Climate Transparency

BROWN TO GREEN

EXECUTIVE SUMMARY AND INDONESIA COUNTRY PROFILE | 2019

2019

ABOUT CLIMATE TRANSPARENCY AND THIS REPORT

14
PARTNERS

Our global partnership brings together experts from research organisations and NGOs in the majority of the G20 countries.

20
MAJOR ECONOMIES

Our mission is to encourage ambitious climate action in the G20 countries: we inform policy makers and stimulate national debate.

80
INDICATORS

Our Brown to Green Report is the world's most comprehensive annual review of G20 climate action: we provide concise and comparable information on mitigation, finance and vulnerability.

Partners:

Funders:

Supported by:
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
based on a decision of the German Bundestag

Data Partners:

CONTENTS

BROWN TO GREEN | REPORT 2019

The *Brown to Green 2019* consists of this summary report and an in-depth country profile or each G20 country. The country profiles and a echnical note on data sources and methodology can be downloaded at::
www.climate-transparency.org/g20-climate-performance/g20report2019

ABOUT THIS REPORT

"The Brown to Green Report is instrumental in understanding, where Indonesia stands in comparison to other G20 countries and contributes to stimulating the national debate about climate change and necessary action."

Rachmat Witoelar

President's Special Envoy for Climate Change, former State Minister of Environment of Indonesia

"I am already living in this future that others fear. Decisions made today will primarily affect future generations. The climate crisis needs to be taken seriously. We all need to show more action and fight together against climate change. The Brown to Green Report shows how far G20 countries are away from what they owe our future."

Yola Mgogwana

Young Climate Activist, African Climate Alliance, Earthchild Project, South Africa

"China as one of the leading global emitters has a particular responsibility and an interest in transitioning to a low-carbon economy as soon as possible. Experts from G20 countries, drafting together the Brown to Green Report, provide great insights about what have been and could be done, which as a result drives the national debate forward."

Sze Ping Lo

CEO of WWF China

"Climate change needs a response from both businesses and policy-makers that goes hand in hand. This requires an ongoing dialogue to achieve a regulatory framework which enables rapid, predictable and socially-balanced emission reductions to transition to net-zero emissions by 2050. The Brown to Green Report reinforces this dialogue and knowledge transfer by assessing recent policy developments and key opportunities in each G20 country."

Oliver Bäte

CEO of Allianz SE

EXECUTIVE SUMMARY

In 2018, global emissions grew once again signalling that ever stronger efforts to reduce emissions are required to arrest global warming at 1.5°C. This means that G20 countries will have to ratchet up their 2030 emissions targets in 2020 and significantly bolster mitigation, adaptation, and finance measures over the next decade. The 'Brown to Green Report 2019' takes stock of where the G20 countries stand in terms of 1.5°C benchmarks and highlights key opportunities to enhance climate action across sectors.

01 ADAPTATION

Currently, extreme weather events lead to around 16,000 deaths and economic losses of US$ 142 billion in G20 countries every year. Although less developed countries are generally more affected than industrialised ones, several G20 countries are among the top 31 worldwide with the highest annual death rates per total population from extreme weather events.

Limiting global temperature increase to 1.5°C – rather than 3°C – reduces negative impacts across sectors in G20 countries by over 70%. For example, it cuts down the average drought length by 68% and the number of days above 35°C a year from 50 to 30. It also limits the growing season's shrinkage and the reduction of rainfall, as well as substantially diminishing the risk of the heat waves that ravage crops.

All G20 countries have adaptation plans with the exception of Saudi Arabia. Climate change adaptation is increasingly a seminal policy goal that is inscribed in national adaptation strategies.

02 MITIGATION

Economic growth and emissions have not been fully decoupled: G20 energy-related CO_2 emissions increased in 2018 by 1.8% because of high economic growth and an ever greater fossil fuel energy supply. This boosted sales of all fossil fuels with the gas industry profiting most. Energy supply rose most steeply in the US and Canada as a result of strong growth and weather conditions. The energy supply from fossil fuels grew in nine G20 countries – Australia, Canada, China, India, Indonesia, Russia, South Africa, South Korea, and the US – mainly due to increased fuel usage in transportation and higher electricity demand. The energy system's carbon intensity fell only slightly. 82% of the G20's energy mix is still fossil fuels. This must fall to at least 67% by 2030 and to 33% by 2050 globally to be 1.5°C compatible, and ultimately to much lower levels – and to substantially lower levels without CCS.

G20 countries need to cut their current greenhouse gas (GHG) emissions by at least 45% in 2030 (below 2010 levels) to be in line with global benchmarks set by the IPCC report on 1.5°C. They must reach net-zero emissions by 2070. Industrialised G20 countries must bring down GHG emissions to net zero a few years earlier than the rest of the world.

NATIONALLY DETERMINED CONTRIBUTIONS (NDCS) – 2030 EMISSIONS TARGETS: About half of the G20 countries (China, the EU and its G20 member states, India, Indonesia, Russia, Saudi Arabia, Turkey) are projected to meet or surpass their NDC targets, excluding land use, land-use change, and forestry (LULUCF) emissions. Saudi Arabia's progress, however, is difficult to assess. In addition, Saudi Arabia's NDC target along with those of Russia and Turkey are very far from what is required to achieve the Paris Agreement's long-term temperature goal. Indonesia is not likely to meet its NDC if emissions from LULUCF are considered.

South Korea, Canada and Australia are the G20 countries furthest off track to implement their NDCs. Argentina, Brazil, Japan, Mexico, South Africa, and the US may also miss their NDC targets without additional action. To limit global warming to 1.5°C, all G20 countries would have to increase their NDC ambition. This report underscores that there is plenty of room to scale up climate action in the 2020 NDC update.

LONG-TERM STRATEGIES – 2050 EMISSIONS TARGETS: There is an increasing drive that has built momentum around net-zero emissions targets. France and the UK have net-zero 2050 emissions goals that are enshrined in law. Germany has adopted a net-zero 2050 emissions target and will put it into law soon. Argentina, the EU, Italy and Mexico announced the adoption of such targets as well.

Canada, France, Germany, Japan, Mexico, the UK and the US have submitted their long-term strategies for 2050 to the United Nations Framework Convention on Climate Change (UNFCCC). Argentina, China, the EU, India, South Africa, South Korea and Russia are currently preparing strategies.

POWER: In 2018, emissions in the power sector, including electricity and heat production, increased by +1.6%, similar to the annual average of the last ten years. Indonesia and Turkey are burning more coal than ever for electricity – and their power emissions increased the most in 2018. South Africa continues to have the highest emission intensity in the G20. All three countries urgently need to develop coal phase-out plans and stop building more coal power plants. Coal phase-out plans – with 2030 dates for OECD countries and 2040 deadlines for rest of the world – are also imperative for Australia, India, Japan, Mexico, Russia, South Korea and the US, which have yet to take substantial measures to exit coal.

France, Brazil and the UK reduced emissions in their power sectors considerably in 2018. While France and the UK, next to Canada and Italy, have 1.5°C compatible coal phase-out plans, Brazil and Germany are the only G20 countries with long-term renewable energy strategies. All G20 countries need to have zero-carbon electricity in 2050 in order to slow global warming to 1.5°C.

TRANSPORT: Transport emissions of the G20 continued to increase in 2018 (+1.2%). To keep global warming below 1.5°C, the share of low-carbon fuels in the G20 transport fuel mix (6%) would need to increase roughly ten times by 2050. The US, Canada and Australia have the highest transport emissions per capita among the G20. The US, for example, has 24 times higher per capita emissions than India. All three countries maintain policies that are insufficien for a 1.5°C-compatible transport transformation. Australia in particular lacks any significant policy, such as emissions or fuel efficie y standards for light duty vehicles. Nor is it shifting towards public transport.

Canada, France, Japan and the UK show progressive long-term plans to phase out fossil fuel cars by 2040/2050. The commitments of these four countries are however still insufficie . A phase-out by 2035 is the latest date possible to be 1.5°C compatible. China sold over one million electric cars in 2018, almost doubling numbers from 2017. It also has the most progressive public transport policy in the G20.

G20 aviation emissions are increasing with Australia, the US and the UK having the highest flight emissions per person. Australia has 53 times higher per capita emissions from aviation than India. G20 countries need to reduce government subsidies, tax jet fuel, target a reduction of air transport, and invest in electro-fuels.

BUILDINGS: G20 emissions in the building sector grew more than in any other sector in 2018 (+4.1%), although on average emissions had stabilised over the last decade. The US, Australia and Saudi Arabia had the highest building emissions per capita in 2018. The three countries lack ambitious policies to substantially reduce emissions in the sector. They have building codes for new buildings but lack a national strategy for all new buildings to be near zero energy as well as for the retrofitting of existing buildings.

The European countries lead with 1.5°C compatible strategies for zero-energy new buildings. The EU, France and Germany are the only G20 members with long-term strategies for the retrofitting of buildings. To be 1.5°C compatible, even these countries would require deeper renovation rates of annually 5% a year, compared to non-OECD countries with a needed deep renovation rate of 3% by 2020.

INDUSTRY: The G20's increase in industrial emissions (+3.1%) in 2018 remains highly problematic. Emission intensity in the sector is highest in Russia, India and China partly because of a shift of heavy industry away from developed countries towards emerging and developing countries. At the same time, India and China are among the G20 countries with the most progressive energy efficiency policies. India's mandatory efficiency policies cover more than 26–50% of industrial energy use as of 2017, while China's and Japan's cover 51% to 100%. However, no G20 country has a long-term strategy in place to reduce industrial energy emissions by 75–90% from 2010 levels by 2050, which would be 1.5°C compatible.

AGRICULTURE & LAND USE: Less consumption of animal products will lower G20 emissions in agriculture. High deforestation rates in Argentina, Australia, Brazil and Indonesia must be cut. G20 GHG emissions from agriculture continue to climb. Livestock rearing is the main driver and accounts for 40% of agricultural emissions. The four rainforest countries of the G20 – Argentina, Australia, Brazil, Indonesia – need to develop a strategy for net-zero deforestation by the 2020s in order to be 1.5°C compatible. At the UN Climate Action Summit in September 2019, Argentina announced it would aim for net-zero deforestation by 2030. India, China and Mexico rank highest for their long-term deforestation policies. India is the only G20 country with 1.5°C compatible forest policies.

03 FINANCE

FINANCIAL POLICIES AND REGULATIONS: G20 economies lead in greening the financial system. All G20 countries have started to discuss green financial principles, such as national green finance strategies, climate-related financial risks, and the taxonomy of green and brown investments. The G20 emerging economies lead however in the implementation of policies that reduce climate-related risks for the financial system as a whole. Brazil, France and South Africa have climate-related risk disclosure requirements for financial institutions, and Canada and Indonesia have voluntary and mandatory climate-related risk assessments, respectively. China, India and Japan set capital and liquidity requirements for financial institutions that favour green loans and investments.

FISCAL POLICY LEVERS: G20 countries, excluding Saudi Arabia,[a] provided about US$ 127 billion in subsidies to coal, oil and gas in 2017 compared to US$ 248 billion in 2013. This downward trend can be seen in nine G20 countries: Argentina, Brazil, China, India, Indonesia, Italy, Japan, UK and the US.

While overall there has been a downward trend in subsidies to coal mining, subsidies to coal-fired power continue, and subsidies to natural gas infrastructure and production have increased in several countries. All G20 countries need to phase out fossil fuel subsidies by 2025 at the latest. European countries are already committed to a 2020 phase-out.

A total of 18 G20 countries have implemented or are in the process of implementing explicit carbon-pricing schemes such as emission trading systems (ETS) and carbon taxes. Newcomers are South Africa – which launched Africa's first carbon tax in June 2019 – and Argentina, which passed a carbon tax in 2018 for most liquid fuels (The size of Argentina's tax, however, is negligible.). Australia and India have no explicit carbon-pricing schemes and are not considering them.

In 2015, on average 71% of the CO_2 emissions from energy in the G20 were not priced at EUR 30 or higher through carbon taxes, specific taxes on energy use, or the price of tradable emission permits. The pricing gap for G20 countries increases to 78% when EUR 60 per tonne is the benchmark. Russia, Indonesia, Brazil, China and South Africa have the highest carbon-pricing gap.

PUBLIC FINANCE: G20 public institutions financed coal and coal-fired power production internationally at US$ 17 billion and domestically at US$ 11 billion on average in 2016–2017. The biggest G20 overseas financiers are China, Japan and South Korea. China's public finance institutions have financed US$ 9.5 billion per year on average in 2016 and 2017, while Japan's provided US$ 5.1 billion and South Korea's US$ 1 billion.

Brazil, Canada, China, Germany, the UK and the US's development agencies and banks restrict public spending for coal. Germany and the UK are the only two G20 countries that announced restrictions on coal financing in their role as shareholders of multilateral development banks (over and above the 2013 commitments of the World Bank Group, the European Investment Bank, and the European Bank for Reconstruction and Development to restrict coal-fired power finance).

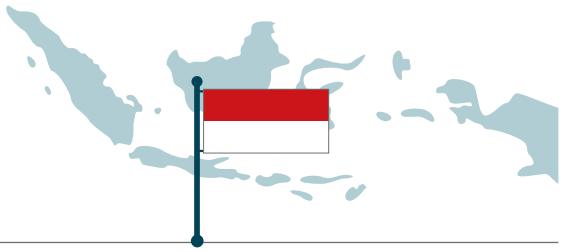
G20 countries reported US$ 31 billion in climate finance to developing countries in 2015–2016. Per GDP, Japan (total amount: US$ 12 billion), France (US$ 4 billion), the UK (US$ 4 billion) and Germany (US$ 4 billion) provided the highest amounts. While Japan, Germany and France remain the largest bilateral funders, the UK provides the highest amount through multilateral funds. Under its current administration, the US has not submitted a third biennial report to the UNFCCC, instead offering only provisional data for these statistics.

a The information presented here is based on the bottom-up inventory approach and database of the OECD, which includes subsidies data for all G20 countries with the exception of Saudi Arabia.

Climate Transparency

BROWN TO GREEN: 2019
THE G20 TRANSITION TOWARDS A NET-ZERO EMISSIONS ECONOMY

INDONESIA



Indonesia's greenhouse gas (GHG) emissions are – per capita – below the G20 average.

But the level of per capita emissions has risen by 17% (2011-2016).

Greenhouse gas (GHG) emissions (incl. land use) per capita[1]
(tCO_2e/capita)

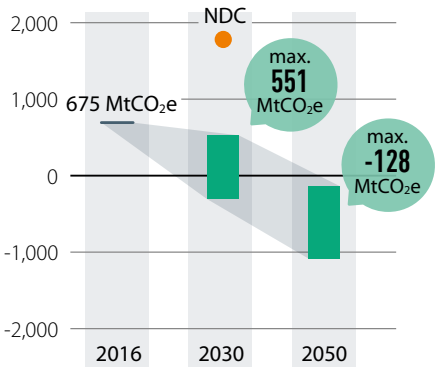
Data for 2016
Source: CAT 2019; PRIMAP 2018; World Bank 2019

Trend (2011-2016) +17% -1%

Indonesia is not on track for a 1.5°C world.

Indonesia needs to reduce its emissions to below 551 $MtCO_2e$ by 2030 and to below -128 $MtCO_2e$ by 2050 to be within its fair-share range compatible with global 1.5°C IPCC scenarios. Indonesia's 2030 NDC would only limit its emissions to 1,817 $MtCO_2e$. All figu es are drawn from the Climate Action Tracker and exclude land use emissions.

1.5°C compatible pathway[2]
($MtCO_2e$/year)



Source: CAT 2019

Recent developments[3]

The 2019-2028 electricity plan of state-owned electricity company PLN raised the 2025 target for the share of coal in the power mix by 0.2 percentage points compared to the previous plan.

A new decree on electric vehicles (EVs) (August 2019) creates the legal basis for battery production, local content requirements, charging stations and tax incentives.

In October 2019, the Government established an agency to manage revenues from carbon trading and other funds related to climate change mitigation.

Key opportunities for enhancing climate ambition[3]

Indonesia produces 61% of its electricity from coal power.

→ **Reduce the number of coal power plants and triple renewable energy share in the power sector by 2030.**

#1

Indonesia only has two appliance groups with mandatory standards or labels.

→ **Improve the efficiency of household appliances and lighting in order to avoid a peak demand of more than 25 GW in 2030.**

#2

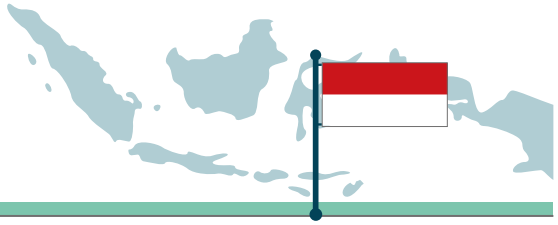
Indonesia has lost 16% of the tree cover it had back in 2000.

→ **Enact a permanent forest clearing moratorium incl. primary and secondary forests, and peat restoration to save at least 66Mha of forest.**

#3

This country profile is pa t of the **Brown to Green 2019** report. The full report and other G20 country profiles can be d wnloaded at: *http://www.climate-transparency.org/g20-climate-performance/g20report2019*

INDONESIA – SOCIO-ECONOMIC CONTEXT



Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. Indonesia ranks medium.

Data for 2017 | Source: UNDP 2018

Gross Domestic Product (GDP) per capita

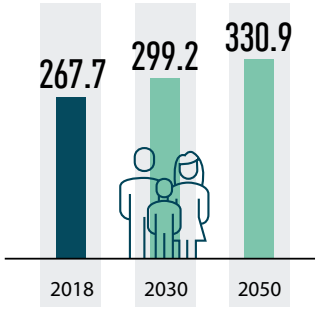
(PPP US$ const. 2018, international)

Data for 2018 | Source: World Bank 2019

Population projections

(millions)

The World Bank expects Indonesia's population to increase by around 24% by 2050.



Source: World Bank 2019

Death through ambient air pollution

(total ambient air pollution attributable deaths)

More than 95,000 people die in Indonesia every year as a result of outdoor air pollution, due to stroke, heart disease, lung cancer and chronic respiratory diseases. Compared to the total population, this is in the mid range of the G20 countries.

95,156
attributable deaths

Data for 2016
Source: World Health Organization 2018

Ambient air pollution attributable death rate per 1,000 population per year, age standardised

JUST TRANSITION[3]

Since the 1980s, the government has promoted the use of coal. The proportion of coal in the primary energy mix has risen from 15.5% in 2007 to 19.9% in 2018, whereas the oil and gas shares were relatively stable and tended to decrease.

The 2017 General National Energy Plan (RUEN) defines the strategy on how to meet the 2014 National Energy Policy (KEN) target: increasing the share of renewables in the primary energy mix in 2025. But the existing policy also promotes both higher total coal consumption at domestic level for electricity generation, and also the use of coal for producing liquid fuel or gas.

As for electricity, the state-owned power company, PLN, predicts that 54% of the electricity mix will come from coal in 2028, down from 61% in 2018. But independent research by IESR estimates that domestic coal consumption in the future will be lower than RUEN forecasts, and there will be uncertainty in coal export due to lower demand from major destination countries. This would reduce state revenues and the labour force in the coal sector. Unfortunately, the coal industry seems to have strong ties and alignment with the political system. A comprehensive inclusive regulation of coal transition would help Indonesia to mitigate its risks in the future, but such a strategy is currently lacking.

Legend for all country profiles

Trends

The trends show developments over the past five years for which data are available.

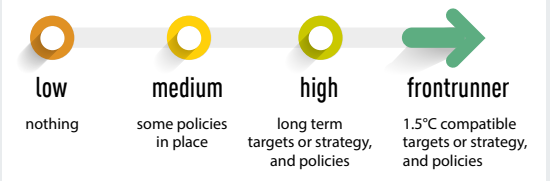
The thumbs indicate assessment from a climate protection perspective.

Decarbonisation Ratings[4]

These ratings assess a country's performance compared to other G20 countries. A high scoring reflects a relatively good effort from a climate protection perspective but is not necessarily 1.5°C compatible.

Policy Ratings[5]

The policy ratings evaluate a selection of policies that are essential pre-conditions for the longer-term transformation required to meet the 1.5°C limit.



For more information see the Annex and Technical Note

MITIGATION BIG PICTURE

INDONESIA

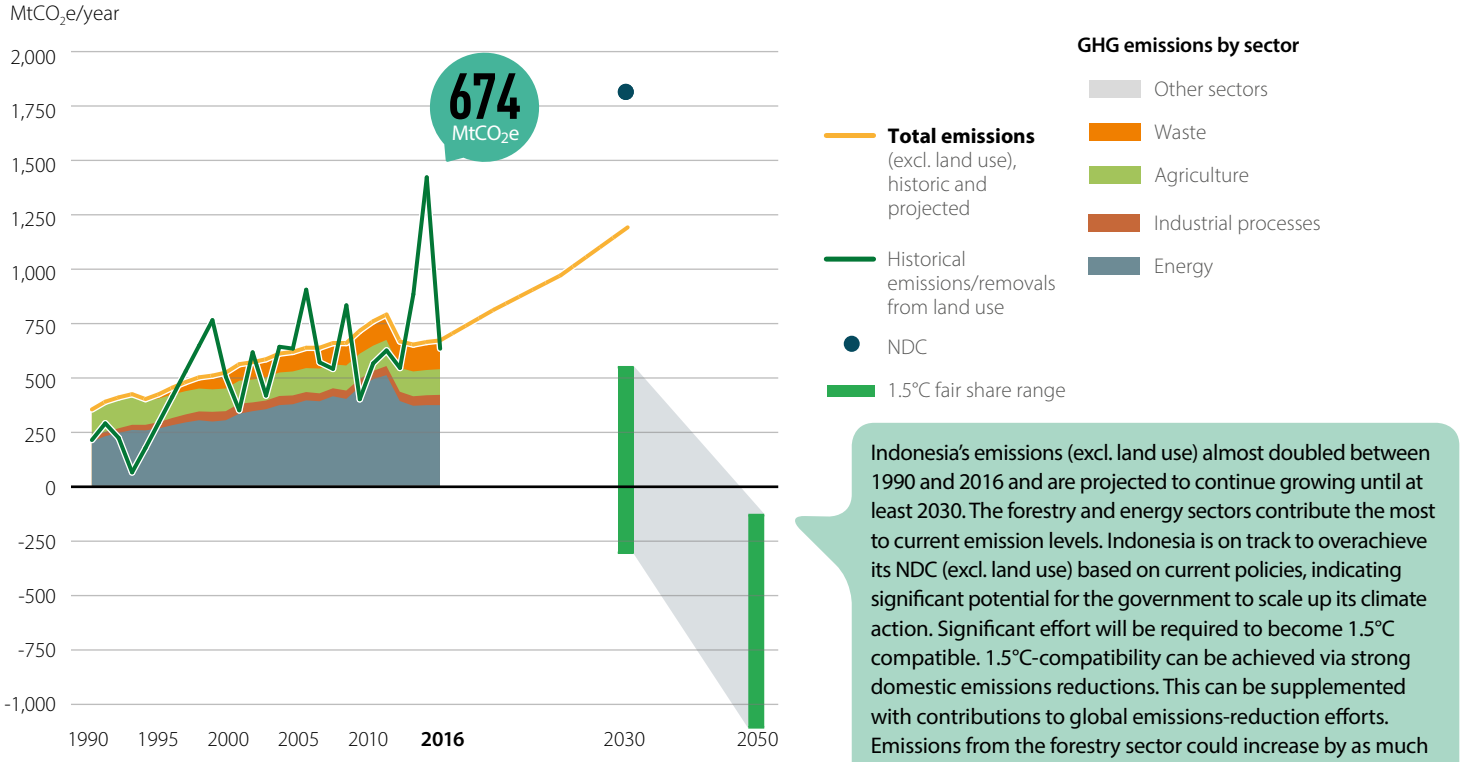
Indonesia's GHG emissions have increased by 90% (1990-2016) and the government's climate targets for 2030 (-29% from business as usual) are not in line with a 1.5°C pathway.

In 2030, global GHG emissions need to be 45% below 2010 levels and reach net zero by 2070.

1.5°C[6]

Source: IPCC SR1.5 2018

Total GHG emissions across sectors[2]



Source: PRIMAP 2018; CAT 2019

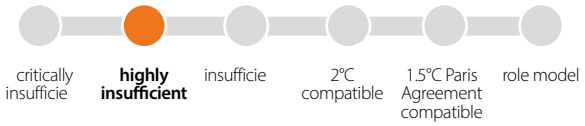
Indonesia's emissions (excl. land use) almost doubled between 1990 and 2016 and are projected to continue growing until at least 2030. The forestry and energy sectors contribute the most to current emission levels. Indonesia is on track to overachieve its NDC (excl. land use) based on current policies, indicating significant potential for the government to scale up its climate action. Significant effort will be required to become 1.5°C compatible. 1.5°C-compatibility can be achieved via strong domestic emissions reductions. This can be supplemented with contributions to global emissions-reduction efforts. Emissions from the forestry sector could increase by as much as 300 $MtCO_2e$ by 2030.

Nationally-determined contribution (NDC): Mitigation

Targets	To reduce unconditionally 26% of its greenhouse gas emissions against the business-as-usual scenario by the year 2020 and 29% by the year of 2030
Actions	Actions specified (se tors: land use and forestry, agriculture, energy, waste)

Source: UNFCCC, NDC of respective country

Climate action tracker (CAT) evaluation of NDC[2]



Source: CAT 2019

Long-term strategy (LTS) to be submitted to the UNFCCC by 2020

Status	No strategy yet
2050 target	n.a.
Interim steps	n.a.
Sectoral targets	n.a.

Source: UNFCCC, LTS of respective country

MITIGATION ENERGY

INDONESIA

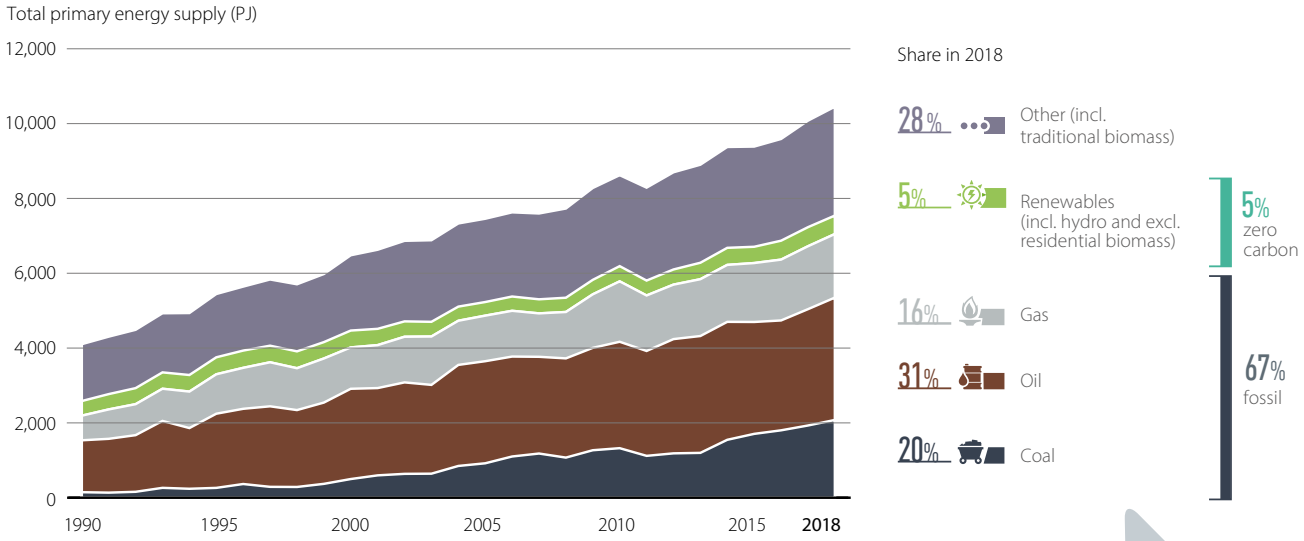
Fossil fuels still make up around 67% of Indonesia's energy mix (including power, heat, transport fuels, etc) and their share is increasing further. The use of renewables has remained stable over the years at a fairly low level.

The share of fossil fuels globally needs to fall to 67% of global total primary energy by 2030 and to 33% by 2050 and to substantially lower levels without Carbon Capture and Storage.

1.5°C[6]

Source: IPCC SR1.5 2018

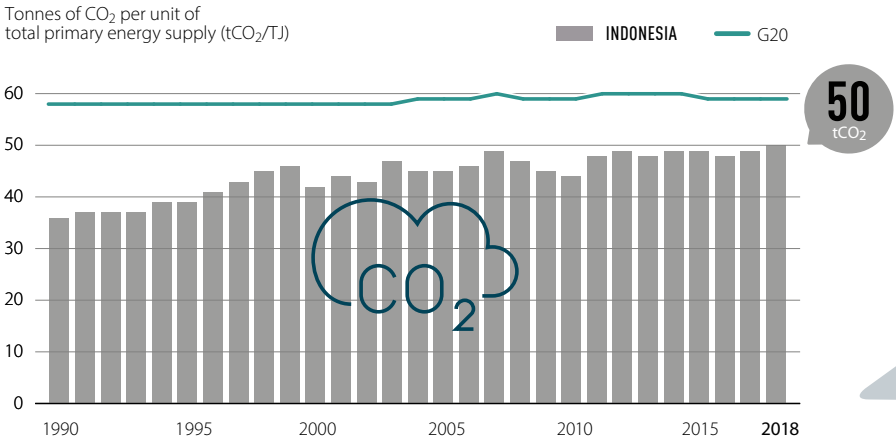
Energy mix[7]



Source: Enerdata 2019

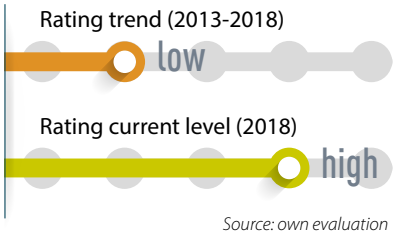
This graph shows the fuel mix for all energy supply, including energy used for electricity generation, heating, cooking, and transport fuels. Fossil fuels (oil, coal and gas) make up 67% of the Indonesian energy mix, which is below the G20 average (82%) but still high. Traditional use of biomass accounts for almost a third of the energy mix.

Carbon intensity of the energy sector



Source: Enerdata 2019

Rating of carbon intensity compared to other G20 countries[4]



Source: own evaluation

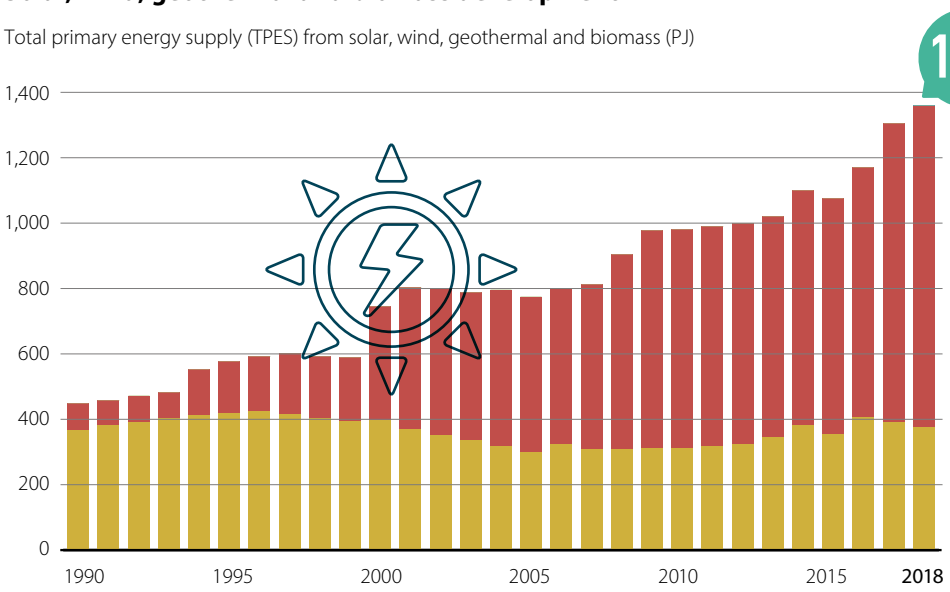
Carbon intensity shows how much CO_2 is emitted per unit of energy supply. At 50tCO_2e/TJ, carbon intensity in Indonesia is below the G20 average (59tCO_2e/TJ), but that level has been rising (+9%, 2013-2018). This reflects the growing share of coal and oil.

MITIGATION ENERGY

INDONESIA

Solar, wind, geothermal and biomass development[8]

Total primary energy supply (TPES) from solar, wind, geothermal and biomass (PJ)



Source: Enerdata 2019

Share of TPES in 2018

0.00% Solar

0.01% Wind

9.40% Geothermal

3.61% Biomass, excl. traditional biomass

Geothermal and biomass account for 13% of Indonesia's energy supply – the G20 average is only 6%. In the last five years, the share of these sources in total energy supply has increased by around 16%, less than the G20 average (+29% 2013-2018). Geothermal makes up the largest share.

Rating of share in TPES compared to other G20 countries[4]

Source: own evaluation

Energy supply per capita

Total primary energy supply per capita (GJ/capita)

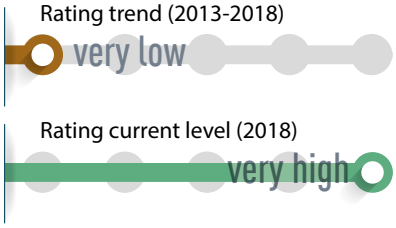
The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy.

At 39 GJ/capita, energy supply per capita in Indonesia is less than half the G20 average, but has increased more (+9%, 2013-2018) than the G20 average (+1%).

Trend (2013-2018) +9% +1%

Data for 2018 | Source: Enerdata 2019; World Bank 2019

Rating of energy supply per capita compared to other G20 countries[4]



Source: own evaluation

MITIGATION ENERGY

INDONESIA

Energy supply per capita in Indonesia is less than half the G20 average, and the energy intensity of the economy remains below average as well. However, energy-related CO_2 emissions have risen significantly in the past few years.

Global energy and process-related CO_2 emissions must be cut by 40% below 2010 levels by 2030 and reach net zero by 2060.

1.5°C[6]

Source: IPCC SR1.5 2018

Energy intensity of the economy

(TJ/PPP US$2015 million)

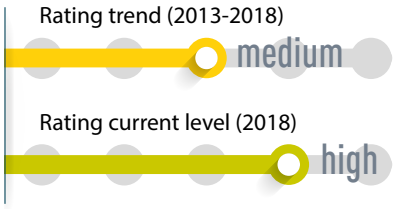
Indonesia	G20 average
3.39	4.86

Trend (2013-2018): -9% | -12%

Data for 2018 | Source: Enerdata 2019; World Bank 2019

This indicator quantifies how much energy is used for each unit of GDP. This is closely related to the level of industrialisation, efficiency achievements, climatic conditions or geography. Indonesia's energy intensity is below the G20 average, but has decreased to a lesser extent (-9%, 2013-2018) than the G20 rate.

Rating of energy intensity compared to other G20 countries[4]

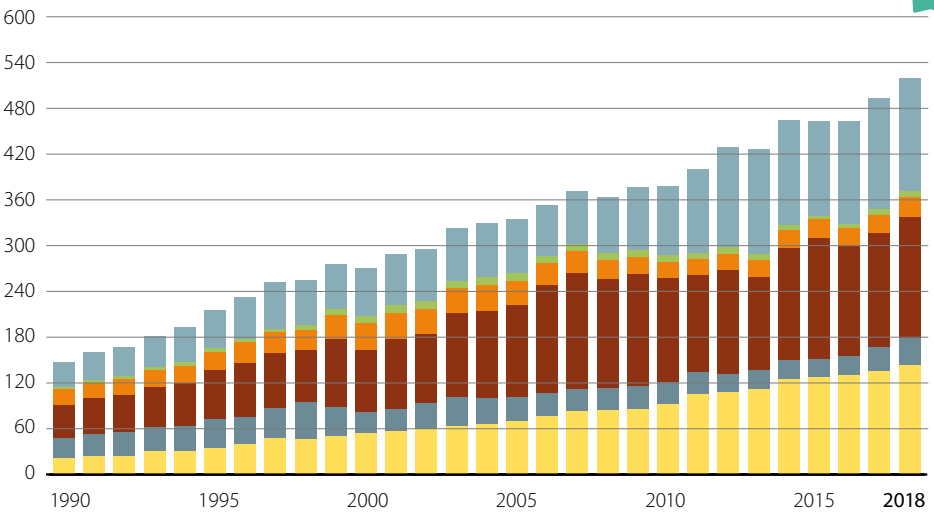


Source: own evaluation

Energy-related CO_2 emissions[9]

CO_2 emissions from fuel combustion ($MtCO_2$/year)

522 $MtCO_2$



Share of total energy-related CO_2 emissions in 2018

28%	Transport
1%	Agriculture
5%	Buildings
31%	Industries (incl. autoproducers)
7%	Other energy sector
28%	Electricity and heat

Source: Enerdata 2019

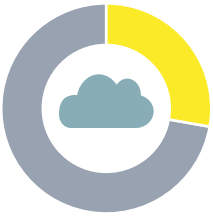
The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. In Indonesia, these emissions have significantly increased since 1990. The industry sector is, with 31%, the largest contributor, followed by electricity and heat, and transport.

MITIGATION POWER SECTOR

INDONESIA

Indonesia produces 61% of electricity from coal and intends to double its coal capacity by 2028. To stay within a 1.5°C limit, Indonesia would need to phase out coal by 2040.

Share in energy-related CO_2 emissions



Data for 2018 | Source: Enerdata 2019

Coal must be phased out in the EU/OECD no later than 2030, in the rest of the world no later than 2040. Electricity generation needs to be decarbonised before 2050, with renewable energy the most promising option.[5]

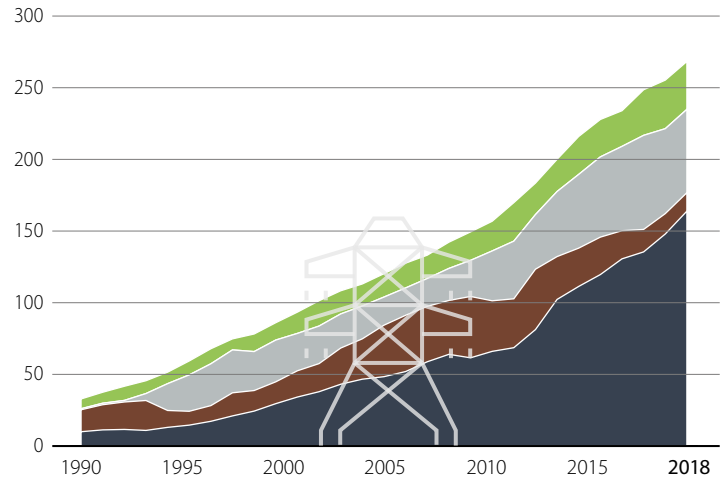
1.5°C[6]

Source: IPCC SR1.5 2018; Climate Analytics 2016; Climate Analytics 2019

STATUS OF DECARBONISATION

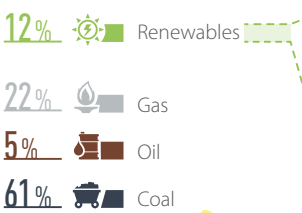
Power mix

Gross power generation (TWh)

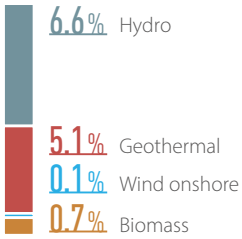


Source: Enerdata 2019

Shares in 2018



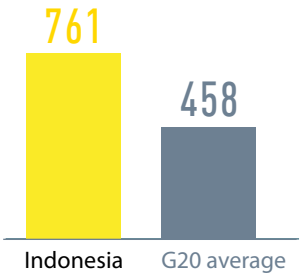
Renewables shares



Indonesia's power mix is dominated by fossil fuels – coal use has risen sharply in the past decade and now accounts for 61%. Renewables are developing only slowly, and at 12% their share is below the G20 average (25%). The main renewable power sources are hydropower and geothermal.

Emissions intensity of the power sector

(gCO_2/kWh)



Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

+10% Indonesia

-11% G20 average

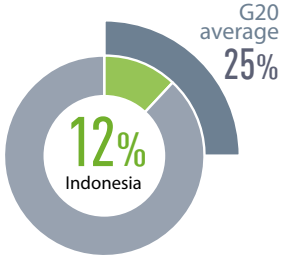
Rating of emissions intensity compared to other G20 countries[4]

Source: own evaluation

For each kilowatt hour of electricity, 761 gCO_2 are emitted in Indonesia. This is almost double the G20 average. Emission intensity has increased by 10% (2013-2018) because of the growing use of fossil fuels.

Share of renewables in power generation

(incl. large hydro)



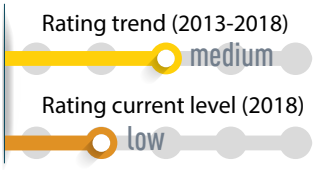
Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

+10% Indonesia

+20% G20 average

Rating of share of renewables compared to other G20 countries[4]



Source: own evaluation

MITIGATION POWER SECTOR

INDONESIA

POLICIES[5]

Renewable energy in the power sector

Indonesia is planning to install 16.7 GW of renewable power capacity by 2028. Indonesia had feed-in-tariffs in the past; the current regulation abandoned this scheme and introduced the BOOT (Build-Own-Operate-Transfer) scheme under which power plant assets cannot be used as collateral.

Recent regulations make investments in renewable energy unattractive.

Source: own evaluation

Coal phase-out in the power sector

Indonesia is not considering a coal phase-out but intends to install 6 GW of coal-fi ed power generation by 2020 and 27.1 GW by 2028, doubling coal capacity by 2028. The coal industry is heavily subsidised both directly (loan guarantees, tax exemptions, royalties and tax rates) and indirectly (price cap on coal sold to domestic power utilities, introduced in 2018).

Source: own evaluation

MITIGATION TRANSPORT SECTOR

Emissions from transport make up almost 30% of Indonesia's total CO_2 emissions, as the transport sector is still heavily dominated by fossil fuels. In order to stay within a 1.5°C limit, passenger and freight transport need to be decarbonised.

Share in energy-related CO_2 emissions

Data for 2018 | Source: Enerdata 2019

The proportion of low-carbon fuels in the transport fuel mix must increase to about 60% by 2050.

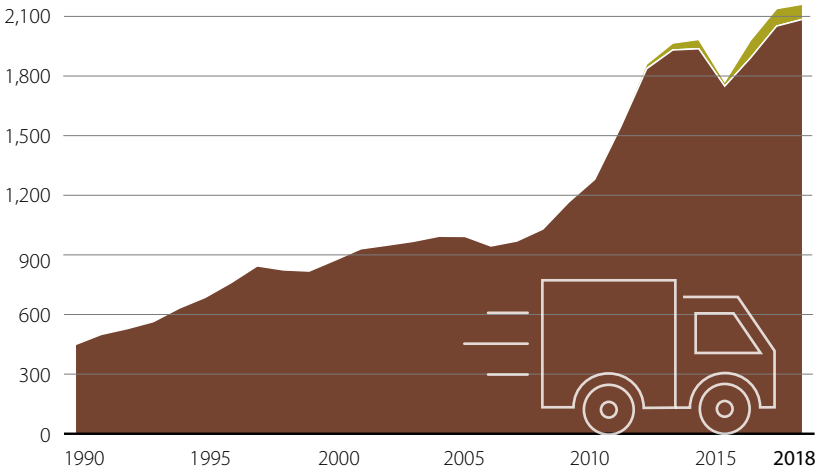
1.5°C[6]

Source: IPCC SR1.5 2018

STATUS OF DECARBONISATION

Transport energy mix

Final energy consumption of transport by source (PJ/year)



Share in 2018

- 3.5% Biofuels
- 0.0% Electricity
- 0.0% Gas
- 96.5% Oil
- 0.0% Coal

Electricity and biofuels together make up only 3.5% of the energy mix in transport (the G20 average is 6%).

Source: Enerdata 2019

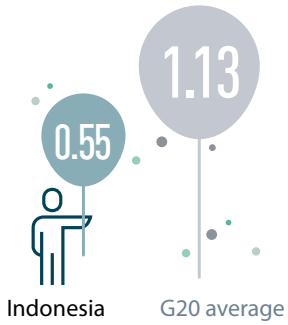
MITIGATION TRANSPORT SECTOR

INDONESIA

STATUS OF DECARBONISATION (continued)

Transport emissions per capita[10]

(tCO_2/capita, excl. aviation emissions)



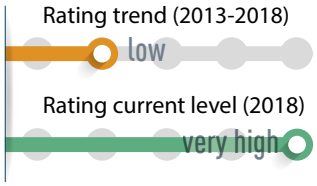
Data for 2018
Source: Enerdata 2019; World Bank 2019

Trend (2013-2018)

+3% Indonesia

+5% G20 average

Rating of transport emissions compared to other G20 countries[4]



Source: own evaluation

Aviation emissions per capita[11]

(tCO_2/capita)

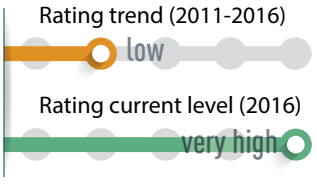
Data for 2016
Source: Enerdata 2019; IEA 2018

Trend (2011-2016)

+11% Indonesia

+10% G20 average

Rating of aviation emissions compared to other G20 countries[4]



Source: own evaluation

Motorisation rate

(vehicles per 1,000 inhabitants)

Data for 2014 | Source: Agora 2018

Market share of electric vehicles in new car sales

(%)

Source: IEA 2019

Passenger transport

(modal split in % of passenger km)

Source: Agora 2018

Freight transport

(modal split in % of tonne-km)

Source: Agora 2018

POLICIES[5]

Phase out fossil fuel cars

There is no target to phase out fossil fuel cars nor are there fuel economy or carbon emission standards in place. However, cars with low fuel consumption or emissions benefit f om a reduced sales tax. A 2019 decree offers tax incentives for the electric vehicle (EV) industry and buyers of EVs.

Source: own evaluation

Phase out fossil fuel heavy-duty vehicles

There is no target to reduce total emissions from freight transport, nor are there energy or carbon emission standards in place for heavy-duty vehicles. There are no measures to support low-carbon freight logistics, and the energy intensity of freight transport remains high.

Source: own evaluation

Modal shift in (ground) transport

Indonesia supports the development of an Intelligent Transport System, the introduction of Bus Rapid Transit Systems in 12 cities, and the enhancement of rail infrastructure including electrification. There is no long-term strategy for supporting a modal shift or measures to support low-carbon freight logistics.

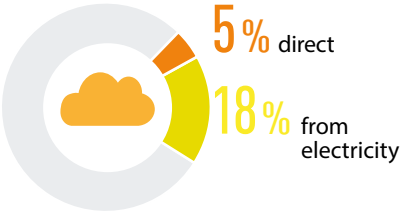
Source: own evaluation

MITIGATION BUILDINGS SECTOR

INDONESIA

Indonesia's building emissions – including heating, cooking and electricity use – make up 23% of total CO_2 emissions. Per capita, building-related emissions are well below the G20 average but increasing widely. Indonesia is lack effective policies to reduce emissions from buildings.

Share in energy-related CO_2 emissions



Data for 2018 | Source: Enerdata 2019

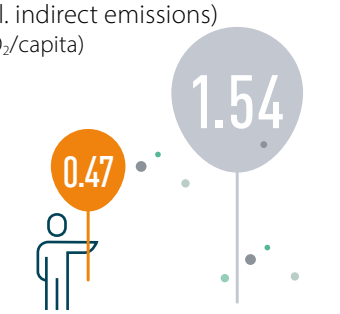
Global emissions from buildings need to be halved by 2030, and be about 80% below 2010 levels by 2050, achieved mostly through increased efficiency, reduced energy demand and electrification in conjunction with complete decarbonisation of the power sector.

1.5°C[6]

Source: IEA ETP B2DS scenario assessed in IPCC SR1.5 2018

STATUS OF DECARBONISATION

Building emissions per capita
(incl. indirect emissions)
(tCO_2/capita)



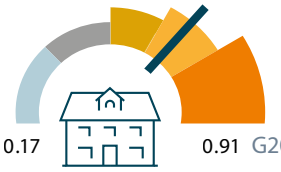
+17.8% +1%

Trend (2013-2018)

Data for 2018 | Source: Enerdata 2019; World Bank 2019

Residential buildings: energy use per m²
(GJ)

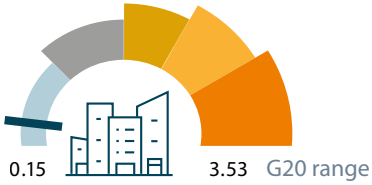
0.71 GJ



Data: year different per country | Source: ACEEE 2018

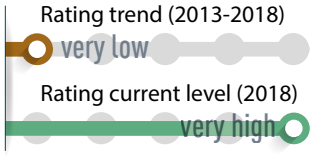
Commercial and public buildings: energy use per m²
(GJ)

0.27 GJ



Data: year different per country | Source: ACEEE 2018

Rating of building emissions compared to other G20 countries[4]



Source: own evaluation

Building-related emissions per capita are only a third of the G20 average. But in contrast to the G20 average, Indonesia's emissions rose by 18% (2013-2018), reflecting growing power consumption and a higher share of coal in the power mix.

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. In Indonesia, energy use per m² is in the upper range for residential buildings and in the lower range for commercial and public ones.

POLICIES[5]

Near-zero energy new buildings

Indonesia has no national strategy for making new buildings near zero energy. Indonesia's National Energy Efficie y Standard for Buildings (2011) is voluntary and applies to non-residential buildings only.

Source: own evaluation

Renovation of existing buildings

There are no national policies for energy performance of existing buildings and retrofits in ndonesia.

Source: own evaluation

MITIGATION INDUSTRY SECTOR

INDONESIA

Industry-related emissions make up more than a third of CO_2 emissions in Indonesia. More stringent policies are required to reduce these emissions in line with a 1.5°C pathway.

Share in energy-related CO_2 emissions (not including process emissions)

31% direct

9% from electricity

Data for 2018 | Source: Enerdata 2019

Global industrial CO_2 emissions need to be reduced by 65–90% from 2010 levels by 2050.

1.5°C[6]

Source: IPCC SR1.5 2018

STATUS OF DECARBONISATION

Industry emissions intensity[12]
(tCO_2e/US$2015 GVA)

Data for 2016 | Source: Enerdata 2019; PRIMAP 2018; World Bank 2019

-1.5%

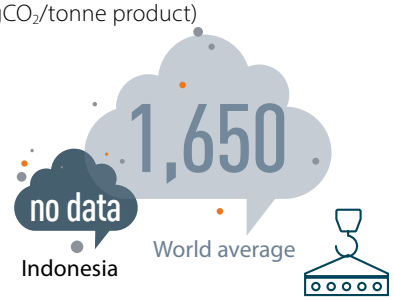
Trend (2011-2016)

-10.2%

Carbon intensity of cement production[13]
($kgCO_2$/tonne product)

Data for 2015 | Source: CAT 2019

Carbon intensity of steel production[13]
($kgCO_2$/tonne product)

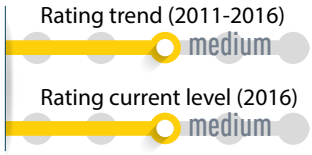


Data for 2015 | Source: CAT 2019

When comparing industrial emissions with the gross value added (GVA) from the industry sector, Indonesia is below the G20 average, but is reducing emission intensity at slower pace (-1.5% compared to the G20 average of -10%, 2011-2016).

Steel production and steelmaking are significant GHG emission sources, and are challenging to decarbonise. There is no data on the emissions of Indonesia's steel or cement industries.

Rating of emissions intensity compared to other G20 countries[4]



Source: own evaluation

POLICIES[5]

Energy efficiency

Source: own evaluation

Mandatory energy efficie y policies cover 26-50 % of industrial energy use. Indonesia has energy management policies in place, mandates for energy managers, and energy audit requirements. However, there are no performance standards for motors or policies to encourage deployment of combined heat and power technologies.

A 2009 regulation promised financial incenti es for energy efficie y measures but these incentives have not been introduced.

MITIGATION LAND USE

INDONESIA

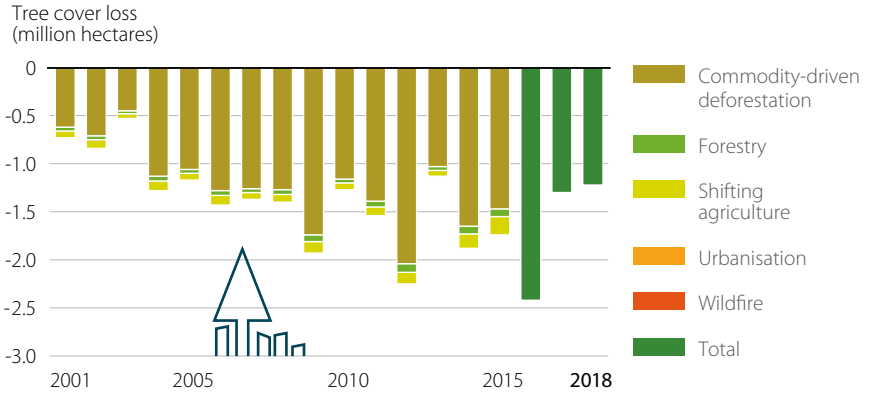
In order to stay within the 1.5°C limit, Indonesia needs to make the land use and forest sector a net sink of emissions, eg by halting the expansion of palm oil plantations, and by creating new forests.

Global deforestation needs to be halted and changed to net CO_2 removals by around 2030.[6]

1.5°C

Source: IPCC SR1.5 2018

Gross tree cover loss by dominant driver[14]



Source: Global Forest Watch 2019

Note: 2000 tree cover extent | >30% tree canopy | these estimates do not take tree cover gain into account

POLICIES[5]

(Net) zero deforestation

In August 2019, the president instructed a permanent moratorium on clearing of primary forest and peatland. However, the instruction neither creates a fi m legal basis nor does it include secondary forests. Indonesia has not set a target to halt deforestation and still faces alarmingly high rates of commodity-driven deforestation.

Source: own evaluation

From 2001 to 2018, Indonesia lost 25.6Mha of tree cover, equivalent to a **16% reduction since 2000**, and 10.5Gt of CO_2 emissions. This does not take tree-cover gain into account. The main drivers are forest clearing for palm oil and timber harvesting, which contribute around two-fifths of deforestation.

MITIGATION AGRICULTURE

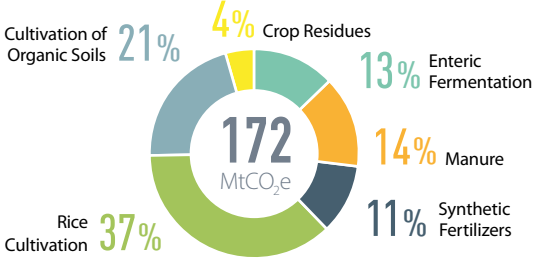
Indonesia's agricultural emissions come mainly from rice cultivation, cultivation of organic soils, and livestock manure. A 1.5°C pathway requires dietary shifts and climate-smart farming practices.

Global methane emissions (mainly enteric fermentation) need to decline by 10% by 2030 and by 35% by 2050 (from 2010 levels). Nitrous oxide emissions (mainly from fertilzers and manure) need to be reduced by 10% by 2030 and by 20% by 2050.[6]

1.5°C

Source: IPCC SR1.5 2018

GHG emissions from agriculture (not including energy)



Data for 2016 | Source: FAOSTAT 2019

In Indonesia, the largest sources of GHG emissions in the agricultural sector are rice cultivation, cultivation of crops on peat soils, and livestock manure. Climate-smart agriculture practices could help reduce emissions.

ADAPTATION

INDONESIA

- **Indonesia is vulnerable to climate change and adaptation actions are needed.**
- **On average, 252 fatalities and losses amounting to US$1.8 billion occur yearly due to extreme weather events.**
- **With global warming, society and its supporting sectors are increasingly exposed to severe climate events such as increasing frequency of heatwaves.**
- **With a 3°C warming, Indonesia would experience around 30 days per year when temperatures reach higher than 35°C.**

ADAPTATION POLICIES

Nationally-determined contribution: Adaptation

Targets	Not mentioned
Actions	Actions specified (se tors: agriculture, water, forestry, health, infrastructure, biodiversity/ecosystems)

Source: UNFCCC, NDC of respective country

National adaptation strategies

Document name	**Publication year**	**Fields of action (sectors)**													**M&E process (reporting frequency)**
		Agriculture	Biodiversity	Coastal areas & fishin	Education & research	Energy & industry	Finance & insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
National Action Plan on Climate Change Adaptation (RAN-API)	2014	x	x	x	x	x	x	x	x	x		x	x	x	Monitoring done by related line Ministries and periodically reported to the Minister of National Development Planning

Source: own research

INDONESIA

ADAPTATION NEEDS

Climate Risk Index for 1998-2017

Impacts of extreme weather events in terms of fatalities and economic losses that occured

Global Climate Risk Index 2019 | All numbers are averages (1998-2017)

Weather-related fatalities	Per 100,000 inhabitants		Annual average losses (PPP US$ mn)	Per unit GDP (%)	
252	0.1	97 rank out of 181 countries	1799	0.1	109 rank out of 181 countries

Source: Germanwatch 2018

Indonesia has already been struck by extreme weather events such as floods, tropical cyclones, fires, landslides and heavy rains. As highlighted by the numbers from the Climate Risk Index, such extreme weather events result in fatalities and economic losses. Climate change is expected to worsen the intensity, frequency and impacts of such events.

Exposure to future impacts at 1.5°C, 2°C and 3°C

		1.5°C	2°C	3°C
Water	% of area with increase in water scarcity			
	% of time in drought conditions			
Heat & Health	Heatwave frequency			
	Days above 35°C			

Source: own research

			1.5°C	2°C	3°C
Agriculture	Maize	Reduction in crop duration			
		Hot spell frequency			
		Reduction in rainfall			
	Rice	Reduction in crop duration			
		Hot spell frequency			
		Reduction in rainfall			

Source: Based on Arnell et al 2019

Overall, with rising temperatures, all sectors are adversely affected. In the water sector, water scarcity and time spent in drought conditions increase significantly.

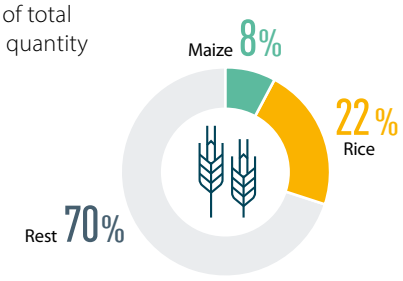
Impact ranking scale

- Very low
- Low
- Medium
- High
- Very high

Blank cells signify that there is no data available

National crop production

(share in % of total production quantity in tonnes)



Data for 2017 | Source: FAOSTAT 2019

Rice and maize represent the largest proportions of crop production out of the four crops analysed (maize, rice, soybeans, wheat). Reduced rainfall and crop duration affects both crops. Generally, maize and rice production are affected by temperature rises and rainfall decreases, particularly in lowland areas.

FINANCE

INDONESIA

Indonesia's fossil fuel subsidies totalled US$7.7 billion in 2017, mostly for petroleum and electricity. The country has no explicit carbon price.

Investment into green energy and infrastructure needs to outweigh fossil fuel investments by 2025.

1.5°C[6]

Source: IPCC SR1.5 2018

Nationally-determined contribution: Finance

Conditionality	NDC partly conditional on international financial suppo t (Indonesia could increase its contribution to 41% emission reduction against BAU by 2030), subject to availability of international support for financ , technology transfer, and development and capacity building)
Investment needs	Not specifie
Actions	National actions to align financial flows specified (public spending)
International market mechanisms	Not mentioned

Source: UNFCCC, NDC of respective country

Financial policy and regulation supporting a brown to green transition

Through policy and regulation governments can overcome challenges to mobilising green financ , including: real and perceived risks, insufficient eturns on investment, capacity and information gaps.

Category	Instruments	Objective	Under discussion/ implementation	Not identified
Green Financial Principles	N/A	This indicates political will and awareness of climate change impacts, showing where there is a general discussion about the need for aligning prudential and climate change objectives in the national financial a chitecture.	**X**	

			Mandatory	Voluntary	Under discussion	Not identified
Enhanced supervisory review, risk disclosure and market discipline	Climate risk disclosure requirements	Disclose the climate-related risks to which financial institutions a e exposed				**X**
	Climate-related risk assessment and climate stress-test	Evaluate the resilience of the financial se tor to climate shocks	**X**			
Enhanced capital and liquidity requirements	Liquidity instruments	Mitigate and prevent market illiquidity and maturity mismatch				**X**
	Lending limits	Limit the concentration of carbon-intensive exposures			**X**	
		Incentivise low carbon-intensive exposures	**X**			
	Differentiated Reserve Requirements	Limit misaligned incentives and canalise credit to green sectors				**X**

Source: own research

In 2014 Otoritas Jasa Keuangan (OJK) launched a Sustainable Finance Roadmap including measures to increase green finance th ough regulatory support and incentives, targeted loans and guarantee schemes, green lending models and green bonds. OKJ has also released a Sustainable Finance Umbrella Policy providing guidance to the Indonesian financial sys em. It defines sustainable finance p inciples and requires financial institutions o submit annual plans on the implementation of sustainable financ , demonstrating how they are developing green finance p oducts and how they are incorporating green finance p inciples into organisational restructuring, risk management and corporate governance.

FINANCE

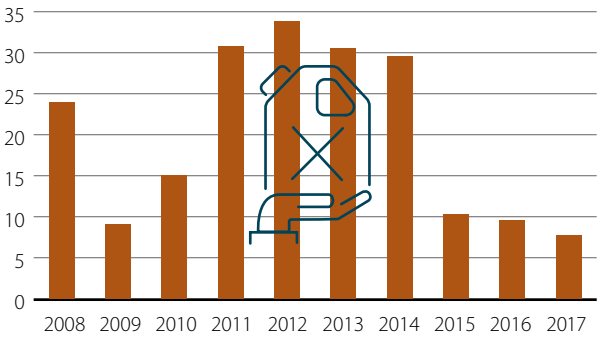
INDONESIA

Fiscal policy levers

Fiscal policy levers raise public revenues and direct public resources. Critically, they can shift investment decisions and consumer behaviour towards low-carbon, climate-resilient activities by reflecting externalities in prices.

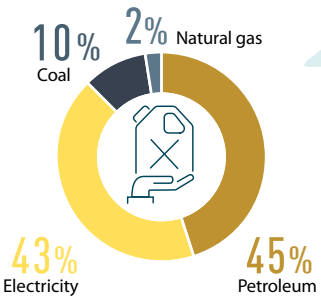
Fossil fuel subsidies

US$ billions



Source: OECD-IEA 2019

Subsidies by fuel type

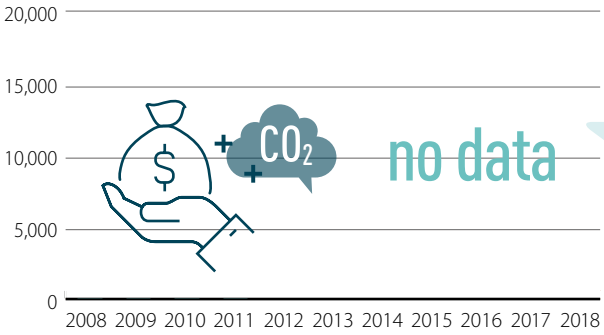


Data for 2017 | Source: OECD-IEA 2019

In 2017, Indonesia's fossil fuel subsidies totalled US$7.7bn (compared to US$24bn in 2008, and the last decade's peak of US$33.8bn in 2012). Of the subsidies quantified, 96% were for consumption of fossil fuels, with the remainder for production. The highest subsidies were for petroleum, at US$3.5bn, and for fossil fuel-based electricity, at US$3.3bn. The largest subsidy is annual compensation to state-owned Perusahaan Listrik Negara for selling (fossil fuel-dominated) electricity at below market prices (US$3.3bn).

Carbon revenues

Carbon revenues (US$ millions)
from explicit carbon pricing schemes

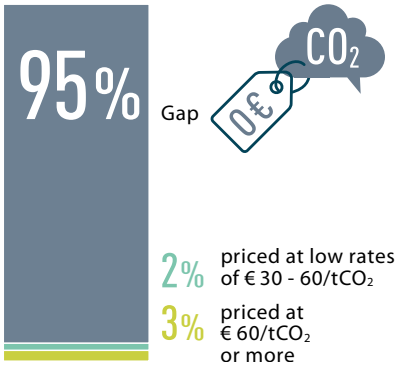


Source: I4CE 2019

Indonesia does not have a national carbon tax or emissions trading scheme, nor are any such schemes planned. Despite this, 16% of domestic emissions from energy use are subject to other taxes. Introducing a carbon pricing scheme has been identified as one way to raise the environmental funds listed in Presidential Regulation No. 77/2018, which could help Indonesia to achieve its NDC target.

Carbon pricing gap[15]

% of energy-related CO_2 emissions



Data for 2015 | Source: OECD 2018

Only 5% of Indonesia's CO_2 emissions are priced at EUR30 or higher (the low-end benchmark), creating a carbon pricing gap of 95%. This gap is much higher than the G20 average of 71%. The price covers not only explicit carbon taxes but also specific taxes on energy use and the price of tradable emission permits.

FINANCE

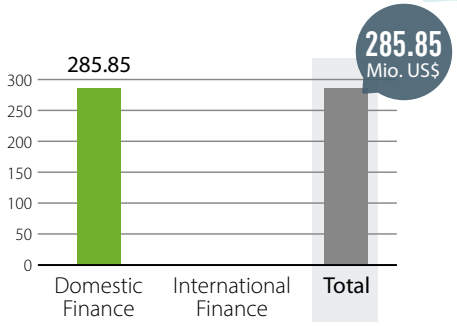
INDONESIA

Public finance

Governments steer investments through their public finance institutions including via development banks, both at home and overseas, and green investment banks. Developed G20 countries also have an obligation to provide finance to developing countries and public sources are a key aspect of these obligations under the UNFCCC.

Public finance for coal[16]

(million US$)



Between 2016-2017, Indonesia's public finance institutions provided US$286 million per year for coal-fired power production domestically.

Domestic Finance

International Finance

Data year: 2016-2017 average
Source: Oil Change International 2019

Commitments to restrict public finance to coal and coal-fired power[17]

MDB level	National development agencies and banks	Domestic export credit agencies	Export credit restriction in OECD	Comment
–	–	–		No commitments identifie

X yes – no not applicable

Source: own research

Provision of international public support[18]

Indonesia is not listed in Annex II of the UNFCCC and it is therefore not formally obliged to provide climate finance. It has nevertheless contributed international public finance via the Green Climate Fund. While Indonesia may channel international public finance towards climate change via multilateral and other development banks, it has not been included in this report.

Obligation to provide climate finance under UNFCCC

YES NO

United Nations Framework Convention on Climate Change

Bilateral climate finance contributions

Annual average contribution (mn US$, 2015-2016)	Theme of support			
	Mitigation	Adaptation	Cross-cutting	Other
0	0%	0%	0%	0%

Source: Country reporting to UNFCCC

Multilateral climate finance contributions

See Technical Note for multilateral climate funds included and method to attribute amounts to countries

Annual average contribution (mn US$, 2015-2016)	Theme of support		
	Adaptation	Mitigation	Cross-cutting
0	0%	0%	0%

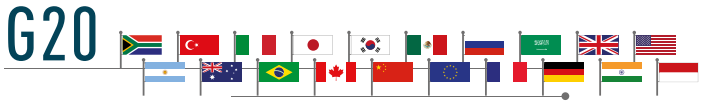
Source: Country reporting to UNFCCC

Core/General Contributions

Annual average contribution (mn US$, 2015-2016)
0

Source: Country reporting to UNFCCC

ENDNOTES



1) 'Land use' emissions is used here to refer to land-use, land use change and forestry (LULUCF). The Climate Action Tracker (CAT) derives historical LULUCF emissions from the UNFCCC Common Reporting Format (CRF) reporting tables data converted to the categories from the IPCC 1996 guidelines, in particular separating Agriculture from Land use, land-use change and forestry (LULUCF), which under the new IPCC 2006 Guidelines is integrated into Agriculture, Forestry, and Other Land Use (AFOLU).

2) The 1.5°C fair share ranges for 2030 and 2050 are drawn from the CAT, which compiles a wide range of perspectives on what is considered fair, including considerations such as responsibility, capability, and equality. Countries with 1.5°C fair-share ranges reaching below zero, particularly between 2030 and 2050, are expected to achieve such strong reductions by domestic emissions reductions, supplemented by contributions to global emissions-reduction efforts via, for example, international financ . On a global scale, negative emission technologies are expected to play a role from the 2030s onwards, compensating for remaining positive emissions.

   The CAT's evaluation of NDCs shows the resulting temperature outcomes if all other governments were to put forward emissions reduction commitments with the same relative ambition level.

   The 2030 projections of GHG emissions are from the CAT's June 2019 update and are based on implemented policies, expected economic growth or trends in activity and energy consumption.

   The CAT methodology does not consider GHG emissions from LULUCF due to the large degree of uncertainty inherent in this type of data, and alsoto ensure consistency and comparability across countries.

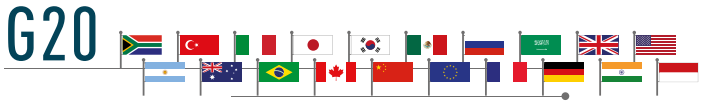
3) See the Brown to Green 2019 Technical Note for the sources used for this assessment.

4) The Decarbonisation Ratings assess the relative performance across the G20. A high scoring refle ts a relatively good efforts from a climate protection perspective but is not necessarily 1.5°C compatible. The ratings assess both the 'current level' and 'recent developments' to take account of the different starting points of different G20 countries. The 'recent developments' ratings compare developments over the last fi e available years (often 2013 to 2018).

5) The selection of policies rated and the assessment of 1.5°C compatibility are informed by the Paris Agreement, the Special Report on 1.5°C of the International Panel on Climate Change (2018), and the Climate Action Tracker (2016): 'The ten most important short-term steps to limit warming to 1.5°C'. The table below displays the criteria used to assess a country's policy performance. See the Brown to Green Report 2019 Technical Note for the sources used for this assessment.

On endnote 5)	low	medium	high	frontrunner
Renewable energy in power sector	No policy to increase the share of renewables	Some policies	Policies and longer-term strategy/ target to significantly inc ease the share of renewables	Short-term policies + long-term strategy for 100% renewables in the power sector by 2050 in place
Coal phase-out in power sector	No target or policy in place for reducing coal	Some policies	Policies + coal phase-out decided	Policies + coal phase-out date before 2030 (OECD and EU28) or 2040 (rest of the world)
Phase out fossil fuel cars	No policy for reducing emissions from light-duty vehicles	Some policies (e.g. energy/ emissions performance standards or bonus/malus support)	Policies + national target to phase out fossil fuel light-duty vehicles	Policies + ban on new fossil-based light-duty vehicles by 2035 worldwide
Phase out fossil fuel heavy-duty vehicles	No policy	Some policies (e.g. energy/ emissions performance standards or support)	Policies + strategy to reduce absolute emissions from freight transport	Policies + innovation strategy to phase out emissions from freight transport by 2050
Modal shift in (ground) transport	No policies	Some policies (e.g. support programmes to shift to rail or non-motorised transport)	Policies+ longer-term strategy	Policies + longer-term strategy consistent with 1.5°C pathway
Near zero-energy new buildings	No policies	Some policies (e.g. building codes, standards or fiscal/ financial incenti es for low-emissions options)	Policies + national strategy for near zero-energy new buildings	Policies + national strategy for all new buildings to be near zero-energy by 2020 (OECD countries) or 2025 (non-OECD countries)
Retrofitting exis-ting buildings	No policies	Some policies (e.g. building codes, standards or fiscal/ financial incenti es for low-emissions options)	Policies + retrofitting stra egy	Policies + strategy to achieve deep renovation rates of 5% annually (OECD) or 3% (non-OECD) by 2020
Energy efficiency in industry	No policies	Mandatory energy efficie y policies cover more than 26-50% of industrial energy use	Mandatory energy efficie y policies cover 51–100% of industrial energy use	Policies + strategy to reduce industrial emissions by 75%–90% from 2010 levels by 2050
(Net) zero deforestation	No policy or incentive to reduce deforestation in place	Some policies (e.g. incentives to reduce deforestation or support schemes for afforestation /reforestation in place)	Policies + national target for reaching net zero deforestation	Policies + national target for reaching zero deforestation by 2020s or for increasing forest coverage

ENDNOTES (continued)



6) The 1.5°C benchmarks are based on the Special Report on 1.5°C of the International Panel on Climate Change (2018). See the Brown to Green 2019 Technical Note for the specific sou ces used for this assessment.
7) Total primary energy supply data displayed in this Country Profile does not include non-energy use values. Solid fuel biomass in residential use has negative environmental and social impacts and is shown in the category 'other'.
8) Large hydropower and solid fuel biomass in residential use are not refle ted due to their negative environmental and social impacts.
9) The category 'electricity and heat' covers CO_2 emissions from power generation and from waste heat generated in the power sector. The category 'other energy use' covers energy-related CO_2 emissions from extracting and processing fossil fuels (e.g. drying lignite).
10) This indicator shows transport emissions per capita, not including aviation emissions.
11) This indicator adds up emissions from domestic aviation and emissions from international aviation bunkers in the respective country. Emissions by aircrafts in the higher atmosphere lead to a contribution to climate change greater than emissions from burning fossil fuels. In this Country Profil , however, only a radiative forcing factor of 1 is assumed.
12) This indicator includes only direct energy-related emissions and process emissions (Scope 1) but not indirect emissions from electricity.
13) This indicator includes emissions from electricity (Scope 2) as well as direct energy-related emissions and process emissions (Scope 1).
14) This indicator covers only gross tree-cover loss and does not take tree-cover gain into account. It is thus not possible to deduce from this indicator the climate impact of the forest sector. The definition of 'forest' used for this indicator is also not identical with the definition used for the indicator on page 3.
15) 'Effective carbon rates' are the total price that applies to CO_2 emissions, and are made up of carbon taxes, specific ta es on energy use and the price of tradable emission permits. The carbon pricing gap is based on 2015 energy taxes and is therefore likely to be an underestimate, as taxation has tended to increase in countries over time.
16) The database used to estimate public finance or coal is a bottom-up database, based on information that is accessible through various online sources, and is therefore incomplete. For more information, see to the Brown to Green 2019 Technical Note.
17) See the Brown to Green 2019 Technical Note for the sources used for this assessment.
18) Climate finance cont ibutions are sourced from Biennial Party reporting to the UNFCCC. Refer to the Brown to Green Report 2019 Technical Note for more detail.

For more detail on the sources and methodologies behind the calculation of the indicators displayed, please download the Technical Note at: http://www.climate-transparency.org/g20-climate-performance/g20report2019

CLIMATE TRANSPARENCY

Partners:

Funders:

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

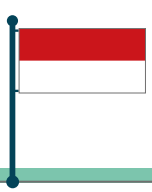
Data Partners:

http://www.climate-transparency.org/g20-climate-performance/g20report2019

Contact point in Indonesia:

Fabby Tumiwa
Institute for Essential Services Reform (IESR)
fabby@iesr.or.id

Erina Mursanti
Institute for Essential Services Reform (IESR)
erina@iesr.or.id



AUTHORS AND ACKNOWLEDGEMENTS

The Brown to Green Report including its 20 country profiles was prepared by:

Lead authors: Lena Donat (Germanwatch), Hannah Schindler (HUMBOLDT-VIADRINA Governance Platform) and Jan Burck (Germanwatch)

Contributing authors: Fadiel Ahjum (Energy Research Centre, University of Cape Town), Roxana Baldrich (Germanwatch), Gabriel Blanco (Fundación Ambiente y Recursos Naturales/Universidad Nacional del Centro-Argentina), Jesse Burton (Energy Research Centre, University of Cape Town), Bill Hare and Ursula Fuentes Hutfilter (Climate Analytics), Ipek Gencsu (Overseas Development Institute), Mariana Gutiérrez Grados (Iniciativa Climática de México), Daniela Keesler (Fundación Ambiente y Recursos Naturales/ Universidad Nacional del Centro-Argentina), Jiang Kejun (Energy Research Institute China), Gerd Leipold (HUMBOLDT-VIADRINA Governance Platform), Tabea Lissner (Climate Analytics), Karan Mangotra (The Energy and Resources Institute), Enrique Maurtua Konstantinidis (Fundación Ambiente y Recursos Naturales), Andrew Marquard and Bryce McCall (Energy Research Centre, University of Cape Town), Yuji Mizuno (Institute for Global Environmental Strategies), Erina Mursanti (Institute for Essential Service Reform), Leo Roberts (Overseas Development Institute), Michiel Schaeffer (Climate Analytics), Thomas Spencer (The Energy and Resources Institute), Claire Stockwell (Climate Analytics), Kentaro Tamura (Institute for Global Environmental Strategies), Emily Theokritoff (Climate Analytics), Fabby Tumiwa (Institute for Essential Service Reform), Lola Vallejo (Institute for Sustainable Development and International Relations), Jorge Villarreal (Iniciativa Climática de México), Charlene Watson (Overseas Development Institute), William Wills (CentroClima, Federal University of Rio de Janeiro), Ryan Wilson (Climate Analytics), Harald Winkler (Energy Research Centre, University of Cape Town), Aleksandra Zebrowska (HUMBOLDT-VIADRINA Governance Platform).

The summary report and country profiles have been prepared by the Climate Transparency Secretariat under the guidance of the Partners. Information is gathered from a range of sources and do not necessarily represent the opinions of Partners.

We express our gratitude to the following contributors for their expert comments, inputs, and guidance: Mauro Albrizio (Legambiente), Cem İskender Aydın (Sabancı University İstanbul Policy Center), Pascal Charriau (Enerdata), Vladimir Chuprov (Greenpeace Russia), Angelina Davydova (Office of Environmental Information Russia), Daye Eom (Climate Technology Centre & Network, CTCN), Christoph von Friedeburg (CF Energy Research & Consulting UG), Funda Gacal (Health and Environment Alliance – HEAL), Sofia Gonzales-Zuñiga (NewClimate Institute), Violeta Helling and Ursula Hagen (Germanwatch), Niklas Höhne (NewClimate Institute), Surabi Menon (ClimateWorks Foundation), Bert Metz (European Climate Foundation), Teika Newton (Climate Action Network Canada), Gereon tho Pesch (Germanwatch), Rachel Mok (World Bank), Sam Pickard (Overseas Development Institute), Ragnhild Pieper (GSCC Network), Karine Pollier (Enerdata), Sophie von Russdorf (Germanwatch), Dr. Değer Saygın (SHURA Energy Transition Center), Chandra Shekhar Sinha and Sandhya Srinivasan (World Bank), Wendel Trio (Climate Action Network Europe), Sebastian Wegner (HUMBOLDT-VIADRINA Governance Platform), Anna Wördehoff (Germanwatch).

Design: Caren Weeks

Suggested citation: Climate Transparency (2019): *Brown to Green: The G20 transition towards a net-zero emissions economy*, Climate Transparency, Berlin, Germany

www.climate-transparency.org

Climate Transparency

BROWN TO GREEN

THE G20 TRANSITION TOWARDS A NET-ZERO EMISSIONS ECONOMY

2019

Climate Transparency

BROWN TO GREEN

THE G20 TRANSITION TOWARDS A NET-ZERO EMISSIONS ECONOMY | 2019

2019