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Report Highlights:

Indonesia is a key stakeholder and an active participant at global environmental fora. Home to a vast swathe of rainforest, Indonesia is ranked as the world's tenth largest emitter of greenhouse gases (GHG), mainly due to land-use change and energy sector emissions. Indonesia is the world's dominant producer and exporter of palm oil, which is a source of controversy in Indonesia's environmental debate on the international stage. This report provides an overview of Indonesia's key international climate change commitments and domestic policies, as well as U.S. government and USDA initiatives to partner with Indonesia on environmental initiatives.

Summary

Indonesia is both a major emitter of greenhouse gas (GHG) and among the countries most vulnerable to the impact of climate change due to its more than 17,000 islands and status as a developing country. Although a major emitter, Indonesia has been active in global climate change initiatives, participating in global climate negotiations at the Rio de Janeiro Earth Summit in 1992 and ratifying the Kyoto Protocol in 2004 and the Paris Agreement in 2016. In 2022, Indonesia submitted its first enhanced climate action plan of Nationally Determined Contributions (NDC) to United Nations Framework Convention on Climate Change (UNFCCC). This update is the first to change the country's targeted GHG emissions reductions since 2016, strengthening its commitment to reduce emissions by 29 percent to 31.89 percent unconditionally (i.e., without international assistance). Indonesia also committed to a slight increase in its "conditional" target (what could be achieved with international financial assistance) from 41 to 43.2 percent by 2030.

In order to achieve its NDC target, Indonesia is taking several steps by joining with international partners to chip away at various aspects of their GHG emissions. Most notably, the Government of Indonesia (GOI) has recently signed an agreement with Norway that has already paid \$56 million for the work Indonesia is doing to combat deforestation. Additionally, an international partners group of G7+ countries announced a Just Energy Transition Plan (JETP) with Indonesia at the G20 Leaders' Summit in Bali. This \$20 billion agreement will provide assistance as Indonesia weans itself off its massive coal reserves and transitions to renewable energy. There are also plans for future implementation of a tightly controlled carbon market, and a carbon tax for the energy sector, though the GOI recently announced the carbon tax has been postponed until 2025. The GOI is also preparing market and performance-based payment mechanisms for reducing emissions.

Indonesia reported GHG emissions in 2020 at 1,050,413 Gg CO_{2e} to which the energy sector contributed 56 percent, followed by forest and other land use (FOLU) (16 percent), and the agricultural sector (9 percent). However, 2020 was an anomalous year; overall, FOLU is usually the largest emitter of GHG in Indonesia with the energy sector coming in second.

Potential areas of collaboration: fuel ethanol and biotechnology. The absence of fuel ethanol in Indonesia's transportation sector shows untapped efforts to reduce GHG emissions. If Indonesia were to apply a biofuel blending mandate of 10 percent (E10), an estimated 890 million liters of ethanol would be required for implementation. As ethanol emissions are lower than gasoline emissions, the use of ethanol would help to reduce GHG emissions in the transportation sector. Collaboration with Indonesia in developing improved crops through biotechnology could help in decreasing fertilizer use, fuel consumption, and deforestation through increased yields in crops such as oil palm. Biotechnology can also help Indonesia adapt to climate change as some genetically engineered (GE) crops can be developed to be tolerant to drought, salt, and stress.

Policies and Programs

Indonesia is one of the countries that is highly vulnerable to the impact of climate change. Extreme weather events pose risks to Indonesia's agricultural production, the source of livelihood for about 28 percent of the population making up about 15 percent of GDP. Millions of people living in coastal areas are at risk due to rising sea levels. Despite its vulnerability to climate change, Indonesia is the tenth largest emitter of GHG in the world, mainly from land-use change and energy sector emissions.

Indonesia's early participation in global climate negotiations began at the Rio de Janeiro Earth Summit in 1992. Since then, Indonesia has ratified several international climate change agreements into law, such the UNFCCC through [Law 6/1994](#), the Kyoto Protocol through [Law 17/2004](#), and the Paris Agreement through [Law 16/2016](#).

Adopting the Paris Agreement, Indonesia submitted its first [NDC](#) to the UNFCCC in 2016 and committed to reducing GHG emissions by 29 percent by 2030 with unconditional reduction, or up to 41 percent with conditional reduction. Indonesia's enhanced NDC submitted in September 2022 laid out specific standards for its unconditional reduction by 2030:

- Additional installed renewable energy at 20,923 Mega Watt (MW)
- Increased utilization of 18 billion liters of palm methyl ester (FAME) in Biodiesel B40
- Increased use of electric vehicles (EV) to 15,197,000 units
- Increased application of organic fertilizers to 1,287,000 metric tons
- Increased use of land dedicated to low emissions crops to 902,000 hectares
- Planned and unplanned deforestation limited to 0.45 million ha
- Planting areas for land rehabilitation increased to 5.6 million hectares
- Peatland restoration increased to 2 million hectares

Indonesia created a national registration system ([SRN](#)) in 2016 to manage the country's data and information on adaptation, mitigation, and means of implementation. The SRN serves several main functions: (a) registration of mitigation and adaptation actions, achievement, and resources to support actions; (b) provision of information for awarding government recognition to mitigation and adaptation contribution of various actors; (c) provision of public access to data and information on actions and resources; (d) data base management to support policy analysis and formulation; and (e) avoiding double counting of achievements. The SRN is expected to be fully functional by 2030.

In 2019, Indonesia established the Environment Fund Management Agency ([BPDLH](#)) which aims to strengthen climate financing. The agency has the authority to manage and mobilize funds for environmental protection, including from international, private, and public sector sources. In addition, the GOI also introduced its green Islamic bond or "green sukuk" to support NDC implementation. In 2018, the Ministry of Finance (Kemenkeu) recorded that the issuance of green sukuk had reached \$2 billion over a five-year period.

The GOI also incorporated the reduction of greenhouse gas emissions into its Medium-Term National Development Plan ([RPJMN 2020-2024](#)), the main agenda of which included a development plan with three priorities: environmental quality, increasing disaster and climate resilience, and low carbon development.

Table 1. Indonesia Projected BAU and Emission Reduction, Enhanced NDC

No	Sector	GHG Emission Level 2010	GHG Emission Level 2030			GHG Emission Reduction				Annual Average Growth BAU (2010-2030)	Average Growth 2000-2012
			Mtonne CO _{2e}			Mtonne CO _{2e}		Percent of BAU			
			BAU	CM1	CM2	CM1	CM2	CM1	CM2		
1	Energy	453	1,669	1,311	1,223	358	446	12.5%	15.5%	6.7%	4.5%
2	Waste	88	296	296	253	40	43.5	1.4%	1.5%	6.3%	4%
3	IPPU	36	70	63	61	7	9	0.2%	0.3%	3.4%	0.1%
4	Agriculture**	111	120	110	108	10	12	0.3%	0.4%	0.4%	1.3%
5	Forestry***	647	714	214	-15	500	729	17.4%	25.4%	0.5%	2.7%
	Total	1,334.7	2,869	1,953	1,632	915	1,240	31.89%	43.2%	3.9%	3.2%

Source: Indonesia Enhanced NDC (2022)

Notes:

CM1= Counter Measure 1 (*unconditional mitigation scenario*) | **CM2**= Counter Measure 2 (*conditional mitigation scenario*)

*: including fugitive

**: only include rice cultivation and livestock

***: including emission from plantations

At COP 26 in 2021, the GOI submitted its [Updated NDC](#) showing Indonesia's progress surpassed its existing NDC goals; however, the updated NDC did not include any changes to Indonesia's overall emission reduction goals. It did show enhanced ambition on Indonesia's adaptation measures and new milestones that aligned with its national development plan. At the same event, the GOI also submitted its Long-Term Strategy on Low Carbon and Climate Resilience 2050 ([LTS-LCCR 2050](#)). Through this long-term plan, Indonesia will increase its ambition on GHG reduction by achieving peak GHG emissions with a forest and other land-use (FOLU) net sink by 2030 and move towards net-zero emissions by 2060.

Indonesia increases emissions reduction target as showed in [Enhanced NDC](#) submitted in September 2022. The Enhanced NDC contains additional program including implementation of B40 and land-based programs that compiled in Operational Plans for FOLU Net Sink 2030. This operational plan is stipulated in the Minister of Environment and Forestry (KLHK) [Decree 168/2022](#).

To increase climate financing, the GOI introduced a carbon tax in 2022, although implementation has been delayed until 2025. The carbon tax is laid out in Law 7 approved by the

House of Representatives (DPR) in 2021 on [Tax Harmonization](#). The carbon tax was initially going to be first enforced within the coal-fire power industry in February 2022 with a set carbon price of 30,000 IDR (\$2.08) per tons of CO₂-equivalent; however, enforcement was then postponed twice. The Ministry of Energy and Mineral Resource (ESDM) [estimated](#) around one million metric tons of carbon were taxable for the initial trial involving 32 coal-fired power plants. The GOI plans to expand the implementation of the carbon tax to all sectors by 2025.

In addition to carbon tax, the GOI also issued [Presidential Regulation 98/2021](#) which provides a baseline for economic instruments for carbon emissions. The regulation set mechanisms on (1) carbon trade, (2) result-based payment, (3) carbon tax, and (4) other mechanisms based on science and technology. Details on the carbon economic value implementation stated in Minister of Environment and Forestry [Regulation 21/2022](#).

In September 2022, President Joko “Jokowi” Widodo issued a presidential proclamation on “the Acceleration of Renewable Energy for Electricity Supply” (112/2022) that gave the transition to renewable energy (RE) the top-level push it needed. The proclamation was also a signal to both his ministers and the international community that he is serious about transitioning away from the large coal reserves toward more sustainable, RE sources. Following President Widodo’s proclamation, the Indonesian legislature dusted off a draft RE law and is reportedly trying to finalize it by the end of 2022.

In October 2022, KLHK published implementing regulations for Indonesia’s nascent carbon market. These regulations are intended to govern how companies or other entities could generate and trade carbon credits largely from FOLU activities. While the regulations provided some certainty for existing projects, new entrants to Indonesia’s carbon market would likely be turned off by stipulations for potential projects to first achieve NDC targets and require an additional 20 percent carbon credit buffer before being able to sell the credits on the international voluntary carbon market.

Indonesia's GHG Emission Profile

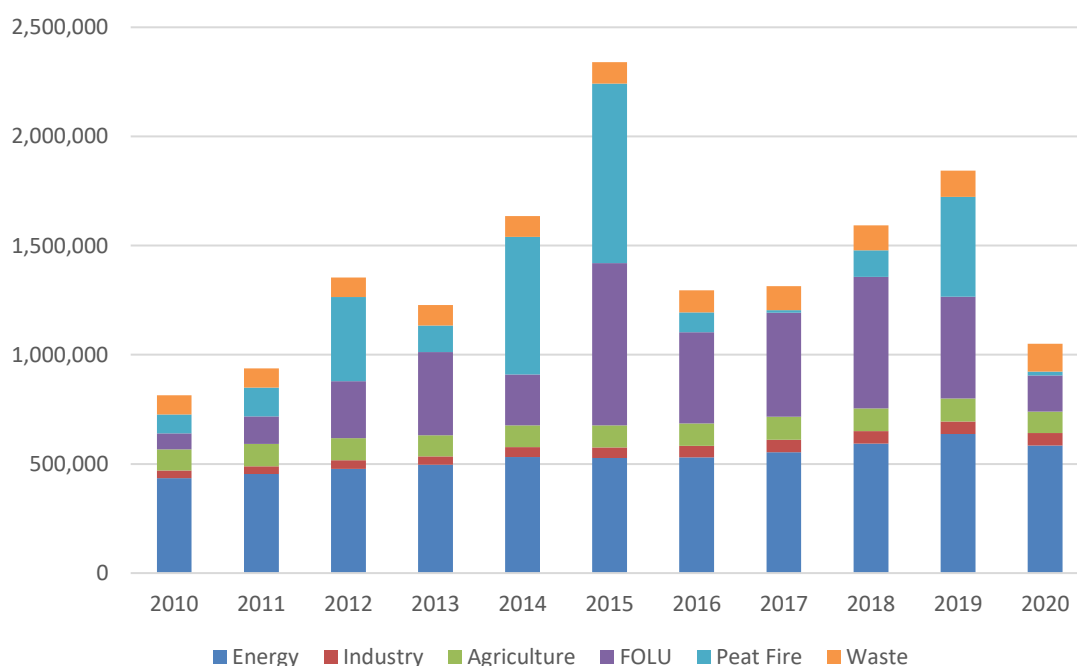
From 2010 to 2020, Indonesia’s emission levels have grown 29 percent overall to 235,768 Gg CO₂e. FOLU and peat fires are the main sources of Indonesia’s emissions, followed by the energy sector. The agricultural sector’s emission profile remained relatively steady between 96,955 Gg CO₂e and 105,363 Gg CO₂e during this period, and FOLU sources of emissions averaged around 358,435 Gg CO₂e per year. According to a Ministry of Environment and Forestry (KLHK) [report](#), extreme emission years were correlated with El-Nino events in 2006, 2009, 2014, and 2015.

Although Indonesia’s emissions levels have generally been growing over the past decade, the economic shutdown in 2020 brought on by the COVID-19 pandemic caused an anomalous exception. In 2020, Indonesia reported a total of 1,050,413 Gg CO₂e of GHG emissions, a decrease of 43 percent from the previous year. In 2020, emissions from the energy sector made

up around 56 percent of total emissions, followed by FOLU (16 percent), and the waste sector (12 percent). Other sources of emissions included agriculture, industry, and peat fires. As for agriculture, GOI reports show N₂O release from soil management activities as being the greatest GHG emission contributor from that sector (27 percent), reaching 26,845 CO₂e. Other sources included rice farming and enteric fermentation, which accounted for 25 percent and 18 percent of total agricultural emissions, respectively.

Indonesia maintains a heavy reliance on coal for power generation. In 2020, emissions from power generation and heat production made up 47 percent of total emissions from the energy sector. Use of liquid fuel for transportation emitted 135,217 Gg CO₂e in 2020, equal to 23 percent of total energy sector emissions.

Figure 1. Indonesia Emission Profile 2010-2020 (Gg CO₂e)



Source: Ministry of Environment and Forestry (KLHK)

Indonesia’s Agricultural Exports and Climate-Sensitive Markets

Indonesia agricultural exports reached \$51 billion in 2021, up by 44 percent on rising commodity prices. Palm oil products accounted for around 51 percent of total 2021 agricultural export value, destined mainly for the People’s Republic of China, India, Pakistan, and the United States. Indonesia is expected to produce 46 million metric ton (MMT) of palm oil products in 2023/24 (See [Oilseeds and Products Annual 2023](#)), 16 MMT higher than over the last ten years. During the same period, exports of palm oil products are expected to rise by 22 percent. Other than palm oil products, Indonesia also exports coffee beans, cocoa products, and coconut oil products.

Despite continuously growing global demand, some markets are trying to curb imports of palm oil products due to environmental concerns. The EU's [Renewable Energy Directive \(RED\) II](#) categorized palm oil as a high indirect land use change (ILUC)-risk feedstock, leading the EU to move to capping palm-based biodiesel starting in 2023 and gradually phasing out its use entirely by 2030. As a workaround to meet demand, EU member states will still be permitted to import palm oil for biodiesel feedstocks, but those imports cannot be counted as credit towards their renewable energy targets. The [EU Deforestation Regulation \(EUDR\)](#) adopted in May 2023, requires several commodities to be “deforestation free” in order to be sold on the EU market. The EUDR's target commodities include Indonesia's top agricultural products, such as palm oil, cocoa, coffee, and wood. In the United States, palm oil is not listed as an approved [fuel pathway](#) under the U.S. Environmental Protection Agency (EPA)'s Renewable Fuel Standard (RFS) Program. The EPA's Notice of Data Availability (NODA) in 2011 shows that biodiesel and renewable diesel produced from palm oil do not meet the minimum 20 percent lifecycle GHG reduction threshold needed to qualify as renewable fuel.

Acknowledging growing global concerns on climate issues, the GOI made Indonesia Sustainable Palm Oil (ISPO) certification mandatory for all palm production operations, both smallholder farms and large-scale plantations alike. ISPO certification covers several environmental aspects, including land-use conversions, GHG emissions, peatland management, and biodiversity conservation. Many palm producers in Indonesia also comply with additional, voluntary certifications to meet customer standards.

USDA Climate Change Footprints in Indonesia

USDA Forest Service has been working with Indonesia for more than 25 years on several environmental issues, including forest governance, biodiversity conservation, forest fire investigation, and climate change. One notable area of collaboration between the U.S. Forest Service and GOI was promoting land use reform using a unified national mapping system. In 2012-2014, the U.S. Forest Service also collaborated with the U.S. Department of State to establish the Indonesia Climate Center for national climate policy.

In 2012, USDA's Office of Agricultural Affairs at the U.S. Embassy in Jakarta recruited a Borlaug fellow with a research focus on climate change. The fellow, a researcher from the Ministry of Agriculture (MOA), managed a research project on developing tools for GHG and carbon sequestration assessment in crop production systems.

The [Indonesia Spice Trade Alliance \(ISTA\) project](#), a five-year USDA-funded project under the Food for Progress program implemented by the National Cooperative Business Association (NCBA-CLUSA) in Indonesia, includes an objective component on improving environmental resiliency against climate change. The ISTA project is helping farmer cooperatives/associations obtain Rainforest Alliance (RA) certification which ensures their products were produced using methods that support three pillars of sustainability: social, economic, and environmental.

Other Existing USG Collaboration

The U.S. – Indonesia Bilateral Climate Working Group is a partnership platform addressing several areas of climate change. When it began in 2021, the bilateral group created four task forces to address emission reduction, land use, renewable energy, and financing. The renewable energy and financing task forces have been largely subsumed by the JETP agreement. The land use task force (task force 2) is still going strong, and the overall emission reduction group is still being discussed, as well.

In the energy sector, in addition to the multi-billion-dollar JETP agreement that was just signed, USAID is working with PLN, a state-owned power utility company to accelerate Indonesia's energy transition to cleaner and more sustainable sources. USAID will assist Indonesia in developing viable scenarios to decarbonize the power sector and identifying incentives to increase investments in renewable energy. A Memorandum of Understanding (MOU) marking this partnership on energy transition was signed by both parties in [August 2022](#).

USAID's environment program works with the GOI and local stakeholders to ensure sustainable economic growth through improving disaster resilience and strengthening the management and protection of marine and land biodiversity. [In May 2022](#), USAID and KLHK signed an MOU on cooperation for emission reduction that aligns with the GOI's FOLU Net Sink 2030 Operation Plan and USAID Climate Strategy 2022-2030. Activities under the agreement are expected to include sustainable forest management, peat and mangrove restoration, and wildlife conservation. USAID also has a program called Clean Cities, Blue Ocean (CCBO) which combats ocean plastic pollution and municipal solid waste in the Dominican Republic, Indonesia, the Maldives, Peru, the Philippines, Sri Lanka, and Vietnam, which has a focus on methane reduction.

[Clean EDGE Asia](#) is a USG initiative to align government and private sector resources to advance sustainable energy growth in the region. Clean EDGE Asia is supporting partner efforts to capture methane emissions from oil and gas production, landfills, wastewater treatment, agriculture, and abandoned coal mines.

Potential Collaboration

Fuel ethanol for cleaner transportation emissions

Indonesia is taking steps to revive a program that is a potential untapped source for GHG emission reduction. Dormant since 2009, the bioethanol mandate program stipulated in [MEMR 12/2015](#) is a framework for Indonesia to develop its domestic ethanol industry, reducing its reliance on fossil fuels while also reducing its GHG emissions. However, unlike the biodiesel mandate program, the bioethanol mandate program will not likely be viable in the long term unless funding is provided to cover the price spread between ethanol and gasoline. Indonesia's first pilot E5 gas stations are slated to open in June 2023 in the Surabaya area, close to local ethanol refineries. Based on a recent study, if the E5 blending mandate is expanded to all of Java

Island, Indonesia's largest and most populated island, demand for ethanol is expected to reach 180 million liters a year. The same study also estimates that nationwide implementation of an E10 blending mandate will require 890 million liters ethanol per year, equal to 17 percent of total U.S. ethanol exports in 2022. [A study in the United States](#) showed that ethanol's emission profile is 39-41 percent lower than gasoline's. With its enormous gasoline consumption, transitioning to ethanol would greatly reduce Indonesia's GHG emissions.

However, Indonesia is prioritizing making biofuels the main energy source for the transportation sector and aims to have biofuels constitute 46 percent of Indonesia's energy sources by 2050. As described in [LTS-LCCR 2050](#) submitted to the UNFCCC, Indonesia is seeking to substitute gasoline with both bioethanol and palm oil-based gasoline. The U.S. government and U.S. bioethanol industry are poised to help Indonesia with this transition through technical assistance and trade opportunities.

Table 2. Indonesia Projected Transport Energy Source, 2050

Energy Source	Contribution
Biofuels	46 percent
Oil Fuels	20 percent
Electricity	30 percent
Natural Gas	4 percent

Source: Indonesia LTS-LCCR

Biotechnology uses in climate change adaptation and reduction

GE crops offer various potential environmental benefits such as reduced fertilizer use, reduced fuel consumption, increased carbon sequestration, and reduced land use due to increased yields depending on the variety. Using biotechnology, some GE crops have been developed with traits that help with climate change adaptation, e.g., tolerance to drought, pests, salinity, and stress.

However, Indonesia's biotechnology research and approval process are underfunded and slow. Currently Indonesia has completed risk assessments for 20 GE corn varieties, 14 GE soybean varieties, three GE sugarcane varieties, one GE potato variety, four GE canola varieties, and five GE cotton varieties (see [Indonesia: Agricultural Biotechnology Annual 2022](#)). Of these, four GE corn varieties, one GE potato variety and one GE sugar cane variety have undergone all three assessments: food, feed, and environmental and so can be cultivated in Indonesia.

The introduction of higher-yield GE crops to Indonesian agriculture would reduce pressure on forests and peatland areas, important carbon sinks. Biotechnology offers the capability to increase agricultural production without the need to clear more land. And as incidents of extreme weather increase, so will the demand for crops that are resistant to drought and disease, developed through advanced biotechnology research on which Indonesia and the United States could collaborate.

Attachments:

No Attachments.