) pinpoint the importance of developing strict mitigation rules

Table 2: solar and wind energies showing the classification of authors, and findings detail

Authors	Cited	Classification	Procedure	Settings
(De Barbosa et al., 2017)	68	solar and wind electricity	virtual batteries	transmission grid development
(Wei et al., 2013)	53	solar and wind electricity	fossil fuels	greenhouse gas
(Jian et al., 2017)	213	solar and wind energy	performance	Potassium-ion batteries
(Jiang et al., 2017)	124	solar energy	electrocatalytic reduction	renewable energy applications
(Tzivanidis et al., 2015)	88	Solar energy	trough collector	heat transfer
(Koo et al., 2014)	57	solar energy	future energy source	energy supply
(Wang and Lu, 2013).	54	Solar energy	electricity production	photovoltaic
(Ameli and Brandt, 2015)	44	Solar energy	technology adoption	energy efficiency
(Andreu-Cabedo et al., 2014)	92	Thermal energy storage	low-carbon emission	industrial technologies
(Evans and Kiesecker, 2014)	42	wind and shale gas	future energy	ecosystems
(Caduff et al., 2012)	99	Wind energy	wind turbines	produced electricity
(Samsatli et al., 2016)	76	Wind energy	wind-hydrogen-electricity	wind turbines
(Alexander et al., 2012)	64	wind energy	offshore renewable energy	tidal energy developers
(Bergström et al., 2014)	64	wind energy	marine landscape	environmental effects
(Lehnert et al., 2014)	51	wind turbines	non-exchangeable hydrogen	renewable energy

and growing species and scale-specific preservation methods on both domestic and global concentrations to safeguard resource inhabitants of bats. Wind turbines are a significant renewable energy source for many developed nations. However, strong reservations are related to marine life. Marine executive proposals around the world communicate high-level opportunities for the development of seaward wind energy. That significantly contributes to a renewable energy source but a potential threat to the marine landscape (Bergström et al., 2014). That also creates importance in protecting the marine ecosystem during the large-scale development of offshore wind energy. The installation is also bringing challenges for social, cultural, and spatial issues related to that (Alexander et al., 2012). However, wind energy turbines are one of the very significant sources of energy sources, and many European countries are using very efficient wind turbines to produce energy. Literature related to wind energy is discussing more the issues associated with the wind energy-producing process (Caduff et al., 2012).

4.3. Renewable Electricity

The global electricity demand is still in many parts of the developing world, resources and production of energy is a dream in rural regions. There are two world maps we have that are consist of without power and seeking for economically low-cost electricity. Clemmer et al. (2013) study showing the results that the provision of low-cost, internationally approachable, durable, zero-carbon electricity in South Asian is the aim. Many populations are living in this part of the world. Study findings are showing that renewable electricity is possible to provide all countries of SAARC region countries with cost assumptions showing in the study. Renewable energies (wind and solar) with electrochemical storage (batteries and fuel cells) are very vital for the supply of electricity as a source of renewable energy. The growing phase of renewable energies is the future of electricity availability in most regions of the world, and the year 2030, many renewable sources can supply more power for users (Budischak et al., 2013). In the literature, one of the studies discussing the electricity supply in the United States, that is estimating the future demand and requirements of water for electricity generation. The findings of the course presenting that in the forthcoming U.S. also need to adopt better and new ways of power generation to fulfil the electricity demand. Water resources are going down very rapidly, and renewable resources are the requirement of the coming time for electricity generation (Liu et al., 2015). The U.S. related another study discussing the use of natural gas for electricity generation is impact the environment critically, greater generator productivity, and reduce CO2 emissions per unit of power than coal. With the improvement of environmental policies and climate change, renewable energy generation is taking place in the future for better development of electricity supplies. Study findings showing the results that, not Including a climate policy, whole electricity usage also rises as the gas supply rises (Shearer et al., 2014). Although the U.S. electricity generating sector is solely responsible for producing 40% of together energy-associated carbon dioxide emissions and complete freshwater removals for power plant refrigeration (Clemmer et al., 2013b).

However, the generation of electricity through carbon-emitting fossil fuels is more in many parts of the world due to the unavailability of low carbon, renewable energy sources, and nuclear power stations. Achieving decarbonisation is a challenge for the countries. The country having a high GDP impose a higher price on carbon as compared to the states having lower capital economies (Hirth and Steckel, 2016). According to the findings of De Barbosa et al. (2017) in the future role of hydro dams can be transferred into virtual batteries for solar and wind electricity storage, minimising the function of storing tools. The storage of electricity from solar and wind turbines is a more significant challenge for researchers, and renewable energy sources are mainly depending on phenomena. Transformational adjustments in battery technologies are the importance of recent times for the effective use of renewable sources. The future of renewable electricity is related to the batteries' storage capacity and utilisation for a specific purpose. Table 3 is showing the details of literature derived from renewable literature.

4.4. Fossil Fuels

The history of energy and power is an essential big through the development of civilisation. The developmental era of energy creating more challenges and impacts on societies, but we cannot deny the contribution of fossil fuels in power demand fulfil. Table 4 is showing the details of authors, classification, settings, procedures, and findings of the literature. The overall consumption

Table 3: Authors, classification, settings, procedures, and findings of renewable electricity

Authors	Cited	Classification	Procedure	Settings
(Budischak et al., 2013)	293	renewable electricity	grid system	renewable generation
(Han et al., 2015)	60	renewable electricity	electrolyser performance	circuit voltage
(Liu et al., 2015)	56	renewable electricity	water supplies	future energy
(Hirth and Steckel, 2016)	42	renewable electricity	fossil fuels	climate policy
(Shearer et al., 2014)	42	renewable electricity	natural gas	climate policies
(Clemmer et al., 2013b)	42	renewable electricity	carbon dioxide emissions	water use
(Gulagi et al., 2017)	41	renewable electricity	future energy	zero-carbon electricity

Table 4: Authors, classification, settings, procedures, and findings of fossil fuels literature.

Authors	Cited	Classification	Procedure	Settings
(Zou et al., 2016a)	63	fossil energy	oil and amp; gas, coal, and wood	ecological, environmental protection
(Chen et al., 2016)	521	Fossil fuel	electrocatalyst	energy generation
(Karmee, 2016)	49	Fossil fuel	Biodiesel	renewable energy sources
(Berrill et al., 2016)	44	Fossil fuel	electricity	climate change
(Achinas et al., 2017)	135	fossil fuels	organic resources and waste	bioenergy production
(Rolison and Nazar, 2011)	80	fossil fuels	electrochemical energy storage	batteries and electrochemical
(Borthwick, 2016)	58	fossil fuels	global warming	marine renewable energy
(Stolze et al., 2016)	45	fossil fuels	microbial communities	production-scale biogas plants
(Mirandola and Lorenzini, 2016)	44	fossil fuels	society	climate change

ratio of oil, gas, and coal is significantly higher as compared to the new technologies and sources (Zou et al., 2016b). The use of fossil fuels is a more significant impact on environmental issues, and many countries are dropping down the coal using energy-producing. China is one of the highest users of coal energy, and with the period reducing the coal in energy-producing (Chai et al., 2018). However, fossil fuel shortage is also a significant problem in the coming days, and many new renewable energies are, and bioproducts are alternatively using for power generation.

Therefore, research is looking for potential renewable energy sources. According to Joshi et al. (2019), biodiesel is a primary renewable energy source that can be extracted from oils and fat. Biodiesel is a better alternative energy source; the production of biodiesel from the vegetable is costly. Biofuels are considered a critical developing process of renewable energies that is the drive from plant material, agricultural residual, and food waste. The biofuels are still not in positions to replace the fossil fuels in the energy sector, and researchers need to investigate about the biofuels (Stolze et al., 2016). Although fossil fuels are a more significant challenge for climate change, developed countries are ignoring the fossil fuels for energy generation. According to Berrill et al. (2016), discussing a letter showing a detailed power model system into 44 electricity in Europe 2050. That model is presenting the power generation process on low carbon utilisation energy sources like coal, oil, and natural gas. The model is also showing high shares of variable renewable energy sources like wind and solar.

Fossil fuels are an environmental challenge in the current period, and many researchers are suggesting using renewable energy sources to deal with environmental sustainability. Fossil fuels also impact on greenhouse gasses, and research is showing that anaerobic digestion is an effective replacing technology that combining biofuels production along with sustainable waste management, and other technologies are working biogas producing sector (Achinas et al., 2017). The author is also suggesting that biogas production is increasing in the European market as a replacement for fossil fuels economically and environmentally better results. However, there is a need for understanding the climate change concerns around the globe, and the development of alternative energy sources is the importance of time. Fossil fuels are impacting the environment and bringing negative impacts on the environment. The environmental-related research is also raising the point o are the consumers using fossil fuel energy (Rolison and Nazar, 2011). Mirandola and Lorenzini (2016) showing some environmental and climatic issues that were challenging the present time and started in the past. The findings of the study are suggesting that society is looking for renewable energy to minimise the climate and environmental impacts, but in the meantime, fossil fuels gradually replace due to large scale capital investment on the resources.

5. COMPARING THE RENEWABLE ENERGIES RESOURCES WITH TRIPLE BOTTOM LINE

In recent years knowledge of the significance of sustainability and the preservation of natural resources is increasing more than ever before. Profit and loss is not the sole focus of progressive organisations in the current scenario. The environment, economy and social footprint are ignoring in present will be paid in future (Wunderlich and Martinez, 2018). Some renewable energy resources are economically viable; physical adaptability is very complex to install. Zhang et al. (2018) conclude that solar energy fosters match the respective energy demand and supply, while at the same time the economic effectiveness and the operation feasibility to maximise distributed renewable energy harvesting. Wind and solar energies are also familiar sources of renewable energy, and literature is widely directing about solar energy plants' effectiveness. Solar energy replacing the fossil fuel generating energy, and researchers are significantly discussing the strategies to adapt to solar energy in the less developed part of the world. The

installation of solar panels is also highly practical, and an impact on the environment is positive (Kabir et al., 2018).

However, wind energy is also one of the renewable sources of energy, and researchers are concluding that in the future traditional dams are a significant source of batteries that store electricity from the solar and wind (Barasa et al., 2018). Besides, literature dominant on renewable electricity that is generating through different sources. Literature related to renewable electricity is discussing more U.S. electricity resources and the future of renewable electricity. Us primary source of electricity is freshwater and coal that is an environmental issue according to findings of the literature. In the future, electricity resources from freshwater and coal are replaced by renewable energy sources. China is also generating electricity using coal, and that is responsible for environmental and climate change issues. Figure 6 is showing the overall literature findings and results in the last decade.

Biofuels are one of the very fundamental needs of today's world because fossil fuels are environmentally very harmful. Most of the literature and researchers agree to the utilisation of biofuels in vehicles and other industries (Khan et al., 2018). The Biofuels production process is still a discussion between the researchers. Some of suggesting that biofuels are economically affordable, and production from waste is much cheaper. Another source of producing biofuels is that vegetables are discussed in many studies (Kaur and Bhaskar, 2020). Another pool of researchers is concentrating that biofuel and bioproducts are affordable in developed parts of the world. Underdeveloped and poor regions are still not able to traditional sources of energy (Qureshi et al., 2016).

Renewable energies are a scorching research area in the recent period; many countries are doing collaborations on finding better results. In the current study, a clear dominancy is seen by the U.S. researcher's contribution to renewable energies. The most productive country from this point of view in the United States of America. Figure 7 Is showing that China and the United Kingdom are also significantly contributing. Collaborative work is done between the European countries and very few numbers from Asia and Africa. The research collaboration network among the European countries is very high; this is justifying the close collaboration of the states. The collaborative work among low and middle resources countries is scarce. However, some countries are still having some numbers like Vietnam, Iraq, and Ecuador.

Figure 6: Distribution of literature from published research

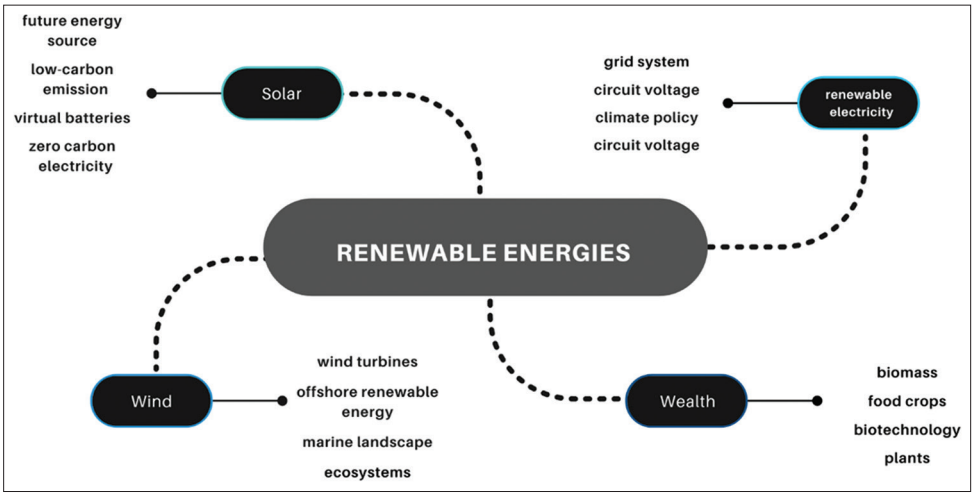
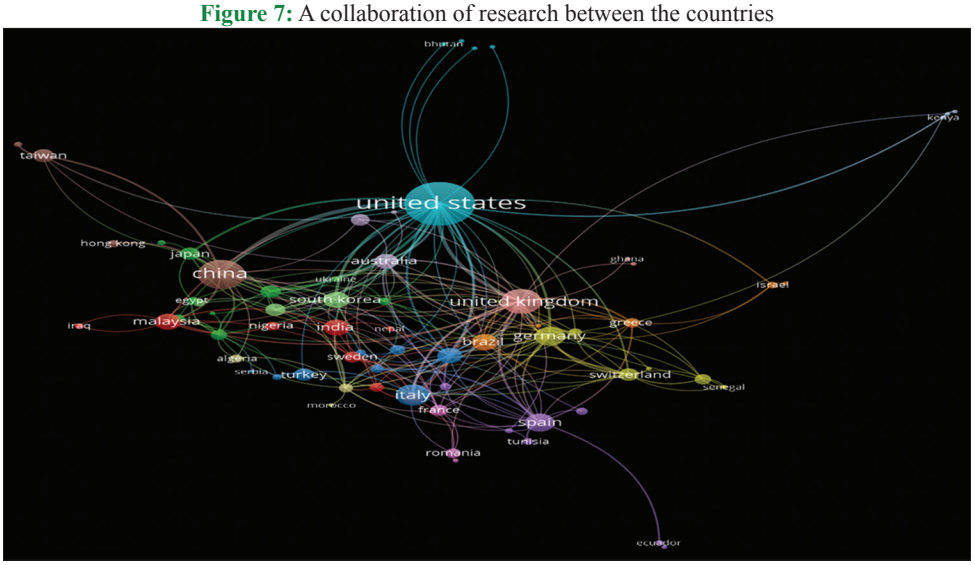


Figure 7: A collaboration of research between the countries



6. CONCLUSION AND FUTURE AGENDA

The current study's main idea is to find out the direction and research work conducted on renewable energy sources in the last decade. Renewable energies are a scorching topic over the years due to the demand and supply position of power in different parts of the world. The selection of data is a very essential and critical step for the review. For the choice of two reputed databases, Scopus and web of science are chosen due to an incredible number of energy-related journals. The inclusion and exclusion criteria are followed on the PRISMA statement 2015 for an acceptable process for reviewing. The final 52 articles are selected for review and bibliometric analysis. The most critical part is the classification of data, on which area literature is widely discussing the renewable sources for the energy is biofuels.

Findings of the current study from the literature showing that renewable energy sources are the most efficient by calculating the costs of the fuel, the production, and the environmental damages. Among the other source of renewable energy, the wind comes out on top by a wide margin as compared with other options, solar, hydro, nuclear, thermal and geothermal (Wang et al., 2019). The wind energy is a free and renewable source of power that no polluting and clean. It can be built on land that is also useable for growing crops or grazing animals, having harmony with nature. Significance of wind energy are no fuel is needed to keep things on; it may be an initial investment is high (Nazir et al., 2019). Some of the researcher's findings are not supporting the current agenda about wind energy, and they are focusing on solar renewable energies resources. Solar renewable energy sources for home and commercial, use proven to be the most efficient and influential among the other renewable resources (Kabir et al., 2018). However, some advantages and disadvantages are associated with both solar and wind renewable energy sources. Technical skills, economic hindrance and institutional obstacles are the barriers that need to sort it out for sustainable development in renewable energies progress (Kabir et al., 2018).

The environmental impact of using fossil energy sources are discussing in many studies. Literature is showing that using fossil fuels for power generation is degrading ecological issues. Fossil fuels are also affecting the marine wildlife, and many studies are recommending that renewable energy sources are a better solution for generating power. The power demand is growing day by day, and it is complicated to fulfil the demand only using fossil fuels. However, it is also tough to say that renewable energies are entirely replacing the traditional source of power in a short period. The gradually alternating fossil fuels to the renewable energy source is a better solution for the economies. The renewable energy sources are comparatively easier for developed nations. They have enough resources to invest in production. In the case of lower developed economies, it is not easy to adopt renewable energy sources. In the current study majority, of literature is focusing on biofuels, wind energy, and solar energy; future research should look at some other renewable energy sources like tidal or wave energy that is recently gain more attention in many research journals.

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