

Renewable Energy Development in Indonesia From New Normal to Better Normal: Environmental Law Perspectives

Yulinda Adharani*, Ida Nurlinda**, Gusman Siswandi***, Maret Priyanta****, Rewita Salsabila*****

DOI: <https://doi.org/10.22304/piih.v10n3.a7>

Submitted: July 7, 2023 | Accepted: November 6, 2023

Abstract

The COVID-19 pandemic has changed many aspects of human life worldwide. This virus makes people aware of the importance of the environment and the relationship between humans and the environment. One of the awareness is the transition from fossil energy to renewable energy. This article aims to explore the opportunities to develop renewable energy in Indonesia from an environmental law perspective and to reduce the obstacle in energy utilization to advancing renewable energy development. To achieve the aims, the writer uses the doctrinal method. This research adopted a qualitative research method to conduct the research objectives of this study. This article describes the theories of environmental law that grow and develop from human relations. The environment has a vital role in encouraging human behaviour that supports a better normal life that is more harmonious with the environment. The environmental phenomenon caused by the COVID-19 pandemic is triggering the transition from fossil energy to renewable energy, especially in Indonesia. The Indonesian government should ratify regulations related to renewable energy immediately to reduce the obstacles to renewable energy development, such as environmental problems.

Keywords: better normal, environmental law, renewable energy.

A. Introduction

In early 2020, a new virus called COVID-19 emerged in Wuhan City, China. In just a few months, COVID-19 spread quickly to almost all countries, including Indonesia. The spread of this corona virus has caused an uproar throughout the world community. Various countries have started implementing regional lockdown policies

PADJADJARAN Journal of Law Volume 10 Number 3 Year 2023 [ISSN 2460-1543] [e-ISSN 2442-9325]

* Doctoral Student at Faculty of Law Padjadjaran University, Jalan Banda No. 42, Bandung, S.H., M.H. (Padjadjaran University), yulinda.adharani@unpad.ac.id.

** Lecturer at the Department of Environment, Spatial, and Agrarian Law, Faculty of Law, Padjadjaran University, Jalan Dipati Ukur No. 35, Bandung, Prof. Dr. S.H., M.H. (Padjadjaran University), ida.nurlinda@unpad.ac.id.

*** Lecturer at the Department of International Law, Faculty of Law, Padjadjaran University, Jalan Dipati Ukur No. 35, Bandung, S.H., LL.M., Ph.D. (Padjadjaran University), ahmad.gusman@unpad.ac.id.

**** Lecturer at the Department of Environment, Spatial, and Agrarian Law, Faculty of Law, Padjadjaran University, Jalan Dipati Ukur No. 35, Bandung, Dr., S.H., M.H. (Padjadjaran University), maret.priyanta@unpad.ac.id.

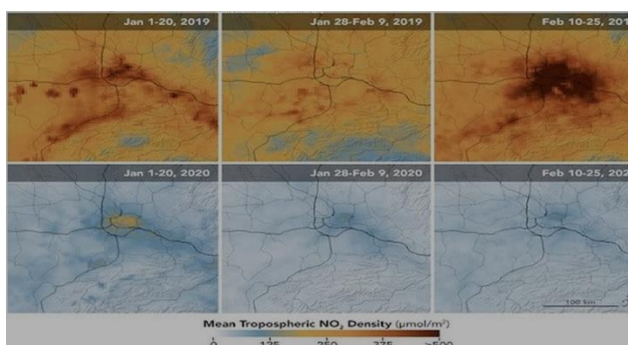
***** Undergraduate Student Faculty of Law, Padjadjaran University, Jalan Dipati Ukur No. 35, Bandung, Prof. Dr. S.H., M.H. (Padjadjaran University), rewita16001@mail.unpad.ac.id.

to prevent the spread of the COVID-19. Not long after the emergence of the virus, coronavirus also spread to multiple countries, including Indonesia, in March 2020. In response, the Indonesian government set the Large-Scale Social Restrictions policy to prevent the spread of COVID-19.

Several countries have implemented regional quarantine policies to reduce the risk of transmission. This policy forced residents to stay inside at home, and residents were advised to refrain from gathering directly with many people. Educational institutions such as universities and schools were also starting to implement learning from home, and some company offices were implementing working from home. The number and operating time of public transportation were limited to maximize the prevention of the spread of COVID-19.

Many say that the earth's condition was getting better and healthier with the steps taken. The spread of the COVID-19 virus has had a positive influence on air pollution.¹ When China began to declare a lockdown due to the increasingly wild spread of the coronavirus, satellite images showed that the level of air pollution in China had decreased quite dramatically. In addition, Italy also reported that air pollution began to decrease. It said the world's carbon emissions experienced the most significant decline since World War II. Moreover, the declining level of global pollution and emissions was also due to the industry not carrying out operations during the COVID-19 outbreak. Looking at these facts, we can see that the COVID-19 pandemic can also positively influence the environment.

Figure 1. Comparison of Nitrogen Dioxide Levels from NASA Satellite Imagery in Beijing



Source: NASA, 2019 and 2022

¹ National Geographic Indonesia, "The Sky Looks Clear During a Pandemic, Are Emissions Reducing?" accessed on August 23 2020, <https://nationalgeographic.grid.id/read/132211061/langit-terlihat-bersih-selama-pandemi-apakah-emisi-berkurang>.

Many lives have been lost, and the world's economy has also been affected by COVID-19. People want the environment to change for the better, but at the same time, they also want to return to normal daily activities again. It takes a supporting policy to overcome the climate problem, not because of the epidemic that cost many human lives accompanied by the economic crisis. Situations and conditions that indirectly teach humans how important it is to protect the Earth and not be greedy will give good results such as fresh air.

The pandemic makes us think that the earth is recovering itself. As human beings, we can learn from this COVID-19 pandemic how important it is to protect the earth from the hands of greedy people. In doing so, we can start by implementing an environmentally friendly lifestyle. People can implement it after the pandemic ends by making beneficial habits at home and raising awareness in every human being to take better care of nature. The COVID-19 pandemic has heavily impacted the renewable energy sector. Sharp downturns in economic activities have caused significant delays in renewable energy supply chains. In contrast, the lack of available financing from the market and government incentives for renewable energy investment has raised serious concerns among developers.²

In addition to changing each individual's lifestyle, it needs concern from the government and industry. Therefore, the production process that runs later must harmonize with nature and adapt to the Sustainable Development Goals (SDGs).³ Along with many industrial activities carried out by humans, global warming appears, and its impact is starting to be felt by the entire world community.⁴ The impact of global warming has resulted in climate change and is felt by the world community. Suddenly, energy and environmental problems seem very complicated, and their complexities are overwhelming. Our economically based decision-making processes need to be improved. Many solutions proposed are offered to solve energy problems, solve environmental problems, and create sustainability.⁵

In Indonesia, real-time air quality monitoring - a collaboration between the Center for Climate Risk and Opportunity Management-IPB and the National Institute for Environmental Studies in Japan - noted a decrease in air pollution in Bogor City, West Java. Levels of nitrogen dioxide, one of the greenhouse gases harmful to human health and the environment, fell 7.2% between April and May 2020, compared to the same period in 2019.

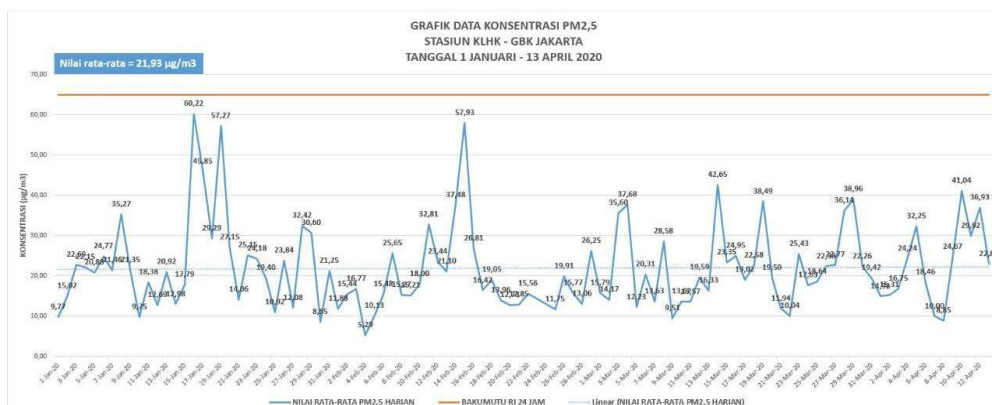
² Karmaker C.L. (et.al.), "Improving Supply Chain Sustainability in the Context of COVID-19 Pandemic in an Emerging Economy: Exploring Drivers Using an Integrated Model," *Sustainable Production and Consumption* 26 (2021): 411–427, <https://doi.org/10.1016/j.spc.2020.09.019>.

³ Eggi Alvado Da Meisa, "The Impact Due to the Covid-19 Outbreak on the Environment," accessed on August 20, 2023, <https://www.kompasiana.com/eggialvado/5ead7707d541df1549258dd2/dampak-yang-ditimbulkan-akibat-wabah-covid-19-terhadap-lingkungan>.

⁴ Adedeji, Olufemi, "Global Climate Change," *Journal of Geoscience and Environment Protection* 2, no. 2 (2014): 117, <http://dx.doi.org/10.4236/gep.2014.22016>.

⁵ Stephan A Roosa, *Sustainable Development Handbook*, (New York: CRC Press, 2020), 151.

Figure 2. PM 2.5 Concentration Data Graph of Jakarta Air Quality



Source: Ministry of Environment and Forestry, 2020

According to the Director General of Environmental Pollution and Damage Control (*Direktorat Jenderal Pengendalian Pencemaran dan Kerusakan Lingkungan-PPKL*) - Ministry of Environment and Forestry, several factors improve Jakarta’s air quality. It is because the number of vehicles passing from the outskirts of Jakarta decreased during the spread of the coronavirus outbreak. It shows a relationship between the number of vehicles passing by and air quality. Air pollution also influences clean air due to vehicle fumes, factories, etc.⁶ Based on Wood Mackenzie's analysis, global 2020 storage and Solar Power Plants installations are expected to decrease by almost 20% (compared to pre-COVID-19). Wind installations are estimated to fall by 4.9 gigawatts (GW) (6%). The decline in New Renewable Energy installations and energy efficiency measures caused 106.000 jobs lost in March 2020 in the United States and 51 thousand drilling and refining jobs in the same period. Analysis shows that it could lose 15% of the total clean energy workforce over the coming months, or more than half a million jobs.⁷

Global warming is a matter that has always been in the spotlight for the last two decades. Global warming increases the average temperature in the atmosphere, sea, and land on earth. According to research, the cause of the rising temperature is the burning of fossil fuels such as stone, coal, oil, and similar non-renewable natural gas.

⁶ Hariman Surya Siregar (et.al.) *Merekonstruksi Alam Dalam Kajian Sains dan Agama: Studi Kasus Pada Masa Pembatasan Sosial Berskala Besar (PSBB) Dampak Covid-19* (Bandung: Digital Library UIN Sunan Gunung Djati Bandung, 2020), 8.

⁷ Yurika, “The Covid-19 Pandemic has the Potential to Accelerate Renewable Energy Development,” accessed on June 14, 2020, <https://www.dunia-energi.com/pandemi-covid-19-berpotensi-percepat-pengembangan-ebt/>.

It happens because the burning process of fossil fuels releases carbon dioxide and other gases known as greenhouse gases into the earth's atmosphere. As the atmosphere becomes richer in these greenhouse gases, it becomes increasingly an insulator that retains more heat from the sun emitted to the Earth, causing an increase in temperature.⁸ The temperature rise resulted in climate change and even reached the stage of a climate crisis. It forces us to start shifting from fossil energy to renewable energy.

Renewable energy utilization in Indonesia has only reached 8.55%. It is expected to continue to increase as the target set in the General Plan for the Provision of Electricity), both achievement targets for generators and non-generators. Meanwhile, the Medium-Term Development Plan, plans to add a target for renewable energy from 2024, around 9.050 MW. The achievement of these targets only run with the support of policy tools, efforts related to financing, and other supporting factors.⁹ The COVID-19 pandemic has prompted significant changes in the use of world energy resources. Lecturer in Nuclear Engineering and Physics, Faculty of Engineering UGM, Ahmad Agus Setiawan, revealed that the direction of utilization of world energy resources is transitioning to forms of renewable energy resources. Campaigns for the use of renewable energy resources have existed before. However, Ahmad said that the trend of utilizing renewable energy resources increased after COVID-19 emerged drastically.

Many countries that have passed the COVID-19 pandemic have begun to implement the new normal in their daily activities in their country, but the new normal is only a bridge to return to normal. Going back to normal is normal; what will be extraordinary is to make the new normal a bridge to a better normal, especially in the energy sector, namely by promoting clean energy and issuing regulations related to renewable energy. Making the effects of the COVID-19 pandemic a trigger for a better normal can be carried out in countries, especially in Indonesia. Based on the background above, the author has at least two questions: (1) how are the opportunities to develop renewable energy in Indonesia post-pandemic from the environmental law perspective? (2) what are the obstacles in energy utilization to advancing from the new normal to the better normal in Indonesia?

To answer these questions, the writer uses the doctrinal method. This research adopted a qualitative research method to conduct the research objectives of this study. The qualitative approach is a commonly used research method in social sciences that enables researchers to gain in-depth insights and knowledge on an

⁸ Dadang Rusbiantoro, *Global Warming for Beginner: Pengantar Komprehensif Tentang Pemanasan Global* (Yogyakarta: Niaga Swadaya, 2008), 6.

⁹ Yurika, "The Covid-19 Pandemic has the Potential to Accelerate Renewable Energy Development."

issue.¹⁰ This study has two primary purposes: the first is to discuss the opportunities to develop renewable energy in Indonesia, and the second is to discuss the obstacles in energy utilization to advancing from the new normal to the better normal.

B. Climate Change to Climate Crisis

One of the environmental issues that have a significant influence on all components of life and living systems for many people today is the phenomenon of climate change. According to the United Nations Framework Convention on Climate Change (UNFCCC), the climate system in relation to climate change is defined as the totality of the atmosphere, hydrosphere, biosphere, and geosphere with their interactions. Meanwhile, climate change is expressed as a change in climate that is influenced directly or indirectly by human activities that change the atmosphere's composition, which will increase the observed climatic diversity over a reasonably long period. One undeniable fact is that in the 20th century, the earth's average temperature rose by 0.4-0.8°C.¹¹ This increase is expected to continue, and by 2100, the global average temperature is expected to reach 1.4-5.8°C warmer. Climate change is one of the issues of great concern to every country in the world. Sir David King, one of the leading British scientists, even said that the issue of climate change is more worrying than the issue of terrorism.¹²

Climate change is a form of environmental damage phenomenon that impacts almost every field of life and threatens the existence of human life at the local, national, and global levels. Climate change issues have touched a multidimensional condition with high complexity in science, economy, and justice. Currently, much attention is paid to the impact of climate change on the economic and scientific sectors. Still, discussions regarding justice to climate conditions rarely receive serious attention. The concept of justice in the environmental dimension has become a cross-sectoral and cross-interest discussion. From the standpoint of environmental justice, the geographical condition of each country is a provision that must be treated wisely, and the right to a good and healthy environment is a human right.¹³ The concept of intergenerational justice has developed in the struggle for international law in general. It is indicated in the preamble to the Universal Declaration of Human Rights, which stipulates:

¹⁰ Lin-Sea Lau (et.al.), "Expert Insights on Malaysia's Residential Solar Energy Policies: Shortcomings and Recommendations," *Clean Energy* 6, no. 4 (2022): 619-631, <https://doi.org/10.1093/ce/zkac043>.

¹¹ Herman Haeruman, "Perspektif Kebijakan Terkait Perubahan Iklim dan Dampaknya Terhadap Ekonomi," *Jurnal Ekonomi Lingkungan* 13, no. 1 (2009): 15-32.

¹² Arum Siwiendrayanti, "Perubahan Iklim dan Pengaruhnya Terhadap Sektor Kesehatan," *Jurnal Kesehatan Masyarakat* 3, no. 1 (2007): 17-26.

¹³ Joseph W Dellapenna, "International Law's Lessons for the Law of the Lakes," *University of Michigan Journal of Law Reform* 40 (2006): 747.

"Whereas recognition of the inherent dignity and the equal and inalienable rights of all members of the human family is the foundation of freedom, justice, and peace in the world."

The terminology "all members" used in the previous sentence is certainly not limited to current conditions but is also forward-thinking and is the ideals of international law.¹⁴ In the development of international environmental law, the concept of intergenerational justice began to be discussed during the preparation of the 1972 Stockholm Conference on the Human Environment as the first international meeting to discuss human existence and the environment.¹⁵ In the opening sentence of the convention, several times, it is explicitly emphasized that the goal to achieve in this convention is the creation of appropriate environmental conditions for now and in the future.²² Further discussion on the concept of intergenerational justice is contained in the U.N. report. The World Commission on Environment and Development (WCED), known as the Brundtland Commission Report on Our Common Future, provides a concrete definition of intergenerational justice. In the formulation of the Brundtland Report, the concept of intergenerational justice emphasizes the goal of meeting the needs of the present without neglecting the needs of future generations.¹⁶ The issue of inter-generational justice was rolled out until the Earth Summit in 1992, resulting in the Rio Declaration on Environment and Development and Agenda 21, which puts the existence of current and future generations as a top priority.¹⁷

In general, Intra-generational justice can be interpreted as an understanding that everyone within the same generation has the same rights and access to benefit from existing natural resources and can obtain excellent and healthy environmental conditions.¹⁸ Another understanding of the concept of intergenerational justice is present as a form of fulfilling all basic human needs, including a healthy environment, the availability of adequate food and shelter, and the fulfilment of spiritual and cultural needs. In implementing these needs, the concept of welfare transfer and technology transfer from rich countries to developing countries is one alternative that can be done.¹⁹

¹⁴ Mon Patrimony, "Agora: What Obligation Does Our Generation Owe to the Next? An Approach to Global Environmental Responsibility," *Ecology LQ* 495 (1984): 540-544.

¹⁵ U.N. Doc. A/CONF.48/14/REV.1, 16th of June 1972 (Report of the United Nations Conference on the Human Environment, June 16, 1972).

¹⁶ Gro Harlem Brundtland (et.al.), "Our Common Future the World Commission on Environment and Development," *Environment* 29, no. 5 (1987): 8.

¹⁷ U.N. Doc. A/CONF.151/26 (Report of the United Nations Conference on Environment and Development vol. I 2, June 13, 1992).

¹⁸ Ronnie Harding (et.al.), *Interpretation of the Principles for the Finer Conference on the Environment: Sustainability Principles to Practice 1* (Unisearch: University of New South Wales, 1994), 21-29.

¹⁹ Goodland, Robert, and George Ledec, "Neoclassical Economics and Principles of Sustainable Development," *Ecological Modelling* 38, no. 1-2 (1987): 10, [https://doi.org/10.1016/0304-3800\(87\)90043-3](https://doi.org/10.1016/0304-3800(87)90043-3).

The current presence of climate justice must be highlighted and serve as an ideological basis for formulating sources of international environmental law. International agreements in the context of climate change today are minimal to create environmental justice, both at the intergenerational and intra-generational justice levels. As is the case in many developing countries, Indonesia's poor and marginalized communities suffer from climate change's effects. Predicted impacts include:

- a) more intense rainfall and flooding;
- b) threats to food security;
- c) rising sea levels harm coastal communities; and
- d) increasing diseases such as malaria and dengue fever.

As an archipelagic country, Indonesia is vulnerable to rising sea levels, storms, and coral reef bleaching caused by global warming that threatens coastal communities and their livelihoods, both because of climate patterns that are increasingly unpredictable for the growing or the harvest season. A recent report on Indonesia by the United Nations Development Program (UNDP) calls for greater attention to the adaptation of people with low incomes to the impacts of climate change.²⁰ Climate crisis needs to be understood as being produced by contradictions internal to the prevailing society. In this sense, it is called a crisis, not a disaster. The model of capitalist industrialization has driven the rapid acceleration of greenhouse gas emissions in recent years, particularly by the drive for low cost energy.²¹

The energy system's need for transformative change and innovation is becoming more urgent amidst the climate crisis. Governments must rapidly drive down carbon emissions in an increasingly complex system with inherent risks. Failing to observe, share, and act on policy-based learning risks wasting public money and slowing the response to the climate emergency. Appropriate and timely evaluation can ameliorate these risks, helping to increase the pace and scale of innovation, accelerate energy policymaking, and improve delivery.²²

Sustainable energy conversion and management processes increasingly require an integrated approach, especially in addressing the climate crisis. Research advances and knowledge dissemination on methods, policies, and technologies towards integrated approaches are highly relevant in crucial times that require rapid societal transformations to address the climate crisis. Since the beginning of the 21st Century, the Conferences on Sustainable Development of Energy, Water, and Environment Systems (SDEWES) have provided an interactive forum for worldwide

²⁰ Deni Bram, "Perspektif Keadilan Iklim Dalam Instrumen Hukum Lingkungan Internasional Tentang Perubahan Iklim," *Jurnal Dinamika Hukum* 11, no. 2 (2011): 285-295, <http://dx.doi.org/10.20884/1.jdh.2011.11.2.187>.

²¹ James Goodman, "Researching Climate Crisis and Energy Transitions: Some Issues for Ethnography," *Energy Research and Social Science* 45 (2018): 340-347, <https://doi.org/10.1016/j.erss.2018.07.032>.

²² Sam Hampton, "Evaluation in an Emergency: Assessing Transformative Energy Policy Amidst the Climate Crisis," *Joule* 5, no. 2 (2021): 285-289, <https://doi.org/10.1016/j.joule.2020.12.019>.

scientists and those with research interests in the field, challenging the frontiers of what is considered possible and extending an understanding beyond any sectoral boundaries. The dedication of the SDEWES Conference series to improving efficiencies across energy, water, and environment systems has encouraged researchers to undertake leading scientific contributions in these fields and to pursue integration whenever possible to decouple growth from the use of natural resources. The urgent need to address the climate crisis is the most pressing issue that humanity has ever faced and one for which solutions have been questioned intensively by researchers in the SDEWES scientific community based on technologies and policies for system integration towards enabling sustainable development.²³

The greater the level of activity in the fossil energy sector, the more severe the pollution and damage it causes to the environment. Therefore, the energy transition from fossil energy to renewable energy is fundamental in order to minimize pollution and environmental damage in general and in the context of tackling global warming in particular.²⁴

C. Green Energy Links With Sustainable Development and SDGs

The UN General Assembly declared 2012 the 'International Year of Sustainable Energy for All' (SE4ALL) to promote global access to sustainable energy by 2030. This initiative has three specific objectives: ensuring universal access to modern energy services, doubling the rate of improvement in energy efficiency, and doubling the share of renewable energy in the global energy mix.²⁵ The General Assembly considers the presence of global challenges, especially in the fields of energy; it is necessary for the transformation of energy move to the energy transition, which is a global appeal with clear targets mainly to increase the production and utilization of renewable energy. The appeal also demands strategies to encourage policy bottom-up (from domestic to international); although not binding, this strategy has put renewable energy in a discourse of dialogue at the international level, which is more spacious.²⁶

Climate change is one of the impacts of global warming caused by the greenhouse effect due to increasing concentrations of greenhouse gases. The increase in greenhouse gas concentrations is mainly due to the production and utilization of fossil energy. CO₂ is a greenhouse gas whose contribution to global

²³ Şiir Kilkış (et.al.) "Research Frontiers in Sustainable Development of Energy, Water, and Environment Systems in a Time of Climate Crisis," *Energy Conversion and Management* 199, no. 111938 (2019): 3, <https://doi.org/10.1016/j.enconman.2019.111938>.

²⁴ Donny Yoegiantoro, *Kebijakan Energi-Lingkungan* (Jakarta: Pusat Lembaga Penelitian, Pendidikan, dan Penerangan Ekonomi dan Sosial, 2017), 150.

²⁵ Giles Atkinson (et.al.), *Handbook of Sustainable Development* (USA: Edward Elgar Publishing, 2014), 529.

²⁶ Imam Mulyana, "The Development of International Law in the Field of Renewable Energy," *Hasanuddin Law Review* 1, no. 1 (2016): 50, <http://dx.doi.org/10.20956/halrev.v1i1.213>.

warming reaches more than 70% of the total existing greenhouse gases. Growing research shows that the electricity sector has an important role in decarbonization. Power generation needs to shift to low-carbon technologies, relying on a variety of technological solutions (both centralized and decentralized), and energy transitions need to be made from the direct use of fossil fuels to more efficient and environmentally friendly energy use.²⁷

Although there are various definitions of Sustainable Development, all of these are based on three related pillars: environmental, economic, and social.²⁸ In 2015, the United Nations designed the Sustainable Development Goals (SDGs) to achieve sustainable development by 2030.²⁹ The SDGs consist of several goals, which are parameters for realizing sustainable development. There are several SDGs goals related to this research. The first is Goal 7, namely Clean and Affordable Energy, ensuring access to affordable, reliable, sustainable, and modern energy for all; and the second is Goal 13 SDGs, namely Climate Action.³⁰

The Sustainable Development Goals (SDGs) originate from various countries' agreements to break the poverty chain, overcome and reduce inequality, and protect the environment. Hence, with the procurement of alternative energy, not only the goals or objectives are fulfilled, but other points in the SDGs are indirectly implemented. For example, point 13 of the SDGs concerns handling climate change (take urgent action to combat it and its impact). As we know, greenhouse gas emissions are one of the most significant factors in climate change, and greenhouse gases are a by-product of processing fossil fuels, which are still widely used. Meanwhile, life does not just happen today. The future with generations that will continue also requires energy that we are currently using. As stated in other points in the Sustainable Development Goals (SDGs), such as food security, economic efforts, and improving health, indirectly, humans are expected to use renewable, eco-friendly energy.

Emissions from fossil energy are the most significant Greenhouse Gas (GHG) producing sector, compared to other sectors such as industry and agriculture. Its value reaches 74%, agriculture is 13%, industry is 8%, and other sectors are 5%.³¹

²⁷ Richard Baron, "Energy Transition After the Paris Agreement: Policy and Corporate Challenges", accessed on April 20, 2022, <https://oecd.org/sd-roundtable/papersandpublications/Energy%20Transition%20after%20the%20Paris%20Agreement.pdf>.

²⁸ Oekan S. Abdoellah, *Pembangunan Berkelanjutan di Indonesia: di Persimpangan Jalan* (Jakarta: Gramedia Pustaka, 2016), 34.

²⁹ United Nations Department of Economic and Social Affairs, "Sustainable Development: The 17 Goals," accessed on December 11, 2022, <https://sdgs.un.org/goals>.

³⁰ SDG Indonesia, "Sustainable Development Goals," accessed on December 11, 2022, <https://www.sdg2030indonesia.org/>.

³¹ International Energy Agency, "International Energy Agency: CO2 Emissions from Fuel Combustion: Overview 2019," accessed on October 31, 2019, https://iea.blob.core.windows.net/assets/eb3b2e8d-28e0-47fd-a8ba-160f7ed42bc3/CO2_Emissions_from_Fuel_Combustion_2019_Highlights.pdf.

Accordingly, the fossil energy currently used in Indonesia pays little attention to environmental sustainability, not only the problem of climate change but also, in this case, more broadly, to environmental problems. Considering Indonesia's geographical condition, which is crossed by the equator, consists of many islands, and has a tropical climate, Indonesia has the potential to maximize the pursuit of renewable energy for sustainable development.³² It is because the basic materials needed come directly from nature, cannot be used up, and the processing tends to be more environmentally friendly. It aligns with Sustainable Development Goal number 7 in providing clean and modern energy that anyone can enjoy.³³

The concept of a welfare state is not solely a guard for security and public order but also the main bearer of responsibility in realizing social justice, general welfare, and the greatest prosperity of the people.³⁴ The state controls natural resources in Indonesia. The natural resource wealth owned by Indonesia is entirely utilized for the benefit of the people.³⁵

D. Indonesia's Commitment to Reducing GHG Emissions

Global warming and climate change are consequences of increasing greenhouse gas emissions worldwide. Most Indonesian people who are still agricultural depend on the weather and the influence of climate in their daily lives. Considering these facts, Indonesia should take action or play a role in tackling global warming and climate change efforts to reduce GHG emissions. At the G-20 meeting 2009, Indonesia stated that it will voluntarily reduce greenhouse gas emissions by 26 percent by 2020 from the Business as Usual (BAU) level and up to 41 percent if it receives international support.³⁶

One way to reduce greenhouse gas emissions is the adoption of the Paris Agreement to the United Nations Framework Convention on Climate Change and ratification through Law Number 6 of 1994 on the Ratification of the United Nations Framework Convention on Climate Change (UNFCCC). Indonesia also has ratified the Kyoto Protocol through Law Number 17 of 2004 on the Ratification of the Kyoto Protocol to the UNFCCC. Then, in 2016, after signing the Paris Agreement with the UNFCCC, Indonesia ratified the agreement through Law Number 16 of 2016 on the

³² David McCollum, Luis Gomez Echeverri, Keywan Riahin, Simon Parkinson, "Connecting the Sustainable Development Goals by Their Energy Inter-Linkages," *Environmental Research Letters* 13, no. 3 (2018): 10, <https://doi.org/10.1088/1748-9326/aaafe3>.

³³ United Nations Department of Economic and Social Affairs, "Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All," accessed on August 2, 2021, <https://sdgs.un.org/goals/goal7>.

³⁴ Ida Nurlinda, *Prinsip-prinsip Pembaruan Agraria* (Jakarta: Rajawali Pers, 2009), 15.

³⁵ Jimly Asshiddiqie, *Konstitusi Ekonomi* (Jakarta: Kompas, 2016), 276.

³⁶ IEA, "National Action Plan for Reducing Greenhouse Gases," accessed on August 2, 2021, <https://www.iea.org/policies/2459-national-action-plan-for-reducing-greenhouse-gas-emissions>.

Paris Agreement to the United Nations Framework Convention on Climate Change.³⁷ The energy use pattern influences the high emission of greenhouse gases in Indonesia, where most energy use is non-renewable energy derived from fossils, especially oil and coal. It causes significant gas emissions that result in climate change even though several new and renewable energies have become the main focus on overcoming national energy security and alternative energy to reduce gas emissions from energy use in Indonesia.³⁸ Energy use in Indonesia will continue to increase because people's need for energy grows in parallel with economic growth and community growth, thus triggering a national energy policy to create infrastructure standards for energy fulfilment in Indonesia that can meet both energy needs and emission reductions in Indonesia's commitments. Energy diversification is one of the determining factors to meet energy needs in Indonesia. This is because energy availability in Indonesia cannot meet the increasing energy needs due to energy production, which has decreased significantly from year to year.³⁹

Energy security and energy sovereignty have been stated in Law Number 30 of 2007 on Energy. The government needs to implement the control and regulation of energy resources fully, and it is necessary to guarantee national energy security.⁴⁰ Indonesia's energy sovereignty and security can be seen declining based on the Energy Sustainability Index Rankings, which show a continuous decline due to Indonesia's dependence on non-renewable energy. In addition to decreasing energy security and sovereignty, GHG emissions resulting from non-renewable energy are a significant factor in the problem of large gas emissions in Indonesia. Various factors need to be fully considered to achieve the GHG emission reduction target, namely the National Energy Policy, the General National Energy Plan, the National Electricity General Plan, the General Plan for the Provision of Electricity, and Presidential Regulation Number 61 of 2011 on National Action Plan for Reducing Greenhouse Gas Emissions.

It is clear that the most significant greenhouse gas emissions are generated from power generation efforts, so it is necessary to review several regulations and regulations for power plants in Indonesia. By the Indonesian General National Energy Plan, four ways are prioritized in maximizing efforts to reduce greenhouse gas emissions, namely energy diversification, increasing the share of renewable energy and reducing the portion of fossil energy; utilization of clean coal technology for

³⁷ Deniza Ariani, "The Effectiveness of Climate Change Litigation as a Venue to Uphold State Climate Change Obligations in Indonesia," *Indonesian Journal of International Law* 16, no. 2 (2019): 213, 10.17304/ijil.vol15.3.751.

³⁸ Biro Komunikasi, "Layanan Informasi Publik dan Kerja Sama Kementerian Energi dan Sumber Daya Mineral," *Jurnal Energi : Program Strategis EBTKE dan Ketenagalistrikan* (2016): 9.

³⁹ Iwan J. Azis (et.al.) *Pembangunan Berkelanjutan dan Kontribusi Emil Salim* (Jakarta: Gramedia, 2010), 374.

⁴⁰ Article 4 on Law Number 30 of 2007 regarding Energy.

power generation; substitution of energy use from fuel to natural gas; and implementation of energy conservation programs in the coming year.⁴¹ By considering these factors, it will be possible for Indonesia to have a supply of energy by the capacity of its needs and the reduction of greenhouse gas emissions.

The National Energy Policy targets new national energy for a particular year, currently targeted until 2050. The national energy mix that has been planned in the National Energy Policy is a mix of New Renewable Energy which reaches 40 percent, including a combination of hydro energy, geothermal energy, waste biomass, Biofuels (BBN), solar energy, marine energy, wind energy, and nuclear energy and the reduction of petroleum, natural gas, and coal which will be set at a threshold of 20 percent. The National Energy Policy has determined the direction of the national policy, which includes considerations in the general national energy plan (*Rencana Umum Energi Nasional*-RUEN) or the regional available energy plan (*Rencana Umum Energi Daerah*-RUED) so that conservation, diversification, and energy development priorities can be considered to be achieved under the predetermined plan.

Table 1. Renewable Energy Potential in Indonesia

Types of Renewable Energy	Potency
Wind Power	950 Megawatt
Solar Power	11 Gigawatt
Hydro Power	75 Gigawatt
Biomass	32 Megawatt
Biofuel	32 Megawatt
Ocean	60 Gigawatt
Geothermal	29 Gigawatt

Source: Ministry of Energy and Mineral Resources, 2016

Government Regulation Number 79 of 2014 (GR 79/2014) on the national energy policy describes various policies on energy management controlled by the state and the basis for general national and regional energy plans. GR 79/2014 does not explicitly explain the reduction of greenhouse gas emissions but explicitly notes that the percentage of non-renewable energy use will be reduced and the increase of renewable energy use in Indonesia. Non-renewable energy is one of the main factors in Indonesia's magnitude of greenhouse gas emissions. Thus, GR 79/2014 indirectly seeks to reduce greenhouse gas emissions.

GR 79/2014 also sets out the direction of the national energy policy, namely:

- a) availability of energy for national needs;

⁴¹ Presidential Regulation Number 22 of 2017 regarding the General National Energy Plan.

- b) energy development priority;
- c) utilization of national energy resources;
- d) energy reserve;
- e) energy conservation, energy resources conservation, and energy diversification;
- f) environment and work safety;
- g) energy prices, subsidies, and incentives;
- h) infrastructure, community access, and energy industry (Sustainable Energy Development);
- i) research, development, and application of energy technology; and
- j) institutional and funding.

The effort of the direction of the national energy policy is to create the fulfilment of energy needs in Indonesia. The availability of energy in Indonesia still depends on energy produced from non-renewable energy, namely coal and oil, so it is planned to increase renewable energy production in the national energy policy and the general national energy plan. The Presidential Regulation Number 22 of 2017 on the General National Energy Plan has clearly explained the implementation to be carried out to reduce GHG emissions, namely:⁴²

- a) implement energy conservation on the energy supply side.
- b) post coal mining land reclamation.
- c) implement energy audit and management program.
- d) requires the gradual use of environmentally friendly and high efficiency (Ultra Super Critical/USC) coal energy technology (Clean Coal Technology/CCT).
- e) implement Presidential Decree Number 61 of 2011 on RAN-GRK consistently.

E. Indonesia's Opportunity for Renewable Energy Post-Pandemic Era

Throughout the first quarter of 2020, global electricity demand was declared to have fallen by 2.5% compared to the same period in 2019. The average decline in order was 20% in conditions of total lockdown. This decline in global electricity demand is projected to be 5-10% during 2020. The Ministry of Energy and Mineral Resources said that the COVID-19 pandemic had a tremendous impact on most aspects of people's lives, including energy use. Lockdown policies or large-scale social restrictions implemented in several countries have significantly reduced electricity.⁴³

Through the Ministry of Energy and Mineral Resources, the Indonesian Government has implemented several strategies for utilizing renewable energy after COVID-19, including using the State for activities that drive the community's economy. One example is the collaboration of the Ministry of Marine Affairs and Fisheries to construct Solar Power plants for cold storage. The second strategy is using reservoirs/lakes to build floating solar power plants, referring to the provisions

⁴² Presidential Regulation Number 22 of 2017 regarding the General National Energy Plan.

⁴³ Yurika, "The Covid-19 Pandemic has the Potential to Accelerate Renewable Energy Development."

of the Minister of Public Works and Public Housing Number 6 of 2020, 5% of the total reservoir area for floating solar power plants. Third, regulatory improvements can also be made by drafting a Presidential Regulation on Renewable Energy that can accelerate the development of Renewable Energy through price improvements, mechanisms, and governance. The fourth strategy is cooperation with international institutions seeking cheap funding, cooperation in large-scale Renewable Energy development, cooperation in renewable energy integration, etc.

In addition, the fifth strategy concerns regulatory improvement. Recently, the Minister of Energy and Mineral Resources Regulation Number 4 of 2020 has been issued to improve several things from Ministerial Regulation Number 50 of 2017. However, the Minister of Energy and Mineral Resources is not a substitute for the Presidential Decree, and the Presidential Regulation is still being processed. The Ministry of Energy and Mineral Resources expects the utilization of geothermal, biofuels, and all new energy to increase by 5% by 2025.⁴⁴ Indonesia has been compiling the document Long-term Strategy on Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050) towards net-zero emissions while considering growing economic conditions, climate resilience and equity.

Other initiatives include support from stakeholders, the 50 GW PLTS mega booster program initiated by the Indonesian Smart Network Initiative, the 1 GW/year Surya Nusantara Program created by IESR, and PLTS for on-grid and portable cold storage that can drive the community's economy and save energy costs.⁴⁵ For the trend of national electricity loads during this pandemic, the condition of the Java-Bali, Kalimantan, Sumatra, and Sulawesi systems experienced a decline in demand. The highest decline occurred in the Java-Bali system, minus 9.55%.

Furthermore, the Ministry of Energy and Mineral Resources said that the post-pandemic economic stimulus must include clean energy investment because clean energy generates financial returns 3-8 times higher than the initial investment, as analyzed by the World Resources Institute (WRI); the volatility of fossil fuel prices provides a global opportunity to accelerate the shift to clean energy. Moreover, investment in Renewable Energy could generate 63 million new jobs by 2050. There are two options: reopening an economy driven by failed fuel sources in the past or embarking on a path to a clean future, including energy efficiency. The Government and investors must respond that COVID-19 is not a signal to slow down but to accelerate Renewable⁴⁶

The government continues to strive to create an attractive renewable energy investment climate to achieve the renewable energy target of 23% by 2025. It is

⁴⁴ National Energy Management Blueprint 2006-2025 according to Presidential Regulation Number 5 of 2006.

⁴⁵ Yurika, "The Government Prepares a Post-Pandemic Renewable Energy Utilization Strategy," accessed on June 14, 2020, <https://www.dunia-energi.com/pemerintah-siapkan-strategi-pemanfaatan-energi-terbarukan-pasca-pandemi/>.

⁴⁶ Yurika, "The Covid-19 Pandemic Has the Potential to Accelerate Renewable Energy Development."

hoped to provide more excellent space for renewable energy by issuing the Presidential Regulation on Renewable Energy and the Renewable Energy Bill.⁴⁷ Indonesia has great energy potential, so the value of energy security in Indonesia is quite large. However, from the available energy sources, they still use fossil energy because fossil energy is still considered to be 'cheap' energy compared to clean renewable energy. The price of fossil energy has become cheaper, partly due to the cost of environmental damage to fossil energy, which is not included in the cost of its generation. Hence, in Indonesia, it is most challenging to balance the last energy trilemma point, namely environmental sustainability. Therefore, an energy transition is needed toward environmentally friendly energy.

Besides the opportunity, there are also obstacles to energy utilization. The critical problem in this area is the need for more alignment between the national and regional spatial plans. The government has recently introduced amendments to the spatial planning regulatory framework to accelerate amendments to spatial plans and potential strategic projects to proceed based on their inclusion in the national spatial layout plan.⁴⁸

F. Constraints in the Energy Utilization in Indonesia During New Normal Towards A Better Normal

Indonesia is highly vulnerable to climate change impacts, including extreme events such as floods and droughts, and long-term changes from sea level rise, shifts in rainfall patterns, and increasing temperature.⁴⁹ Two things can be done to reduce the amount of greenhouse gas emissions in the energy user sector: conserving energy and using clean energy technologies that do not cause greenhouse gas emissions.⁵⁰ Energy use in Indonesia is still dominated by non-renewable energy derived from fossils, especially oil and coal. Still, over time, fossil energy availability is dwindling; renewable energy is the best alternative to anticipate this. The use of renewable energy must be the main concern of the Indonesian Government, not only as an effort to reduce the use of fossil energy but also to create clean or environmentally friendly energy.⁵¹

⁴⁷ Yurika, "The EBT Business has the Potential to Become a Leading Post-Covid-19 Pandemic," accessed on June 14, 2020, <https://www.dunia-energi.com/bisnis-ebt-berpotensi-jadi-unggulan-pasca-pandemik-covid-19/>.

⁴⁸ Karim, R., Ghazali, F., & Ansari, A. H., "Renewable Energy Regulations in Indonesia and India: A Comparative Study on Legal Framework," *Journal of Indonesian Legal Studies* 5, no 2 (2010): 376, <https://doi.org/10.15294/jils.v5i2.41986>.

⁴⁹ World Bank, "Climate Change Overview Country: Indonesia," accessed on December 23, 2023, <https://climateknowledgeportal.worldbank.org/country/indonesia>.

⁵⁰ Agus Sugiyono. "Penanggulangan Pemanasan Global di Sektor Pengguna Energi," *Jurnal Sains & Teknologi Modifikasi Cuaca* 7, no. 2 (2006): 15-19.

⁵¹ Muhamad Azhar and Dendy Adam Satriawan, "Implementasi Kebijakan Energi Baru dan Energi Terbarukan Dalam Rangka Ketahanan Energi Nasional," *Administrative Law & Governance Journal* 1, no. 4 (2018): 399.

In Indonesia, the transition to renewable energy takes work. Among the main challenges in developing renewable energy is its price, which cannot compete with fossil energy (coal, oil, and gas), except for a few types of renewable energy. The price of fossil energy has become cheaper, partly due to the cost of environmental damage to fossil energy, which is not included in the cost of its generation. Destruction of forests, which are rich in functions and sources of biodiversity on the islands of Kalimantan and Sumatra due to open-pit coal mining, CO₂ emissions that will continue to be produced in line with the electricity we enjoy, as well as various types of coal ash which are harmful to health, are the consequences of coal-fired electricity generation. The shock from the pandemic is leading to a global reduction in emissions. The result was a sudden decrease in global CO₂ emissions by 8.8% in the first half of 2020. Although it aligns with the Paris Agreement in reducing greenhouse gas emissions to prevent the earth's temperature from rising above two degrees Celsius, this is casuistic. Only if it is not immediately responded to with the right policy. It is a good opportunity for the Government to immediately take strategic policies to restore its economy and carry out an energy transition by abandoning fossil energy towards renewable energy.⁵²

The initial steps that the government must take are to realize projects related to renewable energy development and improve policies through laws, ministerial regulations, or other policies. It is because energy security is essential in dealing with an uncertain pandemic, and it is unknown when it will end. In addition, energy security through new and renewable energy can be the foundation and solution for energy problems in reducing fossil fuels. The authors argue that the Draft on New and Renewable Energy Bill is urgent to be approved soon, especially after the outbreak of COVID-19. New Normal also provides particular protocols to reduce the use of non-essential energy, the New and Renewable Energy Bill. In addition, the protocols will improve the environment so that future generations will enjoy clean energy and accommodate the world's concerns in dealing with climate change, which is one of the points in the sustainable development goals (SDGs). It can also improve the nation's economy after the pandemic to a better normal to revive the national macroeconomy.

The law must be built and made commander-in-chief. Besides, the law can be a means of development and, at the same time, a means of community renewal or law as a tool for social engineering.⁵³ The problem of collaboration, in this case, is a need for coordination and commitment among stakeholders. Communication among the parties must be more effective for a partnership process among stakeholders. Jamal

⁵² Institute For Services Reform (IESR), "Taking the Post-COVID-19 Energy Transition Seriously Will Prevent Economic Shocks due to Climate Change," accessed on January 19, 2021, <https://iesr.or.id/serius-sikap-transisi-energi-pasca-covid-19-akan-cegah-guncangan-ekonomi-akibat-perubahan-iklim>.

⁵³ Danrivanto Budhijanto, *Teori Hukum Konvergensi* (Bandung: PT. Refika Aditama, 2014), 44.

and Getz have stated that partnership needs collaboration, not cooperation, in the short term.⁵⁴ The Penta-Helix Model is based on five stakeholder types: businesses, public administration, local people, the knowledge sector, and capital. The model benefits multi-stakeholder problem areas where stakeholders represent a range of interests on a site or problem. Penta-Helix is an extension of the triple helix strategy by involving various elements of the community or non-profit institutions to realize the innovation. Through synergistic collaboration, it is expected to learn an innovation supported by multiple resources that interact synergistically.⁵⁵

Indonesia's G20 presidency, which carries the issue of energy transition, emphasizes strengthening a cleaner global energy system through a transition process and a sustainable post-COVID-19 economic recovery. This goal is expected to be achieved through increasing access to energy, availability of technology, and adequate.⁵⁶

G. Conclusion

The COVID-19 pandemic, which harms many people's lives in Indonesia and other countries worldwide, has caused little fresh air, especially in carrying out the mission to reduce greenhouse gas emissions through using renewable energy. The environmental phenomenon caused by the COVID-19 pandemic is triggering the transition of energy to renewable energy, especially in Indonesia. The Indonesian Government shows its seriousness in tackling climate change by ratifying the Paris Agreement to the United Nations Framework Convention on Climate Change through Law Number 16 of 2016 on the Ratification of the Paris Agreement.

In addition, the National Energy Policy, which targets the national energy mixture until 2050, has set a policy direction that considers the national energy general plan to the regional energy general plan, which is expected to achieve energy development according to the stipulated plan. During the COVID-19 pandemic, it was noted that there was a decrease in global electricity demand by 2.5%, and this figure could continue to increase in the range of 5% -10% throughout 2020. The Draft on New Energy and Renewable Energy Bill must be approved immediately, especially after the outbreak of COVID-19. It is hoped that the development and use of renewable energy are appropriately implemented and can support the concept of the inter-generational justice principle, where the fulfilment of all basic human needs can continue to be fulfilled not only in the current generation but also for future generations.

⁵⁴ Eny Rachyuningsih, "Kebijakan Kemitraan Publik, Privat, dan Masyarakat Dalam Pengembangan Pariwisata," (Brawijaya University Dissertation, 2010).

⁵⁵ Elof Sturesson (et.al.), "Collaboration for Innovation a Study in the Öresund Region," (Master Thesis in Business Administration, 2009), 9.

Acknowledgment:

This study was funded by the Universitas Padjadjaran Research Grant and accompanied by The Center of Spatial Planning Law Faculty of Law Padjadjaran University.

References**Books**

- Abdoellah, Oekan S. *Pembangunan Berkelanjutan di Indonesia: di Persimpangan Jalan*. Jakarta: Gramedia Pustaka, 2016.
- Asshiddiqie, Jimly. *Konstitusi Ekonomi*. Jakarta: Kompas, 2016.
- Atkinson, Giles, Simon Dietz, Eric Neumayer, and Matthew Agarwala (ed.) *Handbook of Sustainable Development*. United Kingdom: Edward Elgar Publishing, 2014.
- Azis, Iwan J. (et.al.) *Pembangunan Berkelanjutan dan Kontribusi Emil Salim*. Jakarta: Gramedia, 2010.
- Budhijanto, Danrivanto. *Teori Hukum Konvergensi*. Bandung: PT. Refika Aditama, 2014.
- Nurlinda, Ida. *Prinsip-Prinsip Pembaruan Agraria*. Jakarta: Rajawali Pers, 2009.
- Ronnie Harding (et.al.) *Interpretation of the Principles for the Finer Conference on The Environment: Sustainability - Principles to Practice 1*. Australia: University of New South Wales, 1994.
- Rusbiantoro, Dadang. *Global Warming for Beginner: Pengantar Komprehensif Tentang Pemanasan Global*. Depok: Niaga Swadaya, 2008.
- Siregar, Hariman Surya (et.al.) *Merekonstruksi Alam Dalam Kajian Sains dan Agama: Studi Kasus Pada Masa Pembatasan Sosial Berskala Besar (PSBB) Dampak Covid-19* (Bandung: Digital Library UIN Sunan Gunung Djati Bandung, 2020).
- Stephen A., Roosa. *Sustainable Development Handbook*. New York: CRC Press, 2020.
- Winanti, Poppy S. (et.al.) *G20 di Tengah Perubahan Besar: Momentum Kepemimpinan Global Indonesia?* Yogyakarta: UGM PRESS, 2023.
- Yoesgiantoro, Donny. *Kebijakan Energi Lingkungan*. Jakarta: Pusat Lembaga Penelitian, Pendidikan, dan Penerangan Ekonomi dan Sosial, 2017.

Other Documents

- Adedeji, Olufemi. "Global Climate Change." *Journal of Geoscience and Environment Protection* 2, no. 2 (2014): 115-122. <http://dx.doi.org/10.4236/gep.2014.22016>.
- Ariani, Deniza. "The Effectiveness of Climate Change Litigation as a Venue to Uphold State Climate Change Obligations in Indonesia." *Indonesian Journal of International Law* 16, no. 2 (2019): 210-234. 10.17304/ijil.vol15.3.751.
- Azhar, Muhammad and Dendy Adam Satriawan. "Implementasi Kebijakan Energi Baru dan Energi Terbarukan Dalam Rangka Ketahanan Energi Nasional." *Administrative Law & Governance Journal* 1, no. 4 (2018): 398-412.

- Biro Komunikasi. "Layanan Informasi Publik dan Kerja Sama Kementerian Energi dan Sumber Daya Mineral." *Jurnal Energi: Program Strategis EBTKE dan Ketenagalistrikan 2* (2016): 1-100.
- Bram, Deni. "Perspektif Keadilan Iklim Dalam Instrumen Hukum Lingkungan Internasional Tentang Perubahan Iklim." *Jurnal Dinamika Hukum* 11, no. 2 (2011): 285-295. <http://dx.doi.org/10.20884/1.jdh.2011.11.2.187>.
- Conference on Environment and Development, Rio de Janeiro, Braz., June 13, 1992, *Report of the United Nations Conference on Environment and Development*, U.N. Doc. A/CONF.151/26, vol. I, Aug. 12, 1992
- Conference on the Human Environment, Stockholm, Swed., June 5-16, 1972, *Report of the United Nations Conference on the Human Environment*, 3, U.N. Doc. A/CONF.48/14/REV.1, June 16, 1972.
- David McCollum, Luis Gomez Echeverri, Keywan Riahi, Simon Parkinson. "Connecting the Sustainable Development Goals by Their Energy Inter-Linkages." *Environmental Research Letters* 13, no. 3 (2018): 1-23. <https://doi.org/10.1088/1748-9326/aaafe3>.
- Dellapenna, Joseph W. "International Law's Lessons for the Law of the Lakes." *University of Michigan Journal of Law Reform* 40 (2006): 747-797.
- Eggi Alvado Da Meisa. "The Impact Due to the Covid-19 Outbreak on the Environment." Accessed on August 20, 2023. <https://www.kompasiana.com/eggialvado/5ead7707d541df1549258dd2/dampak-yang-ditimbulkan-akibat-wabah-covid-19-terhadap-lingkungan>.
- Goodland, Robert and George Ledec. "Neoclassical Economics and Principles of Sustainable Development." *Ecological Modelling* 38, no. 1-2 (1987): 19-46. [https://doi.org/10.1016/0304-3800\(87\)90043-3](https://doi.org/10.1016/0304-3800(87)90043-3).
- Goodman, James. "Researching Climate Crisis and Energy Transitions: Some Issues for Ethnography." *Energy Research and Social Science* 45 (2018): 340-347. <https://doi.org/10.1016/j.erss.2018.07.032>.
- Hampton, Sam, Tina Fawcett, Jan Rosenow, Charles Michaelis, and Ruth Mayne. "Evaluation in an Emergency: Assessing Transformative Energy Policy Amidst the Climate Crisis." *Joule* 5, no. 2 (2021): 285-289.
- Harlem Brundtland, Gro (et.al.) "Our Common Future-the World-Commission-on-Environment-and-development." *Environment* 29, no. 5 (1987): 25-29.
- Herman, Haeruman. "Perspektif Kebijakan Terkait Perubahan Iklim dan Dampaknya Terhadap Ekonomi." *Jurnal Ekonomi Lingkungan* 13, no. 1 (2009): 15-32.
- International Energy Agency. "International Energy Agency: CO2 Emissions from Fuel Combustion: Overview 2019)." Accessed on October 31, 2019. https://iea.blob.core.windows.net/assets/eb3b2e8d-28e0-47fd-a8ba-160f7ed42bc3/CO2_Emissions_from_Fuel_Combustion_2019_Highlights.pdf.
- Institute for Services Reform (IESR). "Taking the Post-COVID-19 Energy Transition Seriously Will Prevent Economic Shocks Due to Climate Change." Accessed on

- November 2, 2020. <https://iesr.or.id/serius-sikapi-transisi-energi-pasca-covid-19-akan-cegah-guncangan-ekonomi-akibat-perubahan-iklim>.
- International Energy Agency. "CO2 Emissions from Fuel Combustion: Overview (2019 Edition)." Accessed on January 19, 2021. <https://www.iea.org/>.
- Karim, R., Ghazali, F., and Ansari, A. H. "Renewable Energy Regulations in Indonesia and India: A Comparative Study on Legal Framework." *Journal of Indonesian Legal Studies* 5, no. 2 (2020): 361-390. <https://doi.org/10.15294/jils.v5i2.41986>.
- Karmaker C.L., Ahmed T., Ahmed S., Ali S.M., Muktadir M.A., Kabir G. "Improving Supply Chain Sustainability in the Context of COVID-19 Pandemic in an Emerging Economy: Exploring Drivers Using an Integrated Model." *Sustain. Prod. Consum* (2021): 411–427. <https://doi.org/10.1016/j.spc.2020.09.019>.
- Kılıç, Şiir (et.al.) "Research Frontiers in Sustainable Development of Energy, Water and Environment Systems in a Time of Climate Crisis." *Energy Conversion and Management* 199, no. 111938 (2019): 1-21. <https://doi.org/10.1016/j.enconman.2019.111938>.
- Lau, Lin-Sea (et.al.) "Expert Insights on Malaysia's Residential Solar Energy Policies: Shortcomings and Recommendations." *Clean Energy* 6, no. 4 (2022): 619-631. <https://doi.org/10.1093/ce/zkac043>.
- Mulyana, Imam. "The Development of International Law in the Field of Renewable Energy." *Hasanuddin Law Review* 1, no. 1 (2016): 38-60. <http://dx.doi.org/10.20956/halrev.v1i1.213>.
- National Geographic Indonesia, "The Sky Looks Clear During a Pandemic Are Emissions Reducing?" Accessed on June 24, 2020. <https://nationalgeographic.grid.id/read/132211061/langit-terlihat-bersih-selama-pandemi-apakah-emisi-berkurang>.
- Patrimony, Mon. "Agora: What Obligation Does Our Generation Owe to the Next? An Approach to Global Environmental Responsibility." *Ecology LQ* 495 (1984): 540-544.
- Rachyuningsih, Eny. "Kebijakan Kemitraan Publik, Privat, dann Masyarakat Dalam Pengembangan Pariwisata." (Brawijaya University Dissertation- 2010).
- Richard Baron. "Energy Transition After The Paris Agreement: Policy and Corporate Challenges." Accessed on April 20, 2023. <https://www.oecd.org/sd-roundtable/papersandpublications/Energy%20Transition%20after%20the%20Paris%20Agreement.pdf>.
- SDG Indonesia. "Sustainable Development Goals." Accessed on December 11, 2022. <https://www.sdg2030indonesia.org/>.
- Siwiendrayanti, Arum. "Perubahan Iklim dan Pengaruhnya Terhadap Sektor Kesehatan." *Jurnal Kesehatan Masyarakat* 3, no. 1 (2007): 17-26.
- Sturesson, Elof, Adam Lindmark, and Markus Nilsson Roos. "Collaboration for Innovation-A Study in the Öresund Region." (Master Thesis in Business Administration-2009).

- Sugiyono, Agus. "Penanggulangan Pemanasan Global di Sektor Pengguna Energi." *Jurnal Sains & Teknologi Modifikasi Cuaca* 7, no. 2 (2006): 15-19.
- United Nations. "Goals 7 Ensure Access to Affordable, Reliable, Sustainable, and Modern Energy for All." Accessed on August 2, 2021. <https://sdgs.un.org/goals/goal7>.
- United Nations Department of Economic and Social Affairs. "*Sustainable Development: The 17 Goals*." Accessed on December 11, 2022. <https://sdgs.un.org/goals>.
- World Bank. "Climate Change Overview Country: Indonesia." Accessed on December 23, 2020 <https://climateknowledgeportal.worldbank.org/country/indonesia>.
- Yurika. "The Covid-19 Pandemic Has the Potential to Accelerate Renewable Energy Development." Accessed on June 14, 2020. <https://www.dunia-energi.com/pandemi-covid-19-berpotensi-percepat-pengembangan-ebt/>.
- _____. "The EBT Business Has the Potential to Become a Leading Post-Covid-19 Pandemic." Accessed on June 14, 2020. <https://www.dunia-energi.com/bisnis-ebt-berpotensi-jadi-unggulan-pasca-pandemik-covid-19/>.
- _____. "The Government Prepares a Post-Pandemic Renewable Energy Utilization Strategy." Accessed on June 14, 2020. <https://www.dunia-energi.com/pemerintah-siapkan-strategi-pemanfaatan-energi-terbarukan-pasca-pandemi/>

Legal Documents

- Law Number 30 of 2007 regarding Energy [*Undang-Undang Nomor 30 Tahun 2007 tentang Energi*].
- Presidential Regulation Number 5 of 2006 regarding National Energy Management Blueprint 2006-2025 [*Peraturan Presiden Nomor 5 Tahun 2006 tentang Kebijakan Energi Nasional*].
- Presidential Decree Number 61 of 2011 regarding Indonesian National Action Plan for Reducing Greenhouse Gases [*Peraturan Presiden Nomor 61 Tahun 2011 tentang Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca*].
- Presidential Regulation Number 22 of 2017 regarding the General National Energy Plan [*Peraturan Presiden Nomor 22 Tahun 2017 tentang Rencana Umum Energi Nasional*].