

The Use Of Waqf Through Money In The Application Of Mosque-Based Environmentally Friendly Electrical Energy

Hafifuddin ^{1*}, Qurroh Ayuniyyah ²

¹Postgraduate Program, Ibn Khaldun University Bogor, Jl. Sholeh Iskandar, RT.01/RW.10, Kedungbadak, Bogor, 16162, West Java

¹Postgraduate Program, Ibn Khaldun University Bogor, Jl. Sholeh Iskandar, RT.01/RW.10, Kedungbadak, Bogor, 16162, West Java

*E-mail: h.afifuddin81@gmail.com

Abstract

The use of solar electricity is a very promising potential to support environmentally friendly energy and realize *Sustainable Development Goals (SDGs)*. Indonesia with the big number of mosques is one of the objects to support the use energy using solar power. This article explained potential use of waqf through money in an effort to implement mosque-based environmentally friendly electrical energy. The method used in this article is a literature study and uses SWOT analysis. The results of this article are : Strengths, Indonesia is tropical countries with great sunlight potential, the government contributes directly by issuing policies, the number of mosques that are very large and solar power can save electrical energy up to 30%; Weaknesses, the cost of installing solar power installations is still fairly expensive, waqf through money is still not familiar in the community, the image of waqf is not good in the community; Opportunities, The need for electrical energy is getting bigger every year, public concern for health is increasing and global concern and support for the use of environmentally friendly electrical energy; Threats, limited availability of solar panel raw materials, the possibility of reduced PLN revenue, and changing on *green lifestyle* to hunting for business profits

Keywords : Waqf, Money, Solar, Energy, Mosque

Introduction

The use of clean energy has become an important theme in recent decades and has become a global concern. Since the advent of the first industrial revolution in the late 18th century, there has been a remarkable development in terms of pollution worldwide. This progress is due to increased industrial production, the use of fossil fuels, and various other human activities that adversely affect the natural environment. Herein lie some aspects of the evolution of pollution since the first industrial revolution, namely: 1). Greenhouse gas emissions resulting from the utilization of fossil fuels such as coal, petroleum, and natural gas to energize machinery and industry have intensified the release of greenhouse gases such as carbon dioxide (CO₂) into the atmosphere. This phenomenon exacerbates global warming and climate change, 2). Air pollution started since the first industrial revolution resulted in substantive air pollution caused by industrial waste, coal burning, and motor vehicles. Air contamination affects air quality and human health, triggering respiratory suffering and other diseases, 3). Water pollution has become a major problem due to contamination of water sources such as rivers, lakes and seas by industrial waste, chemical waste disposal and excessive use of fertilizers. This results in threats to aquatic life and negative impacts on the health of individuals who depend on such water sources, 4). Soil quality deteriorates due to increased industrial and agricultural activities resulting in the accumulation of chemical waste and pollutants. In addition, the use of pesticides and other chemicals can reduce soil fertility, 5). The extensive use of plastic since the first industrial revolution has led to the accumulation of plastic waste in the environment. It has posed a significant threat to marine life, ecosystems, and human health, 6). Pollution and industrial activity have led to a decline in biodiversity by destroying natural habitats and causing species loss. Furthermore, climate change caused by pollution can alter the distribution of species and lead to extinction, 7). The quality of human life and the environment are threatened by pollution due to industrialization, despite the technological and economic advances it brings. The damage caused by air and water pollution can have long-term impacts on human health and the environment in which humans live.

Various efforts have been made to control and reduce pollution, in addition to awareness of its impact. Global efforts to curb pollution involve key components such as environmental regulation, clean technologies, and sustainable approaches. Since the First Industrial Revolution, the development of pollution has posed significant challenges to the balance of ecosystems and the quality of human life. Collaborative action and Integrated integration is needed to reduce the negative effects of pollution and promote sustainable development in the future.

Air pollution remains a major environmental hazard to global health. The devastating effects of substandard air quality result in a staggering 93 billion days of disease-related health complications and more than six million deaths each year. The economic burden associated with this issue exceeds \$8 trillion dollars, exceeding 6.1% of the world's annual GDP (The World Bank, 2021). Exposure to ambient pollution has been shown to induce and exacerbate many medical afflictions, including, but not limited to, bronchial asthma, malignant neoplasms, pulmonary disorders, cardiovascular disease, and premature death (Zehnder, 2018). The damaging effects of air pollution are especially noticeable among already vulnerable populations. Most deaths from pollution are concentrated in countries that have lower or middle income levels (Fuller, 2022). According to the 2021 World Air Quality Report, only three percent of cities and no country at all have managed to comply with the current annual air quality guidelines set by the World Health Organization (WHO) (IQAir, 2022). The presence of PM2.5, commonly referred to as fine particle pollution, is widely recognized as the most dangerous form of air pollution and is monitored extensively. Studies have established that it is a significant contributor to health problems such as asthma, stroke, heart disease, and lung disease. PM2.5 is responsible for millions of premature deaths every year (IQAir, 2022). The seriousness in addressing the negative effects on energy use as a cause of pollution gives global attention in investing in the renewable energy industry. The International Energy Agency (IEA) has reported that annual investment in clean energy is observing an increasing trend globally. The IEA has projected that investment in the sector will surpass \$1.4 trillion by 2022. This estimate represents nearly 75% of all escalations in energy investment.

Table 1. Total Investment of World Countries in Clean Energy (2017-2022)/ US\$ billion

Tahun	Energi terbarukan	Efisiensi energi	Jaringan penyimpanan	Nuklir	Kendaraan listrik	Bahan bakar rendah karbon & ccus
2017	326	376	322	37	5	11
2018	359	376	315	34	13	10
2019	393	390	296	35	19	10
2020	418	355	298	40	27	10
2021	446	430	317	44	55	16
2022*	472	470	337	49	93	19

*= year 2022 (estimation)



Figure 1. Total Investment of World Countries in Clean Energy (2017-2022)/ US\$ billion

Sumber : International Energy Agency (IEA), 2022

The utilization of sustainable energy, including electrical energy, has increased. Nevertheless, as per energy consultancy Enerdata's statistics, renewable electricity generation worldwide reached only a meager 28.1% in 2021. This percentage is significantly less than non-renewable power production, which stands at 71.9%.

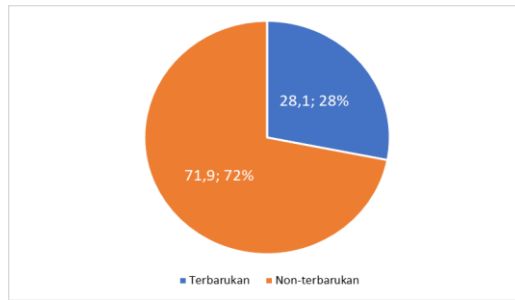


Figure 2. Global Renewable Energy Production, 2021

Sumber : Enerdata,2022.

Indonesia is the country with the largest number of Muslims in the world with a population of 278 million people (BPS, June 2023). With the largest Muslim population, Indonesia also has a very large number of mosques and spread across 34 provinces throughout Indonesia. According to official figures sourced from the Ministry of Religious Affairs (Kemenag), Indonesia currently has a comprehensive network of 290,161 mosques, with construction and distribution covering 34 provinces as of May 2022. Here are the 10 provinces with the largest number of mosques in Indonesia:

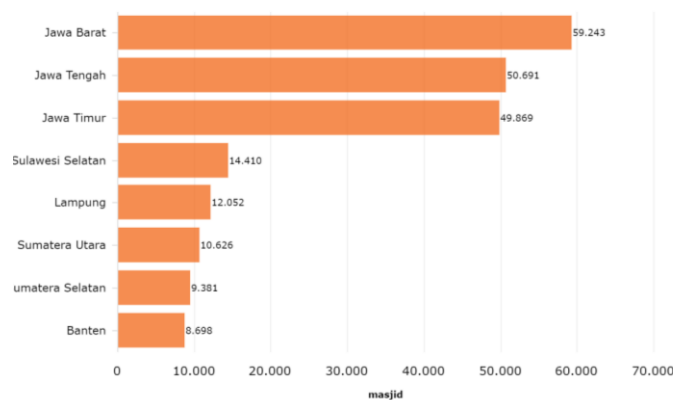


Figure 3. Provinces with the Most Number of Mosques (May 2022)

Source : Kemenag, 2022

In 2021, the total amount of electricity consumed in Indonesia increased to 168.38 million barrels of oil equivalent (BOE). According to statistics provided by the Ministry of Energy and Mineral Resources (ESDM), there has been a significant increase in electricity consumption by 5.82% compared to the previous year, which is estimated at 159.12 million BOE.

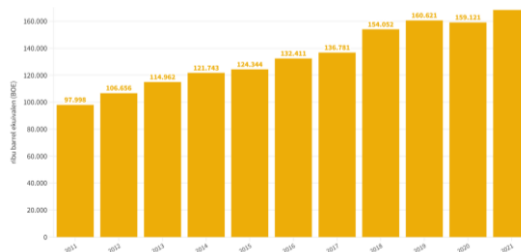


Figure 4. Electricity Consumption in Indonesia (2011-2021)

Source: Kementerian Energi dan Sumber Daya Mineral (2021)

Furthermore, the increase in electrical energy consumption in Indonesia has relatively increased from 1971 to 2019.

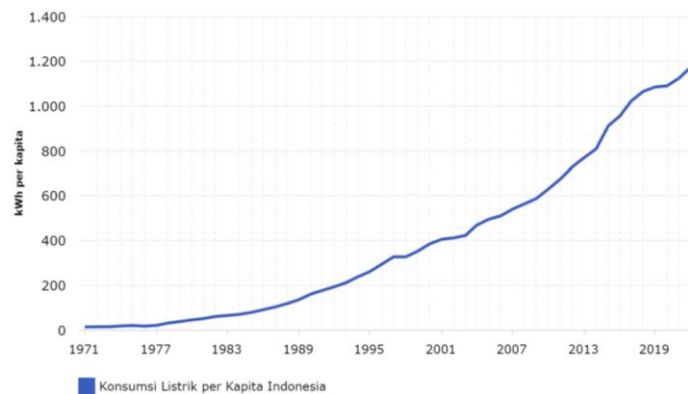


Figure 5. Electricity Consumption in Indonesia (1971-2019)

Source : Kementerian ESDM, World Bank, 2022

Mosques are included in the category of electricity customers of social groups. In general, the number of electricity customers of social groups throughout Indonesia is as follows :

Table 2. Number of social category electricity customers (2015 – 2020)

	2015	2017	2018	2019	2020
Number of electricity customers	156.890	186.497	198.647	218.445	218.949

Source : Badan Pusat Statistik, 2021

In the data, it can be seen that there has been an increase in the number of electricity customers in the social category since the year with a total increase of 39.5% throughout 2015 to 2019. Meanwhile, if you look at the data on electricity distribution in the social category throughout 2015 to 2020 are as follows:

Table 3. Distribution of electrical energy in social category (2015 – 2020)

	2015	2017	2018	2019	2020
Distributed electricity (GWh)	5.946,47	7.055,32	7.789,35	8.627,46	8.050,55

Source : Badan Pusat Statistik, 2021

In the data, it can be seen that there is an increasing trend in the amount of electrical energy distributed in 2015 to 2019 with an increase percentage of 35.4%. In other data related to the value of electrical energy distributed to social categories are as follows:

Table 4. Distribution of electricity value in social category (2015 – 2019)/ Million rupiah

	2015	2017	2018	2019	2020
Electricity distributed (million rupiah)	4.856.545,01	5.848.904,41	6.405.832,18	7.210.915,45	65.435.691,44

Source : Badan Pusat Statistik, 2021

In this data, it can be seen that there was an increase in the value of electricity throughout 2015 to 2020 where 2020 was the highest increase of 1,247%.

In terms of the use of non-renewable fuels using fossils for power generation can be seen in the following data:

Table 5. Use of fossil fuels for power generation (2015 – 2020)

No	Generating Material (kiloliters)	2015	2017	2018	2019	2020
1	Diesel oil (solar)	4.373.930,50	2.585.757,33	2.93.938,11	376.013,57	206.642,05
2	Diesel oil (diesel)	4.587,14	579,93	2.105,88	1.121,09	100,7
3	Fuel oil	931.362,47	738.136,36	994.382,45	630.941,45	229.048,16
4	Coal	70.330.136,25	77.708.235,32	87.201.633,22	92.537.352,22	88.362.090,98
5	Natural gas	530.115,83	538.225,83	496.628,25	555.746,68	400.034,44
6	Mixed fuel (Bio Diesel, Bio Solar, Bio Fame etc)	-	-	-	2.159.564,17	2.128.178,51
	Total	76.170.132,19	81.570.934,77	88.694.749,80	96.260.739,18	91.326.094,84

Source : Badan Pusat Statistik, 2021

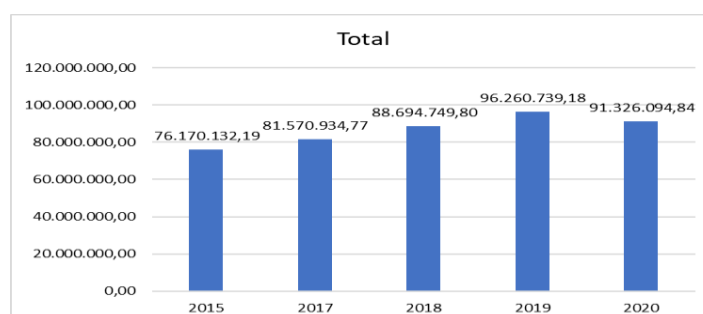


Figure 6. Use of fossil fuels for power generation (2015-2020)

Source : Badan Pusat Statistik, 2021

In the data, it can be seen that the use of fossil fuels for power generation from 2015 to 2020 tends to increase with a percentage increase of 19.8% in 2020 when compared to 2015.

Solar energy is a form of renewable energy that offers the greatest availability of energy as an accessible renewable energy source for all countries. The use of solar power is by converting energy from the sun into two general forms, namely electrical and thermal energy (Shahsavari & Akbari, 2018). Solar energy can save the use of electrical energy up to 30% (Republika, 2021). The use of PV technology (Photovoltaic / solar energy) also has the potential to reduce the consumption of non-renewable energy sources and pollutants such as carbon dioxide (CO₂), nitrogen oxides (NO_x), and sulfur dioxide (SO₂). By 2030, the implementation of PV systems could effectively reduce between 69 to 100 million tons of CO₂, 126,000 to 184,000 tons of SO₂, and 68,000 to 99,000 tons of NO_x. In addition, if a country uses a concentrated solar power system (CSP), each square meter of concentrator surface can be used to save about 200 to 300 kilograms of CO₂ emissions annually (Shahsavari & Akbari, 2018).

Waqf refers to the release of property that is exempt from waqf ownership, after the completion of a perfect waqf procedure (BWI, 2021). Waqf through money in accordance with sharia, is a legal act whereby a person can separate and/or surrender part of his monetary funds to be directly used for the acquisition of movable or immovable waqf property, for the purpose of worship and/or public welfare. (BWI, 2019). In this article, we will explain the opportunities and potential use of waqf through money in an effort to implement mosque-based environmentally friendly electrical energy.

Method

The method used in this article is a literature study and uses SWOT analysis (*Strengths, Weaknesses, Opportunities and Threats*). The literature study took from books, research journals and relevant data to see the potential use of solar energy in mosques. SWOT analysis provides many benefits, some of which are easy to understand through simple diagrams and the absence of mathematical complexity. In addition, SWOT is a tool that can be used at various levels in an organization, which includes individuals, teams, business units, divisions, and overall organizational strategies. This technique can be applied at various levels of precision, ranging from cursory and uncomplicated to very detailed. By utilizing SWOT analysis organizationally can align its overall goals(Sarsby, 2012).

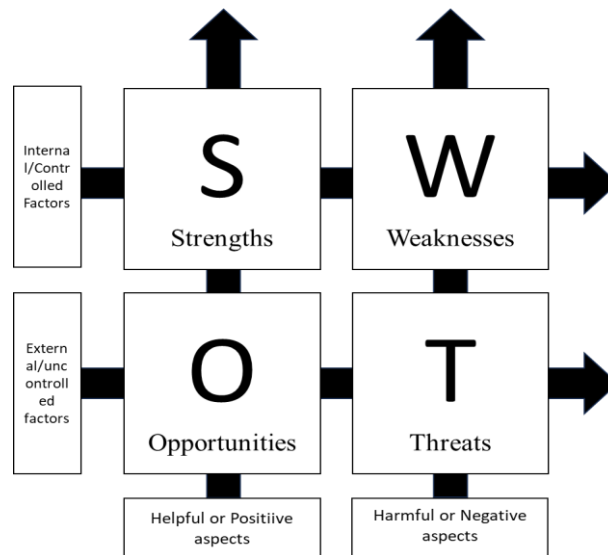


Figure 7 : The Basic SWOT Diagram (Sarsby,2012)

Result

Sustainable energy development (SDGs) is an ongoing challenge in developed and developing countries. Energy that cannot be renewed cannot be relied upon to be able to supply energy in future generations in carrying out economic activities and in order to realize human welfare (Iddrisu & Bhattacharyya, 2015). Solar energy is energy that has been used for a long time that varies in every day, year and location(Gielen et al., 2018). The use of solar energy has been applied to buildings to be used as water heaters and lighting (Gielen et al., 2018)

Developing sustainable energy resources has become one of the most urgent missions for mankind(J Gong et al., 2019). The growing demand for energy is in direct opposition to the limited global supply of fossil fuels(Jinlong Gong et al., 2019). Of the different types of sustainable energy resources available, solar energy shows great potential due to its inexhaustible supply, universal availability, high capacity, and eco-friendly nature(Jinlong Gong et al., 2019). Increasing worldwide demand for energy derived from fossil fuels is an important contributor to the upward trajectory of greenhouse gas (GHG) emissions and atmospheric contamination(Shahsavari & Akbari, 2018). The International Energy Agency (IEA) predicts that renewables will become the dominant source of electricity generation worldwide in the next few years. It is projected that renewables will contribute nearly 40% of global electricity output by 2027, as it replaces a reduced share of coal, natural gas and nuclear power energy (IEA, 2022)

Rapid population expansion and amplified energy needs in developing countries have resulted in a large number of hardships, namely poverty, pollution, and health and environmental problems (Shahsavari & Akbari, 2018). In the case of these countries, especially those with few resources, contemporary energy is indispensable, as it strengthens productivity, income, and social progress, while reducing serious health problems arising from the utilization of firewood, charcoal, animal waste, and agricultural waste(Shahsavari & Akbari, 2018). Solar energy is an interesting solution to the problem of energy scarcity. This condition offers potential signifikan to

reduce greenhouse gas emissions and indoor air pollution by replacing kerosene for lighting and firewood for cooking. In particular, solar photovoltaic (PV) technology is an ideal form of renewable energy for developing countries, especially in remote rural areas that are not economically or technically feasible for power grid expansion (Shahsavari & Akbari, 2018).

Table 6. Electric Power Generated by Solar Power Plants by Province in Indonesia (GWh)

2015	2017	2018	2019	2020
5,28	5,99	6,39	9,58	9,46

From the data mentioned above, it can be seen the increasing trend of solar energy in Indonesia from 2015 to 2020 where there was an increase of 79.2% in 2020 compared to 2015. This is in line with the Indonesian government's policy which is intensifying the use of environmentally friendly energy. The Ministry of Energy and Mineral Resources has set a target to gradually install 3,600 MW of solar roofs by 2025. To achieve this goal, consumers are encouraged to install PLTS Roofs through the revision of ESDM Minister Regulation Number 49 of 2018 concerning the Use of PLTS Roofs (Kementerian ESDM, 2021).

Cash endowments, also identified as money endowments, relate specifically to various endowments in Indonesia that have proven to be highly efficient. Contributions from diverse endowments, such as individuals, groups of individuals, institutions, and legal entities, covering various financial instruments such as securities (BWI, 2022). In relation to the use of waqf through money in the application of mosque-based environmentally friendly energy can be seen through the following illustration:

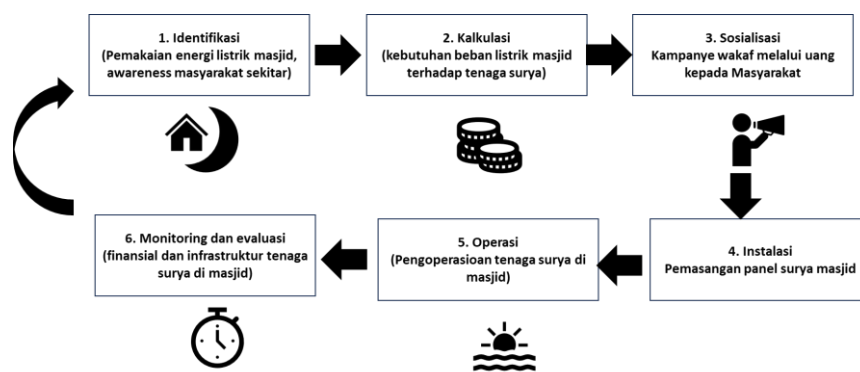


Figure 8 : The Flow Implementation of Mosque Based – Friendly Energy on Waqf through Money

The application of mosque-based environmentally friendly energy using waqf through money is carried out in several steps, namely:

1. Identification of mosques, in this case mapping of mosques that will use solar energy with priority criteria including Jami' mosque (which is used for Friday prayers and other worship with large use of electrical energy, for example: worship during Ramadan, Eid al-Fitr and Eid al-Adha prayers). The identification of this mosque is also carried out in advance through deliberation with the community around the mosque. In this case, the mosque that will use solar power is a mosque that already has nazhir in the management of the mosque (Mosque Prosperity Council)
2. Calculation, namely the calculation of the electricity load and costs needed by the mosque before installing solar installations
3. Socialization, namely providing literacy, information and understanding to the community regarding the importance of environmentally friendly energy, in this case solar power for the management of electrical energy in mosques as well as the collection of waqf through money from the community
4. Installation, namely the installation of solar panels in mosques by competent officers
5. Solar power operation
6. Monitoring and evaluation, which is carried out by officers who are competent in supervising and maintaining solar power installations

For the application of mosque-based environmentally friendly energy using waqf through this money, there are several things that are of concern based on SWOT analysis, namely:

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
<ol style="list-style-type: none"> 1. Indonesia is a tropical country with great sunlight potential throughout the year 2. The government contributes directly by issuing policies related to the use of environmentally friendly electrical energy 3. The very large number of mosques spread throughout Indonesia can accelerate the reduction of air pollution / greenhouse gas emissions by using solar power 4. Solar power can save electrical energy by up to 30% 	<ol style="list-style-type: none"> 1. The cost of installing solar power installations is still fairly expensive for the size of the Jami' mosque 2. Waqf through money is still not familiar among the general public and still invites debate in the community 3. The image of waqf that is not yet large / good in the community 	<ol style="list-style-type: none"> 1. The need for electrical energy is getting bigger every year 2. Increased public concern for health 3. Global concern and support for the use of environmentally friendly electrical energy 	<ol style="list-style-type: none"> 1. Limited availability of solar panel raw materials 2. PLN's business concerns over the possibility of reduced PLN revenue due to a decrease in electricity sales generated due to the use of PLTS Atap 3. The issue of the motive of PLTS Atap changed from originally based on <i>green lifestyle</i> to hunting for business profits

Conclusion

The use of solar electricity is a very promising potential to support environmentally friendly energy and realize *Sustainable Development Goals (SDGs)*. Indonesia with the number of mosques numbering more than 800 thousand throughout Indonesia is one of the objects to support the use of environmentally friendly electrical energy using solar power. In the implementation of the use of solar electricity, cash endowments through money from the community can be a way to realize solar electricity in mosques, especially in terms of providing solar energy infrastructure installation costs. Several things are analyzed based on SWOT analysis in an effort application of solar electricity in mosques through waqf through money including: Strengths, Indonesia is tropical countries with great sunlight potential throughout the year, the government contributes directly by issuing policies related to the use of environmentally friendly electrical energy, the number of mosques that are very large and spread throughout

Indonesia can accelerate the reduction of air pollution / greenhouse gas emissions by using solar power and also solar power can save electrical energy up to 30%; Weaknesses, the cost of installing solar power installations is still fairly expensive for the size of the jami' mosque, waqf through money is still not familiar among the public and still invites debate in the community, the image of waqf is not large / good in the community; Opportunities, The need for electrical energy is getting bigger every year, public concern for health is increasing and global concern and support for the use of environmentally friendly electrical energy; Threats, limited availability of solar panel raw materials, PLN's business concerns over the possibility of reduced PLN revenue due to a decrease in electricity sales generated due to the use of PLTS Atap, the issue of the motive of PLTS Atap changing from originally based on *green lifestyle* to hunting for business profits.

Refrence

- Fuller R, Landrigan PJ, Balakrishnan K. Pollution and health: A progress update. *The Lancet Planetary Health*. 2022; 6, (6), E535-E547. doi: 10.1016/S2542-5196(22)00090-0
- Gielen, D., Boshell, F., Saygin, D., Bazilian, M. D., ..., Jacobson, M. Z., Delucchi, M. A., Bauer, Z. A. F., Goodman, S. C., Chapman, W. E., Cameron, M. A., Bozonnat, C., Chobadi, L., Clonts, H. A., Enevoldsen, P., Erwin, J. R., Fobi, S. N., Goldstrom, O. K., Hennessy, E. M., ... Elena, A. (2018). Potential of solar energy in developing countries for reducing energy-related emissions. *Renewable and Sustainable Energy Reviews*, 33(1), 1276–1288. <https://doi.org/10.1016/j.joule.2017.07.005>
- Gong, J, Li, C., & Wasielewski, M. R. (2019). Advances in solar energy conversion. *Chemical Society Reviews*. <https://pubs.rsc.org/en/content/articlehtml/2019/cs/c9cs90020a>
- Gong, Jinlong, Li, C., & Wasielewski, M. R. (2019). Advances in solar energy conversion. *Chemical Society Reviews*, 48(7), 1862–1864. <https://doi.org/10.1039/c9cs90020a>
- Iddrisu, I., & Bhattacharyya, S. C. (2015). Sustainable Energy Development Index: A multi-dimensional indicator for measuring sustainable energy development. *Renewable and Sustainable Energy Reviews*. <https://www.sciencedirect.com/science/article/pii/S1364032115004918>
- Sarsby, A. (2012). *A Useful Guide to SWOT Analysis*.
- Shahsavari, A., & Akbari, M. (2018). Potential of solar energy in developing countries for reducing energy-related emissions. *Renewable and Sustainable Energy Reviews*. <https://www.sciencedirect.com/science/article/pii/S1364032118301527>
- The World Bank. The global health cost of PM2.5 air pollution: A case for action beyond 2021. Washington, DC: World Bank License: Creative Commons Attribution CC BY 3.0 IGO; 2022
- Zehnder C, Manoylov K, Mutiti S, et al. Introduction to environmental science: 2nd edition. Biological Sciences Open Textbooks. Published 2018. <https://oer.galileo.usg.edu/biology-textbooks/4>
- https://www.iqair.com/id/newsroom/WAQR_2021_PR
- https://id.wikipedia.org/wiki/Pembangkit_listrik
- <https://dataindonesia.id/sektor-riil/detail/konsumsi-listrik-indonesia-capai-18341-juta-boe-pada-2022>
- <https://www.republika.id/posts/20128/hemat-listrik-dengan-panel-surya-bagaimana-caranya>
- <https://ebtke.esdm.go.id/post/2021/09/02/2952/indonesia.kaya.energi.surya.pemanfaatan.listrik.tenaga.surya.oleh.masyarakat.tidak.boleh.ditunda>
- <https://www.bwi.go.id/literasiwakaf/perbedaan-wakaf-uang-dan-wakaf-melalui-uang/>