International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 6, Issue 8, pp 1-7, August-2022

https://doi.org/10.47001/IRJIET/2022.608001

Next Stop Zero Carbon: Focused on Electricity Generation

[1]Haydar Irey, [2]Haydar Kepekci

[1]Independent Researcher, Turkey

[2]Assistant Professor, Mechatronics Engineering Department, Faculty of Engineering, Nişantaşı University, Turkey

E-mail: [1]haydarirey@gmail.com, [2]haydar.kepekci@nisantasi.edu.tr

Abstract **- Today, the most important threat to the ecological balance of the world is seen as climate change. The increase in greenhouse gases in the atmosphere leads to an increase in temperature, deterioration of the ecological system, and a change in the climate system all over the world. Extreme weather changes in climate; drought, desertification, melting of glaciers, increase in sea levels, sudden rains, etc. have important effects that can directly or indirectly affect human life and health, socioeconomic sectors, and ecological systems. In this study, energy policy recommendations have been made for Turkey.**

Keywords: Energy policy, Energy management, Renewable energy, Climate change.

I. INTRODUCTION

CO_2, which is one of the leading greenhouse gases that cause climate change due to its abundance in the atmosphere, has increased rapidly after the industrial revolution according to the IPCC assessments [1].The use of fossil fuels is one of the main reasons for this increase. According to TUIK data, when Turkey's sector-based greenhouse gas emission profile is analyzed, the energy sector has the largest share with 72% as of 2019 [2].Coal, which is one of the fossil fuels and which is frequently discussed in climate policies due to its role in the energy sector, is responsible for approximately one-third of the electricity production in Turkey and approximately 27% of the total CO_2 emissions with 147 million tons.

After becoming a party to the Paris Agreement, which aims to regulate the post-2020 climate change regime and is accepted as the most comprehensive climate agreement, in November 2021, Turkey made an important commitment at the 26th Conference of the Parties and declared its net zero emission target in 2053. Considering that Turkey's annual greenhouse gas emission level in 2019 is 506 million tons (Mt) CO_2 equivalent, it is necessary to reduce greenhouse gas emissions to 100 million tons (Mt) CO_2 equivalent by 2053 in order to reach the determined net-zero target [3].Therefore, in 30 years, besides protecting and increasing the carbon sinks in Turkey, decarbonization studies such as reducing fossil fuels in the energy sector, increasing the share of renewable energy and energy efficiency, developing clean fuel and technologies, and electrification transportation will come to the fore. This study, study has been conducted to decarbonize the electricity generation sector on the way to net zero in line with the target of Turkey.

In the Climate Council held in February 2022 with the aim of determining the Climate Roadmap in Turkey, among the recommendations taken on reducing greenhouse gas in the energy sector, "The use of carbon capture, use and storage technologies in electricity production from coal without hindering Turkey's economic and social development right. In this context, there are studies to reduce the emissions originating from electricity generation, including supply security, macroeconomic and social effects" and "evaluation of increasing electricity production from emission-reducing alternative fuels from the perspective of resource diversity and energy supply security". Prior to the 27th Conference of the Parties to be held in 2022, it is aimed to establish Turkey's Long-Term Energy Plan and submit the updated national contribution statement to the United Nations Framework Convention on Climate Change secretariat. In line with the said plan, it is obvious that the roadmap of the energy sector for fossil-fueled power plants will be clarified, and the efforts to decarbonize the sector will gain momentum without affecting the energy supply security.

Climate policies, which are transforming with the Paris Agreement and especially the Green New Deal discussions, including the EU Green Deal, find their way into the financial world. In the green transformation process in Turkey, it is planned to carry out studies by taking into account the "Creation of the National Green Finance Strategy", "Regulation regarding green financing instruments in line with international standards", and "The creation of the Turkish Emissions Trading System" and the Border Carbon Regulation Mechanism [4].In light of this information, there is no doubt that the decarbonization of the electricity generation sector will go a long way in the fight against climate change. For a more livable world, although it seems impossible to reach the goal without a plan and project on the way to decarbonization,

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 6, Issue 8, pp 1-7, August-2022

https://doi.org/10.47001/IRJIET/2022.608001

it is essential to produce policies institutionally and to raise awareness individually.

II. LITERATURE REPORT

Achieving zero carbon or carbon neutrality has been an issue that has become more important for many countries around the world after the Paris Climate Agreement. While CO_2 is responsible for 76% of the total greenhouse gases, 41% of it originates from the energy sector, especially from coal-fired power plants [5].Coal, which started to be used in thermal power plant energy production with the industrial revolution, has been seen as a pioneer energy source in the world for a long time and continued to be used. However, due to the fact that the emissions as a result of combustion cause environmental pollution and are responsible for global CO_2 emissions, global awareness has started to emerge in the world in recent years and steps have been taken toward the transition from fossil fuels to renewable energy. The most important goal in achieving this transition is to limit greenhouse gas emissions.

In the study by Qin et al. (2021), unlike previous studies, the role of environmental policy, green innovation, composite risk index, and renewable energy R&D in achieving carbon neutrality targets for the G7 economies between 1990 and 2019 has been evaluated [6].The main purpose of the study is to empirically analyze whether the G7 economies can achieve the carbon neutrality target. At the same time, environmental policy, green innovation, and composite risk index are focused on as another purpose in the study. For this purpose, it has been analyzed whether any environmental measures taken by a government or other organization help carbon neutrality in achieving the goal. The final aim of the study is to examine whether green innovation helps achieve carbon neutrality goals. Various econometric tests have been used in the analyzes carried out for these purposes. As a result of the study, the positive effect of economic growth on carbon emissions has been confirmed with short and long-term forecasts made on the subject. However, it has been determined that carbon emissions begin to decrease after a threshold income level. In addition, it has been observed that the composite risk index has a positive effect on carbon emissions. It has been seen that governments' environmental policies, green innovation, and renewable energy R&D practices significantly reduce carbon emissions in the G7 economies. When the experimental findings obtained as a result of the study are evaluated, it is suggested that environmental policies should be strengthened, green innovation and renewable energy research and development expenditures should be encouraged, and political stability and institutional quality should be stabilized in order to reduce sectoral risks that will help a sustainable environment.

One of the most important steps in achieving the Zero Carbon target is to increase the share of renewable energy in the electricity generation sector. In this context, a study has been conducted by Yuan et al. (2022) to investigate the role of renewable energy in reducing greenhouse gas emissions and to discuss whether it can be a pragmatic path to carbon neutrality, mainly to evaluate the causal relationship between renewable energy and carbon dioxide [7].For this purpose, the Granger sliding window causality test method (rolling-window Granger causality test) is referred to in the study. As a result of the research, by examining the interactions between RE consumption and CO_2 emissions, it has been determined that RE's role in changing has become more evident and contributes effectively to the reduction of carbon emissions. According to the experimental data obtained as a result of the study, it can be interpreted that YE shows great potential in reducing the greenhouse effect. China, which supplies 65% of its energy from coal and accounts for approximately 29.4% of the total emissions released to the nature globally, is the country with the largest CO_2 emitter in the world with this ratio. Therefore, analyzing the environmental factors affecting China's CO_2 emissions is critical for global measures. For this purpose, in the study conducted by Abbasi et al. (2022), China's fossil fuel energy, renewable energy and gross domestic product (GDP) between 1980 and 2018 have been examined using dynamic ARDL simulations and Frequency Domain Causality models. [8].

Experimental findings obtained from the studies have shown that fossil fuel energy increases CO_2 emissions intensively in the long and short term, just as in the study of Yuan et al. (2022) [9].It is also concluded that GDP increases carbon emissions in the long run, and China has a significant negative impact on the environment in the short run. Long, medium and short-term causality hypotheses are also supported in the studies conducted using the Frequency Domain Causality (FDC) method. When the data obtained are evaluated in general, it is seen that renewable energy consumption is important to achieve sustainable environmental goals and fossil fuel consumption should be abandoned. In this direction, it is suggested that China should initiate long-term strategies to reduce carbon emissions for a sustainable environment.In the study conducted by Li et al. (2020), it has been aimed to summarize the international energy development status by collecting the research results published by the statistical departments and authorized institutions related to renewable energy in the transition to zero carbon, and to summarize the energy efficiency of the European Union, the United States of America, Australia, India and Brazil. The development status has been systematically brought together [10].

ISSN (online): 2581-3048
Volume 6, Issue 8, pp 1-7, August-2022
https://doi.org/10.47001/IRJIET/2022.608001

In the study, extensive data research has been conducted as a method and for this purpose, the International Renewable Energy Agency (IRENA), BP Amoco, Eurostat, Global Wind Energy Council (GWEC), International Energy Agency (IEA), Bloomberg New Energy Finance (BNEF), which provides professional data sources in this field. Although there are many studies that analyze the development of renewable energy, this study is an important research as there are very few studies that analyze the development trend of renewable energy in various countries based on research results published by relevant statistical departments and authorized institutions. In the study, the development status of renewable energy in the five major economic countries of the world has been comprehensively listed and the development trend of wind, solar, biomass, geothermal, ocean and hydrogen energy has been analyzed. As a result of the study, a policy path has emerged that adapts to China, according to the state of China's energy development and the role of the market. At the same time, when the data obtained within the scope of the study have been evaluated, it has been suggested that China should draw its own renewable energy development path using its international development experience and actively explore renewable energy policies and strategies adapted to different development stages.

The effects of climate change are felt and experienced in many parts of the world, and this factor affects people's health, physical environment, livelihoods and socioeconomic well-being in general [11]. Canada is one of the countries that experience the negative effects of this global warming. According to information provided by Climate Ready (2011–2014), it is stated that Canada's temperature values increased by 1.4°C between 1948 and 2008 and are expected to increase by 2.5°C to 3.7°C by 2050 [12].The Canadian government, which is preparing to take action in this regard, has aimed to reduce greenhouse gas emissions by 30% by 2030 in the Nationally Determined Contribution (NDC) submitted to the United Nations Framework Convention on Climate Change (UNFCCC, 2015). To achieve this, the Canadian federal government, in collaboration with provincial governments, has implemented specific regulatory actions in the transport, electricity and fuel sectors. Measures to be taken in the environmental sense have also been one of the important issues of the leaders in the ideological sense. In this context, the study by Fobissie (2019) aimed to examine how environmental values and political ideology affect public support for RE policy in the ongoing efforts to gradually replace dirty, traditional energy sources with renewable energy sources in Ontario [13].

The study also explores what other factors may influence people's decision-making about FE. The data obtained through open-ended interviews with 50 participants in and around Ottawa have been transcribed, coded, and analyzed using software. As a result of the analyzed data, it has been seen that environmental values and political ideology affect public support for renewable energy policy, but economic factors are also effective on this issue.In the study by Fulong Song et al. (2020), different policy projections to reduce carbon emissions from coal-fired power plants operated by France, Germany, England, America, Japan, and China have been analyzed [14].In the study, firstly, the necessity of increasing energy efficiency on a global scale and a decrease in energy demand has been put forward. Afterward, the necessity of decarbonization of the world energy supply originating from coal-fired power plants has been stated. When the policies and projections of these developed countries are evaluated, it is predicted that the share of renewable energy will increase significantly in the 2050s, fossil fuel consumption will decrease by 21% in the 2030s, and 66% of this decrease will be due to the increase in renewable energy. As a result of the evaluations, it is recommended not to build new coal-fired power plants and to close the existing ones gradually, as well as to make traditional heat pumps more usable and improve their flexibility. In order to reduce the carbon emissions of existing coal-fired power plants, it has been stated that fuel conversion should be provided by using natural gas and different biomass, electricity storage technologies such as batteries and pumped storage HEPP should be widespread, and the emission trading system should further limit greenhouse gas emissions. Of course, financial support mechanisms, market reform, and modern grid planning are also seen as important parameters for the green transition in this energy sector. However, it has been recommended to carry out more detailed studies on carbon trading and carbon capture and storage in the said energy transformation.

In order to achieve carbon neutrality on a global scale, it is necessary to develop effective and efficient technologies and establish green and low-carbon development models. Waste heat recovery technologies allow a beneficial use of the remaining energy without the need for additional consumption. ZixiAngSu et al. have also used mathematical models to examine the positive effects of dehumidification of coal and waste gas and the efficiency of the power plant by using mathematical models [15].In this direction, new and effective has beente heat recovery cogeneration systems with integrated carbon capture and dewatering units for coal power plants have been investigated. With the studies, it has been revealed that the thermal efficiency increased by 5.74% and the emission reduction by 3.56% in the proposed integrated system compared to conventional thermal power plants. This research also shows that it provides additional cooling capacity, moisture removal rate and carbon capture. The aforementioned study emerges as an important option in achieving the carbon neutral target.China, whose electricity

ISSN (online): 2581-3048
Volume 6, Issue 8, pp 1-7, August-2022
https://doi.org/10.47001/IRJIET/2022.608001

production has increased rapidly since the beginning of the 2000s, is a coal-rich country but poor in gas and oil, so the share of coal-fired power plants in total fossil-fuel power plants is more than 90%. Coal-fired power plants are responsible for 62% of the total electricity production in China. However, within the scope of combating the global climate crisis, China has announced its carbon neutral target for 2060, and it needs a significant change in the energy sector, which is responsible for 40% of the country's emissions, in order to achieve this target. Therefore, reducing CO_2 emissions from coal power plants is very important in terms of decarbonizing the energy sector in China and achieving the country's carbon neutral target. CCS technology in the country stands out as one of the most important tools in the process of decarbonisation in the energy sector. With this technology, CO_2 is captured from the emission source and can be temporarily stored in deep salt aquifers, oil reserves or gas reserves. It is stated that there is sufficient storage capacity in China to store national emissions for 200-300 years [16].

Due to the insufficient literature study in revealing the costs of conversion methods in the carbon neutral path, economic models have been made by Shuyang Liu et al.According to the studies, it has been seen that the cost is less than nuclear, solar and wind power plants, provided that the CO_2 transfer is at a distance of 100 km and the coal price is low (around 70.54 USD/tonne). It has been demonstrated that equipping existing coal power plants with CCS is more economical than building a new nuclear, solar or wind power plant. Current CCS designs envision 90% CO_2 capture, but more is needed to meet the stringent targets of the Paris Climate Agreement and to be decarbonised. In this direction, deep CCS technologies have been investigated by Matthew N. Dods et al. (2021) in the light of recent developments in materials and processes [18].According to the results of the study, it has been shown that over 95% CO_2 sequestration can be achieved depending on technological developments. Similarly, Feron P. et al. (2019) stated that the carbon capture rate in thermal power plants can be increased to 90% by using various technologies such as pre-combustion, post-combustion, or oxy-fuel [19].As a result of their study, Wei N. et al. (2021) revealed that carbon capture, utilization, and storage technologies are the key technology for the decarbonization of coal power plants if an affordable price policy is implemented [20].In order to reach the 2050 goals, Guo J.X. et al. (2020) presented a project investment model by transferring the problem to a mathematical model for designing the CCS development roadmap [21].

Another method applied for emission reduction is environmental taxes. With the taxes imposed, especially in China, companies are forced to reduce their emissions. However, Li P. et al. (2021) observed the effect of environmental taxes on 804 thermal power plants selected as a sample in their study [22].Although the study revealed that the effect of taxes on thermal power plants is quite low, it also revealed the importance of taxation requirements on a firm basis. With the Paris Climate Agreement, Europe has declared its goal of being carbon neutral by 2050. Pietzcker R. C. et al. (2021) revealed that the new goal of decarbonizing the EU energy sector accelerates the transformation in the electricity sector and contributes to renewable energy [23].

In order to achieve this target, carbon capture and storage technologies will need to be utilized in energy-intensive sectors, especially in order to decarbonize the energy sector, but further development of these technologies is needed. In 2005, the EU emissions trading system (ETS) has been put into effect within the scope of decarbonization studies. However, in line with the reduction results of the ETS, due to the lack of sufficient studies in the literature, especially after 2013, an empirical analysis has been made by Leticia Canal Vieira et al. to achieve the EU net zero target. Within the scope of the study, the data between 2005 and 2017, which covers the 3 phases of the ETS, have been analyzed for France, Germany, Italy, Spain, and England, which have the five largest economies in Europe [24].The results of the study show that very few plants are proactively decarbonized, while emissions have increased in many plants. Although the ETS 3rd phase is more stringent, it has been observed that the reduction performances in emissions after 2013 are low. These results show that additional policies will likely be required to reach the 2050 target.

III. ENERGY POLICY RECOMMENDATIONS

The carbon neutral target, which came to the agenda on a global scale with the Paris Climate Agreement, is important because greenhouse gases trigger global warming and their effects on human health. In order to achieve this goal, various policies must be developed and acted upon by governments. One of the most important steps to achieving zero carbon targets in Turkey is to draw up a targeted roadmap in the energy sector, make short, medium, and long-term strategic plans, and monitor the developments by providing control of the harmonization process by independent institutions. The Climate Council held in Turkey in February 2020 is one of the most concrete steps recently taken towards zero carbon. It is necessary to increase the number of climate-related organizations and meetings and to follow the implementation of the decisions taken by the governments, in order to raise awareness of the societies and to guide the public about the steps towards the target.

In energy, which is responsible for the majority of carbon emissions, electricity generation facilities are gradually

ISSN (online): 2581-3048
Volume 6, Issue 8, pp 1-7, August-2022
https://doi.org/10.47001/IRJIET/2022.608001

removed from fossil fuels, taking into account the energy supply security, increasing the share of renewable energy, increasing the efficiency of the existing coal-fired thermal power plants until the end of their life, digitalizing them and integrating new technologies into the facilities with R&D studies. In addition, it is necessary to complete the legislation on issues such as the emission trading system and carbon taxes and to complete the preparations of the power plants for carbon pricing mechanisms. With the Border Carbon Regulation, carbon-intensive sectors in the EU will be obliged to determine their emissions by 2023 and to purchase the CBAM certificate corresponding to their emissions by 2026. Countries that import products to the EU, such as Turkey, will also be affected by this situation and will have to reduce their emissions. It is thought that such policy proposals to be given in order to reach the zero-carbon target are an important issue that should be emphasized in terms of protecting national values as well as providing emission reductions.

One of the main methods applied in many countries for emission reduction is environmental taxes. China and various other governments, which are leading in air pollution, have forced companies to reduce emissions by imposing environmental taxes. However, Li et al. (2021) in their study on 804 thermal power plants in China, which have been chosen as a sample, reveal that the effect of taxes on emission reduction is quite low [22].This and many similar studies show that the policy of "the carbon emitter pays" can lead to the perception that "I'll pay for it and pollute". It is thought that the establishment of systems based on penalty and reward systems instead of penalty-oriented taxes will be more effective in reducing emissions.The contribution of coal-fired power plants to greenhouse gas formation together with the existing low calorific value lignite reserves in Turkey is an issue that should not be ignored. To achieve the carbon neutral target on a global scale, it is necessary to develop effective technologies and establish green and low-carbon development models. In Turkey, one of the most striking methods of combating carbon emissions that should be followed in this way is to prevent new thermal power plants to be established. Implementation of carbon reduction in all thermal power plants in operation will be one of the biggest steps toward realizing this target. For this reason, governments and society should be encouraged and appreciated to do their part as conscious consumers. In addition, resource diversity comes to the fore in the process of decarbonizing electricity generation, which is one of the energy-intensive sectors. In addition to natural gas, it is recommended to use carbon neutral fuels such as green hydrogen and biomass in power plants.

While carbon neutral targets are being talked about, on the one hand, the global energy demand is increasing day by day with the increasing population, on the other hand, it is obvious that this increase will also increase carbon emissions due to the use of fossil fuels in the energy sector. Coal-fired power plants, which have the ability to load and shed against the changing energy demand, have an importance that is difficult to substitute in providing energy supply. In order to meet the rapidly increasing energy demand, in terms of using financial resources more effectively, the potential of energy and resource efficiency should be evaluated during the period of their stay in operation in the existing power plants. Developing policies for energy and resource efficiency in thermal power plants will both have a reducing effect on the current account deficit and foreign dependency and will make significant contributions to the fight against climate change and environmental problems. In the process of decarbonizing the energy sector, the realization of projects for the use of thermal power plant has beente heat in district heating systems and the more efficient burning of fossil fuel will contribute to the zero-emission process of buildings.Although studies on carbon capture and storage technologies have been focused on in recent years, CCS is not yet seen as a cost-effective option, but it is thought that it will come to the fore with the developing technology in the coming years and will be an important option for countries in carbon removal. Providing the high energy required to capture carbon with CCS technology from renewable energy sources is essential for the goal of carbon neutrality. With the R&D studies to be done, signals are given that the usability of CCS will increase in the coming years. In Turkey, it is important to support R&D studies for carbon capture and storage activities and to give incentives [25].

IV. CONCLUSION

The zero-carbon target of countries plays a critical role in the fight against the climate crisis, which is a global problem. It should be accepted that carbon targets on a sectoral basis are inevitable on the road to net zero in Turkey, and governments and individuals must fulfill their responsibilities in this regard. By evaluating the empty spaces in the power plant area, the establishment of power plants such as GES / RES / GPP and the hybrid operation of the thermal power plant will contribute to the reduction of emissions by providing its own internal electricity needs as a renewable energy source.

REFERENCES

[1] X. Fu and C. Li, "How resilient are localities planning for climate change? An evaluation of 50 plans in the United States", Journal of Environmental Management, vol. 318, pp. 115493, 2022.

[2] H. Şahin and H. Esen, "The usage of renewable energy sources and its effects on GHG emission intensity of electricity generation in Turkey", Renewable Energy, vol. 192, pp. 859-869, 2022.

ISSN (online): 2581-3048
Volume 6, Issue 8, pp 1-7, August-2022
https://doi.org/10.47001/IRJIET/2022.608001

[3] Ü. Ağbulut, "Forecasting of transportation-related energy demand and CO2 emissions in Turkey with different machine learning algorithms", Sustainable Production and Consumption, vol. 29, pp. 141-157, 2022.

[4] M. Kumar, D. Haillot and S. Gibout, "Survey and evaluation of solar technologies for agricultural greenhouse application", Solar Energy, vol. 232, pp. 18-34, 2022.

[5] E. Shagdar, Y. Shuai, B. Lougou, A. Mustafa, D. Choidorj and H. Tan, "New integration mechanism of solar energy into 300 MW coal-fired power plant: Performance and techno-economic analysis", Energy, vol. 238, pp. 122005, 2022.

[6] L. Qin, D. Kırıkkaleli, Y. Hou, X. Miao and M. Tufail, "Carbon neutrality target for G7 economies: Examining the role of environmental policy, green innovation, and composite risk index", Journal of Environmental Management, vol. 295, pp. 234-242, 2021.

[7] X. Yuan, C. Su, M. Umar, X. Shao and O. Lobont, "The race to zero emissions: Can renewable energy be the path to carbon neutrality?", Journal of Environmental Management, vol. 308, pp. 1-13, 2022.

[8] R. Abbasi, M. Shahbaz, J. Zhang and M. Irfan, "Analyze the environmental sustainability factors of China: The role of fossil fuel energy and renewable energy", Renewable Energy, vol. 187, pp. 390-402, 2022.

[9] L. Bao, B. Sun and Q. Luo, "Optimal control strategy of the turbocharged direct-injection hydrogen engine to achieve near-zero emissions with large power and high brake thermal efficiency", Fuel, vol.325, pp. 124913, 2022.

[10] L. Li, J. Lin, N. Wu, S. Xie, C. Meng, Y. Zheng, X. Wang and Y. Zhao, "Review and outlook on the international renewable energy development", Energy and Built Environment, vol. 3, no:2, pp. 139-157, 2020.

[11] V. Syddall, K. Fisher and S. Thrush, "Collaboration a solution for small island developing states to address food security and economic development in the face of climate change", Ocean & Coastal Management, vol. 221, pp. 106132, 2022.

[12] U. Berardi and P. Jafarpur, "Assessing the impact of climate change on building heating and cooling energy demand in Canada", Renewable and Sustainable Energy Reviews, vol. 121, pp. 109681, 2020.

[13] E. Fobissie, "The role of environmental values and political ideology on public support for renewable energy policy in Ottawa", Energy Policy, vol. 134, pp. 110918, 2022.

[14] F. Song, H. Mehedi, C. Liang, J. Meng, Z. Chen and F. Shi, "Review of transition paths for coal-fired power plants", Global Energy Interconnection, vol: 4, no: 4, pp. 354-370, 2021.

[15] Z. Su and L. Yang, "A novel and efficient cogeneration system of waste heat recovery integrated carbon capture and dehumidification for coal-fired power plants", Energy Conversion and Management, vol: 255, pp.115358, 2022.

[16] S. Liu, H. Li, K. Zhang and H. Lau, "Techno-economic analysis of using carbon capture and storage (CCS) in decarbonizing China's coal-fired power plants", Journal of Cleaner Production, pp. 131384, 2022.

[17] N. Densberger and K. Bachkar, "Towards accelerating the adoption of zero emissions cargo handling technologies in California ports: Lessons learned from the case of the Ports of Los Angeles and Long Beach", Journal of Cleaner Production, vol. 347, pp. 131255, 2022.

[18] M. Dods, J. Kim, J. Long and S. Weston, "Deep CCS: Moving Beyond 90% Carbon Dioxide Capture", Environmental Science Technology, vol.55, no. 13, pp. 8524–8534, 2021.

[19] P. Feron, A. Cousins, K. Jiang, R. Zhai, S. Hla, R. Thiruvenkatachari and K. Burnard, "Towards Zero Emissions from Fossil Fuel Power Stations", International Journal of Greenhouse Gas Control, vol. 87, pp. 188-202, 2021.

[20] N. Wei, Z. Jiao, K. Ellett, A. Ku, S. Liu and R. Middleton, "Decarbonizing the Coal-Fired Power Sector in China via Carbon Capture, Geological Utilization, and Storage Technology", Environmental Science and Technology, vol. 55, pp. 13164-13173, 2021.

[21] J. Guo and C. Huang, "Feasible roadmap for CCS retrofit of coal-based power plants to reduce Chinese carbon emissions by 2050", Applied Energy, vol. 259, pp. 114112, 2020.

[22] P. Li, Z. Lin, H. Du, T. Feng and J. Zuo, "Do environmental taxes reduce air pollution? Evidence from fossil-fuel power plants in China", Journal of Environmental Management, vol. 295, pp. 113112, 2021.

[23] R.C. Pietzcker, S. Osorio and R. Rodrigues, "Tightening EU ETS targets in line with the European Green Deal: Impacts on the decarbonization of the EU power sector", Applied Energy, vol. 293, pp. 116914, 2021.

[24] L. Vieira, M. Longo and M. Mura, "Are the European manufacturing and energy sectors on track for achieving net-zero emissions in 2050?", Energy Policy, vol. 156, pp. 112464, 2021.

[25] K. Kaygusuz, "Energy for sustainable development: A case of developing countries", Renewable and Sustainable Energy Reviews, vol. 16, no. 2, pp. 1116-1126, 2021.

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 6, Issue 8, pp 1-7, August-2022

https://doi.org/10.47001/IRJIET/2022.608001

Citation of this Article:

Haydar Irey, Haydar Kepekci, "Next Stop Zero Carbon: Focused on Electricity Generation" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 6, Issue 8, pp 1-7, August 2022. Article DOI https://doi.org/10.47001/IRJIET/2022.608001

****

