



ASEAN GREEN
FUTURE PROJECT
PHASE 1 REPORT

Accelerating Indonesia's climate agenda to achieve sustainable development

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DISCLAIMER

This ASEAN Green Future report was written by a group of independent experts acting in their personal capacities. Any views expressed in this report do not necessarily reflect the views of any government or organization, agency, or programme of the United Nations.



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About ASEAN Green Future

The ASEAN Green Future project is a collaboration between the Sustainable Development Solutions Network, ClimateWorks Australia, the Jeffrey Sachs Center on Sustainable Development at Sunway University, and research groups from across Southeast Asia (Cambodia, Indonesia, Laos, Malaysia, and Thailand, with potential participation by Brunei, Myanmar, the Philippines, Singapore, and Viet Nam in the future).

The Phase 1 report of each country team presents priorities and actions to date, and key technology and policy opportunities to further advance domestic climate action. The Phase 1 regional report situates the region's path to low-carbon transition within a global context using the country reports and other studies. This series of reports, produced through a synthesis of existing research and knowledge, builds the case for advancing the region's climate agenda. Phase 2 of the ASEAN Green Future project will undertake quantitative assessments of the different options for decarbonizing the ASEAN countries.

Contents

1. Indonesia: Emerging country with high climate exposure	6
2. Indonesia's current emission status and its decarbonization pathways	7
3. Higher national interest in pursuing more ambitious climate targets	11
4. Gaining multiple benefits from a stronger climate action	13
5. Key recommendations	14
Bibliography	16



1. Indonesia: Emerging country with high climate exposure

Indonesia is a vast archipelago country that spans 5,000 kilometers across Southeast Asia with over 17,000 islands. Positioned around the equator, the country has a climate that is almost entirely tropical with an average coastal plain temperature of 28 °C, average inland and mountain temperature of 26 °C, and average higher mountain temperature of 23 °C. These characteristics make Indonesia geographically vulnerable to climate change.

The threat of climate change is exacerbated by Indonesia's own economic activities. As the 16th largest economy in the world with GDP reaching US\$1.1 trillion, this country has a high level of energy consumption and undertakes many activities on forest lands and peatlands. As a result, Indonesia is among the countries with the largest annual greenhouse gas (GHG) emissions in the world. Based on the Climate Analysis Indicators Tool (CAIT) Climate Data Explorer, Indonesia emitted 1,703.86 MtCO₂e of GHG, contributing to around 3.6 percent of total global GHG emissions in 2018. Only China, the USA, India, and Russia had GHG emissions larger than Indonesia's.


Climate change has the potential to cause devastating impacts in Indonesia. With around 65 percent of the population living on the coast and nearly half of Indonesia's population depending on agriculture and forest-based livelihoods, Indonesia is exposed to the threat of sea-level rise and other hydrometeorological events such as droughts, floods, and landslides. In addition, climate change also harms Indonesia's economy. Without taking into account non-market impacts and disaster risk, Indonesia's average GDP loss is already estimated at 2.5 percent by 2100 (World Bank 2009). This is more than four times the global average GDP loss of 0.6 percent. This higher GDP loss is attributed to Indonesia's long coastline, population density, coastal areas, high dependence on agriculture and natural resources, relatively low adaptability, and a tropical climate (ADB 2009).

Indonesia's current climate condition could worsen as the Indonesian economy continues to develop. Taking advantage of the demographic dividend¹, the government of Indonesia has a goal of achieving high-income status before its centennial in 2045. By then, Indonesia's population is projected to reach 309 million people with economic growth of about five to six percent per year, a GDP of US\$9.1 trillion, and income per capita around US\$23,199 (Cabinet Secretariat of the Republic of Indonesia 2017). Without proper mitigation measures, Indonesia could contribute significantly to climate change and global warming.



1 Demographic dividend is the economic growth potential that can result from shifts in a population's age structure, mainly when the share of the working-age population (15 to 64) is larger than the non-working-age share of the population (14 and younger, and 65 and older). Further details, theory and practice of demographic dividend or known as a demographic bonus for Indonesian case are available in UNFPA 2015.

2. Indonesia's current emissions status and its decarbonization pathways



The forestry sector is the largest source of GHG emissions in Indonesia. GHG emissions from the conversion of non-cropland to cropland and peat decomposition accounted for almost half of Indonesia's GHG emissions in 2018 (Figure 1) with estimated emissions of 830 MtCO₂e. Forest cover loss has been a major issue. Indonesia lost 27.7 Mha of its tree cover from 2001 to 2020 (Global Forest Watch, 2021). The loss is equivalent to 17 percent of Indonesia's tree cover in 2000 and contributes to 6.7 percent of global tree cover loss in that period. This illustrates the importance of top-grade forest management in mitigating GHG emissions in Indonesia.

Despite the government's current success in reducing its annual deforestation rate by 75 percent, future development plans might put considerable pressure on high conservation value areas due to the development of biofuels and food estates.² The Ministry of Energy and Mineral Resources' strategic plan 2020–2024 explicitly stated that biofuel utilization in the domestic market is targeted to reach 17.32 million kl, mainly produced from palm oil products. The government has also officially declared the establishment of multiple food estates in selected regions, starting in Pulang Pisau and Humbang Hasundutan District, as its attempt to achieve food self-sufficiency. Without a strong commitment to monitoring high conservation value areas, those policies might provide additional incentives for further forest cover loss.

After land-use activities - electricity generation and transportation are the two activities with the most GHG emissions. These sectors were estimated to have released around 261 and 157 MtCO₂e of GHG respectively in 2018. Emissions mainly stem from fossil fuel combustion: the transportation sector consumes many oil-based energy sources, particularly gasoline and diesel fuel and electricity generation in Indonesia still relies heavily on coal.³ For the last three years, coal-fired power plants have supplied more than 60 percent of total commercial electricity in Indonesia (IESR 2019)⁴. Although the government has publicly stated its intention to transform its electricity generation sector to use more sustainable energy sources, coal is expected to be the dominant energy source for the foreseeable future. Based on the National Electricity General Plan 2019–2038, 47 percent of Indonesia's electricity supply in 2038 would still be generated from coal.

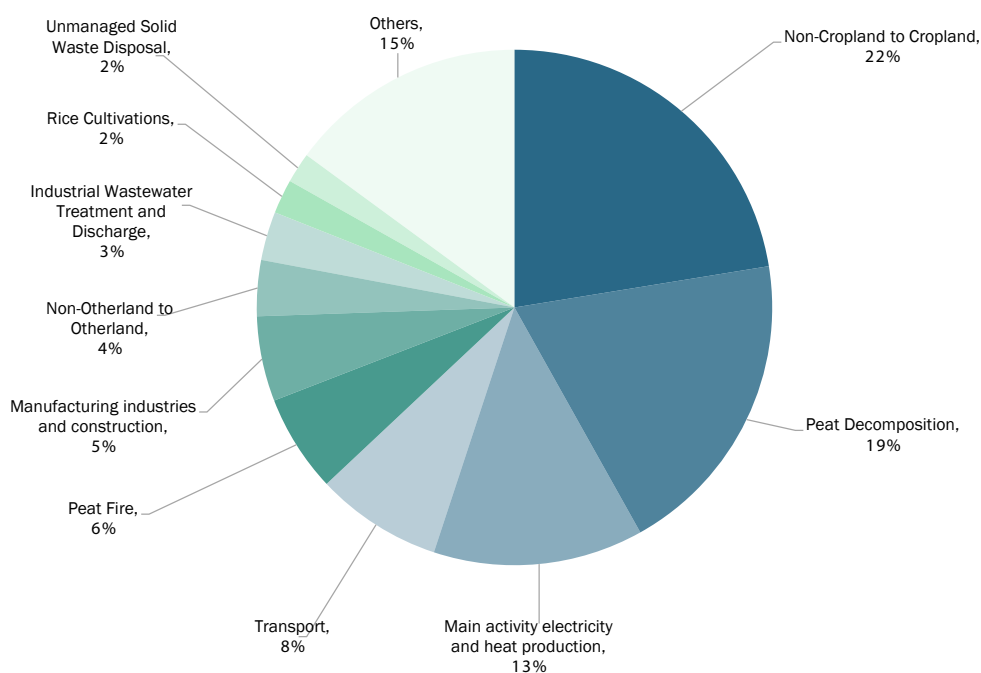
Coal utilization has adverse impacts on environmental quality and public health. While carbon dioxide and methane from coal contribute greatly to anthropogenic global warming (Wijaya and Limmeechokchai 2010), pollutants from the coal combustion process including particulate matter, sulfur dioxide and nitrogen oxides are linked with increased hospitalizations due to respiratory and cardiovascular illnesses and even premature death (Epstein, et al. 2011). LPEM FEBUI (2020) estimated that the monetary value of negative externalities associated with coal-fired electricity generation in 2017 exceeded US\$2.5 billion or equivalent to 0.3 percent of Indonesia's GDP in the same year.

² Throughout 2019–2021, deforestation in Indonesia was estimated to reach 115,460 ha. The figure is lower than preceding years, for example 462,460 ha in 2018–2019.

³ Distribution of GHG emissions from transportation activities in 2018 according to are as follows: 90.9 percent from land transportation, 9 percent from civil aviation, and 0.1 percent from water-borne transport.

⁴ Total commercial electricity includes both electricity supply for residential and non-residential purposes.

FIGURE 1: DISTRIBUTION OF GHG EMISSION BASED ON KEY CONTRIBUTING SUBSECTORS IN INDONESIA, 2018



Source: Ministry of Environment and Forestry (2019)

To address this, the government has pursued various options to tackle climate change. The efforts started with the development of the National Action Plan for Reducing Greenhouse Gas Emissions (Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca/RAN-GRK) in 2011. The plan targets a 26 percent reduction in GHG emissions for the 2010–2020 period in accordance with the Long-Term Development Plan (Rencana Pembangunan Jangka Panjang/RPJP) and the Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah/RPJM) for the 2005–2025 period (Bappenas 2010). Following on from RAN-GRK, Indonesia published their Nationally Determined Contribution (NDC) as part of its commitment to the Paris Agreement in 2016. In the NDC, Indonesia has committed to reducing its GHG emissions 29 percent by 2030 compared to business as usual (BAU). This is without international support; with international support for finance, technology transfer and development, and capacity building, Indonesia has committed to increasing its contribution to a 41 percent reduction by 2030 (UNFCCC 2016).

The government has also declared its goal to integrate climate action by including an environmental sector plan in the National Medium-Term Development Plan (RPJMN) 2020-2024. The plan states three national priorities: 1) environmental quality, 2) disaster and climate resilience, and 3) low-carbon development. A decarbonization pathway was specifically outlined in the Low Carbon Development Initiative (LCDI), issued in early 2019. The LCDI describes development strategies that can assist Indonesia in reaching the country's climate goals as well as protecting and improving its natural resources. At the same time, the LCDI may help the government to maintain the country's sustainable economic growth, alleviate poverty and meet sector-level development targets.

Unfortunately, current commitments and action plans are regarded as incompatible with the temperature reduction target in the Paris Agreement. Climate Action Tracker rated Indonesia's climate ambition as "highly insufficient", a rating that suggests global warming could reach 3°C or 4°C if all countries were to implement this approach to mitigating climate change. A lack of clarity around the conditional target, and high fossil fuel support are the main reasons behind this rating. Climate Action Tracker suggests that further adjustments are required to support low-carbon development in Indonesia, particularly for renewable energy and the general investment environment. Based on the National General Energy Planning (RUEN) road map, the government aims to increase the contribution of new and renewable energy to 23 percent of the total energy mix by 2025. However, Indonesia is struggling to meet this target. Renewable energy only accounted for 9.15 percent of the total energy mix in 2019 (DEN 2019). The main challenges in increasing the share of renewable energy in the energy mix is the cost of renewable energy: new renewable energy in Indonesia is still relatively more expensive than coal due to a perception of high risk, unsupportive policies, cost and inadequate incentives.

To ensure the effectiveness of low-carbon strategies, developing the necessary infrastructure and technology is critical. This requires heavy financing which most developing countries, including Indonesia, struggle with even without the urgency and global context of decarbonization. The Second Biennial Update Report (BUR) 2018 identifies that Indonesia needs around US\$247.2 billion in total, or US\$17.7 billion annually, to achieve its NDC target by 2030. To contextualize this figure, these annual funding needs are larger than the amount the central government has allocated for education, social security and health spending.

These funding needs only include the costs of implementing low-carbon programs and policies, and do not include the huge transition costs. These transition costs include supporting green sectors in Indonesia, compensation for affected parties in order to realize a just transition – for example, compensation for shutting down a coal-fired power plant – and financial support for those at risk of falling into poverty due to rising energy prices.

TABLE 1. FUNDING NEEDS BY GOVERNMENT OF INDONESIA TO ACHIEVE ITS NDC TARGETS UNDER BUSINESS-AS-USUAL SCENARIO

Sector	Policies and Program	Potential GHG Emission Reduction (MtCO ₂ e)	Financing Needs (Billion USD)
Forest and land use	<ul style="list-style-type: none"> • Forest conservation and protection program • Forest fire prevention 	655	5.557
Energy and transportation	<ul style="list-style-type: none"> • Construction of renewable energy power plants • Clean technology investments 	398	236.214
Industrial processes, products and use	<ul style="list-style-type: none"> • Mostly for cement and steel industries 	3.25	0.379
Waste	<ul style="list-style-type: none"> • Solid and liquid waste management at household and industrial level 	26	2.907
Agriculture	<ul style="list-style-type: none"> • Low-emission rice varieties, improving irrigation, biogas utilization, and feed additives 	4	2.164
TOTAL			247.221

Source: Indonesia Second Biennial Update Report (2018)

To meet these funding needs, Indonesia faces several challenges. In terms of fiscal capacity, the budget allocated by Indonesia is still relatively minimal. If the funding needs were extrapolated on an average basis starting in 2016, Indonesia would need about IDR220 trillion (US\$15.7 billion) per year to reach the 2030 target. However, since Indonesia implemented climate budget tagging, the budget allocated for all sectors has only reached US\$4.8 billion on average per year, or 30.3 percent of the total funding needs (Fiscal Policy Agency 2021). In response to the COVID-19 pandemic, the government raised the National Economic Recovery (PEN) budget to slightly above IDR700 trillion in 2021, an increase of 6 percent with the highest increasing rate in social security at around 22 percent compared to 2020. This budget is divided into five classifications: health; social protection; priority programs in sectoral ministries and institutions business support for micro, small, and medium enterprises (MSMEs) and corporations; and business incentives. These together with lower tax revenue further squeeze Indonesia's already limited fiscal capacity.

Fortunately, the government has initiated efforts to address this financing issue. Realizing the importance of businesses taking into account the environmental, social, and governance aspects of their activities, Indonesia's Financial Services Authority (OJK) launched a sustainable finance roadmap in 2014 followed by regulation on sustainable finance (POJK No. 51/POJK.03/2017) in 2017.⁵ Apart from implementing sustainable finance, financial service providers, issuers, and public companies must submit a sustainable finance action plan (Rencana Aksi Keuangan Berkelanjutan/RKAB) and a sustainability report (Laporan Keberlanjutan) to OJK.

5 OJK also introduce OJK's Sustainable Finance Roadmap Phase 2 (2021–2025)

Indonesian financial institutions have also begun to establish initiatives around sustainable financing and green finance products, such as green bonds, sukuk bonds and sustainability-linked financing. The attractiveness of green financing products has resulted in US\$155 billion worth of green bonds issued in 2017, increasing the green bond market by almost 80 percent from 2016 to 2017 (KPMG 2020). The government has also launched several financial institutions to help channel funds for the decarbonization plan, including Indonesia Climate Change Trust Fund (ICCTF), the Public Service Agency for Environment Fund Management (Badan Pengelola Dana Lingkungan Hidup/BPLDH), SDG Indonesia One, and the Indonesia Investment Authority (INA). ICCTF was launched by the government to coordinate and harmonize climate finance through channeling domestic resources and international funds into projects aligned with Indonesia's decarbonization plan. BPLDH aims to become the funding hub for environmental protection and management, managing US\$836 million from international agencies, such as the Green Climate Fund, REDD+ Norway, and the World Bank. Managed together by the Ministry of Finance and PT SMI (Part of the Ministry of Finance, engaged in financing and preparing infrastructure projects), SDG Indonesia One is an integrated platform that combines public and private funds using blended finance schemes for infrastructure projects related to the Sustainable Development Goals. Lastly, INA is a sovereign wealth fund intended to increase infrastructure investment and manages assets of IDR15 trillion from government capital.

Although various innovative financing instruments have begun to emerge, the role of the private sector in the country is still not maximized due to Indonesia's shallow financial market. Incentives such as subsidies or tax reductions, and the capacity of the financial sector to invest in the green sectors are still minimal. These issues suggest the absence of policy signals encouraging the private sector to enter into renewable energy, hence reducing the contribution of financial institutions in the green sector and decelerating progress on Indonesia's decarbonization plan. Therefore, international support is imperative to support Indonesia's attempt to expand its climate commitment towards a more ambitious target.

Such international support needs to be provided in more credible and reliable forms. Historically, the assistance received by Indonesia in dealing with climate change has often been in the form of results-based payments in which funds can only be claimed if efforts to reduce carbon emissions are considered successful. There are at least two challenges that Indonesia faces when implementing this mechanism. First, efforts to reduce carbon emissions generally face large costs. The disbursement of funds that can only be realized a few years after mitigation actions are carried out makes Indonesia need to seek funding from other sources upfront. Second, the results of Measurement, Reporting, Verification (MRV) as a determinant of the value of claims are often not in accordance with the efforts that have been made. As a result, funds that can be claimed by Indonesia may be below the amount sought, or cannot be claimed at all, which makes results-based payment less credible.



3. Higher national interest in pursuing more ambitious climate targets

Many countries have started to show significant interest in more robust climate action policies. More than 131 countries have established or are contemplating setting a target of decreasing emissions to net-zero by mid-century. While net-zero emissions is a long-term objective, drastic emissions reductions – especially by the world's largest greenhouse-gas emitters – are required in the next five to 10 years to limit global warming below 1.5°C and maintain a liveable environment. More than 80 nations have so far filed a new or modified national action plan or NDCs in accordance with the Paris Agreement's requirements. However, their cumulative emissions reductions by 2030 are still far short of the degree of ambition required to meet the 1.5°C targets (UNFCCC 2021).

In Indonesia, there have been discussions between the government and think tanks about their NDC and the path to net-zero emissions. To fulfill the mandate of the Paris Agreement, the government, through the Ministry of Environment and Forestry (KLHK), has prepared a Long-Term Strategy on Low Carbon and Climate Resilience (LTS-LCCR) 2050. The document contains not only mitigation efforts but also adaptation strategies. For mitigation efforts, LTS-LCCR has three scenarios to be implemented in the agriculture, forestry and land use (AFOLU) sector; energy; industrial processes, products and use (IPPU); and waste. In the LTS-LCCR, the projection for primary energy mix in Indonesia by 2050 under the low-carbon scenario is 34 percent from coal, 25 percent from natural gas, eight percent from oil, and 33 percent from renewable energy sources. Under this scenario, Indonesia is expected to reach net-zero emissions by 2060 or sooner by achieving the peak of national GHG emissions in 2030. Many experts consider targets in the latest version of LTS-LCCR not ambitious enough, with room for stronger effort in reducing Indonesia's reliance on coal. The Ministry of National Development Planning (Bappenas) then prepared four more ambitious scenarios, which have not yet been formalized in the form of regulations, namely NZE-2045, NZE-2050, NZE-2060, and NZE-2070. However, considering Indonesia's fiscal capacity and the ongoing pandemic, the scenario that is considered the most likely to be implemented is LTS-LCCR. The Bappenas' net-zero emissions scenario also requires peak GHG emissions in 2027 which is considered rather difficult to achieve given Indonesia's current situation with the COVID19 pandemic.

The Institute for Essential Services Reform (IESR)—a think tank in the energy and environment sectors—has come up with three energy system transition scenarios to achieve zero carbon emissions (IESR, Agora Energiewende and LUT University 2021). Among the three scenarios, only the Best Policy Scenario (BPS) could achieve zero GHG emissions by 2050. This scenario shows that deep carbonization in the energy system by 2050 is technically and economically feasible by increasing the share of renewable energy in the primary energy mix. The renewable energy portion could reach 80 percent by 2040 before reaching 100 percent by 2050. With a high share of renewables, BPS has the lowest annual cumulative system costs – due to technological advancements and the lower capital cost of renewables. There are several things to note. The solar value chain should utilize domestic components to reduce pressure on the balance of payments. Design and technology for solar PV should also be adjusted for tropical climates. During the night, when solar PV is not available, hydropower, geothermal, biomass, and battery discharge could be dispatched to meet energy demand. However, the price trajectory for batteries is currently unclear, with prices still high. The energy mix should also take into account regional characteristics such that the ideal energy mix would be the most reliable and economically viable with decreasing costs. Having the world's largest nickel reserves, Indonesia has great potential as a major player in electric vehicles. The government has expressed interest in taking advantage of this technology trend to increase its competitiveness in the automotive industry (Ministry of Finance 2021).

While Indonesia does not yet have carbon pricing systems in place, it is currently exploring and speeding up efforts to regulate carbon taxes and carbon trading to reduce GHG emissions. The government has been preparing an emission-trading system for future domestic carbon since last year. The draft has been discussed within the Cabinet Secretariat and the State Secretariat (Jakarta Post 2020). The Ministry of Finance (MoF) is currently considering introducing a carbon tax as a new source of income to support economic recovery from the

COVID-19 pandemic (Nikkei Asia 2021). Based on the Bill on General Provisions and Tax Procedures (RUU KUP), Indonesia will apply an initial tax rate of US\$5 per tonne of CO₂. Assuming the carbon tariff would be around US\$5–10 per tonne of CO₂, the government could generate about US\$1.9-2.6 billion per year (Kompas 2021).

Local governments have also started to give more attention to environmental issues. In July 2017, 8 district governments established Lingkar Temu Kabupaten Lestari (LTKL) with the aim to better implement sustainable development. Members of the collaboration are supported in designing and implementing development scenarios that balance economic, social, and environmental aspects through multi-stakeholder collaboration within each district and among members. The partnership also actively engages with national and global development partner networks, mainly to communicate the support needed for the members. In terms of financing, several provinces (e.g., North Kalimantan and West Papua) and several districts (e.g., Jayapura and Nunukan) have initiated Ecological Fiscal Transfers (EFT) which provide incentives for local governments to improve their environmental performance with performance-based transfer mechanisms.



4. Gaining multiple benefits from a stronger climate action

Many interventions that reduce GHG emissions have benefits beyond contributing to climate change and global warming mitigation. Co-benefits are just one way in which climate policy and sustainable development are interlinked. However, co-benefits are not always well documented in GHG emission reduction initiatives, which underestimate their positive impacts.

Transitioning to a low-carbon economy can potentially improve a country's economic performance as it involves a drastic transformation of production processes and consumption preferences. The carbon and energy efficiency of the economic system will be improved through the adoption of new technologies and practices. Though resource-intensive and potentially more expensive than the conventional ones, especially in the short to medium term, these options create more employment opportunities. Estimates from IRENA (2016) show that doubling the share of renewables by 2030 would bring a range of positive impacts including an increase in global GDP up to 1.1 percent, improvement of global welfare⁶ by 3.7 percent, and over 24 million people working in the renewable energy sector.

Similar findings are also obtained from the simulating the economic impact of Indonesia's decarbonization plan. Bappenas (2019) stated that the implementation of the LCDI high scenario can see Indonesia's GDP reach US\$5.4 trillion in 2045, with a per capita income of nearly US\$17,000 that would place the country squarely in the group of developed economies. This is US\$1.5 trillion above the GDP estimated in the baseline scenario (which includes no new policies). Such a figure will be achieved through value-added GDP growth of 5.7 percent per year for the period 2019–2024, and six per year thereafter through to 2045. Economic benefit is also seen in the employment rate. The LCDI high scenario could lower the level of unemployment to 3.4 percent, far below the baseline scenario of 6.9 percent or 15.3 million fewer workers. This figure is getting closer to what can be considered a natural rate of unemployment of three percent in Indonesia. Meanwhile, the poverty rate can also be reduced to around 4.2 percent or 13.6 million people in 2045 with the LCDI high scenario, lower than the baseline scenario of 6.7 percent or 21.5 million people from the projected population of around 318 million people. Apart from the LCDI planning, the four net-zero scenarios (NZE 2045, NZE 2050, NZE 2060, and NZE 2070) simulated by Bappenas are also show significant economic benefits for Indonesia. All of the scenarios could help Indonesia surpass the high-income threshold of US\$12,535 before 2045 (Bappenas 2021). The 2045 and 2050 scenarios suggest a boost in economic growth by around 6.21 percent and 6.06 percent, respectively, from 2021 to 2045. The 2060 and 2070 scenarios may bring a GDP growth rate of 5.87 percent and 5.82 percent, respectively, within the same time frame.

Recently, the Government of Indonesia has submitted the Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR). This LTS projects that Indonesia needs to substantially reduce emissions from the energy sector to close to zero and minimize forestry and land uses. This policy is estimated to minimize the impact of climate change on GDP contraction by 3.45 percent in 2050.

Decarbonization can also bring significant health improvement as climate change mitigation is highly related to air quality improvement. A climate policy scenario with GHG emission reductions of 10–15 percent would potentially avoid 700,000 particle-related annual deaths globally by 2020, compared to business as usual (David 1997). More significant estimations from Anenberg et al. (2012) stated that 0.64–4.92 million deaths could be avoided annually by implementing a set of GHG mitigation measures that simultaneously reduce PM2.5 and ozone. Estimates from Bappenas (2019) also show that the implementation of the LCDI high scenario could mean over 40,000 fewer deaths relative to the base case. Apart from health improvement, decarbonization can also benefit biodiversity from reduced deforestation, afforestation, and improved forest management.

The government needs to consider the co-benefit from mitigation measures. While the global narrative empathizes mitigation action, most developing countries – including Indonesia – have been significantly affected by climate change and are working on many adaptation measures. Using co-benefits, such as adaptation, as the criteria for prioritizing mitigation action is paramount, then programs will have benefits at both local and national levels.

⁶ Calculation of welfare combines several indicators including economic impacts based on consumption and investment, social impacts based on expenditure on health and education, and environmental impacts, measured as greenhouse gas emissions and materials consumption.

5. Key recommendations

The climate agenda needs to become the top priority for Indonesia and other ASEAN countries. Considering the urgency and funding needs of climate change in Indonesia and also in the region, below are the strategies and policies that Indonesia's government must take to confront the threat of climate change and to achieve inclusive growth and sustainable development.

Indonesia can initiate and take a leadership role among ASEAN countries to set regional targets, collaborate, and increase commitment for more decisive climate action. In 2022, Indonesia will hold the G20 presidency, and in 2023, it will hold the ASEAN presidency. By having ASEAN as a common ground with mutual interests in the economic, social, cultural, technical, scientific, and administrative fields, ASEAN countries need to take collective action and organize a potential collaboration to ensure the achievement of net-zero emissions. The potential for collaboration between countries can be built on the existence of common problems and equal opportunities. To tackle these problems, some of the collaborative possibilities are as follows:

- **Set more ambitious targets towards GHG emission** reduction by ensuring that every country has a net-zero emissions plan that includes targets for phasing out coal.
- **Adopt sustainable fisheries management** to reduce marine ecological tension, ensure food security, and increase the welfare of small-scale fisheries while reducing poverty in the region.
- **Mainstreaming circular economy** to reduce marine debris, local pollution, and natural or mineral resource exploitation.

Meanwhile, to seize the opportunities, some of the potential collaborations are as follows:

- Participate more in and **move up global value chains** in goods and services that drive green economic recoveries, such as electric vehicles. This effort could be an extension of the ASEAN Plan of Action for Energy Cooperation (APAEC) 2016–2025.
- Continue efforts to expand **multilateral electricity trading** in the region while simultaneously building a stronger capacity to absorb renewable energy through the ASEAN power grid. This power grid could be initially focused in Java, Sumatra, Singapore, Malaysia, Thailand, and Vietnam.

At the national level, Indonesia should publicly declare more ambitious and coordinated targets along with sound policies to tackle the climate crisis. To ensure that Indonesia can maximize the impact of its decarbonization pathway, several things can be recommended as follows:

- Implementation of the **phasing out of coal** as a major milestone in energy transition targets.
- Ensuring the decarbonization pathway takes the **just transition** aspects into account. The huge cost of transition can be overcome by adopting a carbon tax for carbon-intensive industries and creating an emissions trading system (ETS) to optimize revenue from the global carbon market and international collaboration.
- Maximizing the efficacy of decarbonization efforts through robust policies in the highest emitting sectors:
 - **Seizing opportunities in the energy and transportation sector**
One of the most important elements in decarbonization efforts in the energy sector comes in the form of phasing out coal. In this case, Indonesia needs to ensure the success of the plan to phase out coal by including complementary regulatory plans. Indonesia also has the opportunity to develop electric vehicles. Batteries can be used for EVs and energy storage. Indonesia needs to create a green supply chain to ensure that the electric vehicle industry is environmentally friendly from upstream to

downstream, which should include a responsible and sustainable extractives industry. Next, Indonesia needs to review the optimal renewable energy mix by taking into account the economics and potential in each local area. There are several ways to maximize the proportion of renewable energy in the energy mix. The first is to develop solar PV. If carried out in Indonesia, the industrialization of solar PV, including domestic patents for solar cell production, will provide high domestic value-adds and not disturb the balance of payments. The next renewable energy potential is geothermal. Indonesia can accelerate geothermal development by utilizing the nation's geothermal fund. Indonesia can also develop grid integration to strengthen the electricity system and capacity, including the integration of renewable energy. The development of smart grid integration (within ASEAN nations and possibly Australia) has the potential to be carried out in Sumatra-Java-Bali-Nusa Tenggara, while in other areas small, local smart grid integration can be built. Lastly, Indonesia – perhaps in collaboration with other ASEAN countries – can consider putting hydrogen into the energy and transportation sectors plan (thus in the long-term plan) and start progressing R&D for the technology. One promising source of hydrogen that can be utilized is waste. Waste to fuel technology provides double dividends – it may reduce the emissions from both waste incineration and fossil-fuel use to almost zero. The adoption of hydrogen technology is important as several energy simulation models show that it is very hard to achieve the net-zero emissions without integrating hydrogen into the model.

- **Optimizing the potential of carbon sinks**

Carbon sinks can be found in various sectors including forestry and land use, agriculture, and oceans. Regarding forestry and land use, Indonesia should adjust the land moratorium policy. In addition to extending the validity period which will expire in 2021, the scope of this policy also needs to be expanded for other commodities such as rubber and forest wood. Indonesia also needs to pay attention to the risks arising from its food estate development plan and biofuel policy. For this reason, it is necessary for Indonesia to implement sustainable agriculture to reduce these risks and also consider the diversification of feedstock for biofuel, including the utilization of used cooking oil. Finally, Indonesia also needs to increase the role of oceans by maintaining the ecosystem of mangroves, coral reefs, and seagrass which can help increase carbon sinks.

- **Conducting good waste management and developing a circular economy**

Waste is a minor contributor compared to other emitters, but better waste management could bring about other significant environmental and health benefits. Thus, the adoption of a circular economy, particularly in the plastics industry, is very urgent. One way of implementing this is to impose carbon and other environmental-related taxes on the petrochemical industry to make recycled plastic prices more competitive.

- **Mobilizing domestic and international financing to solve the climate financing gap:** At a national level, the government must eliminate sectoral and financial regulations that are barriers for green sector development. A supportive system has to be built for innovative financing instruments to grow and escalate green project sector pipelines. Fiscal and non-fiscal incentives, including de-risking instruments, need to be introduced comprehensively and thoroughly. The government – with other ASEAN countries – could demand a higher commitment from developed countries, MDBs, and possibly MNCs and UHWIs to increase financing for developing countries. Indonesia and other ASEAN countries should develop clear and reliable instruments and mechanisms, for example public-private partnerships and blended finance, to enable those potential grants and concessional loans to fund green projects. International financing should also share knowledge and provide other assistance that is urgently needed to speed up the transition and reduce economic risks. One example is to take advantage of the ASEAN Catalytic Green Finance Facility that provides funding for green infrastructure projects with dedicated technical assistance.

All in all, Indonesia needs to increase its effort to enforce a more ambitious climate target. With the COVID-19 pandemic striking, many countries are re-planning their development pathways in a more sustainable direction, and Indonesia should do the same. Becoming a late responder in climate action, Indonesia could be left behind. By not joining the global momentum, Indonesia could also be exposed to several risks, such as: being excluded from the global supply chain for sustainable products (e.g., electric vehicles and battery electric vehicles); missing the window of opportunity for new and inclusive economic growth; exposure to carbon border adjustment taxes; and reduced financial flows. With the appropriate strategy, Indonesia could gain positive net benefit in the long term which can strengthen Indonesia's commitment to achieving the SDG targets.

Bibliography

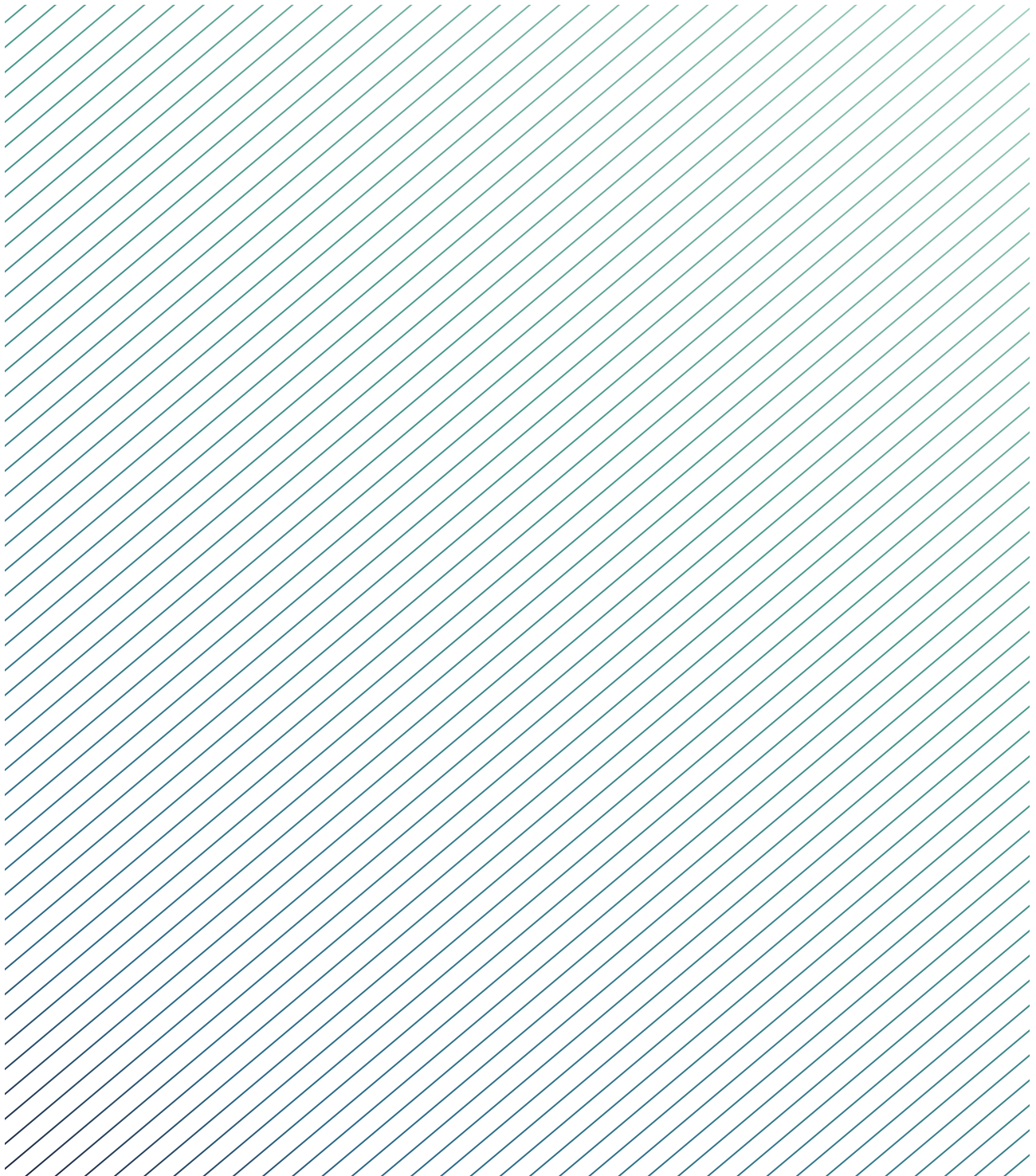
- ADB. 2009. *The Economics of Climate Change in Southeast Asia: A Regional Review*.
- Anenberg, S. C., J. Schwartz, D. Shindell, M. Amann, G. Faluvegi, Z. Klimont, ..., and V. Ramanathan. 2012. "Global air quality and health co-benefits of mitigating near-term climate change through methane and black carbon emission controls." *Environmental health perspectives*, 120(6) 831-839.
- Bappenas. 2010. "Rencana Aksi Nasional Penurunan Gas Rumah Kaca." https://www.bappenas.go.id/files/8414/1214/1620/naskah_akademis.pdf.
- Bappenas. 2021. *Pembangunan Rendah Karbon Indonesia & Net-Zero Emission Menuju Ekonomi Hijau*. April 20.
- Cabinet Secretariat of the Republic of Indonesia. 2017. News. March 27. <https://setkab.go.id/en/indonesia-will-be-worlds-4th-largest-economy-by-2045-president-jokowi-says/>.
- DEN. 2019. <https://den.go.id/index.php/dinamispage/index/925-perhitungan-capaian-bauran-energi-primer.html>.
- Epstein, Paul R., Jonathan J. Buonocore, Kevin Eckerle, Michael Hendryx, Benjamin M. Stout III, Richard Heinberg, Richard W. Clapp, et al. 2011. "Full cost accounting for the life cycle of coal." *Ecological Economics Reviews* 73-98.
- Fiscal Policy Agency. 2021. *Informasi Publik*. March 30. <https://fiskal.kemenkeu.go.id/baca/2021/03/31/205211603151312-kemenkeu-luncurkan-laporan-anggaran-mitigasi-dan-adaptasi-perubahan-iklim>.
- Global Forest Watch. 2021. *Dashboard*. <https://www.globalforestwatch.org/dashboards/country/IDN>.
- Hayes A and Setyonaluri, D. 2015. *Taking advantage of the demographic dividend in Indonesia: A Brief Introduction to Theory and Practice*. UNFPA
- IESR. 2019. *Media Coverage*. December 2. <https://iesr.or.id/en/indonesia-must-stop-building-new-coal-plants>.
- IESR, Agora Energiewende, and LUT University. 2021. *Deep decarbonization of Indonesia's energy system: A pathway to zero emissions by 2050*. Institute for Essential Services Reform (IESR).
- Jakarta Post. 2020. *National*. July 7. <https://www.thejakartapost.com/news/2020/07/07/indonesia-speeds-up-regulation-on-global-carbon-trading.html>.
- Kompas. 2021. *Money*. June 3. Bahana Sekuritas (2021) <https://money.kompas.com/read/2021/06/03/070700626/pemerintah-godok-pajak-karbon-tarifnya-diprediksi-5-10-persen?page=all>.
- KPMG. 2020. "Sustainable Finance in Indonesia."
- Ministry of Environment and Forestry. 2019. *Statistik Tahun 2018: Direktorat Jenderal Pengendalian Perubahan Iklim*. http://ditjenppi.menlhk.go.id/reddplus/images/adminppi/dokumen/statistik_PPI_2018_opt.pdf.
- . 2021. "Indonesia Long-Term Strategy for Low Carbon and Climate Resilience 2050."
- Ministry of Finance. 2021. *Publications*. March 15. <https://www.kemenkeu.go.id/en/publications/news/indonesia-has-a-great-potential-as-a-major-player-in-the-electric-car-battery-industry/>
- Nikkei Asia. 2021. *Economy*. May 24. <https://asia.nikkei.com/Economy/Indonesia-weighs-carbon-tax-in-bid-to-fund-pandemic-spending>.
- UNFCCC. 2016. "First nationally determined contribution republic of Indonesia: United."

—. 2021. *Process and Meetings*. February. <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/nationally-determined-contributions-ndcs/ndc-synthesis-report#eq-5>.

UNFPA, 2015. "Taking Advantage of The Demographic Dividend in Indonesia". Policy memo. https://indonesia.unfpa.org/sites/default/files/pub-pdf/Buku_Policy_Brief_on_Taking_Advantage_on_Demographic_Dividend_02c_%282%29_0.pdf

Wijaya, E W, and B Limmeechokchai. 2010. "The hidden costs of fossil power generation in Indonesia: A reduction approach through low carbon society." *Songklanakarín J. Sci. Technol* 81-89.

World Bank. 2009. "Investing in a More Sustainable Indonesia: Country Environmental Analysis." Washington, DC.





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