Clean Energy Transition: A Policy Implementation Analysis of the Korean New Deal

Zahra Ananta, Revalina Febrizya Fachrany, Diah Aulia Tiara Rahma
Universitas Pembangunan Nasional "Veteran" Jawa Timur
Email: 22044010048@student.upnjatim.ac.id, 22044010032@student.upnjatim.ac.id, 22044010024@student.upnjatim.ac.id

ABSTRACT

COVID-19 has had a severe impact on many countries, especially in the economic sector which has experienced a significant decline. This situation prompted the South Korean government to take action in finding solutions to restore stability to the country. This article discusses the South Korean government's efforts in implementing the Korean New Deal (KND) program with a focus on the digital new deal, namely the development of hydrogen electric vehicles, promotion of renewable use and supporting a fair energy transition and building an efficient electricity grid. The research method used is qualitative, which is a type of research aimed at being able to investigate, find, describe, and explain a quality or virtue of the impact of social influences that cannot be described, described or described in a lift calculation or what is called a quantitative approach. The author is interested in taking research that discusses KND because there is also urgency in this topic because South Korea is one of the countries that is trying to implement the Sustainable Development Goals (SDGs) with focus number 7 (Affordable and Clean Energy). The final result in the form of common ground in this research is expected to make a good contribution in influencing the development of how the performance of the KND policy process provides development to several areas that have been targeted as well as a reference in future research on topics that still have continuity with this research.

Keywords : *Korean new deal, Low Carbon, Green new deal, Korean Government*

INTRODUCTION

The occurrence of the Covid-19 pandemic phenomenon certainly made the entire country's economy decline. During the Covid-19 period in 2020, it created the worst recession event, and not only that, it was also followed by complex problems in society that experienced job losses at the global economic level since the great depression. ("International Monetary Fund," 2020). Therefore, the Covid-19 event encouraged all countries to be able to restore their economy in various ways such as creating policies, programs, and strategies. The same is experienced by the country of South Korea in dealing with the economic crisis during the pandemic. The Korean government itself has introduced its national development strategy known as the Korean New Deal (KND). This strategy aims to get out of the economic crisis that occurred during the pandemic and also as a guideline or basis for global action against structural changes that occur in various activities such as no longer being able to carry out face-to-face services, disruption of small and medium enterprises, and tourists (Lee, 2021, p. 279).

Behavioral changes during the pandemic have limited people's activities outside, leading to increased online and non-contact demand across the global market. This is with the aim of breaking the chain of prevention of the covid-19 virus. Therefore there is a transitional push, by

making a digital economic transition which is an important element for the competitiveness of the Korean economy, which is highly dependent on the global market. Not only that, the covid-19 pandemic has also led the international community to reassess the impact of climate change and give full attention to creating efforts to transform into a low-carbon economy (BIS, 2020).

There are two policies that will be introduced by the Korean Government for the KND program itself, namely, Digital New Deal and Green New Deal, these two programs have an important foundation to become a tool to strengthen employment and social safety net. In order to build a digital economy and green economy transition, the Korean government is shaping environmentally friendly energy infrastructure and building stronger competitiveness of green industries, including green mobility and renewable energy. With the Korean New Deal program, the government hopes to achieve its goal of mobilizing society towards net-zero, by supporting ongoing policies such as the Greenhouse Gas (GHG) emission reduction target by 2030. Additionally, the government has plans to connect renewable energy to provide 20% of electricity generation by 2030. The KND policy also has a focus on green infrastructure that aims to strengthen security networks related to environmental and climate risks. Not only that, the Korean government also has a role to continue promoting sustainability through decentralized energy and the use of low-carb energy. And areas or groups that do not have equal access to this transition will be protected. In addition, the government is also increasing the innovation base and growth will be united for the green industry (National Strategy for a Great Transformation Korean New Deal, 2020).

The Korean government's efforts to change towards the transition to a green economy are in line with Sustainable Development Goals (SDGs) number 7, namely, ensuring access to affordable, reliable, sustainable and modern energy for all. With indicator 7.1, by 2030, ensure universal access to affordable, reliable and modern energy services (United Nations, 2023). In writing this article, the author focuses on programs related to the development of the Green New Deal policy on Low Carbon and Decentralized Energy Supply, by preparing for a paradigm shift towards the energy of the future by activating investment in R&D facilities that promote the use of sustainable and renewable energy throughout the country. (An investment of 35.8 trillion won including 24.3 trillion won from the national treasury will be leveraged by 2025 to create 209,000 jobs) (National Strategy for a Great Transformation Korean New Deal, 2020, p. 28). The three projects that will be implemented by the Korean government itself in implementing its 3 programs are, first, building a smart electricity network for more efficient energy management. Second, promoting the use of renewable energy and supporting a just transition. And third, Expanding the supply of Electric and Hydrogen vehicles (*National Strategy for a Great Transformation Korean New Deal*, 2020, p. 13).

LITERATURE REVIEW

The Korean new deal has many impacts in various aspects both in the technical environment and social aspects. Thus, the author conducted a literature review on previous studies. This research focuses on the development of smart power grids, the promotion of renewable energy use, and the development of electric and hydrogen vehicle supply. In addition, it supports a fair transition for each affected party. This policy not only focuses on technical and environmental aspects or energy transition, but will also pay attention to the social and economic impacts on workers. In this research, the author uses a categorical model to trace previous sources with the same discussion.

The first group of papers from (Patai & Horváth, 2021), discusses the green new deal that emphasizes the transition to environmentally friendly urban infrastructure, the expansion of low-carbon energy, and the development of innovative green industrial ecosystems. This includes green building renovation, improved maintenance services, and measures for greening infrastructure. To promote the use of low-carbon energy, there is financial support for new and renewable energy, the implementation of zero-energy buildings, and the development of green construction sites. In addition, to create a green industrial ecosystem, sustainable production systems, green-oriented contracts, and conservation of input resources are made to be more environmentally friendly.

The second group (Ren & Kim, 2020,) writings mentions that South Korea continues to promote the Green New Deal initiative, which aims to transform the economic growth model into one that is lower in carbon and sustainable. One of the main focuses of this change is the development of renewable energy and environmentally friendly infrastructure. This includes significant investments in sustainable transportation and smart healthcare services, especially in areas outside the capital region. In addition, the industrial sector that previously relied on fossil fuels is now shifting to cleaner and more environmentally friendly industries, with increased investment in renewable energy, particularly solar and wind power. Other investments are also directed towards the development of electric vehicles and fuel cell-based vehicles. Hyundai Automobile, for example, is leading the production of hydrogen fuel cell vehicles and plans to achieve 1.3 million electric vehicles and 200,000 fuel cell vehicles by 2025.

The third article by (Lee & Woo, 2020,) discusses the specifics of the Korean New Deal program where the government has identified 10 specific projects for the Korean New Deal. Among them, five projects are related to the Green New Deal. Among them, Green Remodeling, Green Energy, Eco Friendly Mobility of the Future, Green and Smart Schools, Smart and Green Industrial Complexes. The author concludes from the 5 specific green new deal projects that the aim is to improve energy efficiency through the installation of solar power and eco-friendly insulation materials in buildings. The initiative also includes improving school facilities for green learning and transforming industrial complexes into smart and green production spaces, all aimed at creating a sustainable industrial ecosystem.

Most existing research tends to address the technical and environmental aspects of the energy transition, but less examines how renewable energy policies affect social aspects such as employment, wages, and working conditions in related sectors. This creates a need for more comprehensive research that evaluates not only the environmental outcomes of policies, but also their social implications, including the potential for new job creation, the risk of job loss, and retraining needs for workers affected by the energy transition.

The Korean government is working to expand the Korean New Deal initiative to provincial areas in order to enhance local economic effectiveness and support a more equitable and balanced national development for all regions. There are many Korean New Deal projects from the central government for local governments, and this collaboration is essential for the success of the Korean New Deal concept. However, in reality, there are articles that mention that the capital region still has greater technological capabilities than the regional areas. Some regions, such as the capital region and Daejeon, have high capabilities in technology, while other regions excel in different fields.

Responding to some of the research that has been done before and continuing the literature review, the author will present some novelty in this research. The year is the most important

focus in this research because there are certainly some developments in the KND program, especially those that focus on the GND aspects that have been carried out by the South Korean government. There are 3 programs in GND, namely green transition of infrastructures, low-carbon and decentralized energy, and innovation in the green industry. In these 3 programs, the author will focus on low-carbon and decentralized energy. There are 3 indicators in the sub-chapter, namely the continued development of smart power grids for more efficient energy management, the use of renewable energy and supporting a just transition, expanding the supply of electric and hydrogen vehicles. Since the start of the KND policy, there has been an increase in these indicators in the most recent year of data. Therefore, the author will continue the development of how the implementation of KND is also a form of support for the SDGs.

For the argumentation, the author is interested in taking up research that discusses KND because of the availability of data and the ease of accessibility obtained on the internet. In addition, there is also urgency in this topic because South Korea is one of the countries that is trying to implement the SDGs number 7. With examples of programs such as the continued development of smart power grids for more efficient energy management, the use of renewable energy and supporting a just transition, expanding the supply of electric and hydrogen vehicles. Researchers are also interested due to the conditions of the earth that are increasingly warming due to global warming and the depletion of non-renewable natural resources, South Korea dares to take steps by carrying out the KND concept as a form of sustainability regarding the use of electricity that is wise and clean but also evenly distributed.

The purpose of this research paper is to analyze the current implementation of the KND program. How this policy focuses on the continued development of smart power grids for more efficient energy management, the use of renewable energy and supporting a just transition, the expansion of the supply of electric and hydrogen vehicles. As well as how the development of policies that have been made by the South Korean government right since the KND was created. The data presented is the latest data that has been researched by the author so that written information can explain what changes have occurred in aspects that have changed in the involvement of KND. The final result of this research is expected to make a good contribution in influencing the development of how the performance of the KND policy process provides development to several areas that have been targeted as well as a reference in future research on topics that still have continuity with this research.

METHODS

For researching this article, the author uses qualitative research methods, which is a type of research aimed at being able to investigate, find, describe, and explain a quality or virtue of the impact of social influences that cannot be described, described or described in a lift calculation or what is called a quantitative approach. (Sugiyono, 2010) In line with this research which describes how Korea can carry out the Korean New Deal policy through its Green New Deal program, through data sourced from books, Korean government bookplates, and journal websites. Secondary data is the right data to use in this study, in line according (Sugiyono, 2017, p. 137) to Secondary data is data obtained through reading, analyzing and understanding a source originating from company documents that can be accessed in the media.

RESULT AND DISCUSSION

Building a Smart Grid for more Efficient Energy Management

In a global context that increasingly emphasizes sustainability and energy efficiency, the Korean New Deal policy offers an innovative approach through the construction of a smart power grid. This grid not only aims to improve the resilience of the energy system, but also to utilize digital technology in the real-time management of energy resources. By integrating various renewable energy sources, the smart power grid is expected to provide the ultimate solution to the climate change challenges facing South Korea. Furthermore, the development of a smart power grid is crucial in supporting the transition to a greener and more sustainable economy. Through the application of technologies such as the Internet of Things (IoT) and big data analytics, this grid will enable optimization of energy distribution and reduction of energy waste.

Advanced Metering Infrastructure (AMI), which is an integrated system of smart meters that enables two-way communication between suppliers and consumers, will be provided to 5 million apartments to help disperse energy needs and save energy. An eco-friendly generation system will be established in 42 island regions to reduce the emission of pollutants from diesel-powered generators. Renewable energy facilities installed in 34 island regions; new facilities to improve air quality built in three regions and high-performance hybrid generators installed in five regions. Overhead cables providing electrical power or telecommunication will be replaced with underground cables in school zones and other areas in need. The South Korean government also expects the investment sector to collect 2 trillion won by 2025 to support the KND program in the field of developing a smart grid for more efficient energy management (Ministry of Economy and Finance of the Republic of Korea, 2020, 28).

The promotion and development of green buildings, which not only encourages the incorporation of green building concepts and practices into public facilities such as schools and hospitals, but also, in line with South Korea's national conditions, promotes the use of green buildings. In single-person households and an aging society, this makes it easier for disadvantaged groups and special groups to benefit from green buildings, resulting in more advanced humanistic care. However, the effectiveness of green buildings under these conditions is not always optimal. This suggests that promoting green buildings in special neighborhoods requires collaborative efforts from governments, communities, and educational institutions, as well as engineers. This collaboration requires a range of government policy support, financial assistance, public awareness, practical application, and educational initiatives (Ren & Kim, 2024, 18).

Research on green buildings has emphasized the importance of management throughout the building life cycle. However, there is currently a lack of specific management methods or systematic research, indicating that there is still room for in-depth exploration in the field of building management systems. For example, a general understanding of its significance should be established first. Secondly, more detailed and stringent green building standards should be developed to ensure that buildings adhere to the principles of environmental protection and sustainability in all stages of design, construction, operation, and maintenance. In addition, high-tech tools such as intelligent building management systems are used to monitor and manage energy consumption in real time, and personalized management strategies can be developed based on users' behavioral habits, ensuring the building's energy efficiency is maximized during use. In addition, it increases public understanding and awareness of green buildings and

encourages participation in the promotion and supervision of green buildings (Ren & Kim, 2024, 19).

In addition, existing buildings account for the majority of buildings in Korea; therefore, it is necessary to increase research on economic, technical, and policy support for green renovation of existing buildings and formulate systematic renovation Standard Operating Procedures. Moreover, with the development of new technologies such as BIM and the maturity of the smart city concept, the use of these technologies to construct green buildings during the creation of smart cities will be a trend in the future. Not only can sustainability be achieved, but the quality of the working and living environment can also be improved. Therefore, it is necessary to accelerate the localization of technology, increase public awareness, reduce costs, and fully consider the needs of the community (Ren & Kim, 2024, 19).

Promoting Renewable Energy Use and Supporting a Fair Transition

South Korea became the first country to launch a 5G network in April 2019 and has received recognition for its digital excellence. South Korea also ranked in the top ten of the IMD World Digital Competitiveness Rankings 2020. However, it is known that the integration between traditional industries and digital technology has not fully developed within the economy. So, the South Korean government is launching digital innovation for the entire economic sector by improving its large information and communication technology infrastructure and efficiency in data processing, as well as supporting the emergence of new industries.

The Digital New Deal focuses on enhancing the DNA ecosystem, digitizing the education system and social capital, as well as developing non-contact industries. The improvement of the DNA ecosystem aims to accelerate data processing, AI, and 5G networks across all sectors. The digitization of infrastructure in the education sector aims to integrate online and offline learning environments across elementary schools to universities and vocational training institutions. Online education systems and the development of technology-based educational infrastructure are key projects in advancing the digital new deal (Patai & Horváth, 2021, 281-285).

To support the non-contact industry, the South Korean government is focusing on development in the health sector, such as medical infrastructure and smart care, promoting remote work, and supporting online micro-business activities. In the context of digitalization, there is a primary focus on enhancing the security and well-being of society, as well as improving the competitiveness of each industry involved. This also includes the development of management systems in various sectors as well as the development of smart logistics and distribution system

The shift in technology using renewable energy requires the Korean government to ensure that every party and sector can experience the positive impact. A policy or responsibility is needed to support the affected communities. The South Korean government has launched a Stronger Safety Net, which is a strategy to mitigate the negative effects of the energy transition, such as unemployment and income inequality, by restructuring the economy and assisting economic agents in adapting to the new structure. South Korea is effectively considered to have successfully minimized the negative impact of controlling the spread of the coronavirus. The digital new deal transition is feared to bring about new negative impacts such as a mismatch between jobs and skills, an increase in unemployment, and a changing income system due to low labor demand and workers' skills not aligning.

In this regard, the South Korean government continues to strive to support a fair transition in addressing issues in the labor market and consistently develops budget investments as broadly as possible to build a future-oriented job training system, ensuring that the transitions made can support employment and nurture workers' talents for innovation. The South Korean government is also building a safety net for employment and social protection to safeguard those who are highly vulnerable to the impacts of the crisis. Investment in human resources targets the development of skills to face shifts in the economic structure and to help reduce the digital knowledge gap. The South Korean government is conducting training in digital and green skills, reprocessing the job training system to be future-oriented, and enhancing digital access for rural populations and vulnerable communities (Patai & Horváth, 2021, 285).

Due to the numerous New Deal projects, the central government will collaborate with local governments in regional areas to enhance the success of the Korean New Deal. Furthermore, because the Seoul area is highly concentrated with economic activity, it is necessary to disseminate the results of the Korean New Deal to other regional areas throughout Korea to create balanced development. With this aim. The central government has connected the Korean New Deal with policies in place at the local government level and has supported the maintenance of new projects tailored for each region.

Expanding the Supply of Electric and Hydrogen Vehicles

The Korean government's efforts in carrying out the KND program in the GND focus area are to activate one of its three programs, namely expanding electric and hydrogen vehicles. Switching diesel vehicles to electric vehicles can certainly realize South Korea's ambition to be able to reduce carbon emissions and create environmentally friendly vehicles. This can be seen in the huge influence of the Automotive Industry in the Korean economic sector, making it home to the headquarters and factories of Hyundai Motor Group (the fifth largest car manufacturing company in the world). During the Green New Deal period the Korean government had a plan to be able to set future mobility projects against Industry targets.

this project has been designed with the aim of being able to develop a supply of 1.13 units of electric vehicles, including passenger cars, buses and trucks by 2025, and the government also has the ambition to be able to install 15,000 fast chargers and 30,000 slow chargers.The creation of this project is proposed to be able to expand the driving range of electric vehicles from 400 km to the current 600 km by 2025, and on charging can cut the time to be shorter, starting from 40 minutes to 15 minutes. Not only in 2025 the Korean government wants to create 200,000 Hydrogen vehicles and as many as 450 charging facilities. The size of the project to be able to develop a hydrogen car with an endurance of 500,000 kilometers is worth KRW 40 million (USD 41,000) by 2025 (Ministry of Economic and Finance, 2020).

The program undertaken by the Korean government to expand and increase the supply of electric vehicles is not only during the Korean New Deal period, it can also be seen how the long and large-scale New Energy Vehicle (NEV) design can be seen in terms of the Korean government continuing to promote electric vehicles as a suitable alternative in order to achieve zero emission targets. With the help of responsible government agencies such as the Ministry of Trade, Industry and energy (MOTIE), it plays a role in R&D technology development and infrastructure distribution. Ministry of Education (MOE) is responsible for EV commercialization and infrastructure through subsidies. Ministry of Land, Infrastructure and Transport is responsible for ratification of NEV safety standards. The Office for Government Policy Coordination (OGPC) mediates conflicts between the various ministries (Hwang, S., 2015,).

With the strategy used by the government to promote Fuel Cell Electric Vehicles, which focuses on reducing prices with the aim of increasing consumer purchases and at the same time to develop FCEV-related technologies in the international arena. In addition, there is a subsidy for the purchase of FCEVs with a maximum amount of about US$ 30 thousand from the government (MOTIE., 2018 p. 3) The government has invested US$7.5 million in the development of FCEV bus technology since 2016 (ME, 2015). As a result of this investment, one of the EV vehicle companies such as Hyundai has successfully developed FCEV buses, which have then been successfully tested. The government has set a target for bus deployment of about 1,000 FCEV buses by 2022 (MOE, 2018a).

By building the project named 2019 EV supply and charger infrastructure development, the government invested US$380m. Looking at the efforts of how the government provides subsidy assistance with the mechanism of companies providing discounted prices for each EV purchase, where the discount will be borne by the government as a form of subsidy, with the aim of encouraging increased EV supply. There is also assistance from the Korean Automotive Environment Association which subsidizes charging infrastructure suppliers (MOE)., 2019a, pp. 1-5).

The number of EV charging facilities has been increasing over the years, with only 29 facilities in 2011 and a massive 2,896 in 2019. While the number of FCEVs increased from 1 in 2015 to 25 in 2019. In addition to the continuous increase in charging facilities, the government aims to provide 310 FCEV charging facilities by 2022 with the combined cooperation of private entities and local government bodies. A decision was made to waive restrictions on large companies receiving subsidies to build FCEV power stations (MOTIE)., 2018, p. 15). All applicable forms of subsidies, the government decided to apply EVs until 2022. And the subsidies for FCEVs will be fixed until they can be realized at an economic scale (MOTIE)., 2018, p. 5).

The development of smart grids, promotion of renewable energy use, and expansion of the supply of electric and hydrogen vehicles within the framework of South Korea's Green New Deal are certainly in line with the thinking of SDG number 7, specifically indicator 7.1 which assesses universal access to electricity. By building a smart grid, South Korea is not only improving energy management efficiency, but also ensuring that people, including those in remote areas, have access to reliable and affordable electricity. In addition, the promotion of renewable energy plays an important role in providing a more sustainable source of energy, reducing dependence on fossil fuels, and enabling more equitable access, especially for vulnerable groups. Finally, by expanding the supply of electric and hydrogen vehicles, the initiative supports the transition to a cleaner energy system, while increasing public awareness and participation in the use of renewable energy. Taken together, these three measures are interlinked in an effort to ensure wider and sustainable access to energy, supporting SDG goal number 7 to achieve universal and reliable energy access for all.

CONCLUSION

The South Korean government has been running the KND project since 2020 to overcome the economic impact of the COVID-19 pandemic. KND itself is divided into 2, namely the Green New Deal (GND) and the Digital New Deal (DND), each with a different focus. GND focuses on greener and more sustainable energy changes while DND has more focus on changing labor and energy to be more modern, effective, and fast. Following the development of this program now, some areas have already switched to environmentally friendly electrical energy and its use is evenly distributed. In addition, through this policy, the South Korean government has shifted some

motorized vehicles to electric energy vehicles so that they do not cause much pollution, especially for the air. As for criticism and suggestions for future research, it is hoped that the presentation of data will be more detailed and clear, such as including percentages and comparative graphs than in previous years as relevant guidelines and easier to access. In addition, limitations such as several locked journals are also an obstacle for the author to collect data. The author hopes that in future studies there will be developments, especially in the discussion section so that future authors can conduct research more easily and in detail.

REFERENCES

Bank for International Settlements. (2020). Green Swan 2 – Climate Change and COVID-19 Reflections on Efficiency versus Resilience, speech by Luiz Awazu Pereira da Silva, Deputy General Manager of BIS,.

Hwang, S. (2015). Comparative study on electric vehicle policies between Korea and EU countries. *World Electric Vehicle Journal Vol. 7*.

International Monetary Fund. (2020). https://www.imf.org /en/News/Articles/2021/01/27/pr2125-korea-

Lee, J., & Woo, J. (2020). Green New Deal Policy of South Korea: Policy Innovation for a Sustainability Transition. *MDPI*, *12*. https://www.mdpi.com/2071-1050/12/23/10191

Lee, S. H. (2021). Sustainable Recovery and Economic Transition After the Pandemic in South Korean in Light of the Korean New Deal. In *AGE OF EURASIA Future directions of knowledge, technology, money and sustainable geoeconomics* (p. 279). Magyar Nemzeti Bank.

Ministiry of Economic and Finance. (2020). *Government Releases an English Booklet on the Korean New Deal*.

Ministiry of Environment. (2015). NEVs: Hybrid vehicles, plug-in hybrid electric vehicles, electric vehicles, fuel cell electric vehicles (in Korean).

Ministry of Economy and Finance of the Republic of Korea. (2020, July). National Strategy for a Great Transformation: KOREAN NEW DEAL. *Green New Deal*, 28.

Ministry of Environment. (2018). *Decision to expand FCEV bus! 'Government-eight local*.

Ministry of Environment (MOE). (2019a). 2019 Project for electric vehicle supply and charging infrastructure construction – instructions for subsidy provision (in Korean). 1-5.

Ministry of Trade, Industry and Energy (MOTIE). (2018). Policy direction for increasing supply of electric vehicles and fuel cell electric vehicles. Ministerial. 15.

Ministry of Trade, Industry and Energy (MOTIE). (2018a). *Policy direction for increasing supply of electric vehicles and fuel cell electric vehicles. Ministerial Conference on Innovation and Growth (in Korean)*.

National Strategy for a Great Transformation Korean New Deal (Goverment of the Republic Goverment, Compiler). (2020).

Patai, M., & Horváth, M. (Eds.). (2021). *Age of Eurasia: Future Directions of Knowledge, Technology, Money and Sustainable Geoeconomics : a Study Volume of the Magyar Nemzeti Bank on the Opportunities of Eurasian Cooperation*. Magyar Nemzeti Bank.

Ren, W., & Kim, K. (2020, Februari 21). Tinjauan Sistematis Tren Bangunan Ramah Lingkungan di Korea Selatan dari tahun 2001 hingga 2023 Menggunakan Kata-kata Topik Penelitian. *MDPI*, *16*, 12.

Ren, W., & Kim, K. (2024, February 21). A Systematic Review of Green Building Trends in South Korea from 2001 to 2023. 18.

Ren, W., & Kim, K. (2024, February 21). A Systematic Review of Green Building Trends in South Korea from 2001 to 2023. 19.

Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, kualitatif, dan R&D.* Bandung : Alfabeta.

Sugiyono. (2017). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, kualitatif, dan R&D.* Bandung: Alfabeta.

United Nations. (2023). *7 Ensure access to affordable, reliable, sustainable and modern energy for all*. Department of Economic and Social Affairs Sustainable Development. https://unstats.un.org/sdgs/report/2023/