INDONESIA

DDP INDONESIA

COUNTRY FACTSHEET

This document presents a synthesis of key results of the decarbonization scenarios developed for Inodnesia. It describes the key national and sector level techno-economic transformations to 2050, their main socio-economic aspects and resulting emission profiles. It also highlights some main policy implications and challenges, investment insights and necessary developments in international enablers.

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High-level characterization of DDS trajectory

Drivers	2020	**2030**	2040	**2050**	
GDP Growth (in relation to 2020)	-	**97%**	320%	**701%**	
GDP/capita ($USD 2015/capita)	5,277	**9,545**	19,186	**33,981**	

Emissions	2020	**2030**	2040	**2050**	
CO_2	1,108	**1,201**	892	**496**	$MtCO_2$
GHG	1,241	**1,340**	1,032	**637**	$MtCO_2e$
CO_2 Cumulative from 2020		**13**	23	**30**	$BtCO_2$

Dates

CO_2 Peaking date	Around 2030
CO_2 Peaking date	Around 2030
CO_2 Net Zero date	Around 2060
GHG Net Zero date	Around 2060

with LULUCF without LULUCF

DDP

The DDP is an initiative of the Institute for Sustainable Development and International Relations (IDDRI). It aims to demonstrate how countries can transform their economies by 2050 to achieve global net zero emissions and national development priorities, consistently with the Paris Agreement. Analyses are carried out at the national scale, by national research teams. National research teams openly share their methods, modelling tools, data and the results of their analyses to share knowledge between partners in a collaborative manner and to facilitate engagement with sectoral experts and decision-makers.

About this project

Thanks to the support of the International Climate Initiative (IKI) of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), and building on the Deep Decarbonization Pathways (DDP) Initiative and the collaboration with the 2050 Pathways Platform, an IDDRI-led consortium with outstanding partners in four emerging economies has developed granular deep decarbonization pathways to 2050 for Brazil, India, Indonesia and South Africa. These pathways have been brought to public debate and domestic decision-making processes. Methodological insights from this work are shared with researchers and practitioners around the world and with members of the 2050 Pathways Platform to support their process of developing long-term strategies.

IDDRI

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

ECONOMY WIDE TRANSFORMATIONS

- Indonesia's low-carbon development in 2050 (496 $MtCO_2e$) towards net zero in 2060 highly emphasizes the deep cut of fossil fuel in the power sector and the utilization of CCS technology and net sink role from the AFOLU sector.
- Under the DDS scenario, the AFOLU sector will reach a net-sink in 2030 and reach -201 $MtCO_2e$ of negative emission in 2050. This sequestration role requires a massive cut of both legal and illegal deforestation, conservation and restoration of the degraded peatland at an accelerating rate, and increased land-use efficiency (e.g., improved productivity and cropping intensity, efficient technology from harvest to post-harvest to reduce food loss, etc.) followed by sustainable consumption.
- Implementation of efficiency measures, decarbonization of power using large renewable and coal with CCS/CCUS, and biofuel use in transport will enable the energy sector to achieve significant emission reduction. After peaking at 1,274 $MtCO_2$ in 2030, emissions of the energy sector decline to around 720 $MtCO_2$ in 2050.
- In 2050 under DDS scenario, power generation mix are: renewables (43%), coal (38%), natural gas (10%) and BECCS (8%). The renewables include hydro, geothermal, solar PV, biomass, biofuel, and wind. Around 76% of the coal power plant are equipped with CCS to achieve zero emissions in coal power plants.
- The installed capacity of renewable power generation mix is solar PV 113 GW, hydro 68 GW, geothermal 23 GW, wind power 17 GW, biomass 13 GW, biofuel 14 GW, and BECCS 23 GW with negative emissions.
- For the transport sector, the breakdown of transport energy in 2050 is as follows: biofuels (52%), oil fuels (30%), electric vehicles (14%), and natural gas (4%). The biofuel (CPO-based) program is considered successful and will be continued to 2050 by supplying biofuel with higher biodiesel proportions (B30, B40, B50), which will be produced from sustainable sources.

Figure 3. Power generation capacities

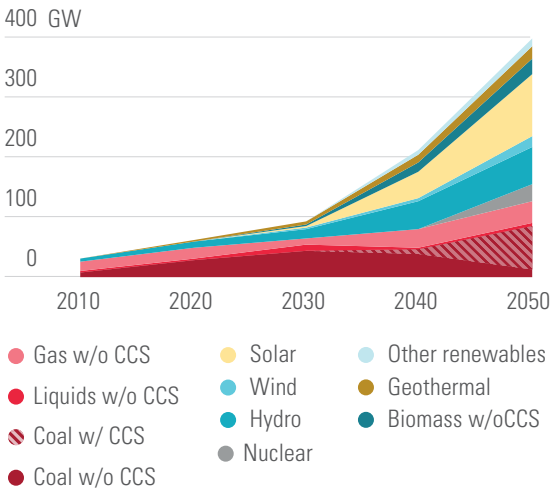


Figure 1. Energy sector emissions

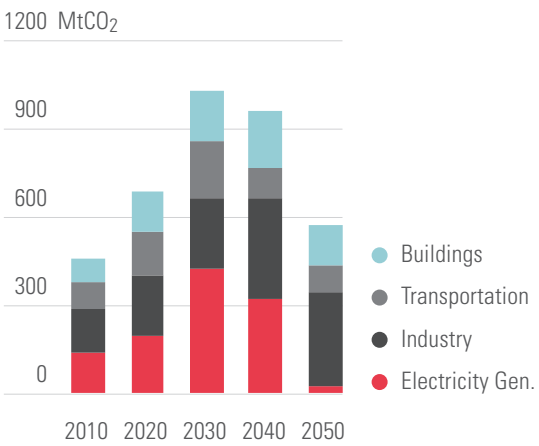
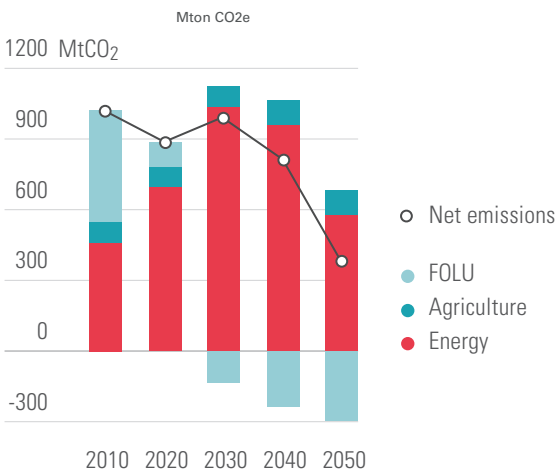


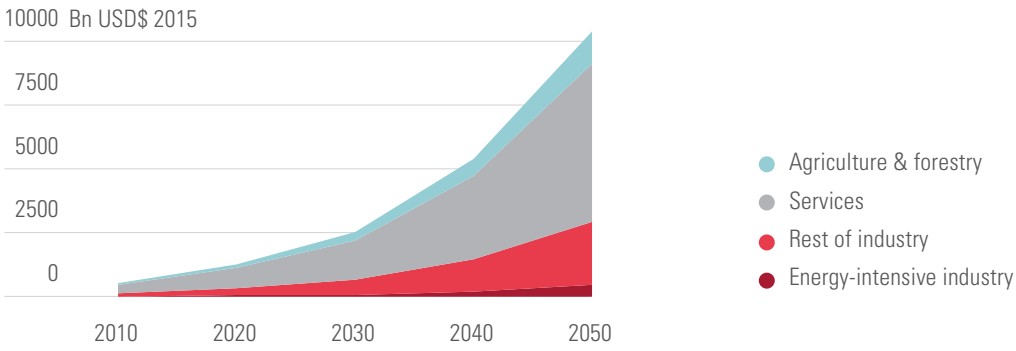
Figure 2. Net emissions, energy + AFOLU



KEY NATIONAL-SCALE SOCIO-ECONOMIC ASPECTS

- Indonesian population in 2010 was 239 million people and projected to increase to 296 million people in 2030 (1% p.a.) and reach 336 million people by 2050 (0.9% p.a.). At present, 48% of the total population live in the rural/countryside and 52% in urban cities.
- By 2030 it is projected that people living in urban areas will reach 60% and 80% by 2045. The high rate of urbanization has also affected labor in the agriculture sector, which demands labor efficiency by large-scale agricultural technology and machinery adoption.
- Under the 5% average of historical GDP annual growth, Indonesia is entering upper-middle-income countries in 2019 with USD 4,135 GDP per capita. The COVID-19 pandemic has shifted the future GDP growth to 3% for the 2020-2025 period. The growth will return to 5% in the period 2025-2030 and up to the peak of GDP growth in 2030-2035 to 6%. The GDP growth is assumed to be saturated at a 4.5% level in the period of 2045-2050.
- Under the rapid economic growth, Indonesia's economic structure will shift to industry and services/tourism. In the DDS scenario, the utilization of CCS in industrial fossil energy systems, electrification of industry equipment, and use of renewables (e.g., hydropower in metal industries) will lower the GHG emission intensity for the industry. The energy input to industries will be transformed from primarily coal and oil fuels to natural gas, renewable (especially in smelters), and electricity, in decreasing order.
- Under the DDS scenario, Indonesia will become a high-income country in 2050 with USD 9,876 of GDP per capita (5% economic growth). The positive economic growth attracts an increasing number of employees as the creation of green jobs increases significantly. The economic impact under the DDS scenario will be higher under the inclusion of non-monetized benefits from GHG emission reduction (e.g., decline of health-damaging pollution).

Figure 4. Evolution of GDP



INTERNATIONAL KEY ENABLERS

- Fair-trade deal to maintain country's supply on the exported agricultural product while fulfilling partner countries' demand on sustainable commodities, including the indirect land-use change (ILUC) criteria.
- Stronger global investment in green investment, cooperation of international research centers and think tanks on clean technologies, and improved country's trade policy on renewable energy goods to create a supportive ecosystem in promoting environmental technologies.
- International cooperation on low-carbon transition research for priority sectors (e.g., energy, AFOLU) and climate change-related research for evidence-based policy and fair responsibility of mitigation effort for Party Actors and Non-Party Actors.
- Expanding international financial support to diversify national climate budget sources.

SECTORAL SYSTEM TRANSFORMATIONS

- The main key to achieve net zero emission in the AFOLU sector is by increasing land-use efficiency (e.g., increased productivity, increased cropping intensity), maintaining sustainable consumption, and reducing pressure to the high carbon stock ecosystem. Under this condition, land demand for food and forest product is fulfilled without being exacerbated by massive clearance of natural forest and land degradation.
- To increase land-use efficiency, technology improvement and high-quality inputs (e.g., seeds, fertilizer, etc.) are needed. Under DDS scenario, farmers access to credit support is increased with innovation on value chain financing scheme. In addition, the private sector (e.g., traders, modern market) and research agencies/universities will actively engage in empowerment programs; hence, improving the human resources of the agricultural workers.
- As supported by several regulations, including a ban to convert forested land in the forest area and moratorium to natural forest and peat, the cumulative area to be deforested until 2050 for DDS scenarios is only 6.8 Mha. To conserve natural forest in the concession area, GoI has issued a mandatory certification to ensure a sustainable logging technique, that will be fully adopted by the concessionaire under the DDS scenario. At the local level, Forest Management Unit (FMU) has a crucial role to reduce the risk of deforestation in the forest area.
- As emissions from peatlands contribute to half of the historical emission from the AFOLU sector, the DDS scenarios emphasize the urgency in executing 4.2 million ha of peatland restoration and 1.04 million ha improved peat water level management in 2050.
- To increase the country's capacity in sequestering terrestrial carbon, the DDS scenario sets an ambitious target of rehabilitating 10.6 million ha critical land until 2050 under the government forestry program (e.g., social forestry, land rehabilitation program, multi permit, etc.).
- Under the DDS scenario, integrated land use planning is the key to ensure sustainable feedstock supply of biofuel and wood biomass for BECCS and the fulfillment of staple food production. Given that BECCS are expected to play a significant role in GHG mitigation of the power sector (8% contribution to power generation), a large amount of solid biomass supply needs to be prepared and developed.
- Under the various types of power plants in the DDS scenario, the power sector will be improved into a reliable technology and dispatch management that ensures electricity grid stability.
- The transport sector in the future is envisaged to drastically change, with the passenger transport mode being made up of mass public transport (buses, MRT, LRT) in metropolitan, buses in smaller cities, trains and big buses for inter-city transport, and air transport between metropolitan areas and inter-island (ships and ferries). Meanwhile, freight transport is made up of trains for the inter-city, trucks/trailers, air, and ships for inter-island cargoes, as well as small trucks in cities.
- Under the progressive Information and Communication Technology (ICT) development in the future, most of the workforce is working from home (teleworking) by opening businesses at their homes.
- The breakdown of transport energy in 2050 is as follows: biofuels (52%), oil fuels (30%), electric vehicles (14%), and natural gas (4%). The biofuel (CPO-based) program is considered successful and will be continued to 2050 by supplying biofuel with higher biodiesel proportions (B30, B40, B50), which will be produced from sustainable sources.

Figure 5. Net emissions breakdown - LULUCF

(includes emissions and sequestration)