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Making Indonesia Sustainable: Shaping the Law to Reduce Digital Carbon Footprint

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Abstract

In alignment with the commitments made under the Paris Agreement, Indonesia has pledged to significantly reduce its carbon emissions by 2030 as part of its Enhanced National Determined Contribution (ENDC) within the Indonesia Emas 2045 (Golden Indonesia 2045) Program. However, while the focus has predominantly been on addressing physical carbon footprint, it's imperative to also consider the burgeoning digital carbon footprint. As Southeast Asia, including Indonesia, faces heightened risks from climate change, exacerbated by the rapid expansion of the digital economy, the need to curb digital carbon emissions becomes increasingly urgent. This paper examines the regulatory landscape concerning digital carbon footprint in Indonesia and explores strategies to mitigate its impact. Through a combination of normative and comparative approaches, the research analyzes existing regulations and draws insights from international best practices. Key research questions include the current regulatory framework governing digital carbon footprint in Indonesia and potential measures to reduce it. The findings aim to inform policymakers and industry stakeholders on effective strategies for reducing digital carbon emissions. Ultimately, the output of this research will contribute to the development of regulations incentivizing

businesses to adopt sustainable practices and produce Environmental, Social, and Governance (ESG) reports, thereby advancing Indonesia's journey towards a greener and more sustainable future.

Keywords

Digital carbon footprint, Sustainability, Net Zero Emission, Digital Decarbonization, Environmental Advocacy

A. Introduction

A carbon footprint encompasses all the greenhouse gases, such as carbon dioxide and methane, generated by our actions.[1] It's the sum of emissions from products we consume and our activities. Digital carbon footprint specifically pertains to the greenhouse gas emissions produced by digital technology resources, devices, and platforms.[2] According to "Lean ICT: Towards digital sobriety," a report by The Shift Project, digital technologies contribute to 3.7% of global GHG emissions, highlighting their environmental impact.[3]

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1 The Nature Conservancy, 'What is a Carbon Footprint', <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/> accessed 03 September 2023. *See also* Thomas Wiedmann, and Jan Minx. "A definition of 'carbon footprint'." *Ecological Economics Research Trends* 1, no. 2008 (2008): 1-11; Divya Pandey, Madhoolika Agrawal, and Jai Shanker Pandey. "Carbon footprint: current methods of estimation." *Environmental Monitoring and Assessment* 178 (2011): 135-160.

2 Kieran Mulvaney, 'What is a carbon footprint—and how to measure yours' (National Geographic, June 24, 2022) <https://www.nationalgeographic.com/environment/article/what-is-a-carbon-footprint-how-to-measure-yours> accessed 03 September 2023. *See also* Subramanian Senthilkannan Muthu, ed. *The Carbon Footprint Handbook*. CRC Press, 2015; Amanda Bishop, *How to reduce your carbon footprint*. Crabtree Publishing Company, 2008.

3 Carolyn Heinze, 'How to lower IT's digital carbon footprint' (Techtarget, December 21, 2022) <https://www.techtarget.com/searchcio/feature/Understand-the-digital-carbon-footprint-of-enterprise-IT> accessed 03 September 2023. *See also* Abu Sayed Sikder, Shohel Ahmed, and Jahedul Islam. "Leveraging Information Technology for Green IT and Sustainable Development: An Analysis of Environmental Sustainability, Energy Efficiency, and Carbon Footprint Reduction Initiatives.: IT

Reports from Google, Temasek, and Bain & Company underscore Southeast Asia's vulnerability to climate change due to the expanding digital economy. This growth is expected to lead to substantial carbon emissions, estimated at around 20 MTCO2e by 2030. These emissions primarily stem from three sectors: transportation, food delivery, and e-commerce.[4]

Indonesia ranks 6th globally in carbon emissions, reaching 691.97 million tons of CO2 in 2022. These emissions primarily stem from the energy sector, resulting from the burning of oil, gas, and coal. This substantial carbon output contributes to a rise in global temperatures each year, leading to the reduction of snow and sea ice at the poles, declining glacier coverage, and heightened sea levels. Coastal areas face an ongoing threat of flooding and erosion due to milder winters and reduced ice cover. With increased rainfall and the possibility of more frequent heavy rain and storms, the risk of flooding grows. These uncertain weather patterns impact various sectors, including agriculture, forestry, and tourism, adding to economic and social pressures. Additionally, the escalation of extreme weather events, attributed to rising carbon emissions, causes significant damage to infrastructure such as roads, bridges, and utility poles.[5]

Our daily reliance on electronic devices consumes a significant amount of electricity, much of which is sourced from fossil fuels. It's crucial to understand that the digital content we create and store, whether emails, photos, workouts, or work documents, isn't in a carbon-free realm. It's supported by data centers, massive facilities housing power-hungry servers, often referred to as server farms. These centers demand substantial electricity to operate, including the energy needed for cooling and maintaining temperature-controlled

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for Green IT and Sustainable Development." *International Journal of Imminent Science & Technology* 1, no. 1 (2023): 48-63.

4 Annisa Mutia, 'Google: Dampak Ekonomi Digital Asia Tenggara terhadap Emisi Karbon Bakal Tembus 20 MT CO2e pada 2030' (Databoks, October 29, 2022) <https://databoks.katadata.co.id/datapublish/2022/10/29/google-dampak-ekonomi-digital-asia-tenggara-terhadap-emisi-karbon-bakal-tembus-20-mt-co2e-pada-2030> accessed 03 September 2023.

5 Lindungihutan, 'Emisi Karbon: Penyebab, Dampak dan Cara Mengurangi (Update 2023)' (Lindungihutan, February 25, 2022) <https://lindungihutan.com/blog/emisi-karbon/> accessed 03 September 2023.

environments. Shockingly, data centers and networks account for a staggering 2% of global electricity consumption, equivalent to the entire aviation industry. While strides are being made to enhance their energy efficiency, it's estimated that by 2040, digital data storage will contribute to 14% of global emissions, similar to the current emissions of the entire United States.[6]

Indonesia is strongly committed to reducing carbon emissions to combat global temperature rise. The nation has raised its Enhanced Nationally Determined Contribution (E-NDC) target to 32%, equivalent to 912 million tons of CO2 in 2030, up from the previous goal of 29% or 835 million tons of CO2. The Minister of Energy and Mineral Resources warns that without significant changes to reduce fossil fuel usage, Indonesia could produce a staggering 1.5 gigatons of CO2 by 2060. To achieve Net Zero Emissions by 2060 or sooner, Indonesia is implementing various strategies, including transitioning from gasoline to Liquefied Natural Gas (LNG), promoting electric stoves, adopting biofuels to replace fossil fuels, and accelerating solar rooftop installations. Moreover, the country is prioritizing the reduction of coal-fired power plants (PLTU) and the development of new and renewable energy sources, marking a significant shift towards a more sustainable future.[7] Indonesia is committed to reducing carbon emissions in line with the Paris Agreement, a pivotal international treaty on climate change. Adopted in 2015 and enforced since 2016, the agreement's main objective is to restrict global warming to well below 2°C above pre-industrial levels, with efforts to limit it to 1.5°C. In recent years, there's been a growing emphasis on the 1.5°C target due to the severe consequences of surpassing it, including heightened droughts, heatwaves, and extreme rainfall events. To achieve this goal, greenhouse gas emissions must peak by 2025 and decline by 43% by 2030. The Paris Agreement is a historic milestone in global climate efforts as it

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6 Linnea Harris, 'A Guide to Your Digital Carbon Footprint – and How to Lower It' (Ecowatch, November 26, 2021) <https://www.ecowatch.com/digital-carbon-footprint-2655797250.html> accessed 03 September 2023.

7 Kementerian Energi dan Sumber Daya Mineral Indonesia, 'Tekan Emisi Karbon, Indonesia Naikkan Target E-NDC Jadi 32 Persen' (Migas ESDM, November 12, 2022) <https://migas.esdm.go.id/post/read/tekan-emisi-karbon-indonesia-naikkan-target-e-ndc-jadi-32-persen> accessed 03 September 2023.

brings together all nations under a binding commitment to combat climate change and adapt to its impacts.[8]

In Indonesia, the government can play a pivotal role in reducing digital carbon footprints of companies by implementing a regulation mandating the creation of ESG (Environmental, Social, and Governance) reports. These reports aim to ensure the sustainability of companies by disclosing their ESG-related data. By shedding light on a company's ESG initiatives, this disclosure enhances investor transparency and serves as an inspiration for other organizations to follow suit.[9] ESG, or Environmental, Social, and Governance criteria, play a critical role in assessing a company's performance and sustainability. Environmental criteria assess how a company handles environmental concerns, including climate change policies. Social criteria evaluate its relationships with stakeholders like employees, suppliers, customers, and local communities. Governance criteria focus on leadership, executive compensation, audits, internal controls, and shareholder rights. Together, these criteria provide a comprehensive framework for evaluating a company's overall impact and responsibility.[10]

Based on the brief explanation above, it can be seen why digital carbon footprints need to be regulated. The research questions which will be studied in this research are, first, how current legislation in Indonesia regulates digital carbon footprints, and how related regulations in Indonesia are implemented, and second, what can

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[8] UNFCC, 'The Paris Agreement', <https://unfccc.int/process-and-meetings/the-paris-agreement> accessed 03 September 2023.

[9] Fabrizio Tocchini, 'The ABCs of ESG reporting: What are ESG and sustainability reports, why are they important, and what do CFOs need to know' (Wolterskluwer, March 09, 2022) <https://www.wolterskluwer.com/en/expert-insights/the-abcs-of-esg-reporting#:~:text=What%20is%20ESG%20reporting%3F,organizations%20to%20do%20the%20same.> accessed 06 September 2023.

[10] The Investopedia Team, 'What Is Environmental, Social, and Governance (ESG) Investing?' (Investopedia, March 22, 2023) <https://www.investopedia.com/terms/e/environmental-social-and-governance-esg-criteria.asp#:~:text=Environmental%2C%20social%2C%20and%20governance%20(ESG)%20investing%20refers%20to,addressing%20climate%20change%2C%20for%20example.> accessed 06 September 2023.

Indonesia learn and what Indonesia can do to reduce its digital carbon footprint.

B. Method

The type of research used in this research is normative legal research, and the approach used is statutory regulation approach and a comparative approach. The legislative approach is to examine the laws or legal regulations that regulate digital carbon footprints or carbon footprints in general and other regulations that follow. The comparative approach is to compare the current digital carbon footprint reduction regulations in Indonesia with regulations in the European Union and America. From the comparison, the similarities and differences can be seen as well as things that can be applied by Indonesia from these two legal jurisdictions.

The expected implication is the creation of legislation to reduce the digital carbon footprint in Indonesia, as well as regulations for companies and business actors to make ESG (Environmental, Social, and Governance) reports to support the sustainability of the companies.

The originality of this research lies in the discussion of the digital carbon footprint, comparison of regulations with other countries, as well as the implications of the expected new law to reduce the digital carbon footprint in Indonesia and the sustainability of companies in Indonesia.

C. Result and Discussion

1. Current Regulation of Digital Carbon Footprint in Indonesia

Currently, there is no regulation regarding the digital carbon footprint reduction in Indonesia. However, Indonesia already has several regulations regarding the carbon footprint reduction, in order to comply with the Paris Agreement. Article 9 of the Paris Agreement emphasizes the crucial role of climate finance in both mitigation and adaptation efforts. Large-scale investments are needed to reduce emissions significantly, making finance essential for mitigation. Additionally, adaptation requires substantial financial resources to address the adverse effects of climate change. The agreement also promotes technology development and transfer to enhance resilience

and reduce greenhouse gas emissions. It establishes a technology framework and mechanism to accelerate these efforts. Recognizing the capacity challenges faced by developing countries, the Paris Agreement places great emphasis on capacity-building, calling on developed countries to provide support for capacity-building actions in developing nations. Since the Paris Agreement's inception, there has been a notable shift towards low-carbon solutions and the emergence of new markets. Countries, regions, cities, and companies are increasingly setting carbon neutrality targets. Zero-carbon solutions are gaining competitiveness, particularly in the power and transportation sectors, which account for a significant portion of emissions. This trend has created lucrative business opportunities for early adopters. By 2030, zero-carbon solutions may be competitive in sectors responsible for over 70% of global emissions.

Indonesia, in accordance with Article 4.19 of the Paris Agreement, has developed a long-term strategy (LTS) outlining its path toward low-emission development until 2050. This strategy will guide the implementation and future development of nationally determined contributions (NDCs). In 2015, the Indonesian government pledged to reduce emissions from 2020 to 2030 by 29% (unconditional) up to 41% (conditional), a more ambitious commitment compared to the 2010 pledge of 26%. During President Joko Widodo's first term, the national Nawa Cita framework was established, focusing on various priorities such as citizen protection, regional development, quality of life improvement, and global competitiveness. These align with Indonesia's commitment to a low-carbon, climate-resilient development path, integrated into the National Medium-Term Development Plan (RPJMN). The LTS further strengthens Indonesia's vision of "One Hundred Years Indonesia 2045," with pillars including human resource development, sustainable economic growth, equitable development, and national resilience. This vision aims for poverty reduction, human resource development, and economic and social transformation. In a scenario aligned with 1.5°C goals (LCCP), Indonesia's greenhouse gas emissions will peak at 1.24 GtCO2-eq in 2030 and steadily decline,

reaching 0.54 GtCO2-eq by 2050. The country is on track to achieve net-zero emissions (NZE) by 2060 or earlier.[11]

The Ministry of Environment and Forestry (KLHK), serving as Indonesia's National Focal Point for the UNFCCC, announced an enhanced commitment to reduce greenhouse gas emissions through Indonesia's Enhanced NDC (ENDC) document on September 23, 2022. The ENDC document serves to update national climate policies and align with the goal of limiting global temperature rise to 1.5 degrees Celsius, as mandated by Decision 1/CMA.3 in Glasgow. This commitment represents a gradual shift towards Indonesia's long-term policy outlined in the Long-Term Strategy for Low Carbon and Climate Resilience (LTS-LCCR 2050), aiming for net-zero emissions by 2060 or sooner. The ENDC document includes updates to NDC targets, national policies, climate adaptation strategies, and transparency frameworks. Specifically, Indonesia's GHG emission reduction targets have increased from 29% in the NDC Update (UNDC) to 31.89% in ENDC without international support, and from 41% in UNDC to 43.20% in ENDC with international support.[12]

In recent years, global efforts have focused on reducing emissions to combat climate change, with many countries and businesses committing to achieve net-zero emissions by mid-century. Despite increasing awareness and a growing sense of urgency, Indonesia's goal of achieving net-zero emissions by 2060 puts it behind other nations, despite its vulnerability to climate change as an archipelago. Indonesia's current Nationally Determined Contribution (NDC) aims for a 29% reduction in greenhouse gas emissions (voluntarily) or 41% (with international support) by 2030 compared to business-as-usual scenarios. However, this target falls short of what is

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[11] Republic of Indonesia Government, 'First Nationally Determined Contribution Republic of Indonesia', (UNFCCC, November 2016), <https://unfccc.int/sites/default/files/NDC/2022-06/First%20NDC%20Indonesia_submitted%20to%20UNFCCC%20Set_November%20%202016.pdf> accessed 15 September 2023.

[12] Kementerian Lingkungan Hidup dan Kehutanan, 'Enhanced NDC: Komitmen Indonesia Untuk Makin Berkontribusi Dalam Menjaga Suhu Global', (PPID, 2 October 2022), <http://ppid.menlhk.go.id/berita/siaran-pers/6836/enhanced-ndc-komitmen-indonesia-untuk-makin-berkontribusi-dalam-menjaga-suhu-global> accessed 15 September 2023.

required under the Paris Agreement. The energy sector has emerged as a major contributor, responsible for 34% of total emissions in 2019 and expected to become the largest emitter by 2030 without decarbonization efforts. Given the climate urgency, Indonesia must prioritize deep decarbonization over the next three decades. This effort not only addresses climate change but also offers opportunities to modernize the economy, mitigate climate damages, improve air quality, enhance public health, boost energy efficiency, ensure water and food security, and protect biodiversity.[13]

The complexity of deep decarbonization calls for involvement and collaboration from both government and non-government stakeholders. While the central government plays a vital role in setting national climate targets and strategies, the success of such ambitious goals relies on local-level actions. Subnational governments, in particular, should develop more ambitious regional energy plans (RUED) that prioritize decarbonizing the energy system. This includes implementing green building codes, enhancing public transportation, utilizing public procurement to promote renewable energy and electric vehicles, and offering incentives for the transition. Currently, only four out of 20 provinces with RUEDs prioritize renewable energy as the primary source by 2050, highlighting the need to align regional plans with the central government's net-zero target. Moreover, subnational governments should integrate low-carbon development goals into their regional medium-term development plans (RPJMD). However, only half of the ten largest carbon-emitting provinces in Indonesia have specific emission reduction targets in their RPJMD. Given the national focus on decarbonization, subnational governments must intensify their climate efforts. To drive local energy transitions, subnational governments can establish initiatives like 100% renewable energy islands, provinces, and cities, following successful examples from other countries. While Indonesia has initiated the Sumba Iconic Island project to achieve 100% renewable energy on Sumba Island by 2025,

[13] IESR, 'Kenaikan Target Penurunan Emisi di NDC Indonesia Masih Jauh untuk Mencegah Krisis Iklim', (IESR, 6 December 2022), <https://iesr.or.id/kenaikan-target-penurunan-emisi-di-ndc-indonesia-masih-jauh-untuk-mencegah-krisis-iklim-2> accessed 15 September 2023.

similar initiatives are needed throughout the archipelago, given its substantial renewable energy potential.[14]

According to Indonesia Energy Transition Outlook 2022[15], the analysis of the energy sector overview in Indonesia covered six industry categories: banking, coal IPP, coal mining, oil and gas, consumer goods, and technology companies. These sectors were chosen due to their global trend of increased proactive measures in addressing climate change. In the survey, even companies within the same corporate group operating in different industries were treated as separate entities, potentially having distinct net-zero targets. Among net-zero fossil fuel companies, a key motivation for adopting this target was their corporate responsibility in mitigating climate change. Additionally, factors such as government policies, opportunities for business expansion in new sectors, and financial risks linked to fossil energy projects were prominent drivers for net-zero commitments in this segment.

Following the COVID-19 pandemic, digital economy investments soared to a four-year high, totaling $4.7 billion in the first quarter of 2021. Most of these investments came from MSMEs that shifted their operations to online platforms in response to changing consumer preferences and the rapid growth of digital banking. This surge in the digital economy is expected to expand eightfold by 2030. However, this growth has raised environmental concerns, as it has led to a significant increase in electricity demand globally, along with challenges in managing digital waste. Access to financing is crucial for facilitating MSMEs' transition to greener practices, but there are limited financing options for small-scale green projects in Indonesia. Blended finance offers an innovative solution to this issue. It combines public funds, concessional donor funds, and impact investment funds to mitigate the risks associated with small-scale MSME projects. This approach aims to incentivize banks and private investors to support

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[14] Government of Republic Indonesia, 'Optimistis Karbon Net Sink Hutan Indonesia di 2030', (Indonesia.go.id, 3 January 2023), <https://indonesia.go.id/kategori/editorial/6782/optimistis-karbon-net-sink-hutan-indonesia-di-2030?lang=1> accessed 15 September 2023.

[15] IESR, 'Indonesia Energy Transition Outlook 2022', (IESR, December 2021), <https://iesr.or.id/wp-content/uploads/2022/01/Indonesia-Energy-Transition-Outlook-2022-IESR-Digital-Version-.pdf>, accessed 15 September 2023.

these pioneering investments in MSMEs, ultimately promoting sustainable growth in the digital economy.[16]

To address carbon emissions in Indonesia, Presidential Regulation Number 98 of 2021 on Implementation of the Economic Value of Carbon to Achieve Nationally Determined Contribution Targets and Control of Greenhouse Gas Emissions in National Development outlines several key measures. Article 2 paragraph (3) of the regulation defines the Nationally Determined Contribution (NDC) targets, which include policies and actions to reduce greenhouse gas (GHG) emissions by 29% to 41% in 2030 compared to the GHG Emission Baseline. This also involves enhancing national, regional, and community resilience to climate change. Article 3 of the regulation specifies its objectives, focusing on GHG emission reduction, increased climate resilience, and the achievement of NDC targets. The GHG emission reduction target is set at 834 million tons of CO2e if achieved domestically or up to 1,185 million tons of CO2e with international cooperation. Article 5 outlines the NDC implementation strategy, encompassing ownership and commitment, capacity development, enabling conditions, communication frameworks, data policies for GHG emissions and climate resilience, policy formulation, NDC implementation guidelines, actual implementation, and monitoring and review. The implementation of NDC efforts includes climate change mitigation (Article 6) and adaptation (Article 39) measures. These efforts are carried out by various stakeholders, including government bodies, regional governments, businesses, and communities. Additionally, Regulation of the Ministry of Energy and Mineral Resources Number 2 of 2023 on Implementation of Carbon Capture and Storage, as well as Carbon Capture, Utilization and Storage in Upstream Oil and Gas Business Activities regulates carbon capture and storage (CCS) and carbon capture, utilization, and storage (CCUS) activities. CCS involves capturing and safely storing carbon emissions, while CCUS encompasses capturing, utilizing, and storing emissions safely and permanently in accordance with engineering principles.

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[16] Hasintya Saraswati, 'MSMEs: 'The Key to Indonesia's Decarbonization Efforts', (The Diplomat, December 23, 2022), <https://thediplomat.com/2022/12/msmes-the-key-to-indonesias-decarbonization-efforts/> accessed 15 September 2023.

Considering the regulations we've gathered, it's evident that Indonesia is already committed to adhering to the Paris Agreement, as it has established guidelines for its Nationally Determined Contributions (NDC) and initiated measures to reduce carbon emissions. However, to further enhance its environmental efforts, Indonesia should consider the implementation of regulations aimed at reducing digital carbon footprints. Learning from successful models in other countries can provide valuable insights and enable Indonesia to strengthen its strategies in this crucial area of carbon footprint reduction. Indonesia's efforts to address digital carbon footprints and sustainability should extend to active involvement of companies and business actors, who play a pivotal role in the country's economy. Given the rapid digitalization of the business sector, it is essential for companies to recognize the importance of digital carbon footprints and sustainability in their operations. Engaging businesses in these environmental considerations is imperative to create a comprehensive and effective approach to sustainable practices and carbon footprint reduction in Indonesia.

2. What can Indonesia do to Reduce Digital Carbon Footprint

In the pursuit of establishing regulations to mitigate digital carbon footprints and promote sustainability within companies operating in Indonesia, the country can draw valuable lessons from the experiences of other nations. Notably, the European Union and the United States of America have already implemented regulations addressing corporate sustainability. By studying and adapting the practices and regulations of these countries, Indonesia can take significant strides towards reducing digital carbon footprint and achieving its sustainability goals and fostering environmentally responsible business practices.

Regulation (EU) 2020/852 on the Establishment of a Framework to Facilitate Sustainable Investment, and amending Regulation (EU) 2019/2088, established on June 18, 2020, emphasizes the importance of sustainable finance. In point (6), it references the Commission's action plan of March 8, 2018, which outlined a comprehensive strategy to promote sustainable finance. A key goal of

this plan is to redirect capital towards sustainable investments to foster inclusive and sustainable growth. Central to this plan is the creation of a unified system for categorizing sustainable activities. This system is essential for guiding capital flows towards environmentally sustainable economic activities. It acknowledges that achieving sustainability requires a shared understanding of environmental impact. Initially, the focus is on providing clarity about activities that contribute to environmental objectives, such as climate change mitigation, adaptation, water and marine resource management, transitioning to a circular economy, pollution prevention, and biodiversity and ecosystem preservation. While these environmental objectives are prioritized, the plan recognizes the potential for future guidance on activities linked to other sustainability goals, including social objectives.[17]

On February 23, 2022, the Commission introduced a proposal for a Directive focused on corporate sustainability due diligence. The primary objective of this Directive is to promote responsible and sustainable corporate practices while integrating human rights and environmental concerns into a company's operations and governance. These regulations are designed to compel businesses to confront and rectify any harmful consequences arising from their activities, both within and beyond European borders, particularly within their value chains.[18]

During the Digital Decade, Europe faces two crucial challenges: the green transition and the digital transition. These challenges are closely intertwined, and both are vital for Europe's future. Integrating digital technology into our lives has the potential to reduce our carbon footprint. However, it's crucial to ensure that digital technologies don't consume more energy than they save. Currently, digital technologies

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[17] European Parliament and of the Council, 'Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088', (Official Journal of the European Union, 18 June 2022), <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0852&from=EN> accessed 15 September 2023.

[18] European Commission, 'Corporate sustainability due diligence',<https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en> accessed 15 September 2023.

account for 8-10% of our energy consumption and 2-4% of greenhouse gas emissions, which, while small in percentage, translate to significant numbers. There are steps we can take to reduce our environmental impact in the digital realm. For instance, extending the lifespan of smartphones by just one year could save 2.1 Mt CO2 per year by 2030, equivalent to removing one million cars from the roads. Transitioning from 4G to 5G networks can reduce energy consumption by up to 90%. The EU is actively researching and pursuing these opportunities. It plans to update existing laws and introduce new measures to align with its green and digital goals for the next decade. One such measure aims to make data centers climate-neutral, energy-efficient, and sustainable by 2030. The European Commission has proposed a Green Deal Industrial Plan to support its ambition of achieving climate neutrality by 2050 while enhancing Europe's competitiveness in net-zero industries. A key aspect of this plan is ensuring access to crucial technologies, products, and solutions necessary for the transition to net-zero, including photovoltaic cells, wind turbines, batteries, hydrogen electrolyzers, carbon capture and storage equipment, and more. These products and solutions also offer significant economic growth and job opportunities in Europe. To achieve these goals, the plan outlines strategies to expedite investment and financing for clean tech production in Europe, positioning the EU at the forefront of the clean tech revolution. Additionally, it explores innovative ideas such as temporary flexibility in state aid rules and leveraging existing EU-level funds for clean tech innovation, manufacturing, and deployment.[19] Climate change and environmental degradation pose existential threats globally and to Europe. To confront these challenges, the European Green Deal is poised to reshape the EU into a modern, resource-efficient, and competitive economy. Its key objectives include achieving net-zero greenhouse gas emissions by 2050, decoupling economic growth from resource consumption, and ensuring inclusivity, leaving no one and no place behind. Moreover, the European Green Deal serves as a vital path out of the COVID-19 pandemic. Approximately one-third of the €1.8 trillion investments allocated from the NextGenerationEU Recovery Plan, alongside funding from the EU's

[19] European Commission, 'Green Digital Sector', <https://digital-strategy.ec.europa.eu/en/policies/green-digital> accessed 16 September 2023.

seven-year budget, will underpin the initiatives of the European Green Deal.[20]

In the United States, Under Executive Order 14008, the President's goal is net-zero GHG emissions by 2050, aligning with the Paris Agreement's 50-52% reduction below 2005 levels by 2030. Executive Order 13990 prioritizes science-based policies to protect the environment and public health, reduce emissions, and promote environmental justice. Concurrently, digital asset electricity use surged in the US, with Bitcoin mining rising from 4.5% to 37.8% between January 2020 and January 2022. To uphold emission reduction commitments, the federal government must ensure digital asset usage aligns with climate objectives, in line with improving public health, environmental welfare, and environmental justice.[21] The US's commitment to achieving net-zero emissions by 2050 and a net-zero power sector by 2035 is vital for national security and prosperity. The energy sector is a significant contributor to global greenhouse gas emissions, making its decarbonization crucial to limit global warming. President Biden's Build Back Better Agenda emphasizes sustainable investments to lead in clean energy, build resilient energy systems, and create future-proof jobs while addressing climate change. Climate objectives are integrated into US diplomacy, starting with energy diplomacy, led by the Bureau of Energy Resources (ENR). ENR's mission includes supporting power sector decarbonization, enhancing resilience and access, ensuring energy security in key regions, securing critical mineral supply chains, implementing targeted energy sanctions, and advancing US goals in international energy organizations.[22] The Build Back Better Framework prioritizes American-made clean energy technology, such as wind turbine blades, solar panels, and electric cars, using domestic steel and materials. This initiative aims to generate

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[20] European Commission, 'A European Green Deal', <https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en> accessed 16 September 2023.

[21] The White House, 'Climate and Energy Implications of Crypto-Assets in the United States Report' (The White House, September 2022), <https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-Crypto-Assets-and-Climate-Report.pdf> accessed 16 September 2023.

[22] U.S. Department of State, 'Policy Issues: Energy', <https://www.state.gov/policy-issues/energy/> accessed 16 September 2023.

hundreds of thousands of jobs within the United States. Additionally, it promotes environmental justice through the Clean Energy and Sustainability Accelerator, which funds projects across the nation. Importantly, 40% of the investment benefits will be directed towards disadvantaged communities, aligning with the President's Justice40 initiative.[23]

In July 2021, the SEC revealed plans to introduce mandatory sustainability risk disclosures, set to take effect within a year. This regulation aims to standardize and enhance the consistency and comparability of information. It will address issues like ensuring that a fund's name accurately reflects its sustainability focus, especially with the substantial growth in sustainable investment options.[24]

In the United States, environmental, social, and governance (ESG) considerations were traditionally driven by voluntary market responses. However, over the past 18 months, there has been a rapid transformation in the regulatory landscape. The U.S. Securities and Exchange Commission (SEC), the Biden Administration, and state-level regulations have all played a role in this shift. President Biden's February 2021 executive order mandated the federal government's involvement in assessing, disclosing, and mitigating climate-related risks across the economy. The SEC, in response, initiated a comprehensive approach to address climate change and ESG risks, including the establishment of a Climate and ESG Task Force within the Division of Enforcement. The SEC requires public companies to disclose information, including ESG-related risks, that may be material to investors. While not ESG-specific, the SEC's guidance in January 2020 encouraged the inclusion of Key Performance Indicators related to ESG, like energy consumption and employee turnover, in Management's Discussion and Analysis (MD&A) disclosures. In August 2020, the SEC revised Regulation S-K to mandate descriptions of a company's "human capital resources" when material to understanding the business. This includes any human capital measures or objectives, such as those related to personnel development, attraction, and retention, as relevant

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[23] The White House, 'The Build Back Better Framework', <https://www.whitehouse.gov/build-back-better/> accessed 16 September 2023.

[24] Cube, 'Emerging regulations for ESG disclosure', <https://www.cube.global/resource/emerging-regulations-for-esg-disclosure/> accessed 16 September 2023.

to the company's business and workforce. These changes reflect the evolving landscape of ESG regulations in the United States.[25]

The policy paper "The Long-Term Strategy of the United States – Pathways to Net-Zero Greenhouse Gas Emissions by 2050" outlines the strategy to decarbonize US industry, aiming to reduce net greenhouse gas emissions by 50%–52% by 2030. Similarly, the UK government's "Industrial Decarbonization Strategy" seeks to cut emissions by about two-thirds by 2035 and up to 90% by 2050. Addressing the digital carbon footprint is crucial for sustainability strategies of organizations. The concept of digital decarbonization is relatively underexplored in academic literature, with only limited references in non-academic sources. Digital decarbonization typically refers to how digital technologies can reduce greenhouse gas emissions and promote clean energy innovations. Despite the potential benefits of digital innovations for climate goals, it's essential to recognize that digitalization itself can increase an organization's carbon footprint. Digitalization currently contributes to around 4% of global greenhouse gas emissions. The widespread adoption of 5G technology is leading to exponential growth in data volume, with approximately 2.5 quintillion bytes of data generated daily, with 55% considered "Dark Data" – data that organizations collect but don't use effectively. Storing and processing this data requires substantial energy use, contributing to increased greenhouse gas emissions. This poses a significant challenge to achieving net-zero emissions, especially as the energy sector is a significant emitter of greenhouse gases. To address this, organizations must focus on how knowledge and data are utilized and reused. Facilitating knowledge reuse can reduce the need for data searches, data infrastructure, and knowledge storage, ultimately leading to reduced energy consumption and a smaller digital carbon footprint for organizations.[26]

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[25] ICLG, 'Environmental, Social, and Governance Law', <https://iclg.com/practice-areas/environmental-social-and-governance-law/usa> accessed 16 September 2023.

[26] Thomas W. Jackson and Ian Richard Hodgkinson, 'Keeping a lower profile: how firms can reduce their digital carbon footprints', <https://www.emerald.com/insight/content/doi/10.1108/JBS-03-2022-0048/full/pdf?title=keeping-a-lower-profile-how-firms-can-reduce-their-digital-carbon-footprints> accessed 17 September 2023.

Digital Decarbonization focuses on the responsible and efficient use of knowledge and data within organizations, aiming to minimize data-related carbon emissions as part of sustainability strategies. It involves optimizing data generation, processing, and storage to align with sustainable practices, reducing the carbon footprint associated with data management. While global efforts toward achieving net-zero emissions have primarily focused on physical decarbonization activities and promoting digital alternatives to physical processes, the environmental impact of digitalization itself has been overlooked. This encompasses data generation and storage by individuals and IoT devices, as well as increased online technology usage in society. In terms of sustainability, organizations are evaluated using the ESG (Environment, Social, Governance) framework, which helps investors assess an entity's performance against specific criteria to make informed investment decisions.[27]

In Indonesia, there is a growing recognition among investors and policymakers of the significance of Environmental, Social, and Governance (ESG) measures in safeguarding businesses against future risks.

Empirical studies consistently demonstrate a positive correlation between ESG implementation and a company's financial performance. Strong ESG practices facilitate market entry and business expansion, as more countries streamline permit issuance for such companies, as explained by Coordinating Minister Airlangga. Robust governance practices enable businesses to navigate various pressures from regulators, environmental activists, labor unions, and other stakeholders. Additionally, consumers show a preference for product brands that uphold ethical values and environmental responsibility. The investment landscape in ESG and Sustainable Development Goals (SDG) themes is on the rise as investors increasingly prioritize sustainability concerns. In 2016, the Indonesian Stock Exchange listed just one ESG product, but by 2021, the number surged to 15 products valued at IDR 3.45 trillion. The government has also issued its first SDG Bond in 2021,

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[27] Jane Courtnell, 'ESG Reporting: How Does It Differ From Sustainability Reporting?', (Green Business Bureau, June 20, 2020), <https://greenbusinessbureau.com/esg/esg-reporting-and-sustainability-reporting/> accessed 17 September 2023.

alongside SDG-themed bonds totaling IDR 35.2 trillion. Furthermore, Indonesia's commitment to sustainable development is underscored by its inclusion of Energy Transition as a top priority during its G20 Presidency. This commitment has resulted in the launch of the Country Platform for the Energy Transition Mechanism in collaboration with ADB and PT SMI. This platform serves as a financing framework for sustainable energy transition, mobilizing funds from both the public and private sectors, and can serve as a model for other countries to adopt based on their specific needs.[28] However, applying ESG principles to investments in Indonesia comes with its share of challenges. Research conducted by the Mandiri Institute sheds light on the obstacles faced by asset managers in the country. The survey findings reveal a limited understanding of how ESG considerations can enhance investment decisions. Furthermore, participants in the survey expressed difficulties in accessing relevant ESG data sources. Among the challenges identified are the complexity in defining ESG criteria and the struggle to integrate ESG factors into quantitative models. Another issue is the perceived lack of incentives in the form of ESG projects, funding, and supportive policies. Some respondents also believe that ESG may not have a substantial financial impact on companies or may not currently align with their specific business conditions. Additionally, there is a perceived lack of demand for ESG-related investments from various stakeholders. Overall, ESG is seen as offering relatively limited long-term benefits for companies operating in Indonesia. These challenges reflect the current landscape of ESG adoption in the country.[29]

Both the EU and the US have introduced guidelines and standards to promote environmentally friendly digital practices. These regulations encourage companies to minimize their energy

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[28] Coordinating Ministry for Economic Affairs, 'Sokong Pembangunan Berkelanjutan, Implementasi Langkah-Langkah ESG Sekaligus Lindungi Bisnis dari Risiko Tak Terduga di Masa Depan', <https://ekon.go.id/publikasi/detail/4394/sokong-pembangunan-berkelanjutan-implementasi-langkah-langkah-esg-sekaligus-lindungi-bisnis-dari-risiko-tak-terduga-di-masa-depan> accessed 17 September 2023.

[29] Justina Nur Landhiani, 'Inilah Berbagai Tantangan dari Penerapan ESG di Indonesia', (Trenasia, June 29, 2023), <https://www.trenasia.com/inilah-berbagai-tantangan-dari-penerapan-esg-di-indonesia> accessed 17 September 2023.

consumption and adopt eco-friendly approaches in their digital operations.

D. Conclusion

Indonesia has established regulations for reducing carbon footprints across various sectors, but it has yet to address digital carbon footprints specifically. Existing environmental policies may not fully encompass the environmental impact of digital technologies and data-related activities. Consequently, there is a pressing need for Indonesia to develop targeted regulations focused on reducing digital carbon footprints in alignment with global sustainability trends.

From the European Union (EU) and the United States (US), Indonesia can learn valuable lessons on curbing digital carbon footprints. Firstly, implementing regulations centered on digital sustainability is critical. These regulations should establish clear standards and guidelines for eco-friendly digital operations. Similar to the EU and US, Indonesia can promote energy-efficient practices, responsible data management, and the reduction of digital waste through such regulations. Secondly, integrating Environmental, Social, and Governance (ESG) reporting into investment strategies is essential. ESG reports enable companies to prioritize sustainability, including environmental and energy considerations. By incorporating ESG principles into their investment decisions, Indonesian firms can work towards reducing their digital carbon footprint, encouraging energy-efficient digital processes. In summary, Indonesia should consider adopting regulations that incorporate ESG principles into its investment climate and business practices. This approach will enhance corporate sustainability and contribute to a reduction in the country's digital carbon footprint. Learning from the experiences of the EU and US can guide Indonesia toward a more sustainable digital future.

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The environment is where we all meet; where we all have a mutual interest; it is the one thing all of us share.

Lady Bird Johnson

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