



Summary for Policymakers

A GREEN ECONOMY FOR A NET-ZERO FUTURE:

How Indonesia can build back better
after COVID-19 with the Low Carbon
Development Initiative (LCDI)



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About this report

Despite the central positioning of green growth in Indonesia's national development plan for 2020–2024, low-carbon development in Indonesia has taken a backseat following economic and social challenges resulting from the COVID-19 pandemic.

In response, the Low Carbon Development Initiative (LCDI) has led the production of a report aimed at informing the advancement of a low-carbon, green recovery and green economic transformation in the wake of the COVID-19 pandemic, in line with the global climate targets and in pursuit of a more robust, resilient, inclusive and sustainable recovery.

LCDI is a national priority program of the Government of Indonesia as outlined in the National Medium Term Development Program (RPJMN) 2020–2024.



When Indonesia adopted its National Medium-Term Development Plan (RPJMN) 2020–2024 in January 2020, it signaled a shift towards a new green, low-carbon development path that would enable it to meet its goal of achieving high-income status by 2045. This was an important step, but just the start.

Since then, COVID-19 has caused devastation around the world. In Indonesia, there were nearly 4.2 million confirmed cases as of 21 September 2021 and over 140,000 fatalities. The economy has also suffered, with GDP shrinking by 2.1% in 2020 and poverty and unemployment rates rising. Before the latest spike in COVID cases, GDP had been projected to grow by 4.3–4.8% in 2021, but that could change—and in any case, globally, the socio-economic effects of the pandemic are expected to last for years.

The government has made enormous investments to protect public health, strengthen the social safety net, and stimulate the economy: about Rp. 976 trillion (US\$68.5 billion) as of 17 September 2021. Looking beyond the immediate crisis, this report, prepared for the Low Carbon Development Initiative (LCDI) as mandated by the Indonesia Vision 2045 report and the Indonesia National Mid-Term Development Plan (RPJMN) 2020–2024, explores how embracing a path to net-zero emissions by mid-century could accelerate growth, boost employment, and make Indonesia's economy more robust, resilient, inclusive and sustainable. A green recovery from COVID-19 is a key first step.

Net-zero scenarios for Indonesia

Many countries have already adopted net-zero targets, even amid the COVID-19 crisis, recognizing that ambitious climate action can deliver better and stronger growth. As of September 2021, 52 parties representing 63 countries and 54.2% of global greenhouse gas (GHG) emissions has announced net-zero targets: from the European Union, to Brazil, to China, Japan and South Korea. Many companies and financial institutions are adopting them as well. The World Bank, the International Monetary Fund, the Organisation for Economic Co-operation and Development, the United Nations and others have also urged countries to prioritize green investments in their COVID recovery, to “build back better.”

Ambitious climate action is crucial to Indonesia's future. A recent analysis by the insurer Swiss Re found that if the world is 2.0–2.6°C warmer by mid-century, as it may be even if current pledges under the Paris Agreement are met, Indonesia's GDP could shrink by 16.7–30.2% due to climate change impacts.

As Indonesia takes on the G20 Presidency in 2022, a net-zero commitment can demonstrate its strong leadership on climate and inspire others to do the same, including through climate finance. The actions needed to achieve net-zero in Indonesia would also end dependency on volatile fossil fuel markets and protect natural capital, securing the country's place as a “carbon superpower.”

A 2019 Bappenas scenario analysis to inform the RPJMN 2020–2024 showed a low-carbon growth path could deliver GDP growth averaging 6% per year until 2045, help accelerate poverty reduction and boost jobs, with many other co-benefits.

Recognizing that the policy context has changed significantly, especially due to COVID-19, this report presents an updated analysis with four scenarios:

- **A new Reference Case** that reflects the impacts of the COVID-19 pandemic as well as stimulus interventions to date, but assumes that Indonesia advances no further policy efforts—beyond plans and projects already in the pipeline—to green its infrastructure, protect natural capital, or reduce GHG emissions.
- **Three scenarios for achieving net-zero GHG emissions in Indonesia, by 2045, 2050 or 2060.** They apply the same interventions, but on different timelines, with NZ2045 moving fastest. All would ensure that Indonesia meets or exceeds its unconditional pledge under the Paris Agreement of a 29% emission reduction by 2030, then ramp up ambition across major emission sources. Per LCDI standards and principles, they are scientifically rigorous and ambitious, but recognize political, technical and institutional constraints and reflect, to the extent possible, ongoing discussions within key government agencies.

Expanding on the low-carbon measures included in RPJMN 2020–2024, the net-zero scenarios would fully replace fossil fuels with clean energy (renewables and nuclear); sharply reduce the energy-intensity of the economy; phase out fossil fuel subsidies by 2030 and put a price on carbon; electrify road transport (with biofuels' role gradually declining); protect and restore forests, peatlands and mangroves; adopt sustainable practices in agriculture, forestry, fisheries and aquaculture; improve waste management; and make industry more efficient.

Those measures would stabilize GHG emissions at under 1.9 Gt CO₂e in the period 2021–2024, then start declining. By 2030, GHG emissions would fall by 30.9% in NZ2045, 29.7% in NZ2050 and 29.1% in NZ2060 relative to the Reference Case. Over the 2021–2060 period, 87–96 Gt CO₂e of emissions would be avoided. Two-thirds of those reductions would be in the energy sector, and 25% in agriculture, forestry and other land use (AFOLU).

The net-zero scenarios would also deliver sustained real GDP growth—and at higher rates than the Reference

Case: averaging 6.5% per year for 2021–2050 in NZ2045, 6.4% in NZ2050, and 6.1% in NZ2060, then continuing beyond 2050 at a slower growth rate. By 2045, total GDP would be 25–34% greater in NZ2045 than in the Reference Case. Per capita gross national income (GNI), meanwhile, would reach US\$14,495 by 2045 in NZ2045, US\$14,485 in NZ2050 and US\$13,980 in NZ2060. This means that across net-zero scenarios, Indonesia would achieve its goal of becoming a high-income country by 2045 (the current threshold is US\$12,535).

Pursuing net-zero would also create large numbers of green jobs, starting in the first year, and thus could be an integral part of a strong recovery from the COVID-19 economic crisis. A bottom-up estimate based on the NZ2050 scenario indicates that it would result in 1.8–2.2 million new jobs in 2030 in renewable energy, electric vehicle technologies, energy efficiency, land use interventions and improved waste management. That would be 1.0–1.3% of the projected labor force in 2030.

With additional strategies that prioritize equity and inclusion, these gains could be used to benefit poor and disadvantaged populations and help close gender gaps. There are also broader societal benefits, such as sharp reductions in air pollution that could save 40,000 lives in 2045 alone.

Indonesia can start realizing those benefits right away by implementing some net-zero measures as part of its COVID-19 recovery, with significant stimulus effects and job creation. This would also help reduce the risk of stranded assets, as new coal power plants may otherwise need to be retired prematurely, with financial repercussions. That said, not all sectors, communities or individuals will gain equally; high-carbon sectors would be expected to decline, shedding jobs. Economy-wide, those losses will be more than offset by new opportunities in low-carbon sectors, but targeted policies and investments are crucial to support a just transition and ensure that no one is left behind.

Figure ES1. The benefits of Indonesia's Net Zero growth path (compared with Reference Case)

Benefits of the net-zero scenarios vs. the Reference Case



87–96 billion tonnes CO₂e

GHG emissions saved over 2021–2060



6.1–6.5%

average annual GDP growth over 2021–2050



25–34% higher

gross national income (GNI) by 2045



1.8 million additional green jobs

in 2030 in energy sector, EVs, land restoration and waste



40,000 lives

saved in 2045 alone from reduced air pollution



Restore ecosystems with services valued at

US\$4.75 trillion/year

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



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Net-zero targets and strategies in key sectors

Energy

The energy sector is central to achieving net-zero as Indonesia develops and incomes rise, because energy demand is rising quickly. Projections for the Reference Case show demand more than tripling, from 9.3 TJ in 2021 to 31.9 TJ in 2060. If all the added demand were met with fossil fuels, the impact on GHG emissions and air pollution would be devastating.

The RPJMN 2020–2024 already recognizes this challenge and aims to reduce the energy intensity of Indonesia’s economy (a proxy measure for energy efficiency) by 2.5% per year and increase the share of renewable energy in the primary energy mix to 23% by 2025. The net-zero scenarios ramp up ambition on both fronts, aiming to reduce the energy intensity of GDP by 3.9–4.5% per year in 2021–2030 and by an average of 6% per year in 2031–2060, and to meet the vast majority of energy needs with renewables and other clean sources (nuclear, hydrogen) by the net-zero target year, and all by 2060.

By 2060, the energy efficiency gains would enable Indonesia to use less than 10% as much energy per unit of GDP as it did in 2021, enabling the economy to grow robustly while keeping energy demand roughly where it is today, or lower. Notably, a large share of those efficiency gains would come from large-scale electric vehicle (EV) adoption, to reach nearly 100% (with some hydrogen-fueled vehicles as well) by the net-zero target year. A recent analysis found that because EVs

are so energy-efficient, electrifying almost all the world’s road transport by 2050 would only increase global electricity demand by a quarter. President Widodo has already set a goal of having 20% of the country’s auto production be EVs by 2025.

Electrifying road transport would address the single largest source of fossil fuel demand today, freeing Indonesia from oil imports without the need for more biofuels (which help reduce emissions, but also require large amounts of land). Eliminating fossil fuels from electricity production is the other major task. The State Electricity Company (PLN) already has plans to stop adding coal power after 2023, increase the share of renewables to at least 48% of total generation capacity by 2030, and reach carbon neutrality by 2060. In the net-zero scenarios, the share of coal power—59% in 2019—would start to decline by the mid-2020s and drop to 5% by 2035. The share of renewables would rise to 60% by 2030 and 82% by 2053, with nuclear power, introduced in 2030, supplying all the rest by 2060.

To accelerate the energy transition, Indonesia is already phasing out fossil fuel subsidies and piloting carbon markets. The net-zero scenarios would completely end fossil fuel subsidies by 2030 and phase in a carbon price, starting low and then ramping up to US\$60 (Rp. 873,000) per tonne CO₂ by 2040 in NZ2045 (US\$50 in NZ2050 and US\$40 in NZ2060), then remaining at that level.



Agriculture, forests and land use

Natural resources are central to Indonesia's wealth and prosperity, but land use sectors have also produced half to two-thirds of the country's annual GHG emissions over the past 20 years—with disasters such as the 2015 peatland fires causing large spikes in emissions and air pollution. Recognizing the urgent need to protect key ecosystems, the RPJMN 2020–2024 set targets for reforestation, forest protection, peatland and mangrove restoration, and sustainable agriculture.

The net-zero scenarios aim to end all conversion of primary forest to agricultural land by 2025 and scale up forest restoration to 250,000 hectares (ha) per year by 2040, to reach 48.2 million ha of secondary forest in 2060. Peatland restoration would be scaled up to 90,000 ha per year in 2030, rising to 650,000 ha per year in 2038 in NZ2045 (or nearly 400,000 ha in NZ2050 and NZ2060). Mangrove

restoration would accelerate to 125,000 ha per year in 2021–2024, then continue at 12,000 ha per year. Peatlands and mangroves are crucial for both carbon storage and resilience, to stem land subsidence due to wetland drainage, reduce flood risks, and protect coastal areas from storm surges and erosion. After reaching their targets, restoration efforts would scale down to maintain those levels and offset any further losses due to economic development.

The net-zero scenarios also aim to expand sustainable agricultural practices to 40% of cropland by 2050, and to slow the rise in demand for land for food production by boosting agricultural productivity and reducing food loss and waste. The latter is a serious and growing problem in Indonesia, with daily losses equivalent to about 618–989 kcal per person, enough to feed 29–47% of the entire population.



Waste management and industry

Reducing food loss and waste would also help reduce GHG emissions from solid waste management. The RPJMN 2020–2024 focused on ensuring proper management of waste, and Vision 2045 also prioritizes circular economy strategies, which a recent Bappenas report showed have many benefits. The net-zero scenarios aim to reduce waste generation per capita by 70% from 2020 levels by the respective net-zero target year. On the same timeline, they aim to increase industrial wastewater recycling, to reach 100%.

Lastly, the net-zero scenarios seek to improve the efficiency of industrial processes and product use (IPPU), with the goal of reducing the emissions intensity of IPPU by a third by the net-zero target year. Though the resulting emission reductions would amount to only 2% of the cumulative abatement achieved by the net-zero scenarios, these efforts can help Indonesia enhance its manufacturing productivity and create new jobs.

Addressing key challenges to achieving net-zero

Committing to achieve net-zero by 2060 at the latest would bring many benefits to Indonesia—the earlier the target date, the better. But it will not be easy. It will require major new policies, changes in investment priorities, and strong collaboration across the government and with international partners and the private sector. Line ministries with very different perspectives will need to embrace a common vision and, in some cases, make substantial changes to programs and policies.

Powerful business interests facing higher costs and/or reduced demand for their products can be expected to push back. Citizens may also resist policies that affect their livelihoods and increase costs of living. Significant efforts will thus be needed to ensure a just and equitable transition.

The COVID-19 crisis has taken a significant toll on Indonesia's economy and on government resources. Unless a net-zero vision is integrated into ongoing recovery efforts, Indonesia could lack the fiscal space for ambitious climate action—and new investments will be needed in any case. There are real capacity gaps as well that will need to be addressed to enable Indonesia's institutions to manage the transition in their respective sectors. Additional expertise will be needed in different ministries, along with reliable data to inform policy-making, technical capacity-building, and enhanced resources.

Along with sector-specific measures, recommendations emerging from this analysis include:

- Commit to a vision of a decarbonized, climate-resilient, sustainable and inclusive Indonesia as the foundation for “building back better” after the pandemic, with a net-zero target consistent with the urgency of the climate crisis.
- Prioritize dialogue across government ministries, and across levels of government (central, regional and local), to ensure a common understanding of the net-zero vision and its implications for public policy and investments.
- Significantly advance the process of institutionalizing the LCDI, including empowering, resourcing and strengthening the capabilities of the LCDI Secretariat, as the agency that coordinates implementation of the low-carbon, green development agenda at both the national and subnational levels.
- Engage stakeholders—including domestic and international businesses, finance sector leaders and civil society—from the outset in the process of translating the net-zero vision into plans.
- Immediately review priority projects and other major expenditures included in COVID-19 recovery and in budget allocations linked to medium- and long-term development strategies, and adjust as needed to ensure that they are aligned with Indonesia's vision for net-zero.
- Seize the immediate opportunities created by international “green recovery” funds through the ADB, the World Bank, and other bilateral or multilateral donors to finance projects to help jump-start key aspects green and low-carbon development.
- Work with development partners to align international finance with Indonesia's net-zero vision and complement domestic public and private finance for LCDI investment needs.
- Assess technical capacity and resource gaps in key ministries and other national institutions engaged in LCDI implementation, prioritize closing those gaps, and build capacity for LCDI implementation at the subnational level as well, including provincial governments and major cities.

Indonesia has made great strides through the LCDI, and even amid the COVID-19 crisis, it has continued to look for opportunities to raise its ambitions. Now is the time to set the country onto a better growth path, starting with a green recovery from the pandemic. By embracing a net-zero target, Indonesia can build a more competitive, sustainable and inclusive economy, secure its natural capital, and ensure a more prosperous and resilient future for its people.

Investment needs and finance options

Transforming Indonesia's economy to achieve net-zero will require shifts in existing investments as well as new financing. The costs of the LCDI pathways would start at around US\$20 billion per year in 2021–2022 and average US\$150–200 billion per year in 2021–2030 (that is 3.4–4.5% of GDP for the period).

Those figures would represent a significant increase in low-carbon investment, but only about 10% of total projected investment in Indonesia in 2021–2030. Moreover, especially in clean energy, which accounts for 57% of costs in 2021–2030 and about 75% thereafter, those investments would replace large investments in fossil fuel technologies. Still, to ensure a smooth, but rapid transition, additional financing support will be critical, especially in the first decade of implementation.

While today, most of those costs are shouldered by the government—for instance, building power plants—renewable energy and other green technologies already attract substantial private investment worldwide. With appropriate regulatory reforms, as well as de-risking measures such as guarantees, joint operations and public-private partnerships, Indonesia could unlock significant new private finance flows, especially in the late 2020s and early 2030s, when investment needs peak.

Two strategies in the net-zero scenarios would directly contribute to domestic sources of finance: the phase-out of

fossil fuel subsidies, and the carbon price, which would generate savings and new revenue, respectively, rising to the equivalent of 2.2% of GDP in 2030 (the peak year) before tapering off as fossil fuels are phased out of the economy. Some of that revenue will be needed for social protection programs and other investments to ensure a just transition, but the balance could finance green infrastructure.

Indonesia's successful efforts to restore and protect forests, peatlands and mangroves, meanwhile, and the very ambitious commitments in the net-zero scenarios, could attract significant finance from REDD+ and from major bilateral and multilateral donors focused on land use emissions. These projects could also be prime candidates for carbon markets, and so could sustainable agriculture initiatives.

All this would still leave large financing gaps, for which other sources of international finance may be needed. Targeted “green recovery” funds set up by the Asian Development Bank, the World Bank and others could help jump-start key projects. As President Widodo has stressed, developed countries also urgently need to scale up climate finance, to meet their commitment to mobilize US\$100 billion per year for developing countries. Indonesia will also have to work closely with its development partners, including bilateral donors and multilateral banks, to realign finance flows to advance the net-zero agenda.





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Ministry of National Development Planning/
National Development Planning Agency
Jl. Taman Suropati No.2 Jakarta, Indonesia
Phone: (+62) 21 3193 6207



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