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THE GOVERNMENT'S ROLE IN OVERCOMING AIR POLLUTION CAUSED BY STEAM POWER PLANT IN JAKARTA

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ABSTRACT

The environment is a place for humans to live, actively and have an important role to achieve and improve their prosperity. However, the main challenges for the environment come from two main sources: unsustainable use of natural resources and environmental pollution, especially by pollution. Air pollution caused by Steam Power Plant (PLTU) in Jakarta is a serious problem affecting air quality and public health. The role of the government is very important in addressing the negative impact of PLTU on the environment and public health. Strict supervision and regulations of the Power Plant are governed under various regulations, such as Law No. 32 of 2009 on Environmental Protection and Management and Government Regulation No. 41 of 1999 on Air Pollution Control. In addition, the Governor Regulation of Jakarta No. 66 Year 2019 also provides a framework of supervision of air pollution in Jakarta. The impact of air pollution produced by the PLTU includes environmental pollution and a wide range of public health problems. Greenhouse gas emissions and harmful particulates from PLTU can disrupt ecosystems, cause extreme climate change, and cause respiratory disorders and other diseases in humans. Therefore, resolute and sustainable actions are required, including increased use of clean technology and effective enforcement, to reduce the negative impact of air pollution by the PLTU in Jakarta.

Keywords: Air Pollution, Government Role, PLTU Impact

ABSTRAK

Lingkungan adalah suatu tempat untuk manusia tinggal, beraktifitas dan mempunyai peranan yang penting untuk mencapai dan meningkatkan kemakmurannya. Namun, tantangan utama bagi lingkungan berasal dari dua sumber utama yaitu penggunaan sumber daya alam secara tidak berkelanjutan dan pencemaran lingkungan, khususnya oleh polusi. Polusi udara yang disebabkan oleh Pembangkit Listrik Tenaga Uap (PLTU) di Jakarta menjadi masalah serius yang mempengaruhi kualitas udara dan kesehatan masyarakat. Peran pemerintah sangatlah penting dalam mengatasi dampak negatif dari PLTU terhadap lingkungan dan kesehatan Masyarakat. Pengawasan dan regulasi yang ketat terhadap PLTU diatur dalam berbagai peraturan, seperti Undang-Undang Nomor 32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup serta Peraturan Pemerintah Nomor 41 Tahun 1999 tentang Pengendalian Pencemaran Udara. Selain itu, Peraturan Gubernur DKI Jakarta Nomor 66 Tahun 2019 juga memberikan kerangka pengawasan terhadap polusi udara di Jakarta. Dampak dari polusi udara yang dihasilkan oleh PLTU mencakup pencemaran lingkungan dan berbagai masalah kesehatan masyarakat. Emisi gas rumah kaca dan partikulat berbahaya dari PLTU dapat mengganggu ekosistem, menyebabkan perubahan iklim ekstrem, dan menyebabkan gangguan pernapasan serta penyakit lainnya pada manusia. Oleh karena itu, tindakan tegas dan berkelanjutan diperlukan, termasuk peningkatan penggunaan teknologi bersih dan penegakan hukum yang efektif, untuk mengurangi dampak negatif polusi udara oleh PLTU di Jakarta

Kata kunci: Polusi Udara, Peran Pemerintah, Dampak PLTU

INTRODUCTION

Indonesia is a country consisting of many islands with a diverse population of racial, ethnic, and cultural groups. Therefore, Indonesia is the third largest country in the world after China and India, due to its large population. The Central Bureau of Statistics (BPS) reports that there are currently 167 million people living in Indonesia, and the number continues to increase.¹ The environment is a place where people live, work, and play an important role in creating and improving welfare. In Indonesia, the term "environment" also often refers to "living environment". According to Law Number 32 of 2009 which regulates environmental management, the environment is defined as a unity of space with all forces, conditions, and living things, including humans and their behavior, which affect the welfare of humans and other living things is an aspect of sustainable life.²

According to Munadjat Danusaputo, the environment is everything that exists around human habitation and has an influence on their well-being and the well-being of other living things. This includes human behavior. Otto Soemarwoto defines the environment as an area inhabited by living things, non-living things, and other living elements.³ The two main categories of human activities that cause environmental problems are unsustainable use of natural resources and improper disposal of waste and pollution that exceeds the environment's capacity to absorb or transform it to safe levels.⁴

Munadjat Danusaputo and Otto Soemarwoto emphasize the importance of understanding the environment as a unity that involves all elements of life in it, including humans and their activities. However, the main challenges for the environment come from two main sources, namely the unsustainable use of natural resources and environmental pollution, especially by pollution. Pollution, whether in the form of air, water, or land, is a real impact of irresponsible human behavior towards the environment, with air pollution being an important focus of attention. According to Tresna Wijaya, Wijaya, air pollution if the air in the atmosphere is mixed with substances or radiation that have a negative effect on living organisms.⁵

¹ Ahmad Redi, *"Hukum Sumber Daya Alam Indonesia"* (Malang: Setara Press, 2018), hlm. 4"

² Siahaan.N.H.T. *"Hukum Lingkungan dan Ekologi Pembangunan"*, (Jakarta : Erlangga, 2004), hlm. 4"

³ Otto Soemarwoto, *Ekologi, Lingkungan Hidup dan Pembangunan*, (Jakarta: Djambatan, 1997), hlm. 48

⁴ A'an Efendi, *"Hukum Lingkungan"*, (Bandung: PT Citra Aditya Bakti, 2014), hlm. 4"

⁵ Tresna Wijaya, *"Pencemaran Lingkungan"*, (Jakarta: Rinka Cipta, 2009), hlm. 192"

In the modern era full of technological innovation and mobility, industrial development is one of the main drivers of economic growth in many big cities, including Jakarta. However, these economic benefits often come with serious environmental consequences. The rise of the industrial sector and the expansion of infrastructure have led to significant emissions of air pollutants in metropolitan cities such as Jakarta. Air pollution has thus become one of the pressing environmental challenges in the densely populated capital city of Indonesia. In recent decades, rapid economic growth and rapid urbanization have led to an increase in industry and infrastructure, all of which contribute to the emission of air pollutants. However, among all sources of air pollution, Steam Power Plants (PLTU) have a significant impact on air quality in Jakarta.

Coal-fired power plants and other fossil fuels are commonly used by Indonesia as the main source of energy. Although coal is an important source of energy in meeting electricity needs, the use of coal in coal-fired power plants produces greenhouse gases and air pollutants that are harmful to the environment and human health, including sulfur dioxide (SO₂), nitrogen oxide (NO_x), and particulates. There are adverse effects of air pollution caused by power plants. Various health problems, including respiratory disorders, cardiovascular disease, and even premature death, can be caused by these pollutants. People with weak health conditions, the elderly, and children are particularly vulnerable to the negative impacts of air pollution. In addition, air pollution can cause ecosystem damage, endanger the existence of several species, and damage the natural environment. Every individual has the right to a hygienic and healthy environment. This is because the decline in the quality of the environment will have a direct impact and threaten the lives of humans and other living things, so it is very important for all parties to maintain environmental management continuously and seriously. In overcoming this serious problem, the government plays an important role. It is the government's duty to protect its citizens from the adverse effects of air pollution and ensure that future generations will live in a healthy environment. However, in the context of enforcing environmental justice related to air pollution by PLTU in Jakarta, the legal role of the government is often at the center of debate and challenge.

As a regulator, the government has the authority to regulate and enforce laws related to air pollutant emissions by PLTU. However, the implementation of existing policies and regulations often faces obstacles and

barriers. Starting from the lack of human and financial resources, to political intervention and pressure from industry, all are factors that affect the effectiveness of environmental law enforcement. In this context, the role of government law is the main focus in efforts to uphold environmental justice related to air pollution by PLTU in Jakarta. An in-depth evaluation of existing regulations, policies, and legal mechanisms is essential to assess the extent to which the government has succeeded in protecting the environment and public health from the negative impacts of PLTU. In addition, an analysis of the challenges faced in the implementation of environmental law is also needed, as well as the identification of solutions and strategies to improve the effectiveness of law enforcement in the future.

Air pollution in Jakarta and its surrounding areas has become a serious problem due to the energy industry, especially Steam Power Plants (PLTU). Despite being the main contributor, efforts to overcome its impact by the central government, the DKI Jakarta Provincial Government, and a number of regional governments around the capital city are considered minimal. In addition, air pollution is not only a local problem, but also cross-border, with Banten and West Java Provinces contributing as the main contributors to air pollution in Jakarta. The energy industry, including PLTU, and the manufacturing sector are the main sources of air pollution, with the use of power plants being the main trigger for increasing air pollution in the city of Jakarta. PLTUs that use coal as fuel are the largest sector that produces Sulfur Dioxide (SO₂), which also damages the environment. In fact, PLTUs are considered the main cause of air pollution in Jakarta because there are at least 16 PLTUs in the metropolitan city, both owned by PLN and private electricity companies, which are difficult to calculate the amount of SO₂ emissions produced every day.⁶

In addition to the Regulation of the Governor of DKI Jakarta Number 66 of 2019 Article 5 concerning Air Pollution Control issued by Governor Anies Baswedan in 2019, air pollution control measures have also been regulated in the framework of Indonesian national law. A number of laws and regulations have been made to address the problem of air pollution caused by energy industry activities, especially Steam Power Plants (PLTU). "Law Number 32 of 2009 concerning Environmental Protection and Management is the relevant legal basis in this case". This law imposes obligations on companies, including

⁶ "<https://iblam.ac.id/2023/11/13/polusi-udara-jakarta-penyebabnya-dan-bahaya-kesehatan>"

power plants, to protect the environment from the negative impacts of their industrial activities.

In addition, Government Regulation Number 41 of 1999 concerning Air Pollution Control is also a legal umbrella that regulates emission standards for industry, including PLTU. This regulation sets limits on emissions that are allowed to be released into the air by PLTU to prevent excessive air pollution and harm the environment and public health. The government should play an important role in upholding environmental justice by tightening regulations and supervising industrial activities, especially Steam Power Plants (PLTU), for better public health. This involves implementing strict laws against companies that violate environmental regulations, as an effort to maintain air quality and the welfare of the population. In this problem, the author writes the following problems: The Role of the Government in Minimizing Air Pollution Caused by PLTU in Jakarta and the Impact of PLTU on the Environment and Public Health.

RESEARCH METHODOLOGY

This research is included in the type of normative research, where the author looks at positive legal provisions to identify legal doctrines, rules, and principles that answer the legal questions raised. Several techniques are used to address the problems described. One approach is the statutory regulatory approach, which examines all difficulties based on the relevant statutory regulations to fulfill the legal problems being investigated.

RESULTS AND DISCUSSION

The Role of Government in Minimizing Air Pollution Caused by PLTU in Jakarta.

The physical growth of cities and industrial centers has changed the quality of air, despite the fact that air is necessary for life. The air that was once fresh has now become stale and polluted.⁷ When materials, energy and/or other components enter the atmosphere through human activities so that the air becomes too contaminated to function properly, the result is air pollution.⁸

Based on Law Number 32 of 2009 concerning environmental protection and management, the responsibility and authority to plan and implement

⁷ Soedomo, Moestikahadi, *Pencemaran Udara* (Bandung: ITB, 2001) hlm. 3

⁸ Pasal 1 Peraturan Pemerintah Republik Indonesia Nomor 41 Tahun 1999 tentang Pengendalian Pencemaran Udara

control of environmental pollution or damage, including air pollution, lies with the Government of the Special Capital Region of Jakarta. The purpose of air pollution control is to prevent and manage air pollution and improve air quality. Government Regulation Number 41 of 1999 regulates the regulation of air pollution control efforts.⁹

Pollution Air pollution in Jakarta is a serious problem caused by Steam Power Plants (PLTU). As a densely populated metropolitan city, Jakarta experiences high levels of air pollution due to rapid population growth, uncontrolled urbanization, and intensive industrial activities. PLTU is the main contributor to air pollution in Jakarta with exhaust emissions that pollute the air. The impact of air pollution on the health of the people of Jakarta is very large. High concentrations of air pollutants such as fine particles (PM_{2.5}), nitrogen dioxide (NO₂), and ozone (O₃) can cause respiratory problems, heart disease, and premature death. In addition, air pollution also has a negative impact on the environment, such as water and soil pollution and ecosystem damage. The government has a very important role in minimizing air pollution caused by PLTU in Jakarta. As the main regulator, the government has the responsibility to protect citizens from the negative impacts of air pollution and ensure that a healthy environment is guaranteed for future generations. However, the government's efforts to overcome air pollution caused by PLTU are often faced with a number of complex challenges. One of the main challenges is the limitations in regulating the informal sector involved in the energy industry, including PLTU. The presence of this informal sector is often difficult for the government to regulate, allowing violations of regulations related to emissions and environmental standards. In addition, less than optimal law enforcement and lack of transparency in reporting emissions are also serious problems faced by the government.

a. Supervision and Regulation

The Role of Government in Supervision and Regulation related to air pollution issues, especially those originating from PLTU, is an important aspect of environmental law. This is based on the Government's legal responsibility to maintain environmental health and protect citizens from the negative impacts of air pollution, as well as to ensure environmental sustainability for future generations. Therefore, strict supervision and

⁹ Sarman dan M. Taufik, *Hukum Pemerintahan Daerah Di Indonesia* (Jakarta: Rineka Cipta, 2011), hlm.105

regulation of PLTU needs to be carried out in order to protect the environment. Law Number 32 of 2009 concerning Environmental Protection and Management is one of the important laws and regulations. Law Number 32 of 2009 generally contains coordinated and methodical efforts to protect the environment and stop environmental pollution and/or damage. This is reflected in Article 1 paragraph (2) of Law Number 32 of 2009 which reads¹⁰:

"Environmental protection and management are coordinated and coordinated efforts that include planning, utilization, control, maintenance, supervision and law enforcement carried out to protect environmental functions and avoid pollution and/or damage."

The articles in this law provide a strong framework for the government to regulate air pollutant emissions from coal-fired power plants. This law stipulates the government's obligation to regulate and supervise industrial activities that have the potential to pollute the environment. Articles 71 to 83 of Law Number 32 of 2009 concerning Environmental Protection and Management provide detailed explanations regarding supervision and enforcement of administrative sanctions. Activities carried out by officials or relevant party officials to monitor and enforce compliance with environmental standards are mitigated by the steps outlined in this section. Furthermore, the documents emphasize that if a violation occurs, there will be impacts, including written warnings, government action, freezing of environmental permits, or even revocation of permits. Law enforcement activities, or procedures carried out to enforce the regulations outlined in Law Number 32 of 2009, consist of a series of actions designed to address violations. Law enforcement actions, for example, will be aggressively enforced when someone provides false, misleading, or inaccurate information regarding environmental protection and management.

In such circumstances, parties who violate Law Number 32 of 2009 concerning Environmental Protection and Management will be tried in the criminal justice system. Article 114 of the law states that the maximum penalty for someone who leads an organization or activity that opposes government pressure is one year in prison. In addition, violators can also be subject to large fines for their actions, the total of which can reach one

¹⁰ Pasal 1 ayat 2 Undang Undang Nomor 32 Tahun 2009 Tentang Perlindungan dan Pengelolaan Lingkungan Hidup

billion rupiah. This is a penalty for actions that have a negative impact on the environment.

Government Regulation Number 41 of 1999 concerning Air Pollution Control, which is an important legal basis that regulates the supervision and regulation of air pollution in Indonesia. In this context, the regulation not only provides a framework for general air pollution control, but also sets emission standards that must be adhered to by industry, including Steam Power Plants (PLTU). Through this provision, the government can carry out strict supervision of industrial activities to ensure that the emissions produced do not exceed the specified limits, thereby maintaining air quality and public health.

In addition, DKI Jakarta Governor Regulation Number 66 of 2019 Article 5 concerning Air Pollution Control has the main objective of regulating and supervising air pollution, including that caused by PLTU. In this context, supervision and regulation are carried out with several approaches that focus on environmental impact assessments, the application of clean technology, and operational supervision. This regulation requires PLTU to conduct an environmental impact assessment before starting its operations. This aims to understand the potential negative impacts that may be caused by PLTU on air quality and the surrounding environment. This assessment process also involves the involvement of the local community to ensure transparency and accountability in decision-making. This regulation sets out emission standards that PLTU must comply with. These standards include certain limitations on the amount of pollutants that can be released into the air, such as sulfur dioxide (SO₂), nitrogen oxides (NO_x), and particulates. PLTU is required to use clean technology or an effective emission control system to ensure that these emission standards are met.

Regular operational supervision is carried out to ensure that the PLTU complies with the established regulations. The local government, through related institutions, has the authority to conduct routine inspections of PLTU facilities to ensure that the emission control system is functioning properly and that no violations occur. Thus, DKI Jakarta Governor Regulation Number 66 of 2019 Article 5 aims to control air pollution caused by PLTU through a comprehensive approach, including environmental impact assessments, implementation of clean technology, and strict operational supervision. This is done to protect public health and

maintain the quality of the environment in the DKI Jakarta area. This law enforcement is important to confirm compliance with the provisions that have been set in order to maintain a healthy and sustainable environment. With effective law enforcement efforts, it is hoped that it can prevent similar violations in the future and provide a deterrent effect for those who intend to violate environmental protection regulations. In addition to the law, the government also applies technical regulations issued by the relevant ministries as a legal instrument to set emission standards for PLTU. These regulations outline the technical parameters that PLTUs must comply with, including maximum limits for various types of air pollutants. Law enforcement against violations of these emission standards is the responsibility of the government. In this context, law enforcement agencies such as the Regional Environmental Agency (BLHD) and the Ministry of Environment and Forestry play an important role. They are tasked with conducting routine supervision of PLTUs and enforcing legal provisions related to air pollutant emissions. Legal actions, such as administrative sanctions, fines, or even operational closures, can be imposed on PLTUs that violate emission standards, so that environmental protection and public health can be guaranteed.

Impact of PLTU on the Environment and Public

Impact in the Indonesian dictionary is a powerful force that produces certain results, both positive and negative; a collision between two objects that is strong enough to significantly change the momentum of the system experiencing the collision. The impact of an activity can be natural and can be chemical, physical, biological, or occur as a result of an activity. In addition to socio-economic and cultural impacts, physiological impacts may also occur. Impact can be interpreted as influence or consequence. Whether beneficial or negative, every decision taken by a person often has an impact. Steam Power Plants (PLTU) have several negative impacts on the environment, including air pollution, waste, and vibration. The most common negative impact caused by PLTU is air contamination. Household gas emissions, mostly nitrogen oxides (NO_x), carbon dioxide (CO₂), and sulfur dioxide (SO₂), are produced when coal is used in PLTU. The increasing concentration of these gases in the atmosphere can result in air pollution, which is detrimental to human health and ecosystems. This impact can be manifested in the form of an increase in the amount of hazardous gases in the atmosphere, which can cause air

pollution and endanger ecosystems and endanger human health. In addition, residual fuel from PLTU has the potential to pollute the air and soil. This residual fuel may contain hazardous compounds and heavy metals that are detrimental to living organisms.¹¹

For example, air pollution produced by PLTU is one of the serious problems faced by Jakarta. The use of fossil fuels such as coal in the energy generation process by PLTU causes emissions of greenhouse gases and harmful particulates. The impact of air pollution produced by PLTU is very detrimental, both to the environment and the health of the local community. This shows that PLTU is one of the sources of air pollution that needs serious attention in efforts to maintain air quality and public health in the area. The impact of air pollution from PLTU not only has an impact on the environment, but also reaches the community with significant impacts, especially in terms of health. One example is the increased risk of diseases due to climate change, such as malaria and dengue fever, which are caused by greenhouse gas emissions from PLTU. This climate change can also increase the intensity and frequency of extreme weather events, such as floods and droughts, which then affect water quality and increase the risk of disease. Another example is the increase in cases of diarrhea due to contamination of drinking water, especially when people have to look for water sources in the mountains or caves due to the increasingly long drought.¹²

In addition, coal-fired power plants can also have a negative impact on public health through air pollution resulting from the coal combustion process. This air pollution can cause various serious diseases, including chronic lung disease, respiratory disorders, and cardiovascular problems. Indonesia, especially Jakarta, is recorded as having very high levels of air pollution, even exceeding the average in Southeast Asia. This impact is not only short-term, but also has the potential to cause significant health problems in the long term, contributing significantly to the decline in the overall quality of public health.¹³

To overcome the problem of air pollution caused by PLTU, firm and sustainable action is needed. Higher regulations, such as increasing the use of environmentally friendly technology in the energy generation process and higher emission limits, can be applied to PLTU. To reduce the negative

¹¹ <https://perpusteknik.com/dampak-positif-dan-negatif-pltu/>

¹² <https://www.mongabay.co.id/2020/03/15/kala-pltu-batubara-picu-perubahan-iklim-dan-ancam-kesehatan-masyarakat/>

¹³ <https://www.bbc.com/indonesia/articles/cjmy2nez84vo>

impacts on the environment and public health, the government must also provide incentives for PLTU to switch to more environmentally friendly energy sources, such as renewable energy. Effective monitoring and law enforcement are also very important in ensuring that PLTUs comply with existing regulations. With strict supervision, it is hoped that the impact of air pollution from PLTUs can be reduced significantly.

CONCLUSION

1. The government plays a crucial role in supervision and regulation to minimize air pollution caused by Steam Power Plants (PLTU) in Jakarta. Based on Law Number 32 of 2009 concerning Environmental Protection and Management, the government has a legal obligation to maintain air quality and protect public health. One of the main steps that must be taken is strict supervision of PLTU, including the implementation of routine inspections and sanctions for violators. Government Regulation Number 41 of 1999 and DKI Jakarta Governor Regulation Number 66 of 2019 are also important foundations in setting emission standards and ensuring that PLTUs comply with existing regulations. With strict law enforcement, including administrative sanctions up to permit revocation, it is hoped that violations can be prevented and pollutant emissions from PLTUs can be reduced. The application of clean technology and community involvement in the environmental impact assessment process are also important for transparency and accountability.
2. The negative impacts of PLTUs on the environment and public health in Jakarta are very significant. Coal combustion in coal-fired power plants produces greenhouse gas emissions such as carbon dioxide (CO₂), sulfur dioxide (SO₂), and nitrogen oxides (NO_x), which contribute to air pollution and climate change. This air pollution increases the risk of respiratory diseases, heart disease, and other health problems in the community. In addition, air pollution from coal-fired power plants also damages the ecosystem and the quality of soil and water. In the long term, air pollution from coal-fired power plants can worsen the quality of life of the community and the environment. Thus, the government needs to implement stricter regulations, promote the use of renewable energy, and improve monitoring and law enforcement of coal-fired power plant emissions.

REFERENCES

1. Book

- Ahmad Redi, 2018, *Hukum Sumber Daya Alam Indonesia*, Setara Press, Malang
- A'an Efendi. 2014. *Hukum Lingkungan*. Bandung : PT Citra Aditya Bakti.
- Danusaputo, Munajat. 1985. *Hukum Lingkungan*, Buku 1 Umum. Jakarta: Binacipta.
- Irwan. 2018. *Dinamika dan Perubahan Sosial Pada Komunitas Lokal*. Deepublish Yogyakarta
- N.H.T Siahaan. 2004. *Hukum Lingkungan dan Ekologi Pembangunan*. Jakarta: Erlangga.
- Sarman, Muhammad Taufik Makarao. 2011. *Hukum Pemerintahan Daerah Di Indonesia*. Jakarta, Rineka Cipta.
- Soedomo, Moestikahadi. 2001. *Pencemaran Udara*. Penerbit ITB, Bandung.
- Soemarwoto, Otto. 1997. *Ekologi, Lingkungan Hidup dan Pembangunan*. Jakarta: Djambatan
- Tim Penyusun Kamus Pusat Bahasa. (2001). *Kamus Besar Bahasa Indonesia*, Ed.3. Jakarta: Balai Pustaka.
- Wijaya, Tresna, 2009. *Pencemaran Lingkungan*, Jakarta: Rinka Cipta. Undang-Undang Negara Republik Indonesia Tahun 1945.

2. Legislation

- Undang Undang Nomor 32 Tahun 2009 Tentang Perlindungan dan Pengelolaan Lingkungan Hidup.
- Peraturan Pemerintah Republik Indonesia Nomor 41 Tahun 1999 tentang Pengendalian Pencemaran Udara

3. Website

- Dampak Positif dan Negatif Pembangkit Listrik Tenaga Uap (PLTU). Diakses melalui <https://perpusteknik.com/dampak-positif-dan-negatif-pltu/>
- Kala PLTU Batubara Picu Perubahan Iklim dan Ancam Kesehatan Masyarakat. Mongabay Indonesia. Diakses melalui <https://www.mongabay.co.id/2020/03/15/kala-pltu-batubara-picu-perubahan-iklim-dan-ancam-kesehatan-masyarakat/>
- Polusi Udara Jakarta: Penyebabnya dan Bahaya Kesehatan. IBLAM. Diakses melalui <https://iblam.ac.id/2023/11/13/polusi-udara-jakarta-penyebabnya-dan-bahaya-kesehatan>
- Polusi Udara di Jakarta Tertinggi Se-Asia Tenggara, Dua Tahun Setelah Pemprov DKI Kalah Gugatan. BBC News Indonesia. Diakses melalui <https://www.bbc.com/indonesia/articles/cjmy2nez84vo>