

## ARTICLE

# The Emerging Artificial Intelligence and the Green Victimology in Indonesia

*Berkembangnya Kecerdasan Buatan dan Peran Green Victimology di Indonesia*

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## Abstract

The advancement of artificial intelligence has undeniably fostered progress and expedited human development. Artificial intelligence's capacity to emulate human thinking enables computers to exhibit human-like responsiveness through cognitive processes. Conversely, the advancement of artificial intelligence consumes significant energy and produces heat. A more substantial number of computers is necessary to achieve artificial intelligence that is on par with human thinking. A considerable quantity of computers produce thermal energy, resulting in an adverse impact on the surrounding environment. Under these circumstances, the concept of green victimology should be created. A literature review explored the convergence of AI technology with green victimology. The data selection is derived from secondary sources, such as articles, books, papers, and other written references, including legislation. The data collected are analysed qualitatively, meaning that only data sources that are relevant and consistent with the situation will be used. The research concludes that the extensive utilisation of computers in advancing AI technology, if left unregulated, will result in environmental harm through the emission of excessive heat and the generation of computer trash. Indonesia is fully prepared to implement green policies, supported by appropriate regulations, to demonstrate the importance of protecting the environment. This is based on the understanding that the environment can suffer due to human actions, as shown by the concept of green victimology.

## Keywords

artificial intelligence; green victimology; victimology; Indonesia.



## Abstrak

Perkembangan *artificial intelligence* memang membawa kemajuan dan percepatan tumbuh manusia. Kemampuan *artificial intelligence* untuk berpikir layaknya manusia membuat komputer menjadi responsif bagaikan manusia menggunakan akalinya. Di sisi lain, pengembangan *artificial intelligence* menyerap banyak energi dan menghasilkan panas. Untuk membuat *artificial intelligence* berkembang menyamai cara pikir manusia membutuhkan lebih banyak lagi komputer. Banyaknya komputer ini menghasilkan panas dan membuat lingkungan sekitarnya menjadi terkorban. Maka, keadaan demikianlah *green victimology* harus diperkenalkan. Untuk mencari jawaban atas bersinggungnya teknologi AI dengan *green victimology*, kajian pustaka dilakukan. Pemilihan data berasal dari data sekunder yaitu seperti artikel, buku, laporan, dan referensi tertulis lainnya termasuk perundang-undangan. Hasil akhir dari pengumpulan data dianalisis secara kualitatif, yaitu hanya sumber data yang isinya berkorespondensi dan koheren dengan permasalahan akan diambil. Kesimpulan dari penelitian ini yaitu, penggunaan komputer yang masif untuk pengembangan teknologi AI jika tidak dipantau akan merusak lingkungan dengan pencemaran berupa panas yang berlebihan dan munculnya limbah dari komputer. Walau demikian, Indonesia dengan segala peraturan yang mendukung telah siap untuk menegakkan *green policy* untuk menunjukkan bahwa lingkungan perlu dilindungi karena dalam pandangan *green victimology*, lingkungan dapat menjadi korban.

## Kata Kunci

artificial intelligence; green victimology; victimology; Indonesia.

## Introduction

Humans have experienced the transformation of technological development from the Industrial Revolution 1.0 to the Industrial Revolution 4.0.<sup>1</sup> People worldwide, especially Indonesians, are enduring a transitional phase and are on the verge of entering the Industrial Revolution 5.0. This upcoming revolution is defined by the convergence of human capabilities and cutting-edge technology, resulting in artificial intelligence, commonly called AI. The European Union has proposed a proposal highlighting four critical areas of focus during the era of Industrial Revolution 5.0. :

1. Restore the role of humans in technology development (e.g., AI);
2. Develop and strengthen the capabilities of workers, especially those who work by utilising digital technology;

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<sup>1</sup> Jenis Sheth, "The Industrial Revolution from Industry 1.0 to 5.0! - Supply Chain Game ChangerTM," Supply Chain Game Changer, 2018, <https://supplychaingamechanger.com/the-industrial-revolution-from-industry-1-0-to-industry-5-0/>; Putri Tiah Hadi Kusuma, "Revolusi Industri: Sejarah Dan Perkembangan Revolusi Industri 1.0 Hingga 4.0," Detik.com, 2022, <https://www.detik.com/edu/detikpedia/d-6438001/revolusi-industri-sejarah-dan-perkembangan-revolusi-industri-1-0-hingga-4-0>; Gil Press, "A Very Short History Of Artificial Intelligence (AI)," Forbes, December 30, 2018, <https://www.forbes.com/sites/gilpress/2016/12/30/a-very-short-history-of-artificial-intelligence-ai/?sh=11c450ea6fba>.

3. Must be modern, prioritise the principle of environmental protection and be able to use renewable energy and support the green economy;<sup>2</sup>
4. Create a competitive atmosphere and generate a robust and thriving industry, including in academia, to conduct advanced research and innovation.<sup>3</sup>

Among these four, one issue that has become the centre of attraction today is the implementation of Artificial Intelligence. Before relating the issue of Artificial Intelligence (AI) to the Environment, we will briefly discuss the definition and history of AI. AI has developed since the mid-1940s, with early predictions by Alan Turing, a British logician and computer expert, envisioning a future where computers would possess human-like intelligence.<sup>4</sup> AI is an innovation that enables machines or computers to imitate human thought processes. Its development draws on knowledge from various disciplines through codes and formulas, including mathematical logic, neuroscience, and computer science. The hardware, typically referred to as a computer, plays a vital role in AI development.<sup>5</sup> Running AI applications requires electricity, just like any computer operation. Like human learning, AI undergoes continuous training to enhance understanding and knowledge. As the AI undergoes more training, its thinking becomes more intricate. Consequently, the complexity of the computer "body" housing the AI also increases. This progression necessitates larger computers, memory storage, and server space for AI's growth, leading to higher energy demands as its storage size expands.<sup>6</sup>

The swift rise of artificial intelligence (AI) presents notable environmental hurdles, notably stemming from its considerable energy usage and resulting carbon emissions. AI systems, especially extensive machine learning models, necessitate substantial processing capacity, resulting in a heightened need for data centres that consume substantial electricity. These data centres frequently depend on non-renewable energy sources, which worsens greenhouse gas emissions. Moreover, the production and disposal of hardware utilised in AI infrastructure lead to the accumulation of electronic waste and environmental deterioration. The training of intricate AI models necessitates billions of computations, leading to a substantial surge in energy consumption and environmental burden. With the continuous progress of AI technology and its increasing integration across industries, there is a projected increase in the environmental impact, emphasising the pressing requirement for sustainable practices and environmentally friendly solutions within the AI sector. Ensuring the equilibrium between the advantages of AI and its environmental consequences is essential for attaining sustainable outcomes in the long run and

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<sup>2</sup> Kara Anderson, "What Was the Industrial Revolution's Environmental Impact?," Greenly, 2024, <https://greenly.earth/en-us/blog/ecology-news/what-was-the-industrial-revolutions-environmental-impact>.

<sup>3</sup> European Commission, "Industry 5.0 - European Commission," 2023, [https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/industry-50\\_en](https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/industry-50_en).

<sup>4</sup> Encyclopedia Britannica Team, "Artificial Intelligence - Nouvelle AI, Machine Learning, Robotics | Britannica," accessed May 19, 2024, <https://www.britannica.com/technology/artificial-intelligence/Nouvelle-AI>.

<sup>5</sup> Ibid.

<sup>6</sup> Ashkan Entezari et al., "Artificial Intelligence and Machine Learning in Energy Systems: A Bibliographic Perspective," *Energy Strategy Reviews* 45 (January 1, 2023): 101017, <https://doi.org/10.1016/J.ESR.2022.101017>.

reducing its ecological imprint.<sup>7</sup> The condition of environmental concern has coined the term “green victimology.”

Green victimology is a specialised field within criminology that specifically examines the impact of environmental destruction and how it leads to victimisation. The analysis focuses on the disproportionate impact of environmental deterioration, pollution, and climate change on marginalised groups and ecosystems. Green victimologists study the effects of environmental crimes and corporate carelessness on human and non-human victims, such as wildlife and natural environments. This field promotes the implementation of more robust legal structures and restorative justice methods to tackle environmental damage. Furthermore, it emphasises the necessity of international collaboration in addressing ecological injustices and advocating for sustainability. The emergence of artificial intelligence has posed challenges in the specialised domain of victimology, known explicitly as green victimology. This article will explore the convergence of artificial intelligence and environmental conservation, focusing on the potential harm that might be inflicted upon the environment in Indonesia.<sup>8</sup> This article will delve deep to seek the intersection between AI and environmental harm in Indonesia and how Indonesia navigates out of its danger with the tool, namely law.

## Method

This research aims to analyse the intersection of artificial intelligence and environmental protection, specifically focusing on the potential negative impact on the environment in Indonesia. The researchers ascertain the veracity of the coherence and congruence of information collected in secondary data sources. The secondary data sources utilised in this research encompass legal statutes, regulations, scholarly publications, books, and similar resources.<sup>9</sup> Qualitative analysis subsequently examines and evaluates the facts obtained from data sources. Qualitative research is a type of research that aims to uncover truth by analysing data sources that do not use numerical values.<sup>10</sup> In qualitative research, responses to inquiries are determined by the calibre, consistency, and alignment of data sources to the investigated issues. This research focuses on analysing secondary data sources supporting the notion that the convergence of artificial intelligence and environmental preservation is becoming a significant issue.<sup>11</sup>

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<sup>7</sup> Emma Strubell, Ananya Ganesh, and Andrew McCallum, “Energy and Policy Considerations for Deep Learning in NLP,” in *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics* (Florence, Italy: Association for Computational Linguistics, 2019).

<sup>8</sup> Rob White, “Green Victimology and Non-Human Victims,” *International Review of Victimology* 24, no. 2 (February 6, 2018): 239–55, <https://doi.org/10.1177/0269758017745615>.

<sup>9</sup> Mark Hoecke, *Methodologies of Legal Research, Methodologies of Legal Research*, vol. 9, 2014.

<sup>10</sup> Reza Banakar and Max Travers, *Theory and Method in Socio Legal Research, The Onati International Institute for the Sociology of Law* (Bloomsbury Publishing, 2005).

<sup>11</sup> Ady Thea DA, “BRIN Dorong Penggunaan Artificial Intelligence Buatan Untuk Berbagai Bidang,” *HukumOnline*, 2023, <https://www.hukumonline.com/berita/a/brin-dorong-penggunaan-artificial-intelligence-buatan-untuk-berbagai-bidang-lt646c92eb7ccc7>.

## Result & Discussion

### A. What is Green Victimology?

Green victimology is a developing field within criminology that focuses on the harm caused to the environment and its effects on both human and non-human victims. It broadens the conventional scope of victimology, which mainly concentrates on interpersonal offences, to include environmental deterioration and its broader consequences. This field rigorously analyses the point at which ecological harm, societal fairness, and legal responsibility converge. It emphasises the necessity of a thorough strategy in dealing with environmental offences and the individuals affected.<sup>12</sup> This new field of science acknowledges that environmental damage frequently goes beyond traditional legal categories of criminal activity. Such harm can be caused by individuals, organisations, and even governments, leading to substantial ecological degradation and negative impacts on communities and ecosystems.<sup>13</sup>

Green victimology, a nascent field of intellectual inquiry, encompasses many topics and perspectives. Human individuals affected by environmental damage are not commonly acknowledged as victims of 'criminal' acts. Furthermore, the non-human environmental sufferer rarely deserves attention under the 'victim' category. From an environmental justice standpoint, victimisation can be understood concerning three dimensions: environmental justice (where the victim is a person), ecological justice (where the victim is a particular ecosystem), and species justice (where the victim is animals and plants). Identifying victims' hierarchies between and within each of these categories is possible. An alternative approach to these hierarchies is to advocate for the concept of 'equal victimhood', which posits that all species should be seen as equal or that the natural environment possesses inherent value. Nevertheless, this essay advocates for the environmental justice approach, which emphasises the importance of considering the social and ecological context to comprehend and address cases of environmental victimisation. When considering victimisation and evaluating interests and harms, it is essential to consider specific factors relevant to the scenario.<sup>14</sup>

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<sup>12</sup> Demarco S Johnson, "The Status of Green Criminology in Victimology Research," *McNair Scholars Research Journal*, vol. 10, 2017.

<sup>13</sup> Matthew Hall, "Environmental Harm and Environmental Victims: Scoping out a 'Green Victimology,'" *International Review of Victimology* 20, no. 1 (October 25, 2013): 129–43, <https://doi.org/10.1177/0269758013508682>.

<sup>14</sup> White, "Green Victimology and Non-Human Victims."

## B. Does AI affect the Environment?

AI is a system or machine that typically relies on human-like intelligence to function but can learn and adapt autonomously in response to the information it processes.<sup>15</sup>

While AI has undoubtedly improved lives, it has environmental implications. According to the Council on Foreign Relations, training AI's energy consumption and carbon dioxide emissions equal the energy emitted by operating aviation equipment factories.<sup>16</sup> This signifies that AI development threatens climate stability and contributes to carbon emissions.<sup>17</sup> If the regulation of energy impact during AI development is not adequately addressed, AI's seemingly environmentally friendly nature becomes misleading, as ignoring restrictions can undermine its actual environmental friendliness.

Researchers are actively addressing environmental concerns related to AI technology, including the use of plastic in smartphone casings or any AI-powered devices, the electricity consumption by servers storing AI-processed data, and other AI-related activities impacting the Environment. In this context, Google's DeepMind AI development has achieved a significant breakthrough by successfully reducing the energy emitted from its server machines. By training the DeepMind AI to manage the cooling fans, Google managed to decrease energy absorption by an impressive 15 per cent in 2016.<sup>18</sup>

The concept of AI trained to safeguard the environment is called Green Intelligence.<sup>19</sup> A practical implementation of Green Intelligence can be observed in the case of Gojek, where they aim to transition their partners from motorised to electric vehicles.<sup>20</sup> AI can also play a vital role in maintaining environmental stability on various scales,<sup>21</sup> such as using satellites for global emissions monitoring and employing AI in smart homes to automate tasks like turning off lights<sup>22</sup> when the temperature is high or exceeds a specific threshold.<sup>23</sup>

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<sup>15</sup> "How Artificial Intelligence Is Helping Tackle Environmental Challenges," accessed May 19, 2024, <https://www.unep.org/news-and-stories/story/how-artificial-intelligence-helping-tackle-environmental-challenges>.

<sup>16</sup> Nicola Jones, "How to Stop Data Centres from Gobbling up the World's Electricity," *Nature* 561, no. 7722 (September 1, 2018): 163–66, <https://doi.org/10.1038/D41586-018-06610-Y>.

<sup>17</sup> Payal Dhar, "The Carbon Impact of Artificial Intelligence," *Nature Machine Intelligence* 2, no. 8 (August 12, 2020): 423–25, <https://doi.org/10.1038/S42256-020-0219-9>.

<sup>18</sup> Shay Meynecke, "AI vs. the Environment – DW," DW Nature and Environment, 2018, <https://www.dw.com/en/ai-could-help-us-protect-the-environment-or-destroy-it/a-44694471>.

<sup>19</sup> Bernard Marr, "Green Intelligence: Why Data And AI Must Become More Sustainable," *Forbes*, 2023, <https://www.forbes.com/sites/bernardmarr/2023/03/22/green-intelligence-why-data-and-ai-must-become-more-sustainable/?sh=4aaa86ed7658>.

<sup>20</sup> Kentaro Inamoto and Shotaro Tani, "Grab and Gojek Commit to 'carbon Zero' Ahead of Public Listing - Nikkei Asia," *Nikkei Asia*, 2021, <https://asia.nikkei.com/Spotlight/Environment/Climate-Change/Grab-and-Gojek-commit-to-carbon-zero-ahead-of-public-listing>.

<sup>21</sup> "How Artificial Intelligence Is Helping Tackle Environmental Challenges."

<sup>22</sup> Annette Ekin, "AI Can Help Us Fight Climate Change. But It Has an Energy Problem, Too | Research and Innovation," *Horizon: The EU Research & Innovative Magazine*, 2019, <https://projects.research-and-innovation.ec.europa.eu/en/horizon-magazine/ai-can-help-us-fight-climate-change-it-has-energy-problem-too>.

<sup>23</sup> Marr, "Green Intelligence: Why Data And AI Must Become More Sustainable."

Brevini examined the environmental impact of AI by investigating its extractive production and supply chain. This revealed the environmental expenses associated with existing data-driven communication systems and AI. The book explored artificial intelligence from the perspectives of resources, infrastructure, and materials, viewing it as a collection of technologies, machines, or infrastructures that require and use significant energy for computation, analysis, and categorisation. An accurate definition is crucial in reshaping our comprehension of AI, typically characterised by its purpose and capacity to facilitate significant transformative effects. Recent research in communications, particularly in human-machine communication, has defined AI as studying how meaning is created between humans and machines. Moreover, adopting the legacy of the critical political economics of communications enables us to perceive communications systems as collections of tangible equipment and infrastructures.<sup>24</sup>

Technology has traditionally been regarded as a comprehensive remedy for the disparities inherent in capitalism. Each successive generation has consistently revived the confidence that, regardless of previous assessments of technology, the most recent one will deliver on its radical and revolutionary potential. Within this rhetorical thinking, there is a conviction that digital technology has the potential to disrupt inequalities and power imbalances without requiring a direct challenge to the existing social order.<sup>25</sup>

In line with comparable mythology, the 'sublime phase' of AI presents its applications as remedies for the most pressing issues of our day, such as tackling chronic sickness, revitalising the economy, overseeing social services, predicting cybersecurity risks, and resolving the climate emergency. Yet, the depiction of AI as a miraculous force that will save civilisation hides the physical existence of the infrastructures that play a crucial role in the environmental concerns that have been continuously and skillfully avoided. Instead, it is essential to comprehend AI inside its infrastructure framework since it depletes limited resources during its manufacture, consumption, and disposal, leading to a rise in energy consumption and thus worsening the climate issue. To fully understand the environmental problems caused by AI, including energy consumption, emissions, material toxicity, and electronic waste, it is necessary to build an Eco-political economics of AI. This involves examining the entire global supply chain of AI.<sup>26</sup>

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<sup>24</sup> Benedetta Brevini, "An Eco-Political Economy of AI: Environmental Harms and What to Do about Them," in *Artificial Intelligence, Labour and Society*, ed. Aida Ponce del Castillo (Brussels: ETUI, 2024).

<sup>25</sup> Ibid.

<sup>26</sup> Ibid.

## C. Indonesia's Efforts to Protect the Environment and Provides Clean and Renewable Energy

From 2022 to 2024, Indonesia has experienced notable progress and financial commitments in artificial intelligence (AI), mostly fueled by its strong digital economy. The government has enacted the National Strategy on AI 2020-2045 to construct essential infrastructure and cultivate skilled individuals, establish a board to oversee the ethical use of data and formulate legislation to foster innovation in the field of AI.<sup>27</sup> The objective of this strategic direction is to utilise AI to stimulate economic expansion while simultaneously managing potential dangers and preparing the workforce for the integration of AI. There is an increasing focus on activities that hurt the environment because of their detrimental repercussions, including environmental degradation and ecological destruction, which contribute to global warming. Consequently, these consequences can have an impact on human existence. Climate change, a result of global warming, is adversely affecting human health and posing a significant threat to animal species, potentially leading to their extinction. Within the field of criminology, environmental crime is commonly referred to as green crime. The classification of green crimes consists of two core clusters: (1) primary green crimes and (2) secondary or symbiotic green crimes.<sup>28</sup>

Green crimes primarily refer to criminal activities that involve human acts leading to the pollution or destruction of the Earth's resources. These crimes encompass deforestation, air pollution, the significant deterioration of animal rights, and water contamination. Secondary or symbiotic green crimes involve violating environmental laws or regulations. The offences encompass state-sanctioned aggression towards dissenting factions, the improper disposal of dangerous substances, and the activities of criminal syndicates. The Indonesian government is concerned about these crimes because there are numerous occurrences of environmental crimes.

Over the past eight years, the Ministry of Environment and Forestry of The Republic of Indonesia (KLHK) has been actively pursuing legal measures against various environmental offences. Over 500 environmental cases were presented in 2019, while 18 firms faced civil litigation. Two Consequently, corporations face administrative, civil, and criminal penalties. Over 500 corporations are subjected to government coercion, suspension or revocation of their licences, and fines and fees amounting to around 18 trillion rupiahs. Regarding land-burning actions in the forest, 171 corporations have been subject to administrative sanctions for their involvement in such situations. Furthermore, due to initiating civil proceedings against 11 firms, the government is seeking compensation of around 1 trillion and four hundred billion rupiahs. The Ministry's actions can be comprehended in light of Indonesia's reception of criticism from other affected nations.<sup>29</sup>

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<sup>27</sup> Marcus Ng et al., "The Economic Impact of Generative AI: The Future of Work in Indonesia," August 2023.

<sup>28</sup> Wanodyo Sulistyani, "Environmental Crime Victims under Criminal Justice System: A Study on the Development of Environmental Victimology," *Padjadjaran Jurnal Ilmu Hukum* 6, no. 1 (2019): 50–68, <https://doi.org/10.22304/pjih.v6n1.a3>.

<sup>29</sup> *Ibid.*



The National Research and Innovation Agency (BRIN) in Indonesia advocates for continuous discussions on AI implementation to foster innovative ideas. These ongoing discourses are essential to drive progress and advancements in the field.<sup>30</sup> Additionally, the government has intensified its commitment to achieving Net Zero Emissions with a target set for a 35% reduction in greenhouse gas emissions within a decade after the active adoption of renewable energy plants to replace conventional power plants.<sup>31</sup>

Indonesia has acknowledged the need to control carbon emissions to align with its Net Zero Emission target by 2060.<sup>32</sup> This commitment is exemplified by Presidential Regulation Number 112 of 2022, which focuses on accelerating renewable energy development for electricity supply. During a 2022 webinar titled “*Decarbonizing Energy Sector for Net Zero: Achievement, Progress, and Challenges at the Indonesia Pavilion, Committee On Parties (COP) 27 UNFCCC*,” panellist Herman Darnel Ibrahim emphasised Indonesia’s determination to provide affordable energy, promote environmentally friendly clean energy usage, and establish supportive policies for energy transition in the country.<sup>33</sup>

To meet these goals, since 2021, the national government and local governments have been mandated, under Law Number 30 of 2007 concerning energy, to increase the provision of New and Renewable Energy.<sup>34</sup> A National Energy Policy was prepared through Government Regulation Number 79 of 2014 to support this effort. Furthermore, a report from Renewable Energy Indonesia indicates that as of 2021, 37 provinces have already drafted Regional Regulations on the Utilization of Energy and Natural Resources, showcasing the collective efforts of Indonesian provinces to facilitate the availability of New Energy and Renewable Energy. As a country influenced by the Continental European legal system, written laws significantly sway all governance and community-related activities.

Presidential Regulation Number 112 of 2022, focused on accelerating renewable energy development for electricity supply, marks a significant milestone in Indonesia’s commitment to advancing renewable energy sources. This regulation enables the emergence of a green industry. It fosters the growth of green intelligence, which can complement each other and be supported by government regulations to protect the environment. Indonesia is, therefore, proven to practise preventive regulation, a legal theory that asserts that a robust and well-crafted regulatory framework can effectively prepare a nation to deal with future challenges related to the regulation's subject. The

<sup>30</sup> DA, “BRIN Dorong Penggunaan Artificial Intelligence Buatan Untuk Berbagai Bidang.”

<sup>31</sup> Humas EBTKE, “Pemerintah Perkuat Komitmen Transisi Energi Melalui Peraturan Presiden Pengembangan EBT,” Ditjen Energi Baru Terbarukan dan Konservasi Energi, 2022, <https://ebtke.esdm.go.id/post/2022/10/07/3290/pemerintah.perkuat.komitmen.transisi.energi.melalui.peraturan.presiden.pengembangan.ebt?lang=id>.

<sup>32</sup> Kementerian Koordinator Bidang Perekonomian RI, “Pemerintah Terus Mendorong Percepatan Transisi Energi Di Dalam Negeri Guna Mencapai Target Net Zero Emission Pada 2060 - Kementerian Koordinator Bidang Perekonomian Republik Indonesia,” Kementerian Koordinator Bidang Perekonomian RI, 2023, <https://www.ekon.go.id/publikasi/detail/4996/pemerintah-terus-mendorong-percepatan-transisi-energi-di-dalam-negeri-guna-mencapai-target-net-zero-emission-pada-2060>.

<sup>33</sup> Learning Hub, “Kebijakan Energi Terbarukan | Renewable Energy Indonesia,” Renewable Energy Indonesia, 2023, <https://renewableenergy.id/kebijakan-energi-terbarukan/>.

<sup>34</sup> Ibid.

concept that proactive regulatory measures can limit risks, assure compliance, and preserve stability in rapidly expanding industries such as technology, finance, and environmental protection is the foundation upon which this theory is built.<sup>35</sup>

In conclusion, under several preventive laws in force, Indonesia is well-prepared to embrace AI development and effectively manage energy consumption, leading the way to a future where renewable energy plays a central role in the country's energy landscape. Indonesia is poised to welcome the Renewable Energy-Based Technology (EBT) era soon.

## Conclusion

The advent of artificial intelligence technology fosters a sense of complacency among humans as if it guarantees perpetual solutions to all issues. According to Bernadetta, if not adequately supervised, this will produce digital waste, including computer tool trash, plastics, and excessive heat vapour emitted by computer machines. These factors are associated with climate change. The existence of the field of green victimology suggests that deviant actions resulting in environmental harm can have consequences for a range of victims, including non-human entities such as plants and other natural elements. To achieve the NetZero target by 2060, Indonesia has expedited the implementation of several laws and regulations to promote the adoption of renewable energy sources. This proactive approach demonstrates Indonesia's ability to effectively address potential environmental harm stemming from any source.

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<sup>35</sup> Robert F. Hachiya, *The Principal's Quick-Reference Guide to School Law: Reducing Liability, Litigation, and Other Potential Legal Tangles* (Sage, 2022).

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