Kementerian PPN/ Bappenas

LOW CARBON DEVELOPMENT INDONESIA

GREEN ECONOMY INDEX

A STEP FORWARD TO MEASURE THE PROGRESS OF LOW CARBON & GREEN ECONOMY IN INDONESIA

Kementerian PPN/ Bappenas

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In collaboration with:

UKaid
from the British people

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Main Partner

UK Foreign, Commonwealth and Development Office
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Acknowledgment

The Ministry of National Development Planning/National Development Planning Agency (Bappenas) extends its great gratitude to all partners' hard work and contributions.

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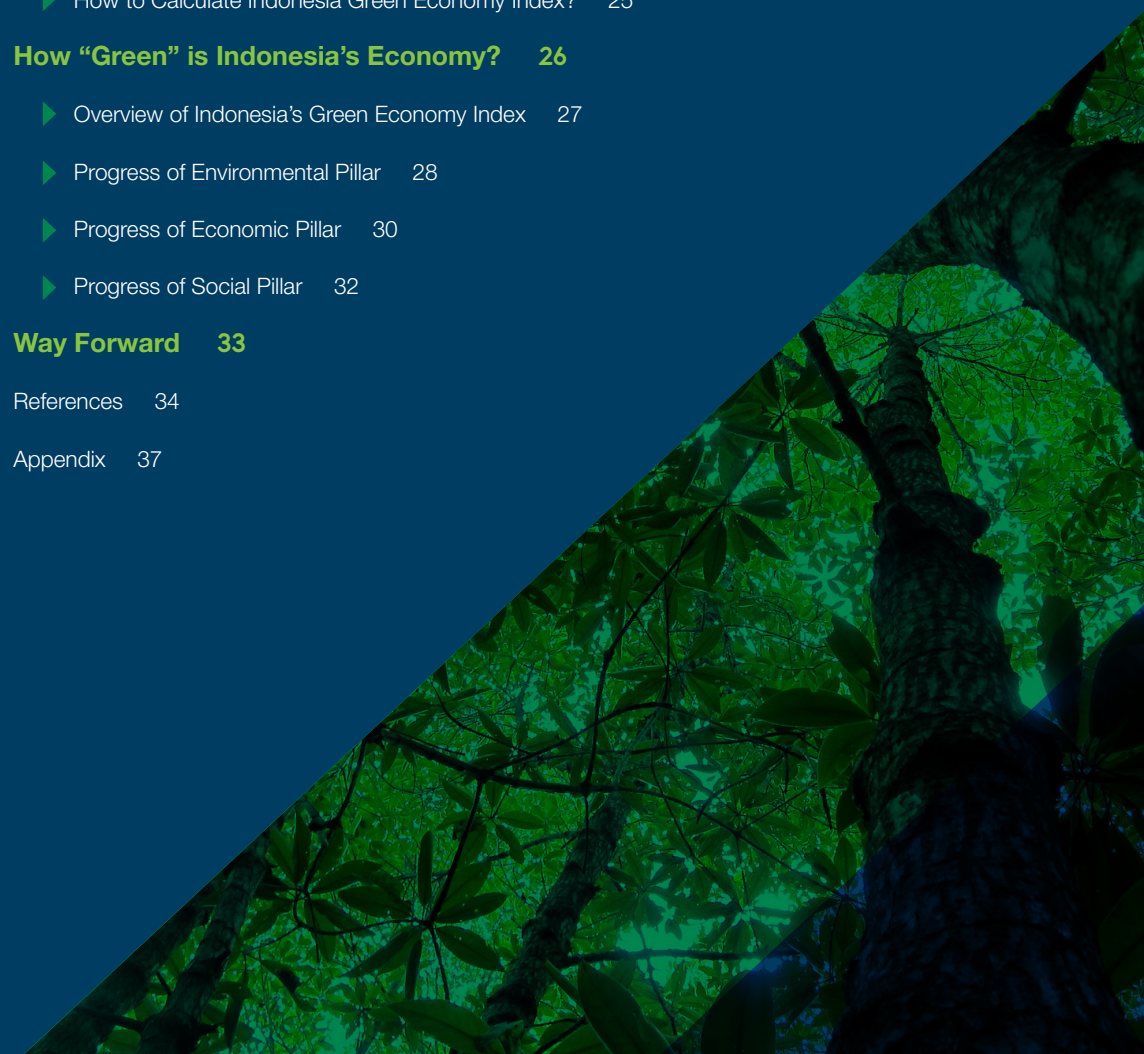


GREEN ECONOMY INDEX

A STEP FORWARD TO MEASURE THE PROGRESS OF LOW CARBON & GREEN ECONOMY IN INDONESIA

FOREWORD

With the global outbreak of the COVID-19 pandemic in 2019–2020, the world – including Indonesia – will never be the same anymore. The devastating impact of the pandemic has left deep scars on the economy and the people. Applying a business as usual approach to recover from the pandemic is not sufficient to return our trajectory growth back to the pre-COVID-19 situation. Economic Transformation is a must! And it should be sustainable.

Therefore, the Ministry of National Development Planning (Bappenas) established six strategies within Indonesia's Economic Transformation framework. Green Economy is one of the strategies.

Long before, Indonesia has committed to moving towards a sustainable development path by incorporating low carbon development and climate resilience policies into the National Medium-Term Development Plan (RPJMN) 2020–2024. The commitment confirms our compliance with the Article 3.4 of the UNFCCC: "Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes".

Moving forward, we need to ensure that our effort in transitioning towards a Green Economy as part of economic transformation is on track. Therefore, we are delighted to present Indonesia Green Economy Index as a tool to measure the progress of Green Economy by using selected indicators representing economic, environmental, and social nexus. This report features our initial thoughts on developing the Green Economy Index. It uses the index to maintain Indonesia's Green Economy trajectory and accelerate the implementation of a low carbon development and climate resilience program as the backbone in transitioning toward a Green Economy.

Our initiative in developing Indonesia's Green Economy Index is a step forward toward Green Economy pathways that will be followed by another giant leap as Indonesia will incorporate this Green Economy Index into our national development planning documents. We believe that continuous improvement and iteration of the Green Economy Index would be required to make it better. We are grateful for all support from our partners in developing this report, and we welcome future strategic collaborations.

Suharso Monoarfa
Minister of National Development Planning/
Head of National Development Planning Agency
(Bappenas) of the Republic of Indonesia

EXECUTIVE SUMMARY

Indonesia's emerging economy is expected to consistently grow, giving positive signal for the government to escape the middle-income trap and achieve high-income status by 2045. However, the unforeseen COVID-19 pandemic has created a multidimensional crisis that affects not only the economy, but also our progress in eradicating poverty and ensuring equality. Aside this pandemic, Indonesia has also been battling with another crisis: climate change, which severely impacted physical environment, ecosystem, and human societies. Both crises will hinder Indonesia's progress to achieve 2030 sustainable development agenda and become a high income country by 2045. Implementing business-as-usual approaches in development will be insufficient to guarantee a long-term sustainable growth in the future.

Bappenas analysis reveals that economic growth of at least 6% is needed to ensure Indonesia fulfilling the 2045 vision. Therefore, a structural change in economy is necessary, not only to recover from the COVID-19 crisis, but in parallel also fostering the economic trajectory of higher growth in the medium-long term. Bappenas expresses this strategy of economic transformation with Green Economy as one of the "game changers", aiming to create advanced and inclusive economic growth while realizing social welfare and maintaining environmental quality. low carbon development and climate resilience policies are designed

to be the main instruments or the "backbone" to run a Green Economy strategy.

Pursuing a Green Economy is envisaged to bring in multiple benefits and lead Indonesia to reach the Net Zero Emissions (NZE) target by 2060 or sooner. One of the key advantages according to Bappenas study includes securing high average GDP growth up to 6.5% annually until 2050. As the concept suggests, the economic growth would not compensate the environment and ecosystem. The study projects almost 100 billion tonnes of CO_2eq saved over 2021–2060, reducing emission intensity up to 68% by 2045 before reaching zero by 2060. Moreover, Green Economy is also predicted to offer 1.8 millions of additional green jobs.

To assure that the economic transformation is effective to head Indonesia toward a Green Economy, a contextual framework with tangible, representative, and accurate indicators to measure the green economic progress is essentially required. Regarding that, Bappenas has developed Indonesia Green Economy Index comprising of a set of multidimensional indictors—15 in total—covering the interlinkages between three main pillars of sustainability: environment, social, and economy.

Within the ten-year period of assessment, from 2011 to 2020, Indonesia Green Economy Index unfolds a rising trend, indicating the right track for the country toward a Green Economy. The composite Green Economy Index score grows 25%, reaching 59.17 in 2020. Four indicators are identified as the main contributors to this result of which having a very good score exceeding 75: forest cover, managed waste, industrial labor productivity, and life expectancy. We found that several policies i.e., ban on issuing new permits to clear primary forests and peatlands and moratorium on new oil palm plantation licenses drive the forest cover indicator to gain the highest score at 88.9 in 2020.

When assessing each pillar's progress individually, pillar of economic indicators are shown to be the most progressive, which prompted mainly by final energy intensity with score more than doubles from 34 to 74 within the span of ten-year. A lower energy intensity value means a more energy-efficient process and technology are utilized to fuel the economy. However, when zooming in each indicator's progress, both share of renewable energy and poverty rate actually own the best progress among all, despite having the lowest score every year. Regardless dragging down the composite index of environmental pillar, score of share of renewable energy triples from 9 in 2011 to 28.9 in 2020. A more renewables focused electricity planning by the government and supportive regulation on biofuel has pushed this improvement. Meanwhile, poverty rate gradually rises with an average increase of 53% annually, hit a score of 24.8 in 2020. In general, the social pillar has a steady growing trend despite significant fall in 2020 due to the pandemic.

Green Economy Index marks a new milestone for Indonesia in transforming towards low carbon and green economy by providing a comprehensive and objective analysis between economy, environment and social nexus. With strong commitment by the Government of Indonesia to incorporate green economy, Green Economy Index would serve as a tool for evaluation and strategic development purposes to help the government formulate future planning document and policies.

INTRODUCTION: HOW TO EMERGE STRONGER AFTER PANDEMIC?

THE DISRUPTIVE EVENTS THAT CHANGE EVERYTHING

Indonesia has achieved significant development progress during 2010–2019 as indicated by the steady economic growth and declining poverty rate. With that trajectory, Indonesia was lauded as a newly emerging country and predicted to become one of the high economies along with China, India, and Brazil by 2050 (PWC, 2017). The Government of Indonesia aims to shift toward low carbon and sustainable development by integrating Low Carbon Development policies into the National Medium Term Development Plan (RPJMN) 2020–2024. According to the scenarios, a low carbon growth path can deliver an average Gross Domestic Product (GDP) growth rate of 6% until 2045 and unlock an array of economic, social, and environmental benefits (Ministry of Development Planning, 2019). All of these indications have given the Government confidence to escape the middle-income trap and achieve high-income status by 2045.

However, the outbreak of the COVID-19 pandemic in the last two years has created a multidimensional crisis that affects not only the health sector, but also the country's economy and people's welfare. As a result, Indonesia's economy contracted up to 2.07% in 2020 (Central Bureau of Statistics, 2021), along with rising poverty and unemployment rates. Responding to the pandemic, the Government has made enormous efforts to save lives while at the same time keeping the economy afloat. Huge investments have been channeled within the National Economic Recovery (PEN) program. In 2020 and 2021, ~IDR 500–557 trillion had been spent through the PEN program, an average of 73.5% of the total allocated budget (Ministry of Finance, 2022).

On the other hand, another crisis has been surging even before the pandemic started: climate change. As one of the most vulnerable countries to climate change impact, Indonesia is highly exposed to physical climate risks such as extreme weather, floods, droughts, and sea level rise. The National Disaster Management Authority data shows Indonesia experienced 5.402 disasters in 2021, of which 5.377 were related to hydrometeorological disasters (The National Disaster Management Authority, 2022). It confirms the latest IPCC report which signaled a code red for humanity, highlighting the increase of global temperature to 1.5°C is faster than previously predicted and climate impacts including climate-related disasters are more severe than expected (IPCC, 2021).

Both the COVID-19 pandemic and climate change are disruptive. They will hinder Indonesia's progress in achieving the 2030 sustainable development agenda and hamper the country's vision to become the fifth-largest economy by 2045. According to the Ministry of National Development and Planning (Bappenas), without a breakthrough in post-covid recovery, Indonesia's economic trajectory will be difficult to return to its pre-pandemic state. In that case, Indonesia will miss the opportunity to escape the middle-income trap by 2045.

COVID-19 pandemic has also changed the way of people's life. Several affected sectors are disrupted and need to be considered as future trends, including evolving health systems, acceleration of digitalization, increased role of Artificial Intelligence (AI), machine learning and big data, changing in global value chain, teleworking, and green recovery.

ECONOMIC TRANSFORMATION AS THE BREAKTHROUGH

Indonesia Vision 2045 boldly stated that Indonesia will become a high-income country by 2036 (Ministry of Development Planning, 2019) surpassing the Gross National Income (GNI) per capita threshold of USD 12,695 (World Bank, 2021). Following the COVID-19 pandemic, the scenario has changed. **Figure 1** shows a projection of Indonesia's growth under various scenarios in the post-COVID event. For Indonesia to become a high-income country and escape the middle-income trap in 2045, economic growth of at least 6% is required. To achieve this goal, Indonesia needs a structural change to shift the country's economic structure from a less to a more productive sector. This structural change is implemented within an economic transformation framework, aiming to recover from the COVID-19 crisis and increase the trajectory of higher growth in the medium-long term.

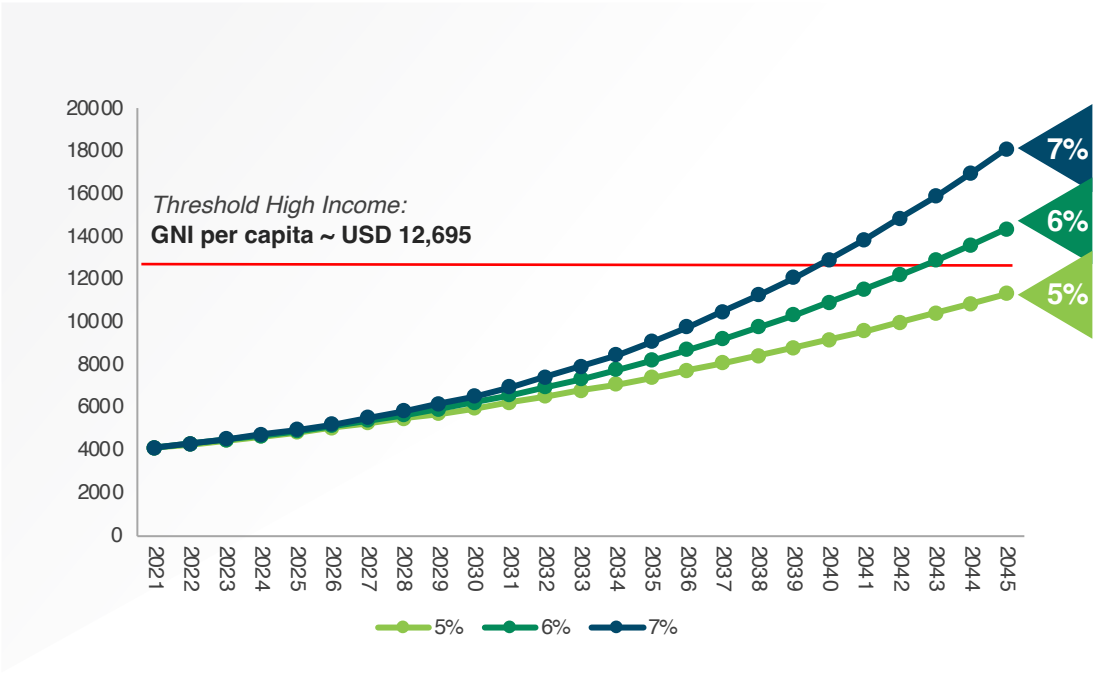


Figure 1 Projection of GNI Per Capita (USD/capita, Atlas Method) with three scenarios of average economic growth of 5%, 6%, and 7%.

In order to manage the trade-off between economic recovery and sustainable development in post-COVID events, the Ministry of National Development Planning/ Bappenas established six strategies within Indonesia's Economic Transformation framework to lift the economic growth trajectory back to the pre-COVID situation. Economic transformation is expected to strengthen three production areas: Total Factor Productivity (TFP), capital productivity, and labour productivity.

These six strategies of economic transformation will serve as "the game changers" to achieve Indonesia's Vision in 2045, which will include:

- Green economy, focusing on low carbon economy and circular economy, blue economy, and energy transition.

- Improving productivity of the economic sector, focusing on industrialization, the productivity of SMEs, and modernization of agriculture.

- Relocation of the New Capital city (IKN), which is expected to create a new source of growth and create balance between regions.

- Bolstering the competitiveness of human resources, focusing on the health system, education, and research and innovation.

- Domestic economic integration, focusing on connectivity infrastructure such as superhub for air and maritime, and domestic value chain.

- Digital transformation, focusing on digital infrastructure, digital utilization, and strengthening enablers.

Implementing Green Economy as one of Indonesia's economic transformation strategies is a timely step, as Green Economy plays strategic role as future "game changers", particularly in navigating the development paradigm toward a more sustainable and low carbon economy.

WHAT IS GREEN ECONOMY?

The urgency of shifting toward a green and sustainable economy has been underlined by the international community over the past few years, which is driven by the implication of climate change and environmental degradation on economic and social growth. In June 2012, the United Nations Conference on Sustainable Development (UNCSD) that was held in Rio de Janeiro issued an outcome document entitled "The future we want". In the document, the green economy is cited as one of the important tools available for achieving sustainable development (UNGA, 2012).

Although the term green economy is relatively new and there is no internationally agreed definition for it, a number of organizations and governments have proposed definitions for a green economy that generally share the same core idea. For example, the United Nations Environment Programme (UNEP) defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (UNEP, 2008). Another definition comes from the Green Economy Coalition, which describes green economy as one that provides prosperity for all within the ecological limits of the planet, which follows five key principles of wellbeing, justice, planetary boundaries, efficiency and sufficiency, and good governance.

The notion of green economy is more than just a green GDP that accounts for negative environmental externality in the accounting of the national output. The green economy concept defined by Bappenas was adopted from UNEP's green economy definition of an economic development model to support sustainable development with a focus on investment, capital, infrastructure, employment and skills to achieve social welfare and environmental sustainability (UNEP, 2012). Within Indonesia's economic transformation strategy, green economy is aimed at creating high and inclusive economic growth while realizing social wellbeing and maintaining environmental quality. The green economy practices in Indonesia are centred on low carbon development and climate resilience policies, which have emerged as the main instruments or "backbone" of the green economy itself. Both policies have been integrated into the national medium-term development plan (RPJMN 2020–2024), which also heeds the mandate of the United Nations Framework Convention on Climate Change (UNFCCC) Article 3.4 to incorporate climate action into the development plan.

Figure 2 depicts how the economic transformation from brown to green economy contributes to the realization of the Sustainable Development Goals (SDGs). The transition to a green economy entails abandoning conventional economic practices or a "brown-based economy" in which environmental sustainability and social inclusion are not prioritized. The brown economy is an economic model that still fosters activities that heavily rely on fossil fuels, which produces significant amounts of Greenhouse Gas (GHG) emissions, air pollution, and waste, as well as an economy that causes severe ecological depletion due to overexploitation. Meanwhile, achieving a Green Economy means implementing a paradigm with a novel concept, that there is no longer a trade-off between economic, social, and environmental development; rather, these three aspects may coexist.

The Green Economy refers to sustainable planetary-wide economy, which applies to both at the terrestrial and marine (blue economy). All activities, investments, and infrastructure that fall under the green economy's umbrella are contrary to the brown-based economy. For instance, a green economy would emphasise the utilization of renewable energy for industry and transportation systems instead of fossil fuel, shifting to low carbon industries, promoting a circular economy, environment friendly and improve economic productivity on land and marine without exploiting and creating damage to the ecosystem. These economic activities will provide significant opportunities for high and green economic growth while fostering social cohesion and improving natural carrying capacity – thereby directly contributing to the achievement of Sustainable Development Goals.

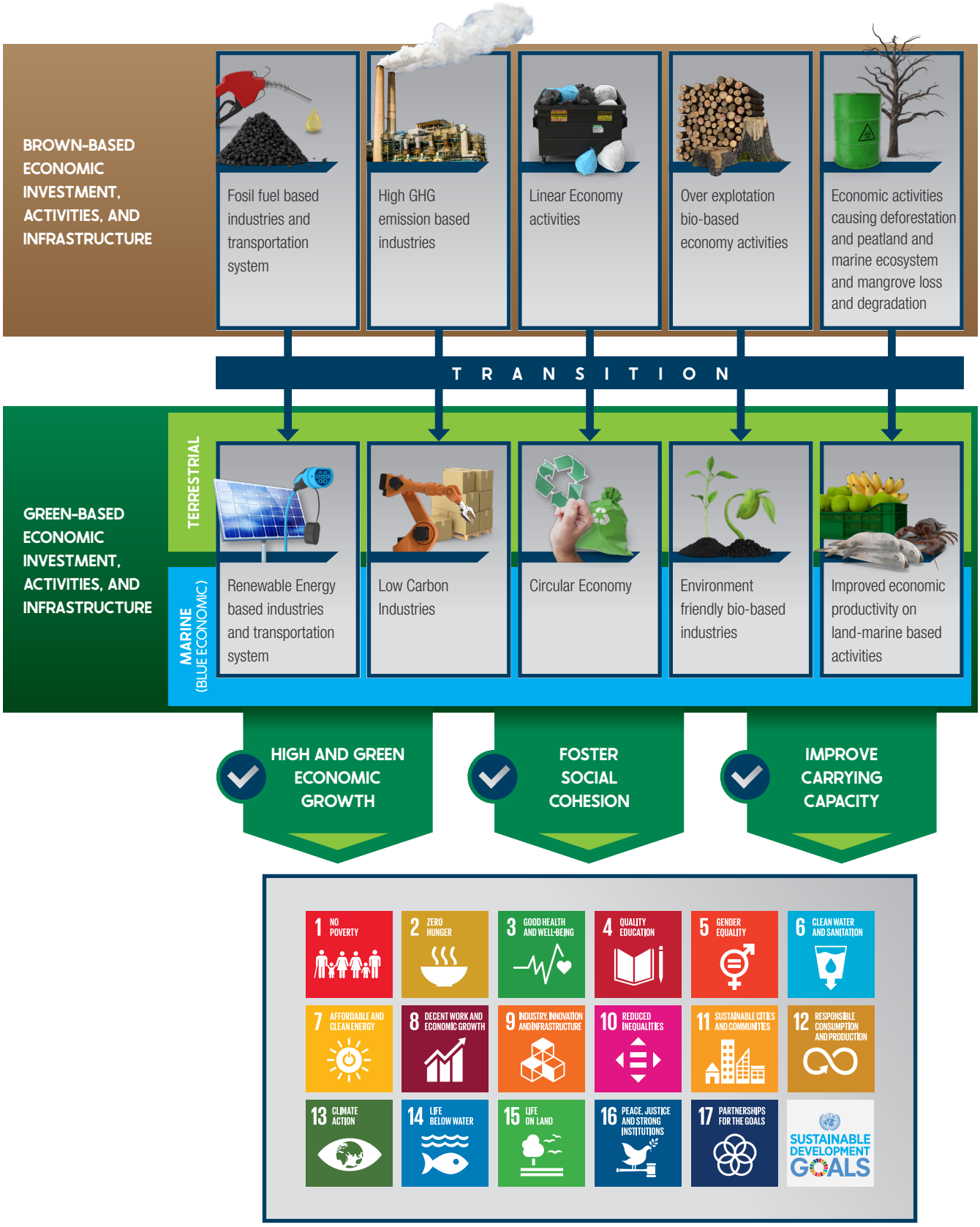


Figure 2 Brown to green economic transformation to support sustainable development

According to the Green Economy Report by Bappenas, pursuing a green economy will offer multiple benefits and lead Indonesia to reach the Net Zero Emissions (NZE) target by 2060 or sooner. The simulation results in the Bappenas study indicate that Green Economy practices through low carbon development and climate resilience can bring a number of advantages for Indonesia, including:

Nearly
68%
REDUCTION IN EMISSION INTENSITY
by 2045, before reaching NZE by 2060

Average GDP growth of
6.1–6.5%
PER YEAR
until 2050

87–96
BILLION TONNES
of CO_2e GHG emissions reduced over 2021–2060

25–34%
(13,890–14,975 USD/CAPITA)
higher gross national income (GNI) by 2045

1.8 MILLION
additional green jobs in 2030 spread across the energy sector, EVs, land restoration and waste sectors

Ecosystem restoration of services valued at

US$4.75 TRILLION/ YEAR

by 2060

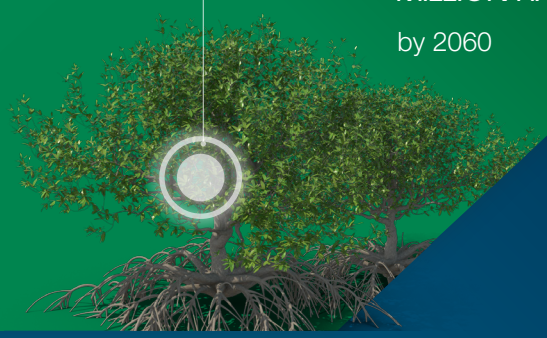
40,000 LIVES SAVED

in 2045 alone from reduced air pollution

Mangrove extent increased to

3.6 MILLION HA

by 2060

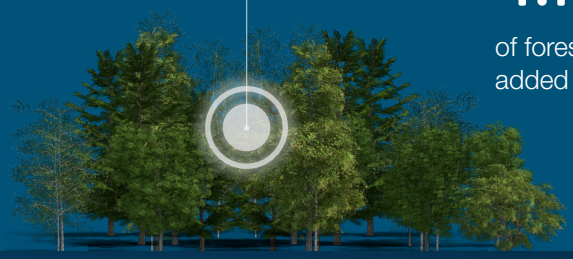


3.2 MILLION HA

of primary forest protected by 2060

4.1 MILLION HA

of forest coverage added by 2060



BOOST **CLIMATE RESILIENCE**

across the economy

Indonesia can begin reaping these benefits immediately by implementing green economy and net zero measures as part of its COVID-19 recovery. However, it will not be easy, since moving toward a green economy and exploring the path to a net-zero future would require significant policy reforms, adjustments to investment priorities, and strong coordination between public and commercial sectors as well as with international partners. Furthermore, the green economy agenda requires integrated cross-sectoral planning and reliable measuring tool to track the progress and achievements. This tool is crucial to determine whether Indonesia's transition to a green economy is on track and aligned with national development targets and global development as well as to identify opportunities for policy adjustments and priority improvements along the way.

DESIGNING AN INCLUSIVE FRAMEWORK TO MEASURE GREEN ECONOMY PROGRESS

Developing a framework to measure green economic progress is a complicated process, requiring a clear methodology with tangible, representative, and accurate indicators of success. Therefore, The Ministry of National Development Planning/ Bappenas initiated to develop and analyze Indonesia Green Economy Index (GEI) based on several existing global practices and relevant studies. In 2012, UNEP published its version of GEI, comprising 40 indicators under three classifications: environmental, policy interventions, and well-being and equity (UNEP, 2012). In 2017, UNPAGE also launched a green economy progress measurement framework, covering three groups: economy, social, and environment spreading out to 13 indicators (PAGE, 2017).

There are several types of GEI developed by other entities like Organization for Economic Co-operation and Development (OECD) and Green Growth and Dual Citizen: Global Green Economy Index. Under their framework, OECD introduced 26 green growth indicators that are specified into four categories e.g., productivity, natural asset base, quality of life, and policies (OECD, 2017). Meanwhile, Global Green Economy Index developed by Green Growth and Dual Citizen consists of 18 quantitative and qualitative indicators focusing on four key dimensions: climate change and social equity, sector decarbonization, markets and ESG investment, dan environmental health (Dual Citizen, 2020).

In this chapter, formulation of Green Economy Index (GEI) framework that can be used nationally is presented. This GEI measurement framework is contextualised within Indonesia's economy to give us an overview of the country's transformation progress towards greening the economy. Ultimately, GEI could be an effective tool for the country's future planning documents purposes to better strategise the Indonesia's development of green economy.

MAPPING AND DEFINING THE INDICATORS

Indonesia's GEI developed by Bappenas captures the distinct characteristics of the inclusive green economy concept. As previously mentioned, the adopted green economy definition in this report supports the promotion of investment, capital and infrastructure, and employment and skills to achieve balance on social welfare, environmental sustainability as well as economic growth. In the long run, green economy will encourage the enablement of a capital generation that ensures inclusiveness, containing low carbon natural capital, resource-efficient physical capital, and human capital with green skills (PAGE, 2017).

Thereby, Indonesia's GEI has a set of multidimensional indicators covering the interlinkages between environment, society, and economy as three main pillars of sustainability. In the effort to identify and determine the all-rounded indicators, a selection process was conducted by considering several aspects.

First and foremost, references from existing global practices and studies are considered and tailored to Indonesia's context. Indicators like renewable energy mix and land cover—despite different terminology used—are included in the index by UNEP, UNPAGE, and OECD. Hence, those two indicators are also inserted into Indonesia's GEI with a slight modification i.e., spanning land cover indicator into forest cover and percentage of degraded peatland. We also directly adopted some indicators by UNPAGE such as energy intensity, life expectancy, and mean years of schooling as well as other indicators embedded in UNEP indexes such as waste collection and employment. Subsequently, we ensured those reference indicators are fit to our other selection criteria:

1. Whether the technical data is relatively available and accessible, including the historical data and its ability for projection. This is essential to confirm that the index measurement process could be sustainably carried out further in the coming years.

2. Whether the targets have Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) characteristics. This is a safe package for one indicator target to have, to ensure achievability of a target.

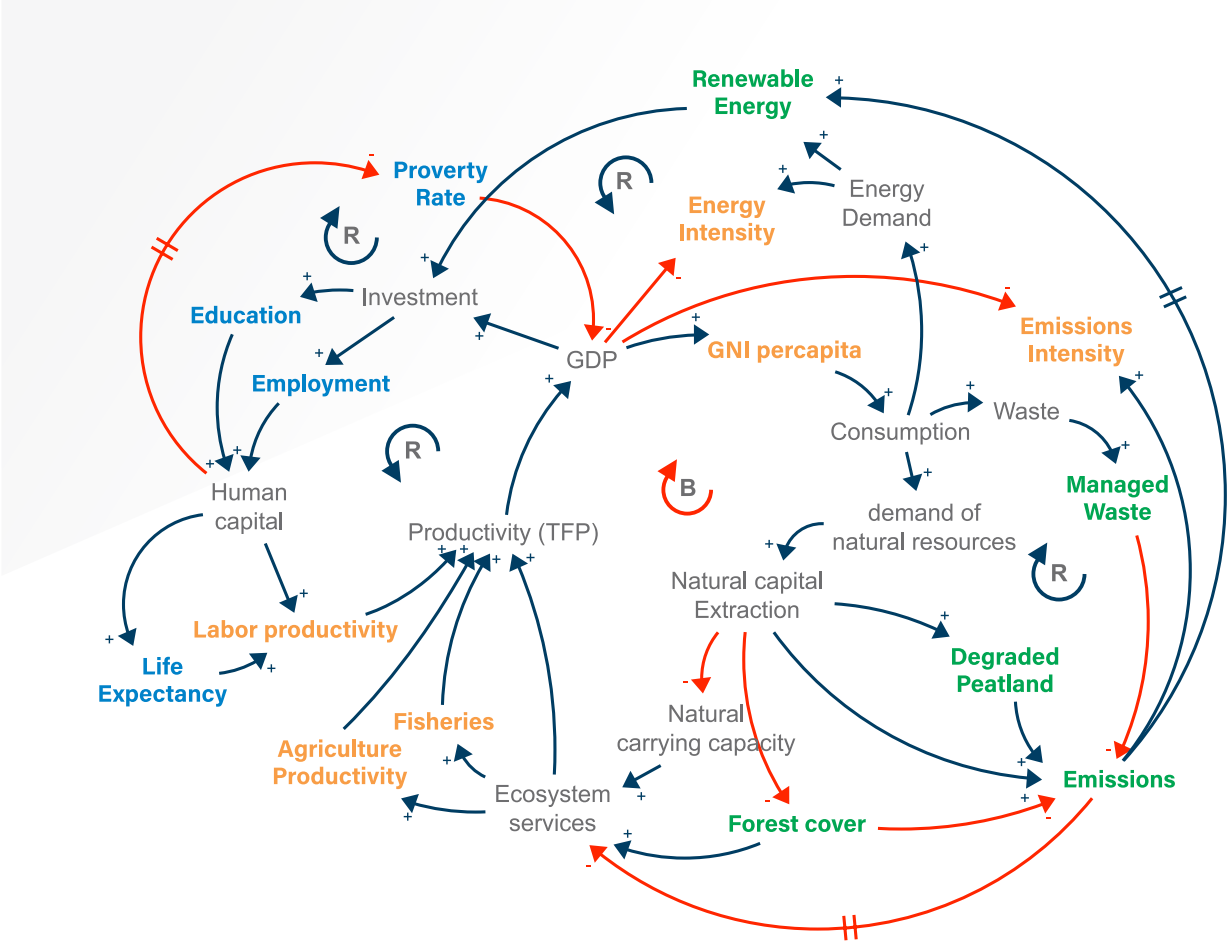


Figure 3 Interlinkages between 15 selected indicators
(**Green**: environmental indicators; **yellow**: economic indicators; **blue**: social indicators)

To understand the interlinkages between each indicator, Bappenas has developed a system dynamics model comprising all GEI indicators based on the Green Economy model. Initially, we built several specific sub-models that align with sustainable pillars e.g., environment model (including AFOLU, energy, and waste sectoral models), economic model, and social model and merged all sub-models into an integrated green economy model. This green economy model is intended for future green economy planning and policies.

Causal Loop Diagram (CLD)–as seen in **Figure 3**—of this model illustrates the correlation and feedback loop between three sustainable pillars as well as 15 selected indicators. For instance, growth in GDP that is aligned with GNI per capita growth will cause higher consumption and encourage more energy needed to provide the demand. This surging energy demand gives opportunity to deploy more renewables, hence increasing share of renewable energy and promoting larger green investment. Following that, rise in investment will foster more employment in green jobs (reducing unemployment rate) and better education (increasing mean years of schooling). Improvement on employment and education combined will enhance human capital (increasing labour productivity and life expectancy). Series of these increment will add Total Factor Productivity (TFP) and loop back to and increase the GDP. These feedback loops will create reinforcing loop (indicated by R symbol) that will keep increasing over time. On the other side, consumption will generate demand of natural resources that will lead to natural capital extraction. This action will create pressure into the natural carrying capacity, as well as reducing forest cover and increasing percentage of degraded peatland. Negative externalities are created from these feedback loop, including increase of GHG emissions and waste. All these negative externalities will create balancing loop (indicated by B symbol) and negative feedback to the ecosystem services and subsequently, will hamper Total Factor Productivity (TFP) and GDP growth.

The GEI reflects the progress accomplished by Indonesia relative to the maximum and minimum thresholds. Minimum thresholds signify the lowest levels for each indicator and are derived from various sources, mainly Government of Indonesia regulations and global databases such as the World Bank. On the contrary, maximum thresholds indicate the highest level for each indicator. Most of the indicators maximum threshold of the such as percentage of forest cover, share of renewable energy, GHG emission reduction, emission intensity, and final energy intensity are referred to the 2045 Net Zero Emission (NZE) Scenario developed using the green economy system dynamics model. Meanwhile, target for all indicators under social pillar including mean years of schooling, life expectancy, poverty rate, and unemployment rate are directly refer to the government's target stated on the Executive Summary of Indonesia's Vision 2045, released by Bappenas in 2019. The remaining indicators put maximum threshold based on the data from the World Bank. The detailed explanation of 15 selected indicators, including the description, specific reasoning, maximum and minimum thresholds for each are elaborated below.

Figure 4 15 selected indicators

DETAILS OF
15 SELECTED INDICATORS

ENVIRONMENTAL PILLAR

1

FOREST COVER (%)

Description

Comparison between forest cover with Indonesia's total land area (excluding water).

Data source from the Land Cover Recalculation Report 2014–2020, Ministry of Environment and Forestry.

Rationale

The UNFCCC mentioned three triple planetary crises: climate change, air pollution, and biodiversity loss (UNFCCC, 2022). Forest cover indicator is used, aside from referencing other indexes, as the best proxy indicator to mitigate the three planetary crises. Forest provide ecosystem services, including regulation of soil, air and water, as well as reservoirs for biodiversity and act as carbon sink (OECD, 2017).

Minimum Threshold

30%

Minimum level of forest cover by Indonesian Law No 41/1999 on Forestry (Government of Indonesia, 1999)

Maximum Threshold

54%

2045 NZE scenario target on green economy model

2

SHARE OF RENEWABLE ENERGY (%)

Description

The share of energy from renewable sources against the total national primary energy mix.

Data source from the Handbook of Energy and Economy Statistics, Ministry of Energy and Mineral Resources.

Rationale

Included in many other global indexes, this indicator is also essential for Indonesia's GEI to show the decarbonization in the energy sector as the second biggest contributor to Indonesia's GHG emission. The higher share of renewable energy in a country indicates a higher commitment of the Government to shift towards a cleaner and greener energy sources.

Minimum Threshold

0%

Maximum Threshold

42%

2045 NZE scenario target on green economy model

3

MANAGED WASTE (%)

Description

Level of household waste generation managed by the government compared to the total waste generated.

Data source from the National Waste Management Information System (SIPSN), Ministry of Environment and Forestry.

Rationale

Aside from referencing to existing global index, managed waste indicator is put to display waste emergency condition in Indonesia since most landfills in big cities almost have reached their maximum capacity. Inability to manage waste generation would cause multidimensional effect to the society, including GHG emission, air pollution, and health issue.

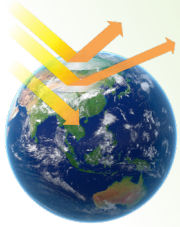
Minimum Threshold

0%

Maximum Threshold

82%

Waste collection rate for upper-middle income countries (World Bank, n.d.)



4

PERCENTAGE OF GHG EMISSION REDUCTION (%)

Description

Level of cumulative emissions reduced from all sectors, started from 2010 as the base year compared to baseline of cumulative emission within the same period.

Data source from The Planning and Monitoring Application for the National Low Carbon Action Plan (AKSARA), Ministry of National Development Planning/Bappenas.

Rationale

As stated by IPCC (2014), economic and human activity drive GHG emission. This indicator is selected to express how progressive the government has acted and implemented “green” policies to reduce GHG emissions. Government target to reduce GHG emissions is also a global target agreed during Paris Agreement back in 2015.

Minimum Threshold

0%

Maximum Threshold

70%

2045 NZE scenario target on green economy model

5

PERCENTAGE OF DEGRADED PEATLAND (%)

Description

Comparison between forest cover on peatland area out of the total peatland area in Indonesia.

Data source from the LCDI's System Dynamics Model estimation.

Rationale

Indonesia is home to over 30% of the world’s tropical peatlands (CGIAR, 2020). However, around half of these peatlands are degraded and threatened by land clearance for forestry and agriculture activities. Forest land clearing on peatlands disturbs the balance of the peat ecosystem and subsequently reduce the quality of its ecosystem services. This indicator shows the importance of sustainable peatland management to restore peatland ecosystem functions that is important to support the sustainable livelihoods of local communities.

Minimum Threshold

30%

2045 NZE scenario target on green economy model

Maximum Threshold

0%

ECONOMIC PILLAR

6

EMISSION INTENSITY (TCO_2eq/BnRp)

Description

Ratio of GHG emissions per unit of economic activity, represented at the national level by GDP.

Data source from The Planning and Monitoring Application for the National Low Carbon Action Plan (AKSARA), Ministry of National Development Planning/Bappenas and Statistics Indonesia (BPS).

Rationale

This indicator shows the relation between emission reduction effort and national economic growth. Lower emission intensity indicates a growing economy without compromising the generated GHG emissions, thereby implying a "greener" economic development.

Minimum Threshold

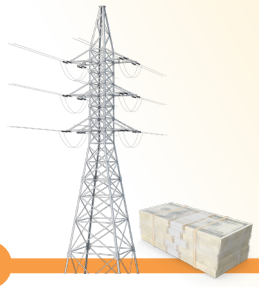
270 TCO_2eq/BnRp

Highest level of emission intensity recorded for a country intensity within 2001–2020 (World Bank, 2022)

Maximum Threshold

26 TCO_2eq/BnRp

2045 NZE scenario target on green economy model



7

FINAL ENERGY INTENSITY (BOE/BnRp)

Description

Amount of energy consumed per level of economic activity, represented at the national level by GDP.

Data source from the Handbook of Energy and Economy Statistics, Ministry of Energy and Mineral Resources.

Rationale

Incorporated into other global index, this indicator express the efficiency of energy utilization in a country to fuel the economy. Lower energy intensity indicates a more efficient energy used in a country to produce a product or provide a service, hence promoting economic productivity while improving efficiency in natural resource utilization.

Minimum Threshold

125 BOE/BnRp

Peak final energy intensity in Indonesia within 2001–2020 according to Handbook of Energy and Economic Statistics of Indonesia (Ministry of Energy and Mineral Resources, 2010)

Maximum Threshold

63 BOE/BnRp

2045 NZE scenario target on green economy model

8

GROSS NATIONAL INCOME (GNI)/Capita (USD/Capita)

Description

Sum of value added by all resident producers plus any product taxes not included in the valuation of output plus net receipts of primary income, measured in IDR and converted to USD.

Data source from the World Bank

Rationale

This indicator is crucial to represent the nation's prosperity, especially as timeline guidance for Indonesia to be released from middle income trap by 2045.

Minimum Threshold

500 USD

Average GNI/capita value of several low-income countries in 2020–2021 (World Bank, 2022)

Maximum Threshold

12,695 USD

Starting level of GNI/capita for high income country (World Bank, 2021)

9

AGRICULTURAL PRODUCTIVITY
(ton/ha/year)

Description

Level of agriculture production output, specific on food crops (paddy), plantations (palm oil), and fisheries (aquaculture) per total area used in a year.

Data source from Statistics Indonesia (BPS).

Rationale

Agriculture produces much more than just crops. Agricultural practices have impact on a wide range of ecosystem services, including water quality, nutrient cycling, soil retention, and carbon sequestration. In turn, ecosystem services affect agricultural productivity which influence the economic sector. This indicator shows the alignment of economic sector growth influenced by ecosystem services. Higher agricultural productivity with healthy ecosystem services indicate that the society is moving towards a greener economy.

PADDY

Minimum Threshold

5 ton/ha/year

Lowest paddy yield in Indonesia at the lowest crop index (harvested/planted area) within 2001–2020 (Central Bureau of Statistics, 2021)

Maximum Threshold

12 ton/ha/year

Highest paddy yield in Indonesia at the highest crop index (harvested/planted area) within 2001–2020 (Central Bureau of Statistics, 2021)

PALM OIL

Minimum Threshold

2 ton CPO/ha/year

Lowest CPO productivity at the export basis within 2001–2020 (Central Bureau of Statistics, 2019)

Maximum Threshold

5 ton CPO/ha/year

2020–2024 Ministry of Agriculture Strategic Plan (Ministry of Agriculture, 2020)

AQUACULTURE

Minimum Threshold

3 ton/ha/year

Lowest productivity of Indonesia Aquaculture within 2001–2020

Maximum Threshold

19 ton/ha/year

Linear projection of Indonesia aquaculture productivity in 2045

10

INDUSTRIAL SECTOR LABOR PRODUCTIVITY (MnRp/person)

Description

Value that shows the ability of labor to produce production goods in industrial sector, measured by dividing the added value of production by the amount of paid labor.

Data source from Statistics Indonesia (BPS).

Rationale

This indicator is chosen to reflect the effects of environmental conditions and environmental risks on human capital and labor productivity in the industrial sector.

Minimum Threshold

20 MnRp/person

Average value of annual output per worker on several low-income countries (ILO) that converted to national currency using PPP (OECD, n.d.)

Maximum Threshold

200 MnRp/person

Average value of annual output per worker on several high-income countries (ILO) that converted to national currency using PPP (OECD, n.d.)

11

SERVICE SECTOR LABOR PRODUCTIVITY (MnRp/person)

Description

Value that demonstrates the labor's ability to generate goods in service sector, calculated by dividing the added value of production by the amount of paid labor.

Data source from Statistics Indonesia (BPS).

Rationale

This indicator helps to Illustrate the effects of environmental conditions and risks on human capital and labor productivity in the service sector.

Minimum Threshold

20 MnRp/person

Average value of annual output per worker on several low-income countries (ILO) that converted to national currency using PPP (ILO, 2021)

Maximum Threshold

200 MnRp/person

Average value of annual output per worker on several high-income countries (ILO) that converted to national currency using PPP (ILO, 2021)

SOCIAL PILLAR

12

MEAN YEAR OF SCHOOLING (years)

Description

Total of years of education for adult age (25 and above) divided by total adult population age (25 and above).

Data source from Statistics Indonesia (BPS).

Rationale

Adopted by UNPAGE, this indicator is essential to ensure our green economy development will also contribute to Indonesia's educational progress.

Minimum Threshold

2 years

Lowest level of mean years of schooling for low-income countries in 2019 (UNDP, 2020)

Maximum Threshold

12 years

Target according to Indonesia's Vision 2045

13

LIFE EXPECTANCY (years)

Description

The average period of people may expect to live.

Data source from Statistics Indonesia (BPS).

Rationale

Adopted by UNPAGE, this indicator shows how long the population's average age based on the probability of death due to all factors. It is important to include this indicator because it is related to the level of welfare and the national health system.

Minimum Threshold

55 years

Lowest level of life expectancy recorded for a country in 2020 (World Bank, 2020)

Maximum Threshold

75.5 years

Target according to Indonesia's Vision 2045

14

POVERTY RATE (%)

Description

Percentage of total population with total expenditure below the national poverty line.

Data source from Statistics Indonesia (BPS).

Rationale

Adopted by UNPAGE, this indicator measures the progress of economic inclusiveness, especially for the poorest and the most vulnerable.

Minimum Threshold

13%

Highest Indonesia's poverty rate within 2010–2020 (Central Bureau of Statistics, 2022)

Maximum Threshold

0%

Target according to Indonesia's Vision 2045

15

UNEMPLOYMENT RATE (%)

Description

Percentage of unemployed people in the labor force.

Data source from Statistics Indonesia (BPS).

Rationale

Adopted by UNPAGE, this indicator links the implementation of a green economy with people's welfare. The low-carbon industry development paradigm is expected to be able to encourage the development of the green sector as well as to create new jobs, thereby reducing the unemployment rate.

Minimum Threshold

15%

The highest level of unemployment rate for a High-Income country in 2018 (World Bank, 2021)

Maximum Threshold

3%

Target according to Indonesia's Vision 2045

Mostly, maximum thresholds indicate the desired value of progress, while minimum thresholds express the critical level. In that case, those indicators make positive contribution to the GEI when the value increase and belong to group 'desired improving'. However, several indicators are against that premise. Having lower value and nearing the minimum threshold signal positive progress for those indicators. We put those indicators under the group 'desired declining' as they will contribute positively to the GEI when the value decrease. Grouping of indicators according to this categorization is shown on **Figure 5** below.

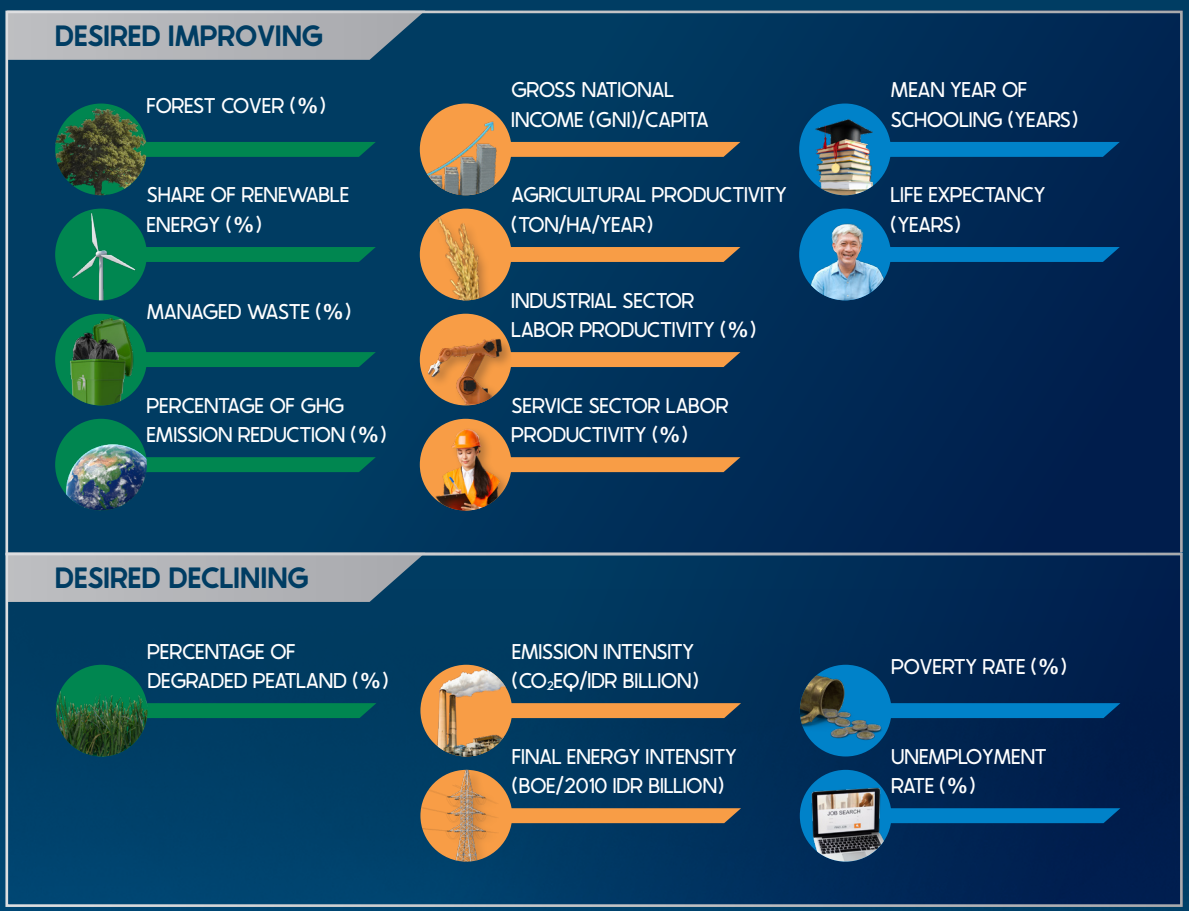


Figure 5 Desired outcomes for each indicator

HOW TO CALCULATE INDONESIA GREEN ECONOMY INDEX?

Measurement of Indonesia Green Economy Index is conducted within the period of 2011–2020, in yearly basis. After compiling the historical data for each indicator, scoring of each indicator is conducted. The scoring calculation is performed by comparing each indicator with its maximum and minimum threshold to determine how far each indicator has progressed and to normalize indicators within a given set of range (see **Equation (1)**).

$$Score\left(i\right) = \frac{(y^{i} - y^{min})}{(y^{max} - y^{min})} \text{ x } 100 \quad (1)$$

With:
y^{i} = indicator value on a certain year
y^{min} = minimum threshold value of the indicator
y^{max} = target value of the indicator

There are two types of progress: pillar-specific progress and multidimensional green economy progress through the GEI. For both progress, we use the arithmetic mean instead of the geometric mean for two reasons. Typically, the geometric mean is preferred to obtain an average over a set of multiplicative indicators or indicators with different scales. Considering that the indicators have been normalized, an arithmetic mean of those indicators will produce a corresponding trend with a geometric mean. The second reason is that because normalization is done using a fixed minimum threshold value, significant shocks or disruptions might produce scores with a zero or even negative number, and a geometric mean cannot handle such value. Thus, pillar-specific progress uses the arithmetic mean of composite individual progress within one pillar and therefore measures the country's achievements for each specific pillar (environment, economy, and social). For each pillar, the calculation is conducted by aggregating individual progress and dividing the results by the number of indicators. Formula of pillar-specific green economy index for each pillar are shown in **Equation (2)**, **(3)**, and **(4)**.

$$Environment\ score\left(i\right) = \frac{\sum_{j=1}^{5} Score^{i,j}}{5} \quad (2)$$

$$Economy\ score\left(i\right) = \frac{\sum_{j=6}^{11} Score^{i,j}}{6} \quad (3)$$

$$Social\ score\left(i\right) = \frac{\sum_{j=12}^{15} Score^{i,j}}{4} \quad (4)$$

The GEI measures progress in achieving the transition towards an inclusive Green Economy by aggregating progress across pillars and weighting the results using the number of indicators in each pillar to recognize that all indicators are potentially of equal importance. The GEI composite formula is shown in **Equation (5)** below.

$$GE\ Index\left(i\right) = \frac{(Env.\ score^{i} \times 5) + (Eco.\ score^{i} \times 6) + (Soc.\ score^{i} \times 4)}{15} \quad (5)$$

HOW "GREEN" IS INDONESIA'S ECONOMY?

OVERVIEW OF INDONESIA'S GREEN ECONOMY INDEX

Overall, Indonesia's GEI shows a rising trend over the ten-year period, as shown in **Figure 6**, with a composite score of 59.17 in 2020, indicating the right track for the nation's green economic growth. A clear trajectory of reducing the emission intensity is driven mainly by FOLU-related policies, such as the forest moratorium that have successfully kept the primary forest areas high since 2011. Based on each indicator's progress from 2011 to 2020 (see **Figure 7**), economic indicators are the most progressive, implied by their large area in 2020 compared to 2011, especially for final energy intensity of which the score is increased from 34 in 2011 to 74 in 2020. As can be seen in **Figure 7**, four indicators are categorized as having a very good score, with a score of more than 75: forest cover, managed waste, industrial labor productivity, and life expectancy.

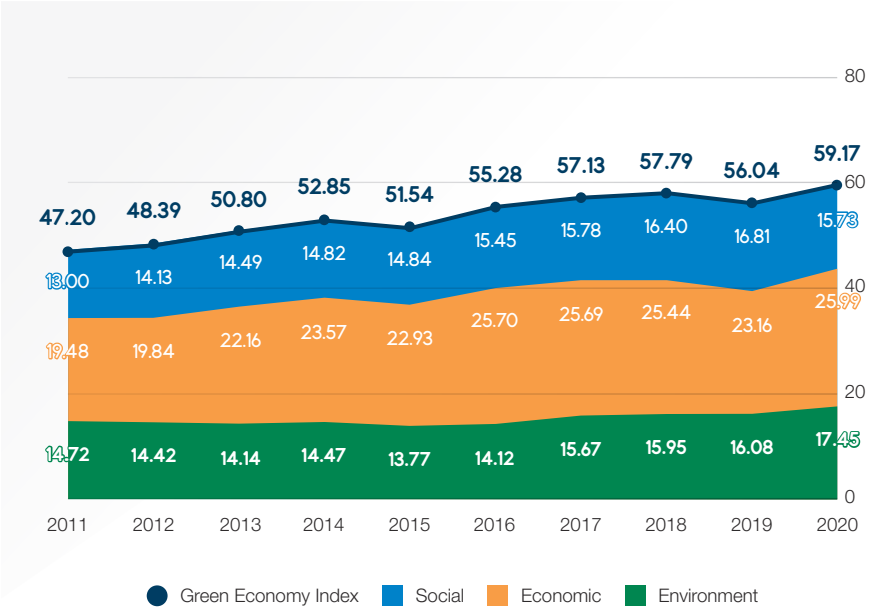


Figure 6 Indonesia Green Economy Index 2011–2020

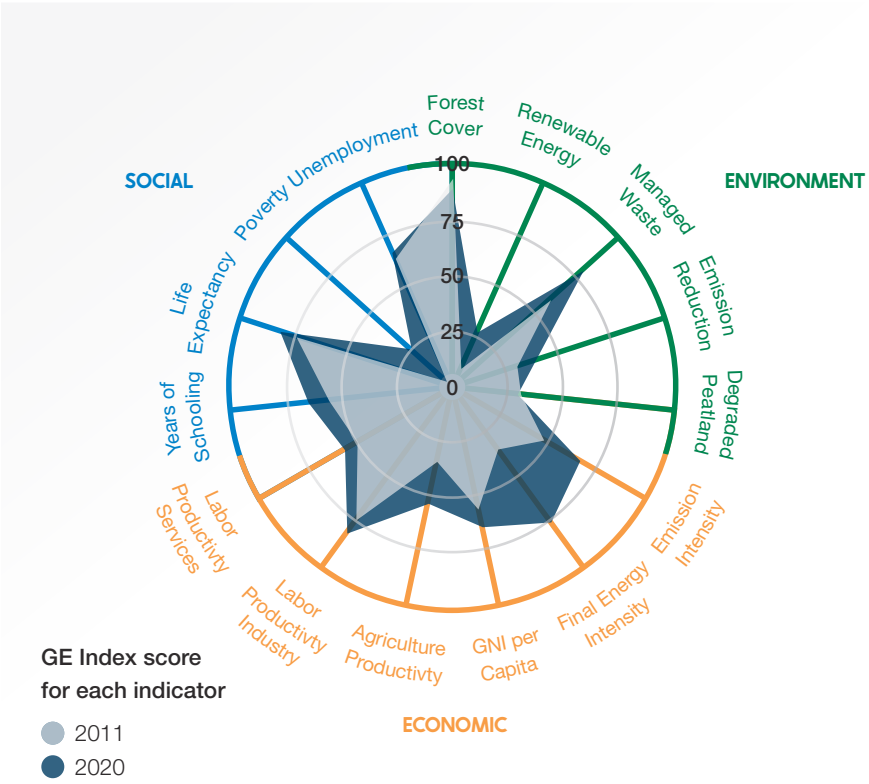


Figure 7 Progress of each GEI's indicator score from 2011 to 2020

Each year, the environmental pillar has the lowest composite index compared to the other pillars which prompted mostly by modest share of new and renewable energy and low percentage of degraded peatland (see **Figure 7** and **Figure 8**). This signals the need for more ambitious environmental policies to transform the economy. Plunges in the years of 2015 and 2019 in economic pillar trend is primarily affected by disastrous forest fires occurred in both years, generating a very high level of GHG emissions that further enlarge the emission intensity. This also leads to a slight drop in the overall index (return to **Figure 6**). Meanwhile, the social pillar trend shows a steady growth despite significant fall in 2020 due to the pandemic.

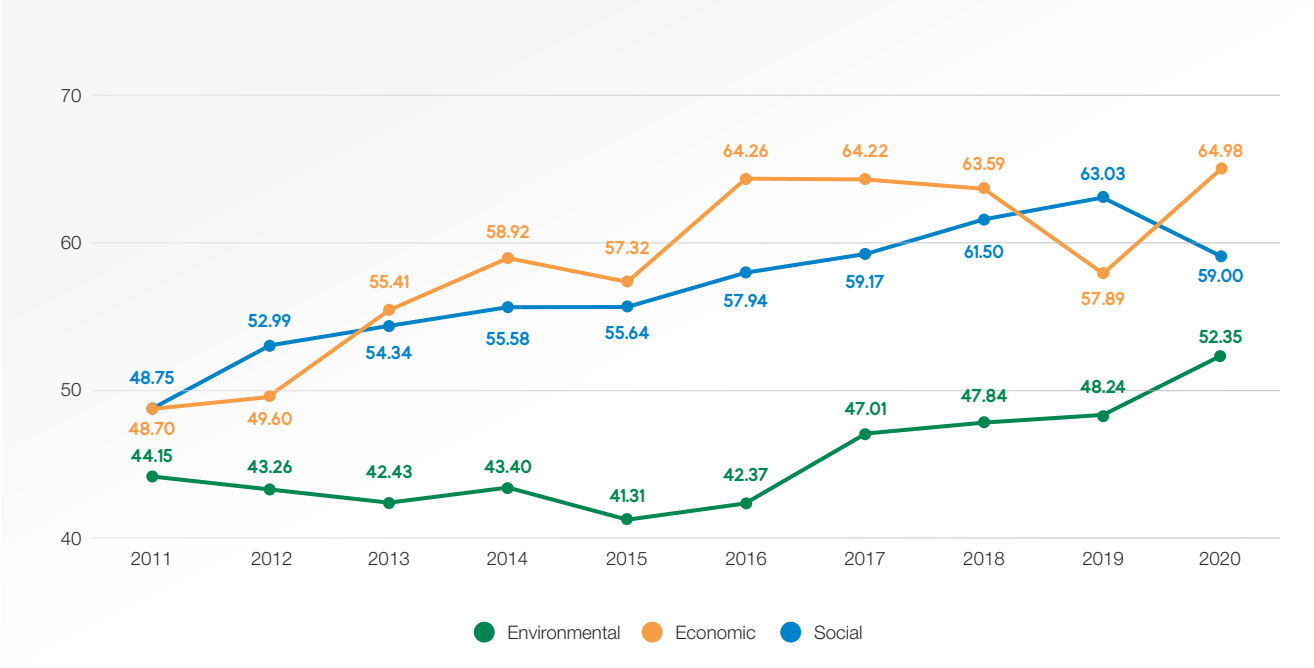


Figure 8 Indonesia Green Economy Index 2011–2020, specified in three pillars

PROGRESS OF ENVIRONMENTAL PILLAR

The environmental pillar score for Indonesia began poorly, particularly in the first five years, from 2011 to 2015. Two reasons primarily contribute to this: the low share of renewable energy in Indonesia primary energy mix and the degradation of peat lands (see **Figure 9**). Therefore, the government decided to accelerate the development of new and renewable energy with the issuance of the Presidential Regulation No. 22/2017 on National Energy General Plan (RUEN). As a result, over the course of the following five years, Indonesia's share of renewable energy in primary energy sources doubled, rising from 4.90 percent in 2015 to 11.28 percent in 2020. Electricity generated from hydro, geothermal, and biomass accounted as the main contributor of this improvement, in which combined they generated 52,140 GWh electricity in 2020 or doubled the production from 2015 (24,250 GWh).

In the transportation sector, biofuel plays a crucial role by supplying 55.5 million BOE in 2020, a massive increase from just 8.4 million BOE in 2015. The B20/B30 implementation regulation by the government was a resounding success in this regard. Kudos to the achievements, however, the government is expected to keep escalating the deployment of renewable energy to support a more progressive GEI.

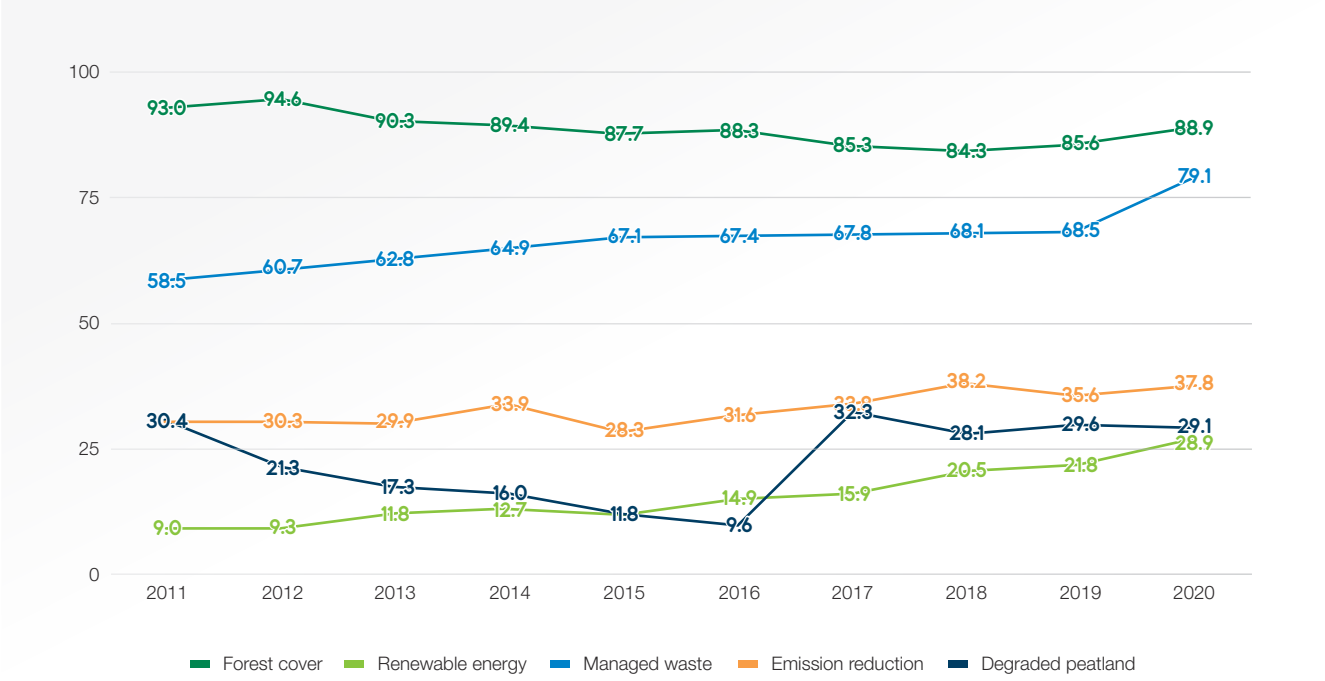


Figure 9 Score of environmental indicators in the GEI (2011–2020)

The Government established the Peatland Restoration Agency (BRG) in the wake of widespread peatland fires in 2015. It gave the responsibility to them for coordinating and facilitating the implementation of peatlands restoration of 2.4 million hectares of degraded peatlands to prevent further fires. Even though the realization came short, the effort successfully restored almost a million hectares of degraded peatland, increasing the indicator's score from 9.6 in 2016 to 29.1 in 2020. The implementation of peatlands restoration has been deployed using the 3R concept, which means rewetting, revegetating, and revitalizing the community's economy and livelihood (around peatlands). The peatland restoration tends to be successful on peatlands outside the concession areas directly undertaken by the government and various other related agencies, i.e., the Ministry of Environment and Forestry and the Environment and Forestry Agency at the Provincial and Regency/City Levels. In addition, the collaboration across multi-stakeholders related to peatland management, such as the private sector and non-governmental organizations, also supports the progress of peatland restoration in their respective areas, even though it still requires law enforcement to force companies to undertake peatland restoration.

The best performance indicator is forest cover, albeit showing a slightly decreasing trend until 2018 that eventually bounced back from 2018 onwards. Indonesia's deforestation rate hit a historic low in 2020, with the government crediting its various policies prohibiting forest clearing, falling oil palm prices, and an economic slowdown as a result of the COVID-19 pandemic. The country also managed to maintain its total forest cover at slightly more than half (50.9%) of its total land area, at 95.6 million hectares, in 2020. The slowing deforestation trends are attributed to the culmination of a number of policies aimed at protecting the country's forests. These include a permanent ban on issuing new permits to clear primary forests and peatlands, the moratorium on new oil palm plantation licenses, forest fire mitigation and prevention, a social forestry program, land rehabilitation, and increased law enforcement against environmental violations. The forest cover condition indicator performance is calculated from National Land Cover Map data by the Ministry of Environment and Forestry. The data has a mapping accuracy level of nearly more than 80%, so it can be used as a tool for monitoring and evaluating the condition of forest cover in Indonesia with a good level of resolution (Ministry of Environment and Forestry, 2021).

The indicator of managed waste fell short behind the forest cover indicator as the second best performing environmental indicator in 2020. The percentage of managed waste in Indonesia at 64.87% was obtained from the National Waste Management Information System (SIPSN) data by the Ministry of Environment and Forestry. This system platform manages data on waste management households in all districts/cities in Indonesia. One factor driving the upward trend is the ongoing improvement of waste handling and waste reduction by regions and cities driven by the National and Regional Waste Management

Strategic Policies (JAKSTRANAS and JAKSTRADA). The latest data showed a steeper rise that might be caused by the reduction of domestic waste during the mobilization restriction of the COVID-19 pandemic. However, waste emergency conditions are still experienced by many cities in Indonesia, which can have multidimensional impacts on health, the environment, and others. Therefore, solid waste management needs to be improved from upstream to downstream in an integrated and comprehensive manner.

The last indicator in environmental pillars is cumulative emission reduction from baseline. Despite dips caused by forest fires in 2015 and 2019, this indicator shows an upward trend. Changes in emissions in the land sector have been the main driver of our emission reduction progress during the last ten years, according to AKSARA, an online platform to plan, monitor, evaluate, and report the low carbon development initiative and greenhouse gas emission reduction progress.

PROGRESS OF ECONOMIC PILLAR

Economic indicator scores mostly fall within the category of good, a score between 50 and 75, except for some lows that occurred in the early years and some drops that occurred in 2015 and 2019 (see **Figure 10**). As mentioned before, the plunges in 2015 and 2019 were due to forest fires affecting emission intensity indicators. The underlying cause of this in 2019 is believed to be the El-Nino (Meteorological, Climatological, and Geophysical Agency, 2019) that extends the duration of the dry season in Indonesia, making not only the forest more vulnerable to fires but also the decrease of agriculture productivity, especially for rice and aquaculture commodities. 2019 was the second hottest year both globally and in Indonesia, and the CO_2 concentration recorded at the Bukit Kototabang Global Atmosphere Watch (GAW) Station reached 406.4 ppm. 2019 was also the fifth driest year since 1979, after 1997, 2015, 1994 and 1982. Weak El Nino occurred since the beginning of the year until JJA (June–July–August) in 2019. Then, in the JAS (July–August–September) to OND (October–November–December) in 2019, ENSO was in a Neutral condition (Meteorology, Climatology, and Geophysics Agency, 2019).

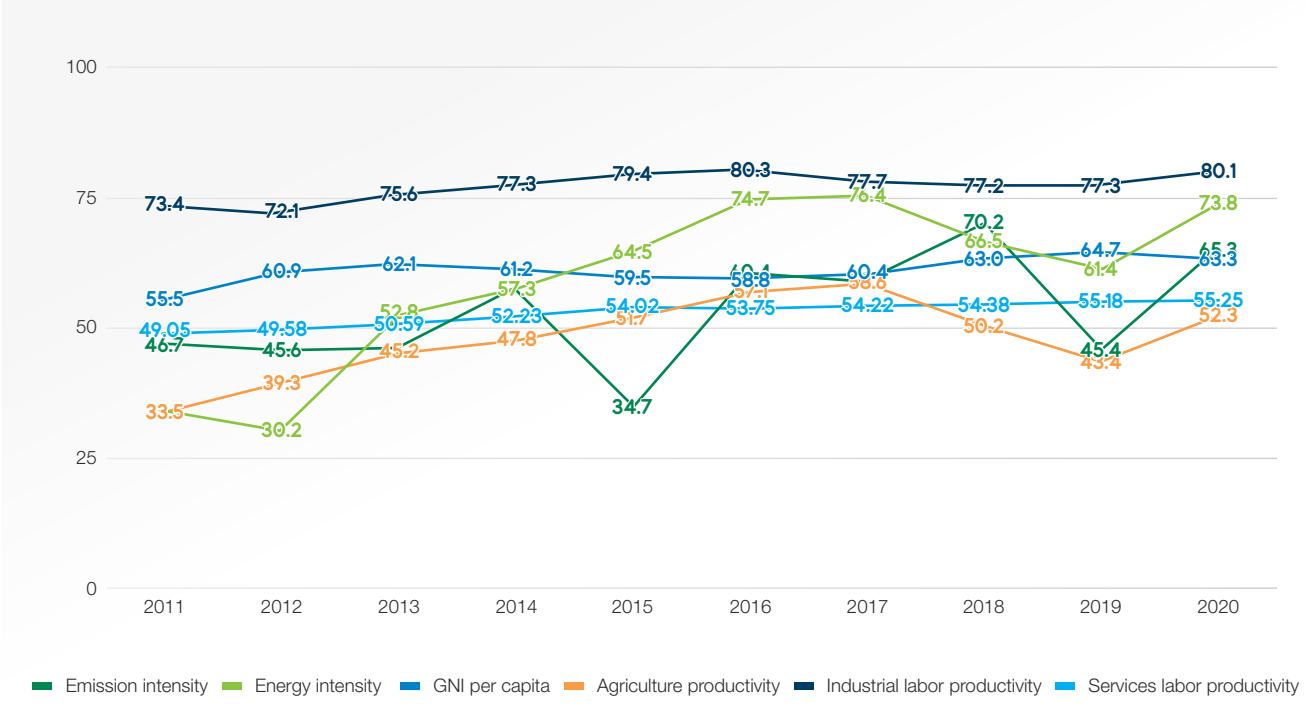


Figure 10 Score of economic indicators in GEI Index (2011–2020)

Moreover, decreased productivity in aquaculture commodities was due to reduced production of seaweed cultivation. Seaweed aquaculture production is the largest contributor to aquaculture production by contributing 60% of Indonesia's total aquaculture production. The decline of seaweed production due to some seaweed canters getting saturated because of the declining seeds quality, which make it less resistant to environmental conditions and susceptible to disease, meanwhile the production of tissue culture in seaweed seedlings could not reach all areas of seaweed cultivation canters in Indonesia (Ministry of Marine Affairs and Fisheries, 2020).

The agricultural productivity indicators are a composite of three sub-indicators that measure the productivity of food cultivation in Indonesia: rice field productivity, palm oil productivity, and aquaculture productivity. Paddy productivity increased and declined somewhat from 8.12 tons/ha/year to 7.33 tons/ha/year between 2011 and 2020 due to numerous agricultural government policies. From 2011 to 2017, the SRI (System of Rice Intensification) and SL-PTT (Integrated Crops Management-Field School) programs had a substantial influence on yield (ton/ha) and crop intensity index (planting times/year) in terms of the usage of organic fertilizer and intermittent irrigation. However, paddy productivity fell significantly between 2018 and 2020 because the national SRI and SL-PTT programs were not running constantly due to focusing of UPSUS Pajale (Special forces of Paddy, Corn and Soybean) (Ministry of Agriculture, 2022). Rice production in 2019 was lower than 2018 due to the long drought and floods caused by El Nino. This affected the rice crops intensity index that determines the rice field productivity.

Meanwhile, palm oil productivity increased harmoniously from 2.46 tons of CPO/ha/year to 3.37 tons of CPO/ha/year as a result of the Indonesia Sustainable Palm Oil (ISPO) certification schemes becoming a national requirement for all palm oil stakeholders, primarily the private sector and state-owned enterprises. It will be mandatory for smallholders in 2030. The ISPO certification could increase the productivity of palm oil in terms of Good Agricultural Practices (on-farm) in the use of organic fertilizer, minimum tillage, no-burning replanting, legume cover crops for immature oil palm crops, and the use of certified seeds that could impact the production of fresh fruit bunch up to 40-50% and the practice of good manufacturing practices, in the using of recycled water, energy efficiency, and waste management, the palm oil yield up to 20–30%.

Since 2011, aquaculture production has increased from 7.2 tons/ha/year to 13.88 tons/ha/year in 2020. The reason behind this positive trend is the Ministry of Maritime Affairs and Fisheries (MMAF) active role in developing breakthrough programs in boosting the export performance of fishery products, with superior commodities such as shrimp, lobster, crab, and seaweed. The MMAF targets shrimp commodities as the main contributor to fishery export products. Since 2013, MMAF has implemented the Participatory Pond Irrigation Management Program (PITAP) to increase the productivity of people's ponds through various irrigation system rehabilitation activities. Moreover, MMAF encourages the pond owners to intensify their ponds to increase pond productivity and develop a cultivation pattern based on area/cluster management.

The final energy intensity, as mentioned previously, has the most progressive performance during 2011–2020. Even though the indicator began with a low score of just 34 or the second-lowest score within the economic pillar, the indicator grew with a remarkable speed that made the indicator ranked second in 2020. The final energy intensity value in 2020 was 78.82 BOE per billion of IDR, compared to an initial value of 103 BOE per billion of IDR. A lower energy intensity value means a more energy-efficient process and technology are used to drive economic growth.

GNI per capita is often recognized as a good indicator of a country's general quality of living. The inclusion of this indicator is important to ensure that our economic growth benefits the people. The ATLAS conversion method for measuring GNI per capita normalized the exchange rate fluctuations and local inflation of specific countries with an international standard called SDR deflator. Indonesia's GNI per capita fluctuated between 2011–2020. Good economic progress happened in 2017–2019, finally categorizing Indonesia as an upper-middle income country. However, it did not last long when pandemic COVID-19 hit the economy and made Indonesia's GNI per capita fall to the category of low-middle income country again.

The last two economic indicators are labor productivity in industry and services. The former showed the highest score within the economic indicators during the last ten years. Even though the labor productivity in the industry has already been categorized as a very good score, the improvement of human capital in the industry needs to accelerate further as the main driver for Indonesia to escape the middle-income trap. Some reskilling and upskilling of industrial workers should also be strategized cohesively to ensure a just transition towards the Green Economy. Such preparations should also be applied to the services sectors, especially for those heavily reliant on fossil fuels, such as transportation. Although the labor productivity in the services lagged behind the industry over the past ten years, its progress was consistent with an increasing trend. The advancement of labor productivity is dependent on human capital. As a result, a Green Economy must positively impact strengthening human capital.

PROGRESS OF SOCIAL PILLAR

Figure 11 shows that overall, the development of social indices in GEI had shown an increasing tendency over the last ten years, except for 2020, when the COVID-19 pandemic caused significant setbacks in poverty and unemployment rates. Mobility restrictions and economic recessions brought imminent effects on employment. Before the pandemic, the total number of unemployed Indonesians reached 7.1 million; by August 2020, this figure escalated to a staggering 9.1 million. This circumstance dropped the unemployment rate score to ten years ago.

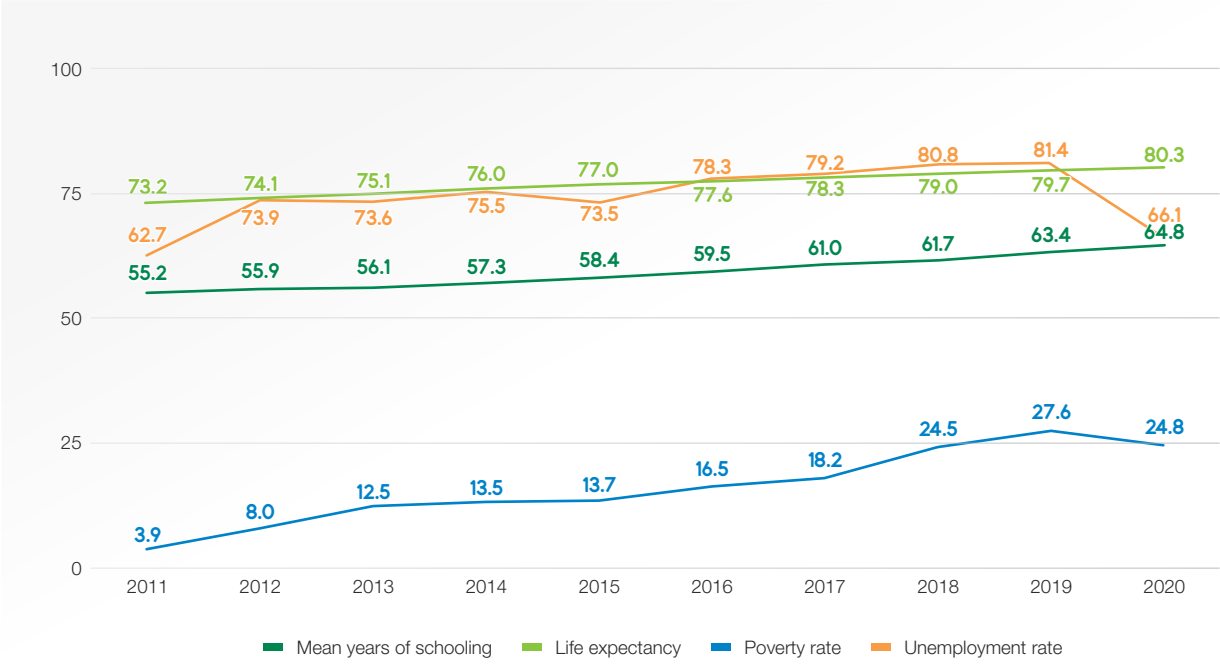


Figure 11 Score of social indicators in the GEI (2011–2020)

The pandemic taught us that a major economic shock would immediately impact employment, causing ripple effects on other indicators such as poverty because their earnings would be reduced or even eliminated. Even though the poverty level reversed to the condition of two years ago, this impact has already been cushioned through the National Economic Recovery (PEN) program, which serves as a safety net for the most vulnerable people. The PEN initiative channeled 216.6 trillion rupiahs into the social protection clusters, directly boosting people's purchasing power and encouraging public spending to keep the economy afloat.

As evidenced by their steady upward trends in 2020, the pandemic seemed to have no immediate impact on the other two measures, mean years of schooling and life expectancy. While the pandemic also disrupts the education sector by changing the methodology of learning from offline to distance learning, its effect on mean years of schooling is not immediate, considering the calculation only accounts for people over 25. However, in the long term, failing to respond to such disruptive events will affect educational progress, reducing the human capital that could potentially lower economic growth.

WAY FORWARD

Green Economy Index marks new milestones for Indonesia in transitioning towards low carbon and green economy by providing an accurate and reliable methodology in measuring the progress and achievements. The index built based on various indicators that have leverage to sustainable development in Indonesia, based on the Indonesian Green Economy model, indicated by strong economic growth, supporting environmental protection and social inclusion.

A continuous process of development and enhancement of the index is definitely required by considering development updates and keep open to further enhancement by taking into account several considerations such as suitability with the currently under-developed Green Economy system dynamics model, data availability and accessibility, and profound reasoning for each indicator that added up to the interlinkages between environment-economy-social nexus. Nevertheless, this set of multidimensional indicators is not rigid. Addition or reduction of indicators that could capture a more inclusive green economy index is possible for future development.

The Green Economy Index provides a more comprehensive and objective analysis on how green Indonesia is, since the index is developed based on the interlinkages of economy, environment and social pillars. With strong commitment of the Government of Indonesia to incorporate green economy to the national development planning documents, green economy index will be included in the next long term and medium term development planning document. The projection of Indonesia Green Economy Index will be generated by using the Green Economy System Dynamics model that will have several policy scenarios agreed by the policymakers.

REFERENCES

Central Bureau of Statistics. (2019). Indonesian Oil Palm Statistics 2019.

Central Bureau of Statistics. (2021, February 05). Badan Pusat Statistik. Retrieved from Badan Pusat Statistik: https://www.bps.go.id/pressrelease/2021/02/05/1811/ekonomi-indonesia-2020-turun-sebesar-2-07-persen--c-to-c-.html

Central Bureau of Statistics. (2021). Luas Panen, Produksi, dan Produktivitas Padi Menurut Provinsi 2019-2021. Retrieved from Badan Pusat Statistik: https://www.bps.go.id/indicator/53/1498/1/luas-panen-produksi-dan-produktivitas-padi-menurut-provinsi.html

Central Bureau of Statistics. (2022, February 7). BPS. Retrieved from BPS: https://www.bps.go.id/pressrelease/2022/02/07/1911/ekonomi-indonesia-triwulan-iv-2021-tumbuh-5-02-persen--y-on-y-.html

Central Bureau of Statistics. (2022). Persentase Penduduk Miskin (P0) Menurut Daerah 2021-2022. Retrieved from Badan Pusat Statistik: https://www.bps.go.id/indicator/23/184/1/persentase-penduduk-miskin-p0-menurut-daerah.html

CGIAR. (2020, 10 27). Progress and perils in Indonesia's peatland restoration journey. Retrieved from Forests, Trees and Agroforestry: https://www.foreststreesagroforestry.org/news-article/progress-and-perils-in-indonesias-peatland-restoration-journey/

Dual Citizen. (2020). Global Green Economy Index. Retrieved from Dual Citizen: https://dualcitizeninc.com/global-green-economy-index/

Government of Indonesia. (1999). Law Number (No) 41 of 1999 on Forestry.

ILO. (2021). Statistics on labour productivity. Retrieved from ILOSTAT: https://ilostat.ilo.org/topics/labour-productivity/

IPCC. (2014). Technical Summary. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge and New York: Cambridge University Press.

IPCC. (2021). Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.

Meteorological, Climatological, and Geophysical Agency. (2019). Kondisi Iklim, Kualitas Udara, dan Gas Rumah Kaca di Indonesia2.

Ministry of Agriculture. (2020). Rencana Strategis Direktorat Jenderal Perkebunan Kementerian Pertanian Republik Indonesia 2020 - 2024.

Ministry of Agriculture. (2022). Rencana Adaptasi dan Penurunan Emisi GRK Sub Sektor Tanaman Pangan.

Ministry of Development Planning. (2019). Indonesia 2045 Berdaulat, Maju, Adil dan Makmur. Jakarta: Bappenas.

Ministry of Development Planning. (2019). Low Carbon Development: A Paradigm Shift Towards a Green Economy in Indonesia. Jakarta: Bappenas.

Ministry of Finance. (2022). Realisasi PEN Sementara. Retrieved from https://pen.kemenkeu.go.id/in/page/data-realisasi

Ministry of Energy and Mineral Resources. (2010). Handbook of Energy and Economic Statistics of Indonesia.

Ministry of Environment and Forestry. (2021). Rekalkulasi Penutupan Lahan Indonesia Tahun 2020.

Ministry of Marine Affairs and Fisheries. (2020). Laporan Kinerja Direktorat Jenderal Perikanan Budidaya KKP 2019.

OECD. (2017). Green Growth Indicators 2017.

OECD. (2017). Green Growth Indicators 2017. OECD.

OECD. (n.d.). Purchasing power parities (PPP). Retrieved from OECD Data: https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

PAGE. (2017). The Green Economy Progress Measurement Framework – Application.

PWC. (2017). The Long View. How will the global economic order change by 2050?

The National Disaster Management Authority. (2022, February 18). BNPB. Retrieved from BNPB: https://www.bnpb.go.id/infografis/kejadian-bencana-tahun-2021

UNDP. (2020). HDR 2020 Tables and Dashboards. Retrieved from Human Development Reports: https://hdr.undp.org/data-center/documentation-and-downloads

UNEP. (2008). UNEP. Retrieved from UNEP: https://www.unep.org/explore-topics/green-economy/why-does-green-economy-matter/what-inclusive-green-economy

UNEP. (2012). Measuring Progress towards an Inclusive Green Economy. Retrieved from https://wedocs.unep.org/: https://wedocs.unep.org/20.500.11822/32438

UNFCCC. (2022, 04 13). What is the Triple Planetary Crisis? Retrieved from United Nations Climate Change: https://unfccc.int/blog/what-is-the-triple-planetary-crisis

UNGA. (2012, September 11). United Nations. Retrieved from United Nations: https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

World Bank. (2020). World Bank. Retrieved from Life expectancy at birth, total (years): https://data.worldbank.org/indicator/SP.DYN.LE00.IN

World Bank. (2021). Unemployment, total (% of total labor force) (national estimate). Retrieved from World Bank: https://data.worldbank.org/indicator/SL.UEM.TOTL.NE.ZS?most_recent_value_desc=true

World Bank. (2021, July 1). World Bank. Retrieved from https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2021-2022

World Bank. (2022). DataBank. Retrieved from World Development Indicators : https://databank.worldbank.org/reports.aspx?source=2&series=EN.ATM.CO2E.PP.GD.KD&country=

World Bank. (2022). GNI per capita, Atlas method (current US$). Retrieved from World Bank: https://data.worldbank.org/indicator/NY.GNP.PCAP.CD

World Bank. (n.d.). Data Bank. Retrieved from https://databank.worldbank.org/metadataglossary/health-nutrition-and-population-statistics/series/NY.GNP.PCAP.CD

World Bank. (n.d.). Trends in Solid Waste Management. Retrieved from https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html

APPENDIX

APPENDIX 1. ANNUAL VALUE FOR EACH INDICATOR

Pillar	No.	Indicator	Unit	Desired	Minimum Thresholds (ymin)	Maximum Thresholds (ymax)	Annual Value									
							2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ENVIRONMENTAL	1	Forest Cover	%	Improving	30	54	51,85	52,24	51,21	51,01	50,61	50,74	50,04	49,81	50,13	50,90
	2	Share of Renewable Energy	%	Improving	0	42	3,77	3,92	4,96	5,35	4,90	6,27	6,66	8,61	9,16	11,28
	3	Managed Waste	%	Improving	0	82	48,00	49,75	51,50	53,25	55,00	55,29	55,58	55,87	56,16	64,87
	4	Percentage of GHG Emission Reduction	%	Improving	0	70	20,88	21,22	20,96	23,72	19,83	22,14	23,66	26,74	24,93	26,45
	5	Percentage of Degraded Peatland	%	Declining	30	0	20,87	23,60	24,80	25,19	26,47	27,13	20,30	21,58	21,11	21,28
ECONOMIC	6	Emission Intensity	Ton CO_2e/BnRp	Declining	270	26	156	159	157	129	185	123	126	99	159	111
	7	Final Energy Intensity	BOE/BnRp	Declining	125	63	103,52	105,92	91,86	89,06	84,57	78,23	77,83	83,33	86,52	78,82
	8	Gross National Income (GNI)/Capita	USD/capita	Improving	500	12695	3010	3580	3730	3620	3430	3400	3530	3840	4050	3870
	9	Agricultural Productivity														
		a. Paddy Productivity	Ton/hectare/year	Improving	5	12	8,12	8,50	8,77	8,73	9,32	9,69	9,94	8,33	7,32	7,31
		b. Palm Oil Productivity	Ton/hectare/year	Improving	2	5	2,46	2,57	2,66	2,72	2,76	2,81	2,82	2,99	3,26	3,37
		c. Aquaculture Productivity	Ton/hectare/year	Improving	3	19	7,20	8,60	10,40	11,45	11,83	13,32	13,42	12,31	10,10	13,88
	10	Industrial Sector Labor Productivity	MnRp/person	Improving	20	200	108,36	105,19	113,96	118,71	124,50	127,05	119,80	118,33	118,59	126,41
	11	Service Sector Labor Productivity	MnRp/person	Improving	20	200	61,88	62,64	64,11	66,58	69,38	68,96	69,71	69,96	71,26	71,37
SOCIAL	12	Mean Year of Schooling	years	Improving	2	12	7,52	7,59	7,61	7,73	7,84	7,95	8,10	8,17	8,34	8,48
	13	Life Expectancy	years	Improving	55	75,5	70,01	70,20	70,40	70,59	70,78	70,90	71,06	71,20	71,34	71,47
	14	Poverty Rate	%	Declining	13	0	12,49	11,96	11,37	11,25	11,22	10,86	10,64	9,82	9,41	9,78
	15	Unemployment Rate	%	Declining	15	3	7,48	6,13	6,17	5,94	6,18	5,61	5,50	5,30	5,23	7,07

APPENDIX 2. GREEN ECONOMY INDEX SCORE

Pillar	No.	Indicator	Score									
			2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ENVIRONMENTAL	1	Forest Cover	92,96	94,62	90,26	89,39	87,72	88,27	85,27	84,31	85,65	88,93
	2	Share of Renewable Energy	8,98	9,33	11,81	12,74	11,67	14,93	15,86	20,50	21,81	26,86
	3	Managed Waste	58,54	60,67	62,80	64,94	67,07	67,43	67,78	68,13	68,49	79,11
	4	Percentage of GHG Emission Reduction	29,82	30,32	29,95	33,89	28,32	31,63	33,80	38,20	35,61	37,79
	5	Percentage of Degraded Peatland	30,44	21,34	17,33	16,05	11,77	9,57	32,32	28,06	29,64	29,08
		Environmental Pillar Score:	44,15	43,26	42,43	43,40	41,31	42,37	47,01	47,84	48,24	52,35
ECONOMIC	6	Emission Intensity	46,74	45,58	46,18	57,67	34,67	60,44	58,96	70,20	45,43	65,23
	7	Final Energy Intensity	34,05	30,19	52,80	57,30	64,52	74,71	75,36	66,51	61,37	73,77
	8	Gross National Income (GNI)/Capita	55,50	60,86	62,13	61,21	59,54	59,27	60,43	63,03	64,68	63,27
	9	Agricultural Productivity	33,48	39,27	45,17	47,75	51,74	57,09	58,59	50,22	43,36	52,28
		a. Paddy Productivity										
		b. Palm Oil Productivity										
		c. Aquaculture Productivity										
	10	Industrial Sector Labor Productivity	73,38	72,10	75,57	77,34	79,42	80,29	77,74	77,21	77,30	80,07
	11	Service Sector Labor Productivity	49,05	49,58	50,59	52,23	54,02	53,75	54,22	54,38	55,18	55,25
		Economic Pillar Score:	48,70	49,60	55,41	58,92	57,32	64,26	64,22	63,59	57,89	64,98
SOCIAL	12	Mean Year of Schooling	55,20	55,90	56,10	57,30	58,40	59,50	61,00	61,70	63,40	64,80
	13	Life Expectancy	73,22	74,15	75,12	76,05	76,98	77,56	78,34	79,02	79,71	80,34
	14	Poverty Rate	3,92	8,00	12,54	13,46	13,69	16,46	18,15	24,46	27,62	24,77
	15	Unemployment Rate	62,67	73,92	73,58	75,50	73,50	78,25	79,17	80,83	81,42	66,08
		Social Pillar Score:	48,75	52,99	54,34	55,58	55,64	57,94	59,17	61,50	63,03	59,00
		GREEN ECONOMY INDEX SCORE:	47,20	48,39	50,80	52,85	51,54	55,28	57,13	57,79	56,04	59,17

Note:

0–25	Bad
25–50	Medium
50–75	Good
75–100	Very good

GREEN ECONOMY INDEX

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