



RESPONSIVE ISLAMIC BOARDING SCHOOL MANAGEMENT TO ENVIRONMENTAL SUSTAINABILITY THROUGH GREEN PESANTREN PROGRAM

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Abstract

Indonesia, a country with the highest number of Islamic boarding schools in the world, is inhabited by students, all of whom carry out activities that are closely related to natural resources and impact the environment. The community as a party in direct contact should also play an active role in helping Islamic boarding schools become communities and institutions that are responsive to environmental sustainability so that all parties can realize Islam's vision, *rahmatan lil'alam*. This qualitative research with a literature study approach and using descriptive analysis methods aims to analyze the efforts that can be made by Islamic boarding schools in protecting and preserving the environment and describe the role of government institutions and community organizations in supporting the Green Pesantren program. Data are obtained from laws and regulations, books, previous research results, and other sources relevant to the research purpose. The results showed that efforts to realize the Green Islamic boarding school governance regulations are: 1) management of organic and inorganic waste into goods of economic value, 2) conversion of wastewater into useful resources, 3) the use of energy-efficient green architecture-based construction, 4) saving water and electricity resources in the daily operationalization of Islamic boarding schools, and 5) efforts for renewable alternative energy as an energy source in future. The role of the community in supporting the Green Pesantren program includes 1) the Nahdlatul Ulama Alms Infak Zakat Institute (LAZISNU), Rabithah Ma'ahid Islamiyah (RMI NU), the Disaster Management and Climate Change Institute (LPBI NU), and Bank Mega Syariah which initiated seven Islamic boarding schools as pilot projects for the Green Pesantren program, 2) the issuance of a fatwa of the Indonesian Ulema Council Number 41 of 2014 concerning Waste Management to Prevent Environmental Damage. The results of this study are expected to be policy recommendations for the Ministry of Religious Affairs and related stakeholders to issue regulations related to the Green Pesantren program.

Abstrak

Indonesia sebagai negara dengan jumlah pesantren terbanyak di dunia tentunya dihuni santri yang kesemuanya tentu menjalankan aktivitas yang terkait erat dengan sumber daya alam dan berdampak pada lingkungan. Masyarakat sebagai pihak yang bersinggungan langsung seyogyanya juga berperan aktif membantu pondok pesantren menjadi komunitas dan lembaga yang responsif pada kelestarian lingkungan sehingga semua pihak dapat mewujudkan visi Islam yang *rahmatan lil'alam*. Penelitian kualitatif dengan pendekatan studi kepustakaan dan menggunakan metode analisis deskriptif ini bertujuan menganalisis upaya yang dapat dilakukan pondok pesantren dalam menjaga dan melestarikan lingkungan serta mendeskripsikan peran lembaga pemerintah dan organisasi masyarakat untuk mendukung program Pesantren Hijau. Data diperoleh dari peraturan perundangan, buku, hasil riset terdahulu dan sumber lain yang relevan dengan tujuan penelitian. Hasil penelitian menunjukkan upaya untuk mewujudkan regulasi tata kelola Pesantren Hijau adalah: 1) pengelolaan sampah organik dan anorganik menjadi barang bernilai ekonomis, 2) konversi air limbah menjadi sumber daya yang bermanfaat, 3) penggunaan konstruksi berbasis arsitektur hijau yang hemat energi, 4) penghematan sumber daya air dan listrik dalam

operasionalisasi pesantren sehari-hari, dan 5 pengupayaan energi alternatif terbarukan sebagai sumber energi di masa depan. Peran masyarakat dalam mendukung program Pesantren Hijau diantaranya, 1) Lembaga Zakat Infak Sedekah Nahdlatul Ulama (LAZISNU), *Rabithah Ma'ahid Islamiyah* (RMI NU), Lembaga Penanggulangan Bencana dan Perubahan Iklim (LPBI NU), dan Bank Mega Syariah yang menginisiasi tujuh pesantren sebagai *pilot project* program Pesantren Hijau, 2) terbitnya fatwa Majelis Ulama Indonesia Nomor 41 Tahun 2014 tentang Pengelolaan Sampah untuk Mencegah Kerusakan Lingkungan. Hasil dari penelitian ini diharapkan dapat menjadi rekomendasi kebijakan bagi Kementerian Agama dan *stakeholder* terkait untuk menerbitkan regulasi terkait program Pesantren Hijau.

Keywords: *environment; management; green Islamic boarding school; responsive; sustainable*

INTRODUCTION

Environmental conservation is something that is no longer ignored today. Evidence of natural damage can be found everywhere, including Indonesia. The idiom of Indonesia as a green paradise, like an equatorial emerald, has begun to be broken by the high rate of deforestation. As quoted katadata.co.id from the Ministry of Environment and Forestry website in 2015-2020, Indonesia's total deforestation reached 2.1 hectares.¹ The Environmental Performance Index (EPI) 2022 notes that Indonesia has a relatively low environmental conservation index worldwide. Based on various indicators such as water quality, water pollution, waste treatment quality, climate change mitigation policies, greenhouse gas emissions, ecosystem vitality, biodiversity quality, fisheries sustainability, agriculture, and water resources, Indonesia is ranked 164th out of 180 countries studied, 22nd out of 25 Asia Pacific countries, or 8th out of 10 ASEAN countries.² This situation will be exacerbated if there is no growing awareness to contribute to a better environment.

Humans as caliphs on earth are obliged to preserve nature as stated in some verses of the Qur'an below:

وَلَا تَبْخَسُوا النَّاسَ أَشْيَاءَهُمْ وَلَا تَعْثَوْا فِي الْأَرْضِ مُفْسِدِينَ

“And do not harm man by diminishing his rights, and do not cause mischief on the earth.” (QS. al-Shuara' [26]: 183)

ظَهَرَ الْفَسَادُ فِي الْبَرِّ وَالْبَحْرِ بِمَا كَسَبَتْ أَيْدِي النَّاسِ لِيُذِيقَهُمْ بَعْضَ الَّذِي عَمِلُوا لَعَلَّهُمْ يَرْجِعُونَ.

“It has been seen that the works of human hands cause corruption on land and at sea; God wants them to feel part of what they have done so that they may return (to the right path).” (QS. Al-Rum [30]: 41)

At the formal legal level, there is a fatwa of the Indonesian Ulema Council (MUI) Number 41 of 2014 concerning Waste Management to Prevent Environmental Damage which contains four legal provisions, namely: 1) every Muslim is obliged to maintain the cleanliness of the environment, avoid *tabzir* and *israf* acts, 2) prohibition of throwing objects that are still useful, 3) the government and entrepreneurs are obliged to manage waste, and 4) recycle legal waste fraud *kifayah*.³ Islamic boarding school is one of the institutions that play a significant role in improving the quality of human resources and preparing a generation of Muslims who maintain cleanliness as a manifestation of their faith.⁴ Indonesia, a country with the largest Muslim population in the world, has tens of thousands of Islamic

¹ Hanna Farah Vania, “Hutan Indonesia Berkurang 2,1 Hektar Sepanjang 2015-2020,” 2021, <https://databoks.katadata.co.id/datapublish/2021/06/03/hutan-indonesia-berkurang-21-hektar-sepanjang-2015-2020>.

² Adi Ahdiyati, “Pelestarian Lingkungan Indonesia Tergolong Buruk Di Asia Pasifik,” 2022, <https://databoks.katadata.co.id/datapublish/2022/07/25/pelestarian-lingkungan-indonesia-tergolong-buruk-di-asia-pasifik>.

³ Komisi Fatwa MUI, “Fatwa MUI Nomor 41 Tahun 2014” (2014).

⁴ Shinfi Wazna Auvaria, Widya Nilandita, and Sulistiya Nengse, “Perencanaan Sistem Manajemen Lingkungan Pada Aspek Air Bersih, Limbah, Energi, Dan Penghijauan Di Pondok Pesantren (Studi Kasus: Pondok Pesantren An-Najiyah Surabaya),” *Jurnal Teknik Lingkungan* 4, no. 2 (2019): 36–45.

boarding schools, either traditional, modern or a combination of both. As the data released by the Ministry of Religious Affairs in 2022, we can read from the table below:⁵

No	Wilayah	Jumlah Pesantren	Persentase
1	Sumatera	3.195	11,84
2	Jawa	21.582	80,01
3	Bali	90	0,33
4	Nusa Tenggara	711	2,64
5	Kalimantan	719	2,67
6	Sulawesi	587	2,18
7	Maluku	36	0,13
8	Papua	55	0,20
Total		26.975	100

Sumber: Direktorat Jenderal Pangkalan Data Pendidikan Pondok Pesantren Kementerian Agama RI

Meanwhile, data on the number of students who are mukim or not mukim can be seen in the following table:

No	Wilayah	Mukim	Tidak Mukim	Jumlah Santri	Prosentase
1	Sumatera	378.137	166.641	544.778	13,59
2	Jawa	747.995	796.884	1.544.879	38,53
3	Bali	5.222	2.859	8.081	0,20
4	Nusa Tenggara	128.814	944.961	1.073.775	26,78
5	Kalimantan	105.059	334.506	439.565	10,96
6	Sulawesi	72.709	49.109	121.818	3,04
7	Maluku	3.129	266.897	270.026	6,73
8	Papua	3.403	3.367	6.77	0,17
Total		1.444.468	2.565.224	4.009.692	100

Sumber: Direktorat Jenderal Pangkalan Data Pendidikan Pondok Pesantren Kementerian Agama RI

Green Pesantren is a term that refers to a process carried out by Islamic boarding schools as an effort to preserve the Islamic boarding school environment with various efforts ranging from waste management, wastewater management, and alternative energy efforts that aim to create pesantren and students who are sensitive to environmental crises.⁶ The EMIS report noted that 50% of Islamic boarding school are located in residential areas.⁷ This data is reinforced by the table above that 80% of Islamic boarding school are located in Java Island, which is very densely populated. This means that the community and residents outside the pesantren are also in direct contact with the behavior and lifestyle of the students, so that support and active role of the community and other elements are needed to support this program. Behind the fact that the geographical condition of the majority of Islamic boarding school in the area is most likely to cause environmental damage, there is also great potential to make Islamic boarding school as conservation agents and centers of ecological movements because religious institutions such as Islamic boarding school are involved in many environmental education approaches.⁸

Research that specifically mentions the term Green Pesantren does not yet exist. The similarity of research with several previous studies is a theme relevant to the concept of Green Pesantren but only partially studied, for example, about green architecture, spatial planning, green energy, green building, energy, waste, and environmentally friendly Islamic boarding school. However, this study examines a comprehensive Islamic boarding school governance concept ranging from waste management, waste, energy saving, and environmentally friendly spatial planning to alternative energy efforts to maintain

⁵ Kemenag, "Statistik Data Pondok Pesantren," 2022, <https://ditpdpontren.kemenag.go.id/pdpp/statistik>.

⁶ LPBI NU, *Menuju Pesantren Hijau* (Jakarta: LPBI NU, 2019).

⁷ Ahsin Sakho Muhammad et al., "Fiqih Lingkungan," *Jakarta: Conservation International Indonesia*, 2006.

⁸ Fachruddin Majeri Mangunjaya, *Ekopesantren: Bagaimana Merancang Pesantren Ramah Lingkungan?* (Yayasan Pustaka Obor Indonesia, 2014).

environmental sustainability. Ultimately, the findings can be used as recommendations for the Ministry of Religious Affairs and related parties to issue Green Pesantren governance regulations.

Some of the latest studies on issues relevant to Green Pesantren include those written by Shinfi et al. This research designed a filling environmental management system in Islamic educational institutions. The research method is qualitative, with environmental aspects studied: clean water, waste, energy, and greening, focusing on planning an environmental management system from clean water, waste, energy, and greening at An-Najiyah Islamic Boarding School Surabaya.⁹ Faaris and Rahmat discussed *Solar Panels as Green Energy Education in the Islamic Boarding School Environment*. This research aims to build a simple power generation system sourced from solar energy as an alternative if the electricity goes out in the *Prambanan Muhammadiyah Boarding School*.¹⁰ Isro and Hestin studied the *Redesign of the Putra Anwarul Falah Islamic Boarding School in Banyuurip District, Purworejo Regency, with a Green Architecture Approach*. The study's results explain the urgency of redesign to minimize damage to the surrounding environment and realize buildings that have environmental quality and create a better and sustainable life through the application of green architecture in Ponpes Putra Anwarul Falah Purworejo.¹¹ Susanti et al. examined *ablution water waste for freshwater fisheries cultivation and hydroponic plants in Ponpes Al Khoiriyah, Sumbergempol-Tulungagung*. This community service-based research records the efforts to utilize ablution water waste as a medium for cultivating catfish and hydroponic plants.¹² Zulfa et al. wrote *Organic and Inorganic Waste Management to Empower Santri at Al-Mustaqim Islamic Boarding School*. This study presents the findings of training in waste management to select waste according to its organic and non-organic types. Where organic waste is used as compost and inorganic waste is used as a creative product.¹³ From several predecessor studies of this research that will be carried out, efforts are offered more comprehensively while involving community participation and government support so that later, they can issue regulations that accommodate the management of an Islamic boarding school to be more responsive to environmental sustainability.

Departing from the above framework, the author examines how Green Pesantren can be a concept of Islamic boarding school governance responsive to environmental sustainability with a library *research approach*, which is a type of research that collects information and data in depth from literature, books, notes, magazines, other references, as well as relevant previous research results, to get answers and theoretical foundations regarding the issue to be researched.¹⁴ This research data is taken from books, the Qurán, laws and regulations, fatwas, articles, documentation, official websites, previous research results, and other sources relevant to discussions related to Green Pesantren.

MANAGEMENT OF ORGANIC AND INORGANIC WASTE INTO GOODS OF ECONOMIC VALUE

The majority of human activities usually produce waste materials. Excessive waste production can cause environmental problems, especially inorganic waste. This type of waste poses a major challenge because it has a prolonged degradation period and a lack of natural ability to decompose in the environment. The waste problem is a classic thing that has been around for decades. Waste management is an issue

⁹ Auvaria, Nilandita, and Nengse, "Perencanaan Sistem Manajemen Lingkungan Pada Aspek Air Bersih, Limbah, Energi, Dan Penghijauan Di Pondok Pesantren (Studi Kasus: Pondok Pesantren An-Najiyah Surabaya)."

¹⁰ Faaris Mujaahid and Rahmat Susanto, "Panel Surya Sebagai Edukasi Energi Hijau Di Lingkungan Pondok Pesantren," in *Prosiding Seminar Nasional Program Pengabdian Masyarakat*, 2019.

¹¹ Isro Megantara and Hestin Mulyandari, "Redesain Pondok Pesantren Putra Anwarul Falah Di Kecamatan Banyuurip Kabupaten Purworejo Dengan Pendekatan Arsitektur Hijau" (University of Technology Yogyakarta, 2020).

¹² Diah Susanti et al., "Pemanfaatan Limbah Air Wudhu Untuk Budidaya Perikanan Air Tawar Dan Tanaman Hidroponik Di Ponpes Al Khoiriyah, Sumbergempol-Tulungagung," *Sewagati* 6, no. 3 (2022): 367–74.

¹³ Muhammad Choiru Zulfa, Agus Subhan Akbar, and Noor Nailie Azzat, "Pengelolaan Sampah Organik Dan Anorganik Dalam Upaya Pemberdayaan Santri Di Pondok Pesantren Al-Mustaqim," *Jurnal Penelitian Dan Pengabdian Kepada Masyarakat UNSIQ* 9, no. 2 (2022): 167–72.

¹⁴ M Zed, *Metode Penelitian Kepustakaan* (Yayasan Obor Indonesia, 2004).

in developing countries and requires planning from design and management to the final stage.¹⁵ The types of waste are:

- a. The type of waste specifications include waste containing materials, toxic and hazardous waste, waste arising from disasters, and demolition debris.
- b. From the characteristics of waste in waste management, organic and inorganic waste are distinguished. Organic waste comes from living bodies that easily decompose, for example, the rest of kitchen ingredients, fruits, vegetables, rice, fish, meat, and pieces of leaves/branches/branches. Inorganic waste comes from natural materials and industrial preparations that do not decompose, such as plastic, old tires, metal, glass, etc.

The issue of waste management has an important meaning in the environmental field, and some people take advantage of this difficulty to generate household income. Given the large economic value associated with waste utilization, it is important to apply management science in waste management.¹⁶ Plastic and fabric waste can be effectively converted into a wide array of products of economic value, thus reducing household waste. In addition, this also has the potential to increase public awareness about environmental issues. The processing of plastic and fabric waste has the potential to produce a variety of fashion and souvenir products.¹⁷

The Islamic boarding school is a large house with many members. Of course, daily activities that consume natural and processed materials that use packaging will cause residues of organic and inorganic waste¹⁸. The waste widely found in Islamic boarding school is the leftover food of students, packaging (snacks, soap, shampoo), sanitary napkins, remnants of building materials, and water and electricity installations. In this period, Islamic boarding school are also synonymous with institutions that still carry out traditional waste management by collecting, drying, and burning. Some are even directly thrown into rivers or seas.¹⁹

Traditional waste management will cause an increase in soil, water, and water pollution. For this reason, it is necessary to instill good habits in the students to be more concerned with preserving the environment. Some things that can be done include:

- a. Sorting waste by type, hazardous or not, organic or inorganic waste, by providing a reservoir for each type. If the waste is not processed further, this activity will help the final processing at the Landfill (TPA) or Temporary Disposal Site (TPS).²⁰
- b. Recycling (*reuse*) is utilizing inorganic waste from food packaging, beverages, and other handicrafts of economic value, such as bags, tissue holders, trash cans, chairs, etc.²¹
- c. They make waste products as raw materials for other useful products (*recycling*). Livestock manure can be used as compost and biogas for organic waste such as food waste, leaves, and twigs.²² Inorganic waste, such as plastic, can be used as raw material for fuel oil using pyrolysis techniques.²³

¹⁵ Ana Pires, Graça Martinho, and Ni-Bin Chang, "Solid Waste Management in European Countries: A Review of Systems Analysis Techniques," *Journal of Environmental Management* 92, no. 4 (2011): 1033–50.

¹⁶ Fahmi Fauziah, Andi Hamzah, and Ahmad Rozy, "Implementation of Management in Waste Banks to Increase Economic Value," *Jurnal PKM Manajemen Bisnis* 1, no. 1 (2021): 37–43.

¹⁷ Maharani Conilie, Umi Farihah, and Nanda Eska Anugrah Nasution, "Utilization of Plastic and Fabric Waste into Economic Valued Products to Minimize Household Waste," in *IOP Conference Series: Earth and Environmental Science*, vol. 747 (IOP Publishing, 2021), 12107.

¹⁸ Eka Putra Romadona, "Konsep Pendidikan Pembiasaan Perspektif Ibnu Miskawaih," *Muslim Heritage* 6, no. 2 (2021): 277–302, <https://jurnal.iainponorogo.ac.id/index.php/muslimheritage/article/view/3308>.

¹⁹ Shinfi Wazna Auvaria, "Perencanaan Pengelolaan Sampah Di Pondok Pesantren Langitan Kecamatan Widang Tuban," *Al-Ard: Jurnal Teknik Lingkungan* 2, no. 1 (2016): 1–7.

²⁰ Auvaria.

²¹ Zulfa, Akbar, and Azzat, "Pengelolaan Sampah Organik Dan Anorganik Dalam Upaya Pemberdayaan Santri Di Pondok Pesantren Al-Mustaqim."

²² Auvaria, "Perencanaan Pengelolaan Sampah Di Pondok Pesantren Langitan Kecamatan Widang Tuban."

²³ Fadli Kasim, Mohammad Kholid Ridwan, and M Yayan Adi Putra, "Pengolahan Sampah Plastik Memakai Teknologi Pirolisis Untuk Pembelajaran Dan Konservasi Lingkungan Di Pondok Pesantren Al-Anwar Sarang Rembang, Jawa

CONVERSION OF WASTEWATER INTO USEFUL RESOURCES

Water use for domestic purposes causes wastewater in the form of household waste. Water pollution is one of the most common forms of pollution in Indonesia, with household waste being the main contributor. Industrial and household activities can cause sources of water pollution. As a result, the result of water pollution is a decrease in overall water quality that is suitable for human use.²⁴ A comprehensive understanding of the various treatment technologies available is essential for wastewater treatment and disposal or reuse of treated waste. Considering the existing circumstances, this knowledge will allow identifying the most appropriate method for a particular location. In addition, it is important to ascertain whether treated wastewater can be legally disposed of or reused following established rules and regulations while ensuring the safety of the practice.²⁵

Islamic boarding school is an institution whose daily activities are closely related to worship that demands sanctity from hadas, large and small. Directly related activities are bathing and ablution. You can imagine how many cubic meters of water are produced as waste from the two activities, especially if the number of students reaches thousands. If it is just thrown away and flows into the sewer or river, of course, this will be a bigger problem in the future. As a solution, several models can be done to manage and utilize this wastewater by:

- a. We use wudu wastewater as plant sprinklers, freshwater fish farming media, and hydroponic plants.²⁶
- b. They treat ablution water as a solution for providing clean water through aeration and adsorption. Aeration aims to add oxygen to wastewater, while adsorption is carried out by separating wastewater and pollutants. If the conditions after treatment are close to the initial conditions, it can be used as clean water; if the results are poor, it can be used as water for agriculture, industry, and power generation.²⁷
- c. It uses wudu waste as a pico hydro power plant that can be used for simple electrical equipment.²⁸
- d. Collecting ablution waste into the ground that can be used as a convergence and groundwater supply for the community.²⁹

USE OF ENERGY-EFFICIENT GREEN ARCHITECTURE-BASED CONSTRUCTION

One of the efforts to preserve the environment is to provide green open space and design environmentally friendly building layouts, better known as green architecture or green building. Green architecture can minimize global warming and carbon dioxide emissions. Points to be considered in green architecture include building envelopes, electrical and lighting systems, water efficiency, water conditioning and ventilation, and landscape treatment.³⁰ Another model that can be developed is redesign using the principles of conservation, efficient energy use, and preservation of the surrounding natural environment. The design of the building is adapted to the surrounding conditions through

Tengah,” *Jurnal Bakti Sainstek: Jurnal Pengabdian Masyarakat Bidang Sains Dan Teknologi* 2, no. 2 (2018): 57–63.

²⁴ Siko Fadil Muhamad, Fenti Prihatini Dance Tui, and Yacob Noho Nani, “Strategi Kebijakan Sistem Pengelolaan Air Limbah Domestik: Studi Kasus Di Desa Tunggulo Kecamatan Tilogkabila Kabupaten Bone Bolango,” *ULIL ALBAB: Jurnal Ilmiah Multidisiplin* 2, no. 8 (2023): 3535–43.

²⁵ Miquel Salgot and Montserrat Folch, “Wastewater Treatment and Water Reuse,” *Current Opinion in Environmental Science & Health* 2 (2018): 64–74.

²⁶ Susanti et al., “Pemanfaatan Limbah Air Wudhu Untuk Budidaya Perikanan Air Tawar Dan Tanaman Hidroponik Di Ponpes Al Khoiriyah, Sumbangempol-Tulungagung.”

²⁷ Eko Prabowo Hadisantoso et al., “Pengolahan Limbah Air Wudhu Wanita Dengan Metode Aerasi Dan Adsorpsi Menggunakan Karbon Aktif,” *Al-Kimiya: Jurnal Ilmu Kimia Dan Terapan* 5, no. 1 (2018): 1–6.

²⁸ Cut Taffazani Fithrian Nazlaa and Syafrina Sari Lubisa, “Potential Analysis Of Mosque Wudhu Waste As A Picohydro Power Plant,” 2021.

²⁹ Nita Noriko, Andi Mukramin Yusuf, and Elma Alfiah, “Gerakan Masyarakat Sedekah Air Wudhu (GM-SAW) Sebagai Upaya Konservasi Air Bersih,” 2022.

³⁰ Wowo Adhizar Darwin, “Implementasi Konsep Arsitektur Hijau Pada Gedung Pesantren Modern ‘Minha,’” *Jurnal Arsitektur Archicentre* 2, no. 1 (2019): 1–5.

the shape of the façade, mass layout, use of materials, energy-saving technology, and building utility systems that follow the local climate.³¹

Based on the principle of saving resources and energy, environmental differences in different regions should be considered in designing energy-efficient green buildings. Combined with the characteristics of the outside natural environment, the characteristics of the territory, and the customs of people’s social life, green buildings must conform to the local construction style and make the most of local resources and environment.³² Another model that can be adopted is that tropical boarding schools can be realized by applying the principles of a tropical architectural approach that provides wider green open space and buildings using cross-ventilation water flow to get the desired amount of water flow to make shade with roof oversell, sun shading, and curtains.³³

SAVING WATER AND ELECTRICITY RESOURCES IN THE DAILY OPERATIONALIZATION OF ISLAMIC BOARDING SCHOOL

Indonesia’s energy consumption as of 2021 is equivalent to 909.24 million barrels. Energy sources can also be separated from natural resources. Electricity and water resources are also among the biggest needs spent in the daily operational activities of Islamic boarding school. If not anticipated, it will be ensured that there will be scarcity and depletion of energy reserves. Energy efficiency practices benefit both environmental preservation and personal financial savings. Considering the above, simple methods are needed to reduce electricity use to reduce costs and contribute to environmental preservation.³⁴ The portion of national energy consumption in 2021 can be seen in the following diagram.³⁵

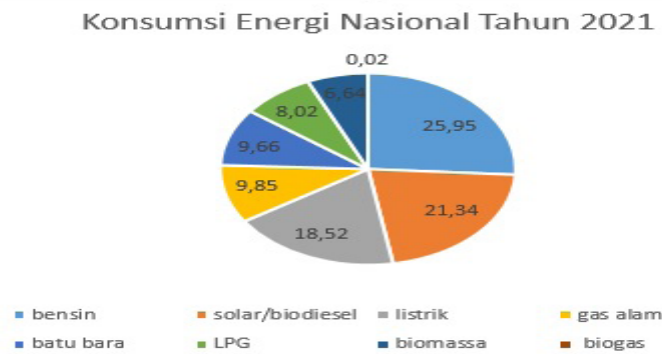


Diagram Konsumsi Energi Nasional Tahun 2021

The concept of *green building*, *green architecture*, and *tropical architecture* is the first step towards saving electrical energy. Wasteful buildings not only consume energy sources but also cause a greenhouse effect. The problem, in general, is that buildings in tropical countries such as Indonesia use the most energy for water systems, around 45-70%, lighting systems, around 10-20%, and elevators and escalators, around 2-7%. And office equipment and electronics around 2-10%. By utilizing the layout of ventilation and lighting, the need for air conditioning, both air conditioning and fans, can be minimized. The open space rich in trees also provides cool and clean water.³⁶

³¹ Megantara and Mulyandari, “Redesain Pondok Pesantren Putra Anwarul Falah Di Kecamatan Banyuurip Kabupaten Purworejo Dengan Pendekatan Arsitektur Hijau.”

³² Xiao-guang Zhao and Chun-Ping Gao, “Research on Energy-Saving Design Method of Green Building Based on BIM Technology,” *Scientific Programming* 2022 (2022): 1–10.

³³ Aida Fitriana, “Perancangan Pondok Pesantren Roudlotut Tullab Di Kabupaten Pasuruan Dengan Pendekatan Arsitektur Tropis” (Universitas Islam Negeri Maulana Malik Ibrahim, 2022).

³⁴ G Paromow, M Jumadurdyew, and T Gurbanow, “Save Electricity and Save the World,” 2022.

³⁵ Viva Budy Kusnandar, “Ini Sektor Dengan Konsumsi Energi Terbesar Di RI Pada 2021,” 2022, <https://databoks.katadata.co.id/datapublish/2022/06/10/ini-sektor-dengan-konsumsi-energi-terbesar-di-ri-pada-2021#:~:text=Konsumsi energi Indonesia mencapai 909,LPG%2C biogas%2C dan biomassa.>

³⁶ Muhammad Ridho, “Pondok Pesantren Modern Dengan Konsep Green Building Di Pekalongan,” *Journal of Economic, Business and Engineering (JEBE)* 2, no. 1 (2020): 195–205.

Water is a primary need on earth, especially in Islamic boarding schools whose activities use ablution water a lot. So efforts should be made to save ablution water because population growth is not proportional to water availability. If by 2025, it is estimated that Indonesia's population reaches 321 million, it will cause water scarcity. For this reason, it is necessary to apply the sunnah of the Holy Prophet (peace be upon him) in ablution to save water. If 3,759,198 students apply this pattern, savings will occur that can save 8,693,145 liters of water and if in rupiah of Rp. 45,239,129.³⁷ In addition to the manual method, ablution water can be saved using an automatic wudu faucet system such as the one in Ponpes Al-Karim Sayung. The ablution faucet has automatic *proximity* sensors for detecting (reading) movements and solenoid valves to open and close.³⁸

STRIVING FOR RENEWABLE ALTERNATIVE ENERGY AS AN ENERGY SOURCE IN THE FUTURE

An alternative to conventional energy sources, renewable energy sources can be a sustainable solution for energy security. To reduce the electricity supply crisis, lack of infrastructure, and conventional energy sources, there is a need for renewable energy sources to meet electricity needs.³⁹ Nonfossil energy has become a big issue today. Using energy derived from solar, wind, geothermal, and other renewable energy is necessary in several countries, including Indonesia. Some alternative energy sources that can be utilized by Islamic boarding school include:

- a. The use of solar energy for power generation is simple. This effort is useful if there is a PLN electricity disruption and student learning materials. Using off-grid solar schemes not connected to PLN's electricity network can produce power that can be used for LED lights.⁴⁰ If the average use of lights is 12 hours of electricity, one-third of the cost of electricity can be reduced by solar cells.
- b. Using water energy with a pico hydro model by utilizing ablution, water waste can also be used in simple electronic equipment.⁴¹
- c. Utilization of organic manure as biogas. The study's results showed that from the total organic manure from humans and cows, 1.3 m³ / day with a methane content of 52.5% can produce an input power of 5,251.4 watts.⁴²

THE ROLE OF THE COMMUNITY TO SUPPORT THE GREEN ISLAMIC BOARDING SCHOOL PROGRAM

The issue of environmental sustainability has become a shared property and responsibility. Although the idea of Green Pesantren specifically refers to the Islamic boarding school community. In handling environmental issues for the preservation of nature, both the government, Islamic mass organizations, MUI, and other communities are expected to play a role in providing theological principles and foundations so that Islamic boarding school residents are more aware and concerned about the surrounding environment because in Islamic teachings caring for and preserving nature is one part of man's duty as a caliph on earth.⁴³ The involvement and active participation of the Islamic boarding school community, the surrounding community, and related institutions aim to transform

³⁷ M Ariesman, "Efisiensi Air Di Pesantren Melalui Penerapan Sunnah Nabi Dan Teknologi Terapan," *NUKHBATUL'ULUM: Jurnal Bidang Kajian Islam* 4, no. 1 (2018): 40–50.

³⁸ Muhammad Arifin, "Keran Wudhu Otomatis Hemat Air Untuk Masjid Di Pondok Pesantren Al-Karim Sayung Berbasis Arduino Uno" (Universitas Islam Sultan Agung Semarang, 2020).

³⁹ Ferdous Ahmed et al., "Alternative Energy Resources in Bangladesh and Future Prospect," *Renewable and Sustainable Energy Reviews* 25 (2013): 698–707.

⁴⁰ Mujaahid and Susanto, "Panel Surya Sebagai Edukasi Energi Hijau Di Lingkungan Pondok Pesantren."

⁴¹ Nazlaa and Lubisa, "Potential Analysis Of Mosque Wudhu Waste As A Picohydro Power Plant."

⁴² Riki Arnando, Syahril Syahril, and Waluyo Waluyo, "Studi Analisis Daya Pembangkit Listrik Biogas Dari Kotoran Sapi Dan Manusia Di Pondok Pesantren Baiturrahman Jawa Barat," *REKA ELKOMIKA* 3, no. 2 (2015).

⁴³ NU, *Menuju Pesantren Hijau*.

moral and religious values within the Islamic boarding school into a moral framework that prioritizes environmental awareness⁴⁴. The approach used is the project approach and the motivational approach, or it could be that both approaches are integrated. Both require persuasive durations and stages.⁴⁵ Community participation in supporting the eco-Islamic boarding school program can be done by building an eco-Islamic boarding school program as a form of environmental education based on Islamic boarding schools.⁴⁶

Real support for the Green Pesantren program is carried out by the Nahdlatul Ulama Alms Infak Zakat Institute (LAZISNU), Rabithah Ma'ahid Islamiyah (RMI NU), the Disaster Management and Climate Change Institute (LPBI NU), and Bank Mega Syariah which on September 3, 2022, initiated seven Islamic boarding schools, namely: 1) Mathlul Anwar Linahdlatil Ulama Islamic Boarding School (MALNU), Pandeglang Banten, 2) Zainul Hasan Genggong Islamic Boarding School, Probolinggo East Java, 3) Islamic boarding school Al Kinaniyah Jakarta, 4) Islamic boarding school Mahasina Bekasi, 5) Islamic boarding school Al-Mubarak Mranggen, Demak Central Java, 6) Islamic boarding school Al-Hamidiyah, Depok West Java, and 7) Pondok Islamic boarding school Al-Hamid Cilangkap, Jakarta as a *pilot project for the Green Pesantren program*.⁴⁷ Although it does not directly mention environmental sustainability, the Indonesian Ulema Council (MUI) also plays an active role by issuing Fatwa No. 41 of 2014 concerning Waste Management to Prevent Environmental Damage.⁴⁸

CONCLUSION

Environmental sustainability is our future responsibility to our children and grandchildren. As part of the community, Islamic boarding school is also inseparable from this responsibility. As a religious institution with Islamic values, *rahmatan lil'alam* should start improving from traditional governance towards responsive environmental sustainability. Some things need to be addressed, among others: 1) organic and inorganic waste management, 2) wastewater management, 3) green architecture, 4) energy saving, and 5) alternative energy efforts. The community as a group in direct contact with Islamic boarding school life should also support Islamic boarding school activities through philanthropic programs, empowerment, training, and mentoring. As a policyholder, the government should also immediately issue regulations so that green Islamic boarding school governance can be immediately implemented through legal signs that may contain rewards and sanctions.

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⁴⁴ Mukhibat Mukhibat and Ainul Nurhayati Istiqomah, "Analisis Implementasi Kebijakan Pengelolaan Data Pendidikan Islam Berbasis Education Management Information System," *Muslim Heritage* 6, no. 2 (2021): 345–58, <https://jurnal.iaiponorogo.ac.id/index.php/muslimheritage/article/view/3098>.

⁴⁵ Herdis Herdiansyah, Trisasono Jokopitoyo, and Ahmad Munir, "Environmental Awareness to Realizing Green Islamic Boarding School (Eco-Pesantren) in Indonesia," in *IOP Conference Series: Earth and Environmental Science*, vol. 30 (IOP Publishing, 2016), 12017.

⁴⁶ Sri Rahayu Pudjiastuti, Herinto Sidik Iriansyah, and Yuliwati Yuliwati, "Program Eco-Pesantren Sebagai Model Pendidikan Lingkungan Hidup," *Jurnal Abdimas Prakasa Dakara* 1, no. 1 (2021): 29–37.

⁴⁷ Aru Lego Triono, "Luncurkan Program Pesantren Hijau, Ketua LAZISNU: Alam Raya Saudara Kita," 2022, <https://www.nu.or.id/nasional/luncurkan-program-pesantren-hijau-ketua-lazisnu-alam-raya-saudara-kita-mWidZ>.

⁴⁸ Komisi Fatwa MUI, Fatwa MUI Nomor 41 Tahun 2014.

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