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The Importance of Environmental, Social, and Governance (ESG) Principles in Public Works and Housing Infrastructure

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ABSTRACT

Public Works and Housing (PWH) infrastructure including water sector, transportation, housing, energy, and telecommunications, is the bedrock of societal progress. However, it also carries substantial environmental responsibilities, contributing approximately 79% of global greenhouse gas emissions, according to UNOPS. The integration of ESG principles provides a framework to mitigate these environmental impacts and promote sustainable development. Beyond environmental considerations, this study delves into the social and governance dimensions of ESG, emphasizing their significance in PWH infrastructure projects. Methodologically, this research employs a conceptual study approach, encompassing a comprehensive literature review and thematic analysis. The literature review draws from reliable sources, including scientific journals, research papers, books, and reputable publications, to explore the multifaceted aspects of ESG in PWH infrastructure. This analysis is structured around four core themes: (1) Sustainable Infrastructure Development, (2) Quality Infrastructure Investment and ESG Investing, (3) Success Story of the Implementation of ESG Principles into PPP Infrastructure Project, and (4) ESG Principles Implementation for Infrastructure Project in Indonesia. In conclusion, the adoption of ESG principles in PWH infrastructure projects is essential enhancing project sustainability and increasing access to funding. In term of enhancing project sustainability, ESG principles may reduce project risk and also its negative impact. On the other hand, it also increases access to funding such as the case with the Solar PPP Project in Uzbekistan and Cambodia which gains further financing from MDB and foreign loan. Since it is still in its early development stage in Indonesia, there is many strategies to be explored to further accelerate the implementation of ESG principle especially for PPP projects.

Keywords: ESG principles, Public Works and Housing infrastructure, PPP projects, sustainable infrastructure financing

SARI PATI

Infrastruktur Pekerjaan Umum dan Perumahan (PUPR), termasuk sektor air, transportasi, perumahan, energi, dan telekomunikasi, menopang kesejahteraanmasayarakat. Namun, pengembangan infrastruktur tersebut juga memiliki dampak yang signifikan terhadap lingkungan. Menurut UNOPS, infrastruktur berkontribusi sekitar 79% terhadap emisi gas rumah kaca global. Integrasi prinsip Environmental, Social, and Governance (ESG) memberikan kerangka kerja untuk mengurangi dampak negatif terhadap lingkungan dan mendorong pembangunan berkelanjutan. Di luar aspek lingkungan, penelitian ini juga mengekslorasi aspek sosial dan tatakelola dalam menunjang keberlanjutan proyek terutama pada proyek infrastruktur PUPR. Secara metodologis, penelitian ini menggunakan pendekatan studi konseptual, mencakup tinjauan pustaka komprehensif dan analisis tematik. Tinjauan pustaka mengambildari berbagai sumber termasuk jurnal ilmiah, makalah penelitian, buku, dan publikasi terkemuka, untuk menganalisis pentingnya penerapan prinsip ESG dalam pembangunan infrastruktur PUPR. Analisis ini terstruktur dalam empat tema inti: (1) Pembangunan Infrastruktur Berkelanjutan, (2) Investasi

Infrastruktur Berkualitas dan Investasi ESG, (3) Kisah Sukses Implementasi Prinsip ESG dalam Proyek Infrastruktur KPBU, dan (4) Implementasi Prinsip ESG untuk Proyek Infrastruktur di Indonesia. Kesimpulan yang didapatkan yaitu, penerapan prinsip ESG dalam proyek infrastruktur PUPR penting untuk meningkatkan keberlanjutan proyek dan meningkatkan akses ke pendanaan. Dalam hal meningkatkan keberlanjutan proyek, prinsip-prinsip ESG dapat mengurangi risiko proyek dan dampak negatif yang ditimbulkan selama atau setelah pembangunan. Di sisi lain, hal ini juga meningkatkan akses ke pendanaan, seperti pada Proyek KPBU Tenaga Surya di Uzbekistan dan Kamboja yang mendapatkan pendanaan tambahan dari Lembaga Keuangan Multilateral dan pinjaman asing. Di Indonesia, prinsip ESG masih berada dalam masa awal perkembangan sehingga terdapat ruang untuk menerapkan strategi yang dapat mempercepat implementasi prinsip ESG terutama pada proyek KPBU.

Kata Kunci: ESG principles, Public Works and Housing infrastructure, PPP projects, sustainable infrastructure financing

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INTRODUCTION

Environmental, Social, and Governance (ESG) is a framework used to assess the sustainability of a business or a project in three main aspects. The rise in popularity of ESG stems from the issue of sustainability. The focus of a business or a project is no longer about profit margin and generating as much revenue as possible, but it also takes into account the impact for society in the long-run. In the context of infrastructure development, ESG most commonly includes the consideration on Greenhouse Gas (GHG) emission in utilities, transport and thermal energy generation, as well as physical climate in all type of infrastructure (OliverWyman, 2020). But in actuality, the nature of ESG not only accommodate environmental issue but also the social and governance side of it.

Although infrastructure especially Public Works and Housing (PWH) infrastructure plays a critical role in enabling development, it is also responsible for the majority of the GHG emotion worldwide with the estimate from the UNOPS that it contributes around 79 % of the total emissions, most of which is associated with energy, building and transport (UNOPS, 2021). The breakdown of the 79% of the GHG emission produced by the infrastructure sector is 37% in energy, 17 % building, 16% in transport, and the rest is water, waste management, and digital communication with the total of 8%. In addition to that, the relationship between infrastructure and sustainable development is especially interlinked, by which from all of the SDGs targets, infrastructure systems influence 17 SDGs targets and directly linked to the achievement of each of the target. Infrastructure should be understood as a system, it has cyclical relationship with built and natural environment as well as enabling environment.

Moreover, there is an urgent need to develop alternative and creative financing scheme to fund for infrastructure development in Indonesia in order to fulfill more than IDR 6,455 trillion or around USD 419 billion of infrastructure funding gap in 2020-2024 alone. By implementing ESG principles, it would allow the project to access wider pool of investment since currently, investing in ESG is ‘soaring’ as Forbes dubbed it in 2022. After the UN Climate Conference in Egypt, 2022 PwC reports estimated that ESG investment would reach USD 33.9 billion by 2026. The rise of ESG investing is seen across the world on all sector. The global sustainable

finance market size is beyond 50 trillion dollars with increase of 43% Compound Annual Growth Rate (CAGR) in 2022 including sustainability linked bond, sustainability bond, social bond, and green bond (Whiteshield, Bloomberg, et al, 2022). Failure to implement ESG principles into projects may cause the government to lose capital. Major banks such as HSBC is also accounting for potential ESG impacts as a part of the screening process.

Although important, implementing ESG principles into a project life-cycle possesses tough challenges, especially regarding additional cost and time. In regard to PWH infrastructure financing, in 2022 the Ministry of Finance (MoF) Republic of Indonesia has launched ESG Framework and Manual to be used by the Government Contracting Agency (GCA) as well as Special Mission Vehicles (SMVs) under MoF in undertaking Public Private Partnership (PPP) projects which receives government support and facilities. These guidelines will encourage ESG principles implementation, but the challenge remains to convince every party involved that implementing ESG principles is paramount to the success of the project in the long-run.

Therefore, this study aims to understand the importance of implementing ESG principles in Public Works and Housing infrastructure especially in PPP project provision as the first step toward its implementation.

RESEARCH METHOD

This study is conducted through conceptual study by which the authors observe and analyze existing information on the topic of ESG in PWH infrastructure and drawing conclusion from the relevant information and data. Step by step of the study is as follow:

1) Literature review and thematic analysis from relevant reliable sources of data including scientific journals, research papers, as well as books, and popular publications. The literature review is divided into four themes which are considered the most relevant and appear recurringly on the subject of the application of ESG principles for infrastructure development. The breakdown is shown in Table 1.
2) Conclusion is derived from thematic analysis according to the literature review conducted. All the data used is secondary data available from various journals, papers, and publication.

RESULT AND DISCUSSION

Literature Review

1. Sustainable Public Infrastructure Development

a. An Overview of Sustainable Infrastructure and the Issue of Funding Gap

Sustainable infrastructure is defined as an infrastructure system which is strategically developed, designed, built, operated, and decommissioned in a way that guarantees enduring sustainability across economic, financial, social, environmental, and institutional dimensions throughout the entire life cycle of the infrastructure. (United Nation Environment Programme, 2022). The Sustainable Infrastructure Action Plan 2009-2011, as outlined by the World Bank in 2008, articulates the role of sustainable infrastructure in the following ways: a) Improving access to fundamental infrastructure sectors (i.e., transportation, energy, water, and information and communication technologies) particularly in developing nations. b) Enhancing infrastructure efficiency through a concentrated effort to solve cross-sectoral challenges. This includes addressing infrastructure's role in climate change mitigation and adaptation, the implementation of PPP in delivering infrastructure services, and exploring innovative methods to

Table 1. Literature Review Framework

Theme	Subtheme	Literatures
Sustainable Public infrastructure development	An Overview of Sustainable Infrastructure and the Issue of Funding Gap	- International Good Practice Principles for Sustainable Infrastructure: Integrated, Systems-Level Approaches for Policymaker Second Edition (United Nations Environment Programme, 2022) - Sustainable Infrastructure: An Overview, Placing Infrastructure in the context of sustainable development (The University of Cambridge Institute for Sustainability Leadership, 2020) - International Standards for Sustainable Infrastructure: An Overview (Sustainable Infrastructure Alliance, 2020)
	Environmental, Social, and Governance Impact of Infrastructure Development	- Infrastructure for Sustainable Development (Thacker, et al. 2019 published on Nature) - Infrastructure for Climate Action (UNOPS, 2021) - ESG Financing for PPP Project Presentation (Hayek Associates, 2019)
Quality Infrastructure Investment and ESG Investing	Quality Infrastructure Investment	- Quality Infrastructure Investment in Asia, Background Note for the 2022 OECD-ADBI High-Level Seminar (OECD, 2022) - Compendium of Quality Infrastructure Investment Indicators developed for the G20 (Infrastructure Working Group G20, 2022)
	The Rise of ESG Investing	- Trends in ESG Investing and Quality Infrastructure Investment in Asia-Pacific (OECD, 2022) - Integrating ESG Factors into Financial Models for Infrastructure Investments (WWF, 2019)
Success Story of the Implementation of ESG Principles into PPP Infrastructure Project		- Uzbekistan PPP Solar Project, Project Overview, Document, and Datasheet (ADB, 2022) - Cambodia Solar Power Project, Project Overview, Document, and Datasheet (ADB, 2017) - Promoting PPPs as part of ADB's Commitment to becoming the Climate Finance Bank for Asia Pacific Presentation (ADB, 2022)
ESG Principles Implementation for Infrastructure Project in Indonesia		- Environment, Social, and Governance (ESG) Framework in Government Support and Facility for Infrastructure Financing (Ministry of Finance Indonesia, 2022) - Environmental, Social, and Governance Manual (Ministry of Finance Indonesia, 2022)

support infrastructure development for rural-urban integration and overall development. c) Emphasizing a comprehensive approach that considers social and environmental objectives alongside economic and financial factors. This approach also ensures affordability while maintaining strong governance practices.

Sustainable infrastructure investments are needed to achieve SDGs and Paris Agreement as a review conducted by scholars of Oxford University, the UN, and the World Bank found that infrastructure has a substantial influence on 72% of the Sustainable Development Goals (SDGs), taking into account both its favorable contributions and possible adverse effects goals (Sustainable

Infrastructure Allience, 2020). Sustainable infrastructure can facilitate inclusive economic growth, improve access to essential services, and advance environmental sustainability. Therefore, it is regarded as the cornerstone for attaining all 17 SDGs (Yamanandra, S. 2020).

While infrastructure is explicitly addressed in Sustainable Development Goal 9 (SDG 9), which focuses on industry, innovation, and infrastructure, it plays a pivotal role in achieving a broader array of sustainable development benefits (Thacker, et al., 2019). Infrastructure serves as a foundation for various facets of society and the economy, impacting multiple SDGs across the Sustainable Development Agenda. It underpins goals related to poverty reduction, access to clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11), responsible consumption and production (SDG 12), climate action (SDG 13), life below water (SDG 14), and life on land (SDG 15), among others. In essence, infrastructure is an enabler of sustainable development, contributing not only to economic growth and industrialization but also to social well-being and environmental sustainability. Recognizing its cross-cutting influence on various SDGs highlights the central role infrastructure plays in advancing the global sustainability agenda.

The funding required for sustainable infrastructure to effectively achieve the SDGs are substantial and surpass the available current public resources. This financial gap, known as the sustainable infrastructure financing gap, is currently estimated at approximately USD 2-3 Trillion annually. According to the World Bank, closing this gap through investment is of crucial importance to achieve all 17 SDGs, with a particular focus on developing countries, which account for 70% of the unmet demand for infrastructure. To fulfill the SDGs, investment across various infrastructure sectors, including water, energy, transportation, communication, and other essential services, will be imperative. The sustainability of infrastructure planning and investment will play a pivotal role in ensuring a livable built environment at both local and global levels. The services provided by infrastructure directly contribute to advancing economic development, creating employment opportunities, and benefiting marginalized and vulnerable populations by facilitating connections and services (The World Bank, 2018 and Global Commission on the Economy and Climate, 2018).

b. *Environmental, Social, and Governance Impact of Infrastructure Development*

Public infrastructure systems serve as the foundation of any society, offering vital services such as energy, water supply, waste management, transportation, and telecommunications. While infrastructure plays a pivotal role in enhancing societal well-being, it can also generate adverse social and environmental consequences, increase susceptibility to natural disasters, and burden future generations with unsustainable debt. Globally, investments in infrastructure have reached unprecedented levels, shaping the trajectory of development for generations to come. These investments, primarily driven by the goals of bolstering economic productivity and employment, have wide-ranging implications.

The development of infrastructure systems is not without their adverse impacts. The social and environmental consequences of infrastructure can be profoundly detrimental, both directly during construction and in more systemic ways, extending beyond the lifespan of these assets (Thacker, et al., 2019). The construction of infrastructure often displaces people, and while it does create employment opportunities, it can also subject workers to hazardous conditions. Fossil-fuel power stations, for instance, contribute to harmful air quality and greenhouse gas emissions. The development of transport infrastructure, including roads, railways, airports, ports, and inland waterways, can result in habitat destruction and fragmentation, providing access that encourages the overexploitation of natural resources. Infrastructure can also heighten vulnerability to both natural and human-made hazards. For example, it can encourage development in high-risk areas like floodplains and mountainsides. Given their central role of infrastructure for socioeconomic development and activity, infrastructure network systems represent critical points of vulnerability to natural disasters and are targets for security threats.

The UNOPS through the Infrastructure for Climate Action reports has several key findings on the negative impact of infrastructure as well as its mitigation n strategy which are: 1) Regarding GHG, infrastructure is responsible for a significant 79% of all greenhouse gas emissions, with the energy, transport, and buildings sectors being the primary contributors. 2) Regarding adaptation costs, a substantial 88% of all adaptation costs are associated with infrastructure. The water sector is expected to require 54% of future adaptation costs due to its hazard protection capabilities against climate impacts like floods, sea-level rise, and storm surges. Nature-based solutions, such as reforestation and wetlands, offer cost-effective alternatives with co-benefits including carbon sequestration and habitat enhancement. 3) Regarding Integrated Approach, transformative change in infrastructure development requires an integrated approach, considering synergies and trade-offs between sectors. (UNOPS, 2021) On the flip side, infrastructure is crucial in mitigating human's impact on the environment, particularly by enabling urbanization through system of waste management, clean water, and transport circulation. There is a growing interest in replacing 'grey infrastructure' with 'green infrastructure,' such as using ponds and reed beds for sewage treatment, wetlands to recharge groundwater aquifers, and afforestation as a substitute for flood protection (The Global Commission on the Economy and Climate, 2016; Scholz, M. & Lee, B.H., 2005; Dadson, S. J. et al., 2017).

Furthermore, in infrastructure projects, the presence of inadequate governance can lead to significant adverse outcomes, as exemplified by the case of the "Big Dig" in Boston. This massive endeavor involved rerouting an interstate highway into a long tunnel and constructing a new bridge and greenway. The project suffered from inadequate long-term planning, leading to cost overruns, delays, and design flaws. Instances of corruption, including the use of substandard materials, resulting in legal actions against six individuals also happened. Escalating costs, with

an initial budget of $2.8 billion and a planned 1998 completion date, eventually exceeding $24 billion causes the project to be also completed much later in 2007 (Hawkesworth writing for World Bank Blogs, 2022). This case is an example of the vital importance of robust governance, transparency, and oversight in infrastructure projects to ensure cost-effectiveness, safety, and timely completion.

On regard to the social impact of an infrastructure project, the study case such as the US$3.8 billion Dakota Access Pipeline which experienced delays and cost overruns due to protests and legal challenges resulting in a US$7.5 billion loss for Energy Transfer Partners (ETP) and its partners is one cautionary tale. ETP's stock price dropped by 20 percent during peak opposition, and banks involved in financing the project faced protests and boycott calls. This case highlights the need for the government, investors, developers, and operators to better understand, engage with, and manage the social aspects of their projects. Social issues such as inadequate planning, restricted access to natural resources, lack of community benefits, and insufficient consultation, have led to conflicts and project disruptions in the past (Whistler writing for Principle for Responsible Investment Website, 2019).

2. *Quality Infrastructure Investment and ESG Investing*

a. *Quality Infrastructure Investment*

The Quality Infrastructure Investment (QII) principles advocate for an infrastructure development approach that prioritizes long-term benefits while keeping costs low. This approach aims to contribute to sustainable growth, well-being, environmental conservation, enhanced economic activity, and financial sustainability. It emphasizes the importance of infrastructure's longevity and its long-term cost-effectiveness, seeking to maximize both social and economic returns on investment over time. Adherence to QII principles is crucial because positive infrastructure impacts can create attractive investment opportunities in the infrastructure asset class. Aligning with these principles is seen as a means to mobilize capital and address the infrastructure gap effectively. (Infrastructure Working Group G20, 2022).

Infrastructure investments face long-term and complex risks, posing challenges for investors in term of its risk assessment and management. Therefore, it should consider economic, environmental, social, and governance aspect. While some institutional investors find these assets appealing for asset-liability management, actual investment remains limited. To facilitate better decision-making, implementing the tool such as QII principles become important. The QII Principles were introduced at the G7 Ise-Shima summit in 2016, expanded to six at the G20 Osaka Summit in 2019, and reaffirmed by the G7 at the Carbis Bay Summit in 2021. In 2019, the G20 endorsed the G20 Principles for Quality Infrastructure Investment (QII), which are voluntary and non-binding guidelines reflecting the G20's vision for Quality Infrastructure Investment (QII). The preamble acknowledges infrastructure's role in economic prosperity and the importance of quality infrastructure in maximizing positive impacts. The QII principles highlights sustainability considerations,

emphasizing alignment with the 2030 Agenda for Sustainable Development throughout the infrastructure's life cycle. These principles align with the Sustainable Development Goals (SDGs), particularly SDG 9, emphasizing resilient infrastructure, and contribute to achieving various other SDGs that rely on sustainable, resilient, and inclusive infrastructure (World Bank Group, 2021).

b. *The Rise of ESG Investing*

Infrastructure investments must incorporate environmental, social, and governance (ESG) principals to align with the SDGs and the Paris climate agreement. Historically, ESG was a neglected aspect in infrastructure investment due to high costs and resistance to change. However, three key factors have shifted this perspective. First, changing social and political pressures highlight the true cost of ignoring ESG risks. Second, recognition that ESG integration can mitigate financial risks and improve returns. Third, growing demands from investors and project owners have shifted ESG from a niche concern to a mainstream consideration. (Sustainable Infrastructure Alliance, 2020).

The Callan Institute, in its annual survey on ESG adoption among investors, discovered that as of 2018, 72% of major investment funds had already integrated ESG standards into their investment decision-making processes. The percentage of respondents incorporating ESG standards nearly doubled between 2013 and 2019, increasing from 22% in 2013 to 42% in 2019. The primary motivation for including ESG factors was fiduciary responsibility, although stakeholder concerns and the prospect of improved risk profiles were also

Table 2. QII Principles Overview

QII Principle	Summary
Principle 1: Maximizing the positive impact of infrastructure to achieve sustainable growth and development	The first principle aims for broad availability, accessibility, inclusivity, and benefit to all while considering local conditions and compliance with laws.
Principle 2: Raising Economic efficiency in view of life-cycle cost	The second principle is about the importance of considering the full life-cycle cost of infrastructure investments for efficiency.
Principle 3: Integrating environmental considerations in infrastructure investments	The third principle is about environmental considerations in quality infrastructure. It should align with national strategies, emissions goals, and communicate environmental impact transparently throughout its life cycle.
Principle 4: Building resilience against natural disasters and other risks	The fourth principle acknowledges emphasizes the importance of adaptability and resilience to address increasing disasters and environmental changes.
Principle 5: Integrating social considerations in infrastructure investment	The fifth principle point out that infrastructure should enable the economic and social inclusion of all, with a focus on assessing economic and social impacts throughout the project's life cycle as a key quality measure.
Principle 6: Strengthening infrastructure governance	The sixth principle stresses governance with clear rules, strong institutions, and international commitment adherence in public and private sectors. This promotes private sector involvement, anti-corruption measures, and responsible business conduct.

significant factors. (Callan Institute, 2019). HSBC's 2019 Sustainable Finance and Investor Survey reported that 94% of investors and 93% of financial issuers view ESG as important. Globally, 62% of investors have ESG policies. In Asia, 86% of investors consider ESG important, with 49% having ESG policies, slightly below the global average. (HSBC, 2019). The importance of ESG principle to create a sustainable environment of investment cannot be overstated. Throughout the year, especially from 2013-2019 there is a significant rise of changing priorities of investor in supporting more investment in ESG. EMPEA Global Limited Partners Survey reports that in 2019 around 34 percent of investor supported ESG investing, a sharp increase from only around 25 percent in 2013. This trend is more than likely to continue since implementing ESG in a project benefits every stakeholder greatly in the long run. (EMPEA Global Limited Partners Survey, 2019).

Multinational Development Banks (MDBs) are vital financiers of infrastructure projects in developing countries, contributing significantly to climate goals and nationally determined contributions (NDCs). Their impact extends through direct investments, mobilizing additional funds, and setting industry standards. These standards are often adopted by other financial institutions, companies, and governments involved in MDB-funded projects. In recent years, there's been a noticeable shift towards greater environmental consideration in investments, with MDBs implementing standardized processes for assessing climate risk. In 2018, collective climate adaptation financing by MDBs reached a record-high of US$43.1 billion, a 22% increase from the previous year. (World Bank, 2019).

In recent years, international standards for implementing ESG in infrastructure projects have emerged with varying characteristics. The choice of a standard depends on investor and project owner priorities. For instance, the SuRe® standard offers objectivity and transparency but involves greater time and cost due to extensive criteria and third-party verification. Simpler standards like the IFC Performance Standards and Equator Principles require less effort but offer reputational benefits. Consideration also includes the time frame, as some standards focus on design and construction, while others require ongoing certification. As ESG standards evolve, they may become more critical, initially impacting sectors with environmental sensitivities. Initiatives are underway to align various sustainable infrastructure indicators through collaboration between schemes like SuRe®, IS, ENVISION®, CEEQUAL, and GRESB, funded by the World Bank and the EBRD, fostering greater cooperation among these tools and standards (Sustainable Infrastructure Alliance, 2020).

Global efforts to boost infrastructure investment are in progress, bolstered by the G20's 2018 Roadmap to Infrastructure as an Asset Class with the goal of improving the investment environment, standardizing contracts, and enhancing data availability. In 2019, the G20 endorsed The Principles for Quality Infrastructure Investment, encompassing six principles that integrate environmental, social, and governance (ESG) factors, crucial throughout the infrastructure

Table 3. Existing International ESG Standards for Infrastructure Project

Type	ESG Tools and Standards
Standard with third-party certification	-CEEQUAL (Civil Engineering Environmental Quality Assessment) (2002) -IS Rating, IS Operation, and IS International Scheme (2015) -SuRe® (Standard for Sustainable and Resilient Infrastructure) (2015) -ENVISION® (2015)
Set of standards with guideline character	IFC Performance Standards, Equator Principles (2006)
Global Sustainability Benchmark with third party verification	GRESB Infrastructure Assement (2016)
Global Development Framework	UN SDGs (2015)
Toolkit for Practical Guidance on Assessing and Managing ESG Factors	Commonwealth Development Corporation (CDC) ESG Toolkit for Fund Managers (2007)

lifecycle. (Global Infrastructure Hub, 2022). Throughout the lifespan of infrastructure assets, encompassing development, construction, operation, and decommissioning phases, various ESG challenges will emerge. These challenges are contingent upon factors like asset type, sector, size, location, and lifecycle stage. Some of these challenges, like rising temperatures, water scarcity, shifting regulations, and tariffs, can originate externally but profoundly affect the asset's functionality and profitability. Others, such as water pollution, community well-being, labor conditions, and externalities, are instigated by the asset itself and impact its surroundings. ESG-related factors, regardless of their influence on or by the asset, can directly or indirectly result in either positive business opportunities or negative risks for infrastructure assets. Positive impacts can lead to financial gains, while negative impacts can lead to financial losses, affecting the financial statements of the asset-holding organization and its investors (Weber et al., 2016).

3. *Success Story of the Implementation of ESG Principles into PPP Infrastructure Project*

The Asian Development Bank (ADB) highlighted the immense need for climate-resilient infrastructure in developing Asia,

	RISKS			BENEFITS		
Impacts on	Vulnerability of asset to extreme whether events	Land planned for development in proximity to important cultural sites	Weak local enforcement of anti-corruption policies	Enabling policy to support or incentivize green infrastructure or renewables	Minority, women, or local labor hiring requirements	Regional government has purchasing requirements and advance business licensure practices
Impacts From	Runoff polluting local water supply leads to environmental non-compliance penalties	Damage to or interference with important cultural sites causes community protests	Bribery allegations leads to legal action against construction contractor	Preservation of or improvements to biodiversity in surrounding ecosystem drive 'eco-tourism' that may increase revenue	Damage to or interference with important cultural sites causes community protests	Bribery allegations leads to legal action against construction contractor

Figure 1. ESG Risks and Benefits – Impacts on vs. Impacts from of an Infrastructure Project

with an annual fund requirement of USD 1.7 Trillion. However, ASEAN nations, including Indonesia, grapple with a significant annual funding gap exceeding USD 100 Billion as of 2021. To address this critical infrastructure funding gap, an escalation of private investment is imperative (Indonesia GIIO Report, 2022). Prominent investors recognize that sustainability is integral to the success of long-term projects, including project developed through Public-Private Partnership (PPP). Governments have yet to fully embrace PPP as a means to achieve Sustainable Development Goals (SDGs) and enhance ESG aspects. This shortfall often stems from a lack of public sector leadership in the realm of PPP and ESG. Furthermore, Multilateral Development Banks (MDBs) traditionally impose specific environmental and social criteria on PPP projects for financing eligibility (Hayek, 2019).

The example of Uzbekistan Solar PPP Project, also known as the Sherabad Solar PPP Project, is a significant initiative in the energy sector. In 2019, the Government of Uzbekistan (GoU) signed a 1 GW solar PPP program with the Asian Development Bank (ADB) to develop and tender multiple solar PPP projects in the country. The first project under this program, the Sherabad Solar PPP Project, involves the design, financing, construction, operation, and maintenance of a 457 MW solar power plant, along with a 52 km long transmission line and a 220 kV project substation. The project was awarded to Masdar, a company from the UAE, in 2021 with a record-low tariff of US$1.80 cents per kWh for the PV plant and US$0.20 cents per kWh for the transmission line. This tariff is highly competitive compared to the average cost of coal generation.

ADB played a crucial role in this project, serving as the Transaction Advisor for GoU. ADB provided assistance in the feasibility study, project structuring, tender preparation, tender management (including the review of technical and financial proposals), and negotiation, as well as support for the commercial closing of the project. To further support the project, ADB's Private Sector Operations Department (PSOD) is offering a Partial Credit Guarantee for power off-take. This guarantee will enable the project company to benefit from a letter of credit backed by ADB for three months of ongoing payment obligations from the off-taker, the National Electric Grid of Uzbekistan (NEGU). In addition to its economic benefits, the project contributes to climate adaptation efforts by diversifying Uzbekistan's energy sources and reducing its dependence on fossil fuels, particularly natural gas. Once the entire 1 GW solar PV program is fully developed, it is expected to significantly reduce carbon dioxide emissions by displacing the widely used natural gas, thereby contributing to the fight against climate change (ADB, 2022).

The project is approved to be given assistance in the form of private sector loan by ADB. The project satisfied three Operational Priorities of ADB relating to ESG which includes: 1) OP2 on accelerating progress in gender equality; 2) OP3 on tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability; and 3) OP6 on strengthening governance and institutional capacity. The project aims to boost renewable energy by promoting private-sector solar photovoltaic power plants. It utilizes innovative strategies like partial credit guarantees (PCGs) and the One ADB approach to streamline government procedures, facilitating private investment in solar projects at competitive tariffs. PCGs play a vital role in building investor confidence by mitigating credit risks

related to the NEGU and ensuring prompt tariff payments. Offering PCGs in a timely manner is expected to achieve multiple goals: attracting private investors, fostering equitable competition, and enabling competitive tariff proposals, even for NEGU, which lacks a well-established payment history. Priority status and government incentives are granted to projects within the medium-term renewable investment program (2021-2025) (ADB Project Data Sheet, 2022).

In Cambodia, the USD 40 Million Solar PPP Project is a collaboration between the public sector which is Electricite du Cambodgie (EDC) and private partner which is Prime Road. It aims to secure 60MW of solar PV power, part of the 100MW Cambodia National Solar Park. ADB Office of Public Private Partnership (OPPP) serves as the PPP advisor. The phase 1 of the project involved constructing and operating Cambodia's first 10 MWp DC utility-scale solar power facility in Bavet City, Svay Rieng Province, near the Vietnam border. It was awarded through a competitive international bidding process, promoting transparency and fair competition. Led by Sunseap, a Singaporean solar developer, the consortium secured the project with a highly competitive tariff lower than Cambodia's average electricity supply cost. Commercial operations started in October 2017, setting a precedent for renewable energy in Cambodia. (ADB Project Overview, 2017). The project has two components: (i) Solar Park which Includes substations, transmission lines, and grid connections; and (ii) Solar PV Power Plant which is Located 60-70 km from Phnom Penh, Prime Road won the 60MW bid with a tariff of $3.9 cents per kWh in 2019, highly competitive compared to the $11 cents per kWh generation cost.

ADB provides transaction advisory services, project structuring, negotiation, tender support, and financial closing assistance for Phase 1. ADB's Private Sector Operations Department (PSOD) offers a loan in partnership with the Canadian Climate Fund for the Private Sector in Asia II. The project contributes to Cambodia's grid and aims to reduce 110,700 tons of CO2 emissions annually by 2023, showcasing the competitiveness of solar projects in Asia. It also has a positive impact on neighboring countries like Vietnam (ADB, 2022). Type or modality of assistance given to the project includes loan by ADB of USD 3.25 million, loan from Canadian Climate Fund for the Private Sector in Asia I of USD 3.25 million, and B-Loan from commercial lender through ADB of USD 2.70 million, all of which has been committed (ADB Project Paper, 2017). The project started construction in September 2016, started generation on 30 August 2017, and achieved commercial operation on October 2017. This project is Cambodia's first large-scale solar power plant and the country's initial renewable energy Independent Power Producer (IPP) project through competitive bidding. ADB's active role in financing this project demonstrates the benefits of increasing Cambodia's power supply using affordable PPP arrangements from local renewable sources. It also shows that private sector-led infrastructure investments can be executed transparently, competitively, and with a solid financing package, signaling this to the government, investors, and international financiers. Both of the projects reap benefit from implementing ESG principle as well as being a sustainable infrastructure project in general.

4. ESG Principles Implementation for Infrastructure Project in Indonesia

Within the specific context of the

Indonesian government, the Ministry of Finance has taken proactive steps to institutionalize ESG principles into project through the standardization of readiness criteria document in order to access government support in project financing. The overarching aim of implementing ESG principles is to contribute to the attainment of Sustainable Development Goals (SDGs) and Environmental and Natural Disaster Challenges (ENDC) targets (Ministry of Finance and UNOPS, 2022). Subsequently, the Government of Indonesia through the MoF has formulated the ESG Framework, serving as the foundational framework for ESG standard guidelines and the basis of the ESG Manual. The framework encourages all stakeholder involved in infrastructure financing to implement ESG principles into projects development. Stakeholders involved includes Ministry of Finance which provides financing support, Government Contracting Agencies (GCAs) and SMVs which applies for support, facility implementer, and Special Purpose Vehicle (SPV) in a PPP project. The framework sets the goal to achieve implementation of ESG principles on all infrastructure projects receiving any kind of government support in every sector by the end of 2025. The roadmap starts by piloting first the ESG principles implementation in PPP projects which aims to earn Project Development Facility (PDF) by the MoF starting from 2022.

In order to push the implementation of PPP principles especially on infrastructure project, The Ministry of Finance through the Directorate General of Budget Financing and Risk Management has made an Environmental, Social, and Governance Manual with tools for each step of the PPP infrastructure project. The government support covered in the guideline includes Project PDF Viability Gap Fund (VGF), infrastructure guarantee, infrastructure co-guarantee, and Availability Payment (AP). By providing tools and clear allocation of roles and function to each stakeholder, ESG factors and principles should be taken into great consideration in every PPP project. It also means that going forward, implementing ESG would be critical for every infrastructure project requesting government support. For example, in the process of obtaining guarantee for the PPP infrastructure project, IIGF needs to conduct ESG assessment and include ESG aspect in the guarantee appraisal criteria and monitoring requirement which resulted in an additional established ESG monitoring and reporting in the course of the guarantee provided.

The significance of Environmental, Social, and Good Governance (ESG) factors is important for several reasons including legal necessity, increase in project value and longevity, improving access to financing, and better buy-in from stakeholders (Ministry of Finance Indonesia and PwC, 2022). It is important to implement ESG principles into each PPP stages, regardless of the need for government support. Table 4 shows guidelines for mainstreaming ESG principles into the PPP stages which combine guidelines created by the Ministry of Finance with QII as a supporting framework.

This set of guidelines is not conclusive and may need to be developed in the boarder as well as project specific context.

Although infrastructure plays a critical role in enabling development, it is also responsible for the majority of the greenhouse gas (GHG) emotion worldwide with the estimate from the UNOPS that it contributes around 79 % of the total emissions, most of which is associated with energy, building and transport (UNOPS, 2021). The breakdown of the 79% of the GHG

Table 4. ESG and QII Principles Implementation According to PPP Stages

	Stage I. Project Planning	Stage 2. Project Preparation	Stage 3. Transaction	Stage 4. Implementation
ESG	Integrating ESG into Preliminary Study including assessment of material environment, social, and government risks which might require further analysis on cultural heritage sites, associated facilities, analysis of alternative, etc. Inclusion of indigenous people and vulnerable groups into public consultation and stakeholder engagement of the PPP process	Approval of government support should be based on the inclusion of ESG datasheet as references to key stakeholder The Pre-Feasibility Study should include a thorough socioeconomic benefits mapped out to the SDGs AMDAL should include extensive risk categories including topics such as GHG and gender as well as specific mitigation actions for project implementation	Tender and agreement documents should include ESG safeguards and commitment to conduct ESG management throughout the project implementation from the pre-construction, construction, and operation	Monitoring report should include status of the project's ESG impact and regularly updated ESG risk register and ESG status Proactive management of ESG risks and achievement of higher ESG performance
QIIs			Maximizing the positive impact of infrastructure to achieve sustainable growth and development Raising Economic efficiency in view of life cycle cost	
	Integrating environmental considerations in infrastructure investments Integrating social considerations in infrastructure investment			
	Building resilience against natural disasters and other risks Strengthening infrastructure governance			

emission produced by the infrastructure sector is 37% in energy, 17 % building, 16% in transport, and the rest is water, waste management, and digital communication with the total of 8 %. In addition to that, the relationship between infrastructure and sustainable development is especially interlinked, by which from the total of the SDGs targets, infrastructure systems influence 17 SDGs targets and directly linked to the achievement of each of the target. Infrastructure should be understood as a system, it has cyclical relationship with built and natural environment as well as enabling environment. Each stages of infrastructure cycle should integrate action to promote climate compatible development from considering collaboration and cooperation as well as contextualizing infrastructure planning in a more strategic perspective in the planning phase, continued by relationship strengthening between

stakeholders and sourcing local material and workforce in the delivery phase, and conducting maintenance of the asset and restoring natural environment after construction in the management phase.

CONCLUSION

Public Works and Housing (PWH) infrastructure which includes vital sectors such as water, transportation, housing, energy, and telecommunications, forms the backbone of any nation's development. It entails the construction and maintenance of physical assets, including roads, bridges, dams, housing facilities, utilities, and public buildings, which are essential for the well-being of communities and the economic prosperity of a nation. The effective management and development of PWH infrastructure are pivotal to a country's sustainable growth, societal advancement, and overall quality of life. The integration of ESG principles into PWH infrastructure development is important, as concluded by the thematic analysis done through literature review. The argument on why it is important can be divided into two main points:

1. Enhancing Project Sustainability: The development of public infrastructure is important in creating socioeconomic growth. As have been observed from the various literatures, public infrastructure plays a crucial role in shaping the prosperity of society. But the adverse aspect of infrastructure is also ever present and needs to be mitigated to avoid catastrophic consequences. If left to its own devices, infrastructure development may cause harmful impact due to externalities. For example, construction and poor waste management of an infrastructure project can directly harm the environment. Social unrest and governance corruption might also grow as a direct result of an infrastructure development. On the other hand, infrastructure development may also be influenced by various environmental, social, and governance factor. Such as observed in the case of Dakota Access Pipeline project and the Boston 'Big Dig' projects which performed poorly due to neglecting the social and governance factor in the course of the project. Sustainable infrastructure development, which includes ESG and QII, can mitigate all of these risks. It also holds significance important in reaching development goals such as SDGs and NDC. The implementation of ESG principles is not only about mitigating and reducing risks, but it also can produce benefits which may increase the profit in the long-run. Therefore, the implementation of ESG principles into infrastructure project especially PWH infrastructure will enhance project sustainability and create more value for the overall project lifecycle. Especially for project which is done through PPP, the implementation of ESG principles may give more assurance for the investor as well as lenders that the project is not only financially viable but it is also sustainable environmentally and socially as supported by a transparent governance with good practices.

2. Increasing Access to Funding: The rise of sustainable infrastructure investment and ESG investing all over the world is not a phenomenon to be taken lightly. The investors of today are acutely aware of the importance of implementing ESG principles into the project, not only to achieve sustainability goals but also to ensure that the project is up to the international standard. QIIs principle which also accommodate ESG factors is one such example of standard developed in partnership across the globe to ensure that infrastructure project can be developed faster with better quality and wider access to funding. This means that project which implement ESG principles will get better pool of funding than the one which fails to do so. It is very much the case particularly for the MDBs such as ADB which have funded various project that supports sustainable infrastructure development and applies sound ESG principles

into its development. Case on point with the development of Uzbekistan Solar PPP project which received tremendous support from ADB both in the form of help to conduct the PPP stages such as transaction and preparation, and also access to guarantee to ensure that the tariff is affordable for the user but also at the same time profitable for investment. The project implements ESG principles in term of gender, climate change mitigation, and strengthening governance. The Cambodia Solar PPP project also attracts support from international loan through ADB due to its being one of the first renewable energy PPP project in Cambodia, which fulfills sustainable infrastructure development target. Therefore, the implementation of ESG principle into PWH project especially in the case of a PPP project will significantly increase the project access to funding. Moreso to access development and funding support from MDBs.

In term of its relevance to PWH project in Indonesia, it is still in its emergence phase. While the government has taken proactive steps to institutionalize ESG principles in infrastructure development, this endeavor is still just starting. Indonesia's commitment to aligning infrastructure projects with Sustainable Development Goals (SDGs) and embracing responsible and sustainable development practices relates directly to the development of ESG Framework and Manual document by the MoF. The roadmap set forth aims to implement ESG across all projects in every sector by the end of 2025, underscoring the country's evolving approach to ESG integration.

In conclusion, the incorporation of ESG principles in PWH infrastructure development is indispensable for achieving sustainability and securing essential funding. PWH infrastructure, serving as the foundation of societal well-being and economic growth, can significantly benefit from the implementation of ESG principles. The case studies presented, along with Indonesia's commitment to ESG, highlights the tangible advantages of integrating these principles into future infrastructure endeavors. Further study on the currently developed and applied ESG principles in Indonesia in comparison with its international counterpart is highly suggested.

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