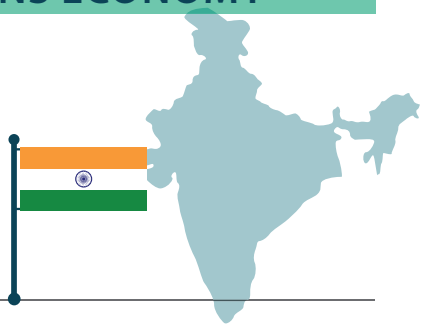
Climate Transparency

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

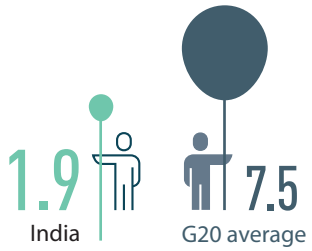
# INDIA



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

But total GHG emissions have more than doubled since 1990 (excl. land use) and are projected to increase further.

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



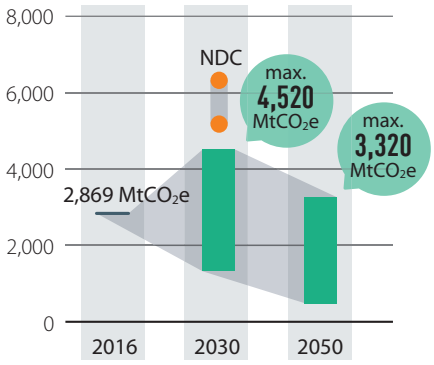

*Data for 2016*
*Source: CAT 2019; PRIMAP 2018; World Bank 2019*

**Trend** (2011-2016) +15% -1%

### India is close to being in line with a 1.5°C world.

India needs to reduce its emissions to below 4.5 $GtCO_2e$ by 2030 and to below 3.2 $GtCO_2e$ by 2050 to be within its fair-share range compatible with global 1.5°C IPCC scenarios. India's 2030 NDC would only limit its emissions to 6-6.3 $GtCO_2e$. All figures 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]

At UNCAS in September 2019, Prime Minister Modi announced that India would scale up its renewable energy capacity to 450 GW.

In May 2019, India approved a $1.4 billion subsidy scheme to scale up the sale of electric and hybrid vehicles.

In 2018, the pace of renewable energy capacity addition was below that required to meet the 175 GW target by 2022 and it now looks increasingly likely that this target will not be met.

### Key opportunities for enhancing climate ambition[3]

The renewable energy sector added less than 60% of its targeted capacity in 2018-2019.

→ **India needs to strengthen policy framework and manufacturing capacity to ensure long-term growth of the sector.**

#1

Current emission standards for heavy-duty vehicles (HDVs) only apply to vehicles above 12t, which covers only half of the HDV market.

→ **The country needs to adopt fuel efficiency standards for all HDVs heavier than 3.5t.**

#2

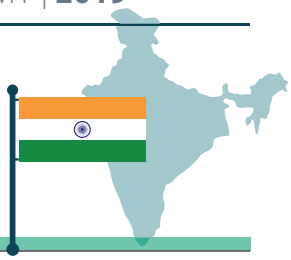
India produces 78% of its electricity from coal – one of the highest rates in the G20.

→ **India needs to develop a roadmap for the phase-out of coal subsidies and ensuring a just transition for workers and communities.**

#3

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

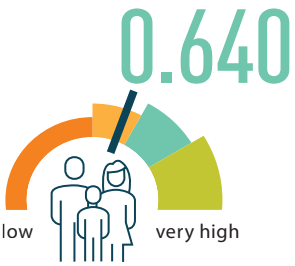
# INDIA – SOCIO-ECONOMIC CONTEXT



## Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. India is ranked medium.

*Data for 2017 | Source: UNDP 2018*




## Gross Domestic Product (GDP) per capita

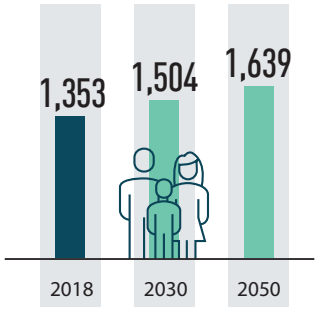
(PPP US$ const. 2018, international)


*Data for 2018 | Source: World Bank 2019*

## Population projections

(millions)

India's population is expected to increase by around 21% by 2050.




*Source: World Bank 2019*

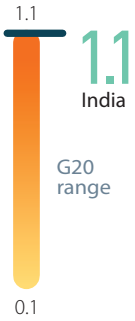
## Death through ambient air pollution

(total ambient air pollution attributable deaths)

More than 1 million people die in India 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 the highest level in the G20.

1,087,018
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]

The concept of a 'just transition' policy to cushion the transition for exposed workers in high-carbon sectors like coal is not prevalent in India's climate policy discourse. India is undergoing massive transitions: urbanisation, industrialisation, formalisation, and labour force growth. India needs to create about 32 million jobs per year. The success of these macro-scale transitions is policymakers' main concern. Coal forms a significant part of the economies of some poorer states (Jharkhand, Orissa, Chhattisgarh). According to official employment figures 355,000 workers were employed in coal mines, out of a workforce of about 450 million. Coal mine employment has fallen by about 1.8% per year, while productivity has grown by about 6% per year (it remains half the global average). Estimates of coal value chain employment arrive at a bit more than 1 million jobs. A just transition will require the macro-transitions underway to be successful.

## Legend for all country profiles

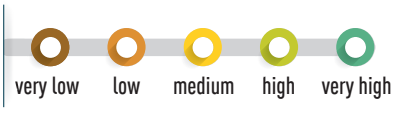
### Trends

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

The thumbs indicate assessment from a climate protection perspective.

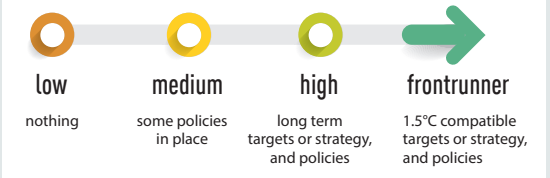
### Decarbonisation Ratings[4]

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

INDIA

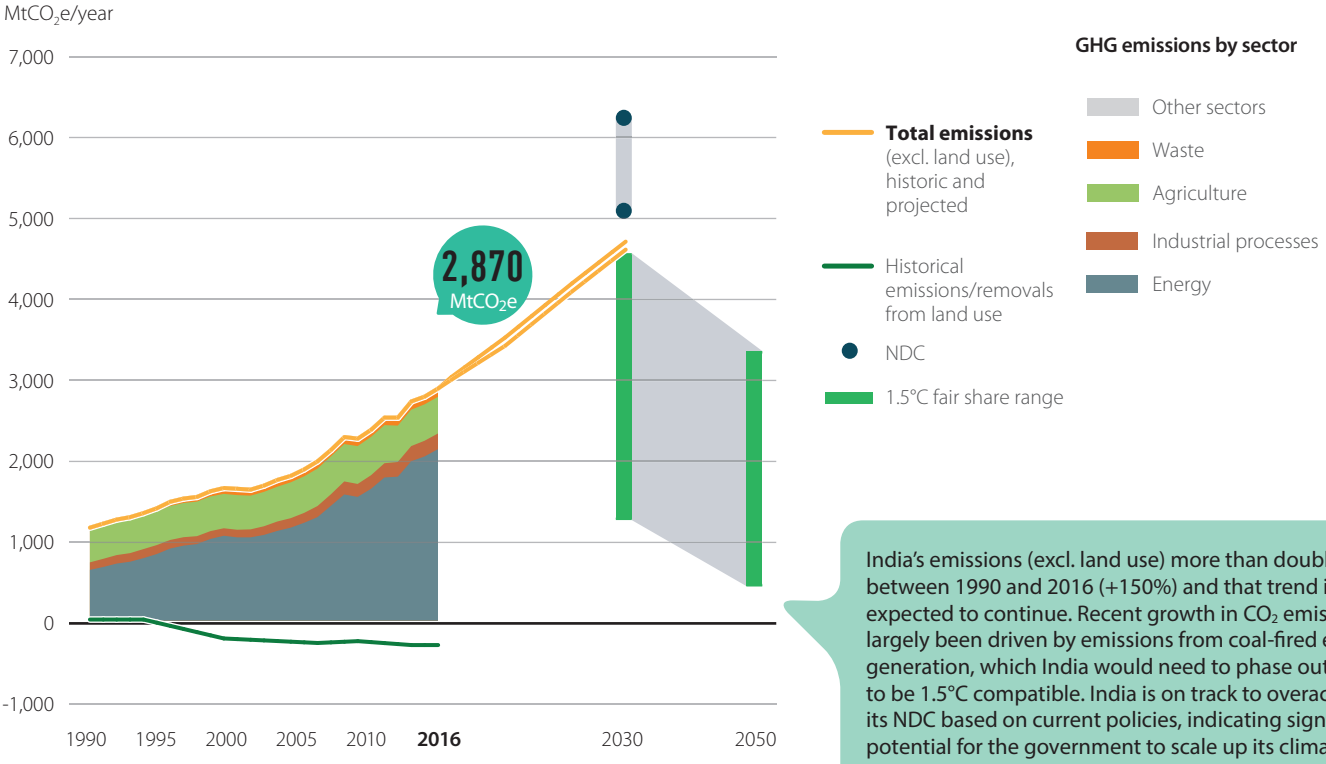
**India's GHG emissions have increased by 150% (1990-2016) and the government's climate targets to reduce its emission intensity by 33-35% by 2030 are not yet in line with a 1.5°C pathway.**

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*

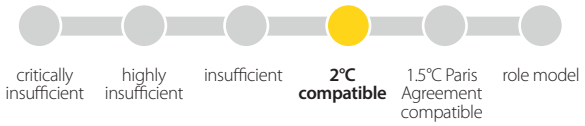
India's emissions (excl. land use) more than doubled between 1990 and 2016 (+150%) and that trend is expected to continue. Recent growth in $CO_2$ emissions has largely been driven by emissions from coal-fired electricity generation, which India would need to phase out by 2040 to be 1.5°C compatible. India is on track to overachieve its NDC based on current policies, indicating significant potential for the government to scale up its climate action.

## Nationally-determined contribution (NDC): Mitigation

| | |
|---|---|
| **Targets** | To reduce the emissions intensity of its GDP by 33-35% by 2030 from its 2005 level |
| **Actions** | Actions specified (sectors: energy, industry, waste, transport, forestry) |

*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** | In preparation |
| **2050 target** | – |
| **Interim steps** | – |
| **Sectoral targets** | – |

*Source: UNFCCC, LTS of respective country*

# MITIGATION ENERGY

# INDIA

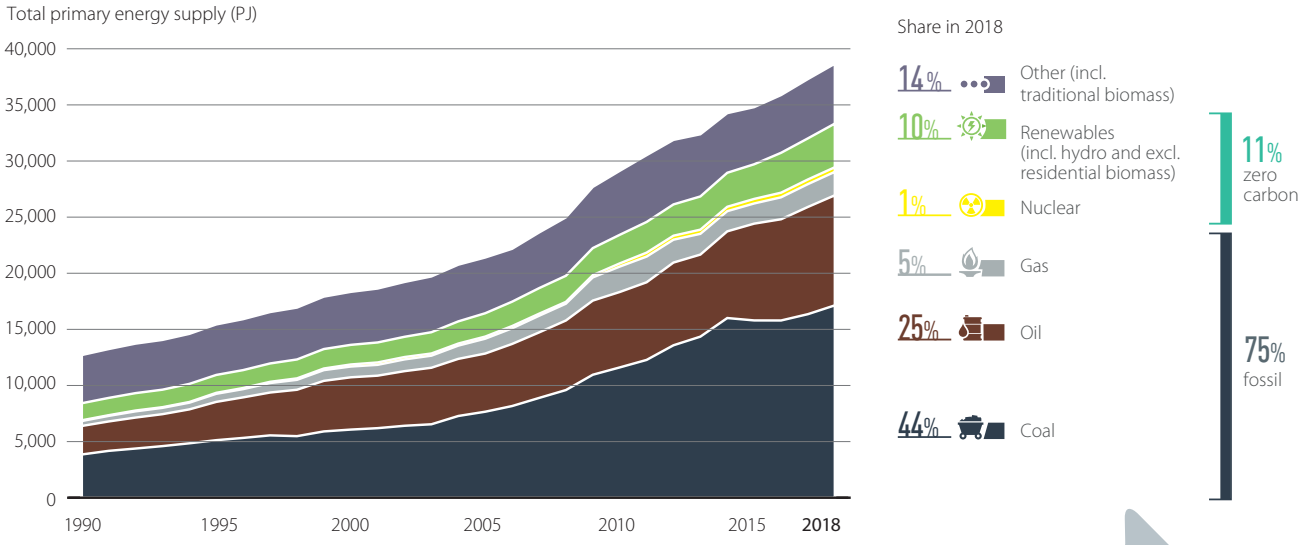
**The carbon intensity of the energy mix has hardly changed. Traditional biomass has mainly been replaced with fossil fuels, which make up 75% of India's energy mix (including power, heat, transport fuels, etc).**

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*

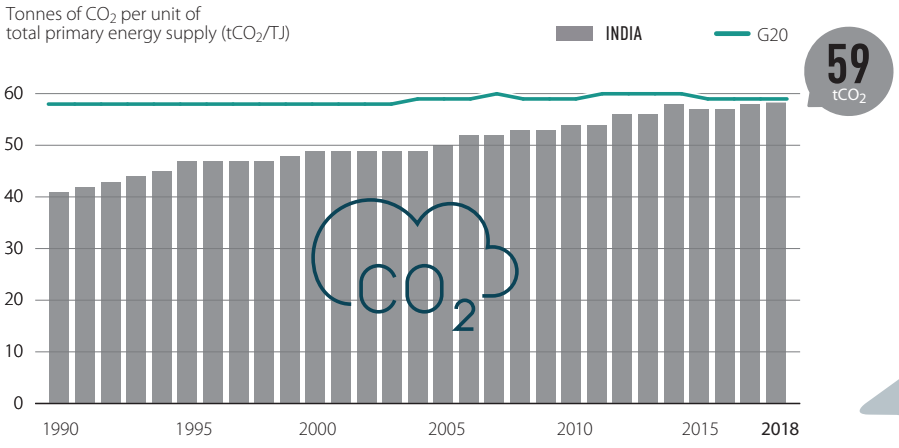
## Energy mix[7]




*Source: Enerdata 2019*

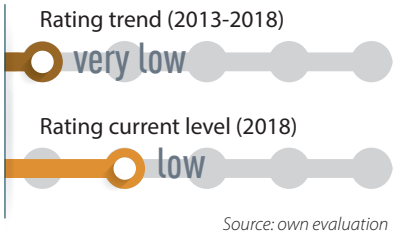
This graph shows the fuel mix for all energy supply, including energy used for electricity generation, heating, cooking, and transport fuels. Fossil fuels (oil, coal and gas) make up 75% of the Indian energy mix, which is below the G20 average of 82%.

## Carbon intensity of the energy sector




*Source: Enerdata 2019*

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




*Source: own evaluation*

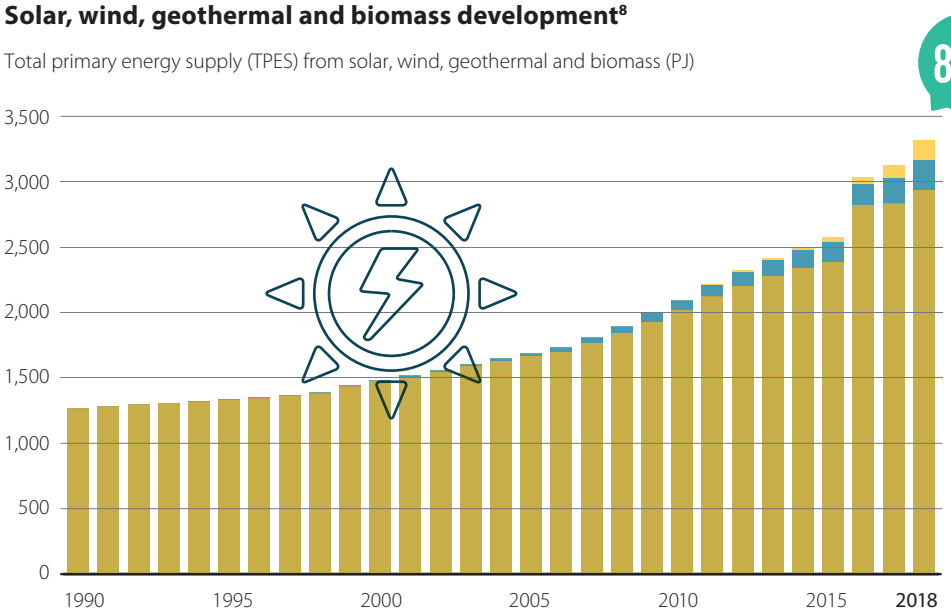
Carbon intensity shows how much $CO_2$ is emitted per unit of energy supply. The carbon intensity of India's energy sector has been increasing since 1990 and now equals the G20 average of 59$tCO_2$/TJ. This reflects the transition from traditional biomass towards fossil fuels.

# MITIGATION ENERGY

# INDIA

## 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**

- 0.38% Solar
- 0.60% Wind
- 0.00% Geothermal
- 7.61% Biomass, excl. traditional biomass

Solar, wind and modern biomass account for around 8.6% of India's energy supply – the G20 average is 6%. In the last five years, the share of these sources in total energy supply has increased by around 20%, less than the G20 average (+29%, 2013-2018). Bioenergy (for electricity, and biofuels for transportation and heat) makes up the largest share.

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

Rating trend (2013-2018): medium

Rating current level (2018): medium

*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 29 GJ/capita, energy supply per capita in India is at the lowest level in the G20, but has increased by 11% (2013-2018) compared to the G20 average of 1%.

**Trend** (2013-2018) +11% +1%

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

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

Rating trend (2013-2018): very low

Rating current level (2018): very high

*Source: own evaluation*

# MITIGATION ENERGY

# INDIA

**While India's energy use per capita remains well below the G20 average, it has increased by 11% over the past five years. Energy-related emissions have been steadily rising since 1990, but this trend needs to be reversed to be compatible with a 1.5°C pathway.**

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)

| India | G20 average |
|---|---|
| 4.17 | 4.86 |

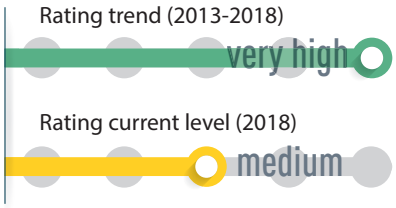
**Trend** (2013-2018): -18% | -12%

*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.

India's energy intensity is slighty below the G20 average but has decreased by 18% (2013-2018), more than the G20 average (-12%).

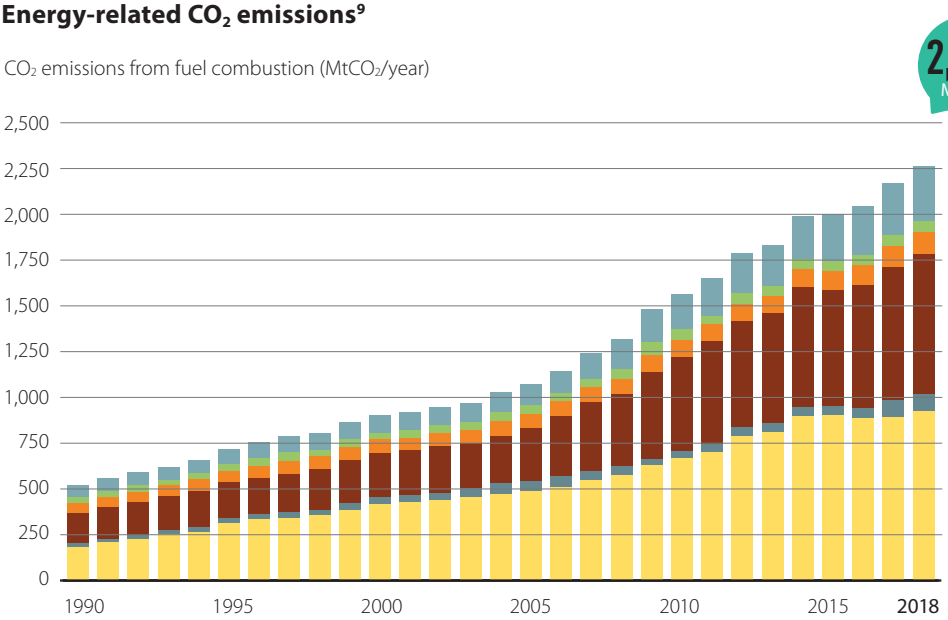
### Rating of energy intensity compared to other G20 countries[4]




*Source: own evaluation*

## Energy-related $CO_2$ emissions[9]

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




**Share of total energy-related $CO_2$ emissions in 2018**

| | |
|---|---|
| 13% | Transport |
| 3% | Agriculture |
| 5% | Buildings |
| 34% | Industries (incl. autoproducers) |
| 4% | Other energy sector |
| 41% | Electricity and heat |

*Source: Enerdata 2019*

The largest driver of overall GHG emissions are $CO_2$ emissions from fuel combustion. In India, they have steadily increased since 1990. At 41%, the electricity sector is the largest contributor, followed by industry (34%).

# MITIGATION POWER SECTOR

# INDIA

**India still produces 73% of electricity from coal, and there are no plans for a coal phase-out. Instead, India aims to add 46 GW of coal capacity by 2027. However, development of renewables is expanding.**

**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]

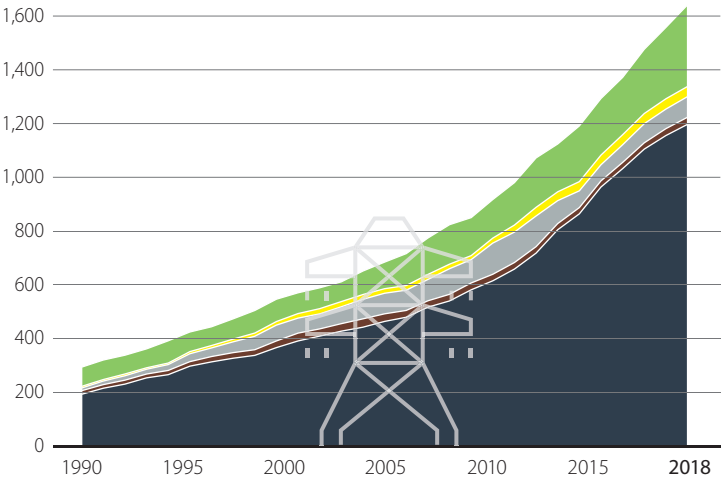
**1.5°C**[6]

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

## STATUS OF DECARBONISATION

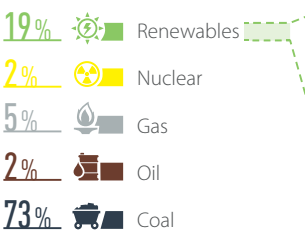
### Power mix

Gross power generation (TWh)

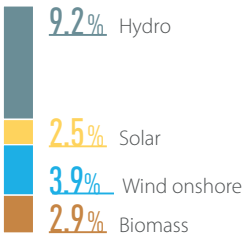



*Source: Enerdata 2019*

**Shares in 2018**



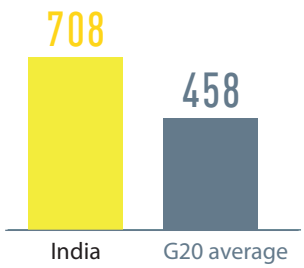

**Renewables shares**




India is increasingly producing electricity from renewables, which now make up 18.5% (G20 average is 25%) of the electricity mix, large hydropower being the main renewable source. However, coal power has also grown significantly, and now makes up nearly three-quarters of the power mix.

### Emissions intensity of the power sector

($gCO_2$/kWh)



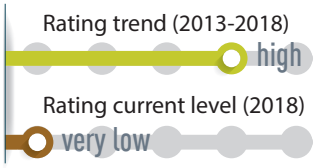

*Data for 2018 | Source: Enerdata 2019*

**Trend** (2013-2018)

-16% India

-11% G20 average

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

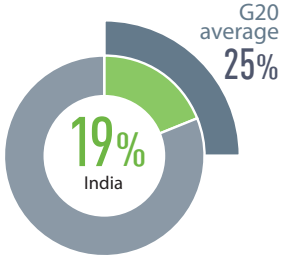



*Source: own evaluation*

For each kilowatt hour of electricity, 708 $gCO_2$ are emitted in India. This is well above the G20 average and reflects the high share of coal. However, emission intensity is decreasing at a slightly faster rate than the G20 average.

### Share of renewables in power generation

(incl. large hydro)



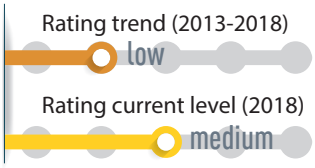

*Data for 2018 | Source: Enerdata 2019*

**Trend** (2013-2018)

+7% India

+20% G20 average

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




*Source: own evaluation*

# MITIGATION POWER SECTOR

INDIA

## POLICIES[5]

### Renewable energy in the power sector

low | medium | high | frontrunner

India aims at 40% non-fossil-based power capacity by 2030 but has no longer-term plan for renewables. In September 2019, the government announced a renewables target of 450 GW (currently around 73 GW), which would place India ahead of its NDC target, leading to a non-fossil capacity above 60%. The clean energy programme doubled renewable capacity between 2014 and 2018.

Policy ambiguity and lack of clarity, eg regarding the Goods & Services Tax (GST), safeguard duty and tender processes.

*Source: own evaluation*

### Coal phase-out in the power sector

low | medium | high | frontrunner

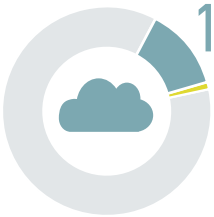
India has no plan for phasing out coal. The 2018 National Electricity Plan envisages net additions of 46 GW between 2022 and 2027. In the long term, the share of coal in power generation is likely to decrease due to the economic competitiveness of renewables and difficulties in financing and insuring new coal power plants.

*Source: own evaluation*

# MITIGATION TRANSPORT SECTOR

**73% of freight transport is on the road in India and the sector is still heavily dependent on fossil fuels. Transport emissions per capita are still the lowest in the G20, but increasing significantly. 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



13% direct

1% from electricity

*Data for 2018 | Source: Enerdata 2019*

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

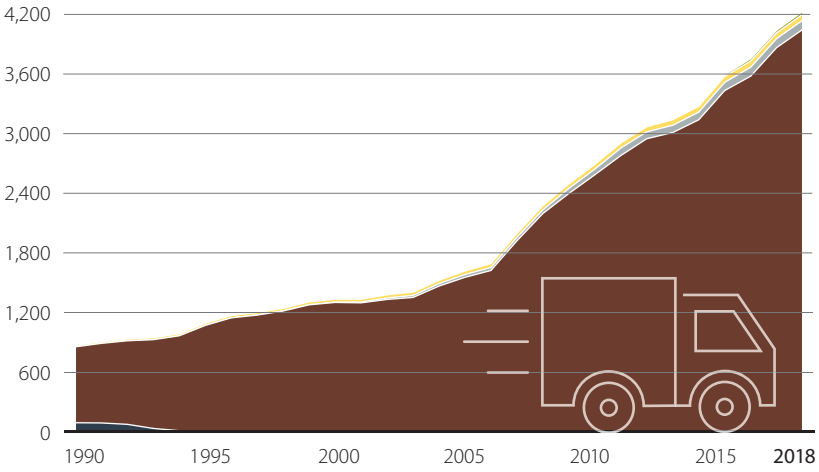
1.5°C[6]

*Source: IPCC SR1.5 2018*

## STATUS OF DECARBONISATION

### Transport energy mix

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




**Share in 2018**

0.7% Biofuels
1.4% Electricity
2.2% Gas
95.7% Oil
0.0% Coal

Electricity and biofuels make up only 2% of the energy mix in transport.

*Source: Enerdata 2019*

# MITIGATION TRANSPORT SECTOR

INDIA

## STATUS OF DECARBONISATION (continued)

### Transport emissions per capita[10]

($tCO_2$/capita, excl. aviation emissions)

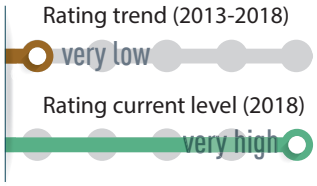

*Data for 2018*
*Source: Enerdata 2019; World Bank 2019*

**Trend** (2013-2018)

+28% India

+5% G20 average

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




*Source: own evaluation*

### Aviation emissions per capita[11]

($tCO_2$/capita)

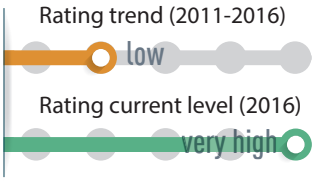

*Data for 2016*
*Source: Enerdata 2019; IEA 2018*

**Trend** (2011-2016)

+19% India

+10% G20 average

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




*Source: own evaluation*

### Motorisation rate

(vehicles per 1,000 inhabitants)

17

*Data for 2014 | Source: Agora 2018*

### Market share of electric vehicles in new car sales

(%)

0.1%

*Data for 2018 | Source: IEA 2019*

### Passenger transport

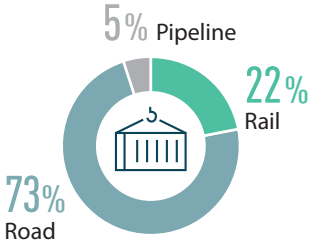
(modal split in % of passenger km)

no data

*Source: Agora 2018*

### Freight transport

(modal split in % of tonne-km)




*Data for 2016 | Source: Agora 2018*

## POLICIES[5]

### Phase out fossil fuel cars


India has no plan to phase-out fossil fuel cars. The government is aiming for 30% electric vehicle (EV) sales by 2030, and in May 2019 approved a US$1.4 billion subsidy scheme to this end. The government has also tightened emission standards to 113 $gCO_2$/km, in effect from April 2022.

*Source: own evaluation*

### Phase out fossil fuel heavy-duty vehicles


India has no strategy for reducing absolute emissions from freight transport. Since April 2018 a fuel efficiency standard for HDVs weighing more than 12t is in effect. As a result, it is estimated that fleet-wide fuel consumption of new vehicles will drop by 10.4% between 2018 and 2021.

*Source: own evaluation*

### Modal shift in (ground) transport


Despite several national programmes to aid a shift to public transport, such as the National Urban Transport policy (launched in 2006 and revised in 2014) and the Smart Cities Mission, there is no overall longer-term strategy for promoting a modal shift.

*Source: own evaluation*

# MITIGATION BUILDINGS SECTOR

# INDIA

**India's building emissions – including heating, cooking and electricity use – make up around a fifth of total $CO_2$ emissions. Per capita, building-related emissions are well below the G20 average, but are rising significantly. Central and state governments have not yet taken sufficient action to ensure energy efficiency in new 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)

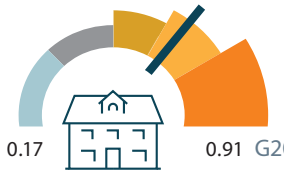

+20.2% +1%

**Trend** (2013-2018)

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

### Residential buildings: energy use per m²
(GJ)

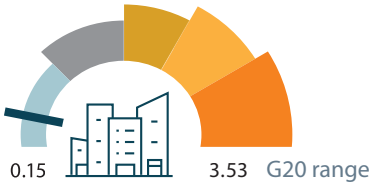
0.69 GJ




*Data: year different per country | Source: ACEEE 2018*

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

0.34 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 around a third of the G20 average – reflecting low incomes and small average floor space per person. However, the level rose by 20% (2013-2018) –reflecting rising incomes.

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. In India, energy use per m² is in the upper range of G20 countries for residential buildings, but in the lower range for commercial and public buildings.

## POLICIES[5]

### Near-zero energy new buildings


The government has not yet pursued a near-zero energy building strategy. In 2017, the government revised its Energy Conservation Building Code (ECBC) for new commercial buildings, aiming to reduce energy use by 50% by 2030. In 2018, the government launched the ECBC-R for residential buildings, followed by an Energy Efficiency Label in February 2019.

Implementation of ECBC codes by state governments and municipal administrations is delayed.

*Source: own evaluation*

### Renovation of existing buildings


There are no policies related to energy retrofitting of existing buildings in India.

*Source: own evaluation*

# MITIGATION INDUSTRY SECTOR

INDIA

**Industry-related emissions make up half of $CO_2$ emissions in India and are increasing. However, India's industry is becoming less emission intensive.**

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

34 % direct

16 % from electricity

*Data for 2018 | Source: Enerdata 2019*

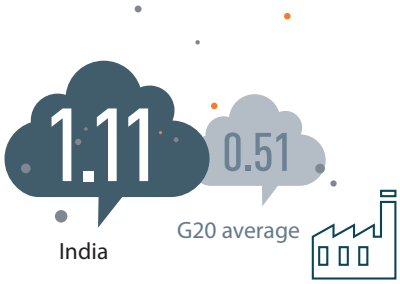
Global industrial $CO_2$ emissions need to be reduced by 65–90% from 2010 levels by 2050.

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*

-12.6% -10.2%

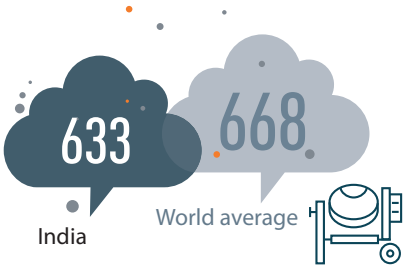
**Trend** (2011-2016)

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


*Source: own evaluation*

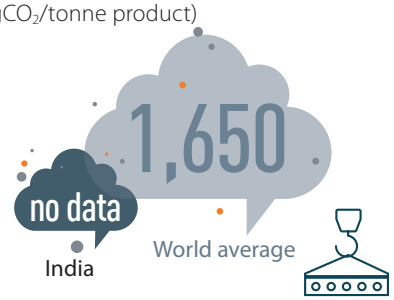
When comparing industrial emissions with the gross value added (GVA measured at market exchange rates) from the industry sector, India performs comparatively badly within the G20. Its industry is more than twice as emissions intensive, reflecting the emissions intensive fuel mix, but is decreasing more than the G20 rate.

**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*

Steel production and steelmaking are significant GHG emission sources, and are challenging to decarbonise. India's cement industry is slightly less emission intensive than the world average.

## POLICIES[5]

**Energy efficiency**


According to the International Energy Agency (IEA), mandatory energy efficiency policies in India cover 26-50% of total energy use (as of 2017). The Perform, Achieve and Trade (PAT) scheme aims to reduce energy consumption in energy-intensive industries with a white certificate scheme.

*Source: own evaluation*

# MITIGATION LAND USE

# INDIA

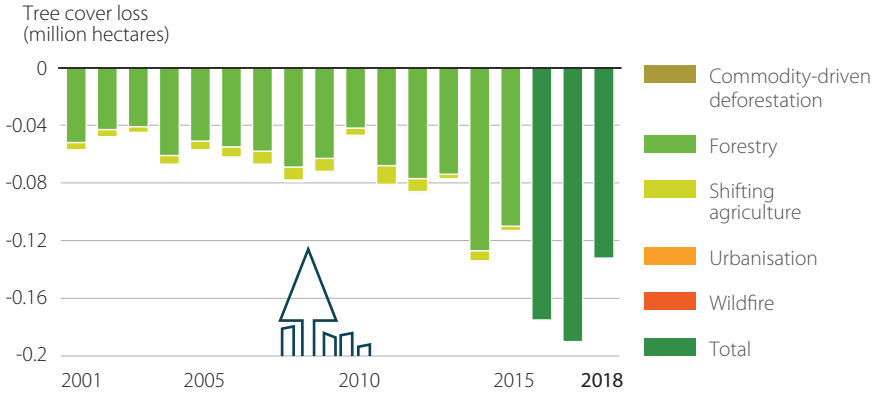
**In order to stay within the 1.5°C limit, India needs to make the land use and forest sector a net sink of emissions, eg by halting the expansion of mining or large infrastructure, and by planting new forests.**

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


The government is currently revising its forest policy to align it with the target stipulated in its NDC of having at least one-third of the total land area under forest and tree cover, thus increasing the current level of 24.4%. India's 2018 REDD+ strategy proposes the development of an institutionalised system for addressing drivers of deforestation and forest degradation.

*Source: own evaluation*

From 2001 to 2018, India lost 1.67Mha of tree cover, equivalent to a **4.3% reduction since 2000**. This does not take tree-cover gain into account.

# MITIGATION AGRICULTURE

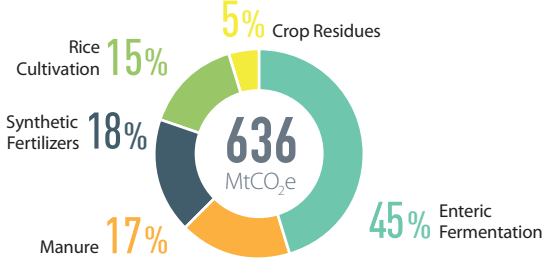
**India's non-energy related agricultural emissions come mainly from digestive processes in animals, the use of synthetic fertilizers, and livestock manure. A 1.5°C pathway requires dietary shifts, increased organic farming and less fertilizer use.**

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 India, the largest sources of GHG emissions in the agricultural sector are digestive processes in animals (enteric fermentation), the use of synthetic fertilizers, livestock manure, and rice cultivation. A shift to organic farming, more efficient use of fertilizers, and diet changes could help reduce emissions.

# ADAPTATION

INDIA

- → **India is vulnerable to climate change and adaptation actions are needed.**
- → **On average, 3 660 fatalities and losses amounting to US$ 2.8 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 extreme heat.**
- → **With a 3°C warming, India would experience around 130 days per year when temperatures reach more than 35°C.**

## ADAPTATION POLICIES

**Nationally-determined contribution: Adaptation**

| | |
|---|---|
| **Targets** | Not mentioned |
| **Actions** | Actions specified (sectors: agriculture, water, health, 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 & fishing | Education & research | Energy & industry | Finance & insurance | Forestry | Health | Infrastructure | Tourism | Transport | Urbanism | Water | |
| National Action Plan on Climate Change | 2008 | x | x | x | x | x | | | x | x | | | | x | n/a |

*Source: own research*

# INDIA

## 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 (%) | |
|---|---|---|---|---|---|
| 3661 | 0.3 | 48 rank out of 181 countries | 12,823 | 0.3 | 59 rank out of 181 countries |

*Source: Germanwatch 2018*

India has already been struck by extreme weather events such as floods, cyclones 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 | | | | |
| **Agriculture** | Maize | Reduction in crop duration | | | |
| | | Hot spell frequency | | | |
| | | Reduction in rainfall | | | |
| | Rice | Reduction in crop duration | | | |
| | | Hot spell frequency | | | |
| | | Reduction in rainfall | | | |
| | Wheat | Reduction in crop duration | | | |
| | | Hot spell frequency | | | |
| | | Reduction in rainfall | | | |

*Source: own research*

*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. Heat wave frequency increases significantly, together with a very high number of days when temperatures reach higher than 35°C.

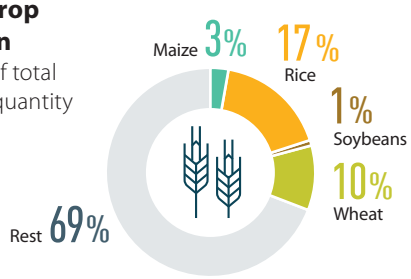
**Impact ranking scale**

- 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 wheat represent the largest proportions of crop production out of the four crops analysed (maize, rice, soybeans, wheat). Both crops experience a slight increase in hot spell frequency and a reduction in rainfall. Wheat is negatively affected by a reduction in crop duration, but for rice this reduction is drastic.

# FINANCE

# INDIA

**India spent US$10.8bn on fossil fuel subsidies in 2017, almost completely on petroleum. India has no explicit carbon price in place, although it does have a specific tax ('cess') on coal.**

*Source: IPCC SR1.5 2018*

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

1.5°C[6]

## Nationally-determined contribution: Finance

| | |
|---|---|
| **Conditionality** | A detailed and full-scale assessment of international climate finance needs will be finalised at a later stage and would depend on available domestic sources |
| **Investment needs** | - Mitigation investment needs: US$834 billion<br>- Adaptation investment needs: US$205 billion (plus additional investments for strengthening resilience and disaster management)<br>- Total preliminary estimates of investment needs: US$2.5 trillion |
| **Actions** | National action to align financial flows mentioned but not further specified (fiscal policy levers and 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 finance, including: real and perceived risks, insufficient returns 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 architecture. | 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 are exposed | | | | X |
| | Climate-related risk assessment and climate stress-test | Evaluate the resilience of the financial sector 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 |

In 2015 the Reserve Bank of India issued a circular titled 'Priority Sector Lending', which explicitly targeted renewable energy and agriculture, including providing additional funds and subsidies liquidity to banks for lending to environmentally friendly projects, and imposing a minimum credit floor. The Securities and Exchange Board of India (SEBI) meanwhile requires detailed disclosure for the issuance and listing of Green Bonds, and has expanded its requirement for 'responsibility reports' from the top 100 to top 500 businesses in the country. In spite of this, there is no evidence of alignment with the TCFD (Task Force on Climate-related Financial Disclosures).

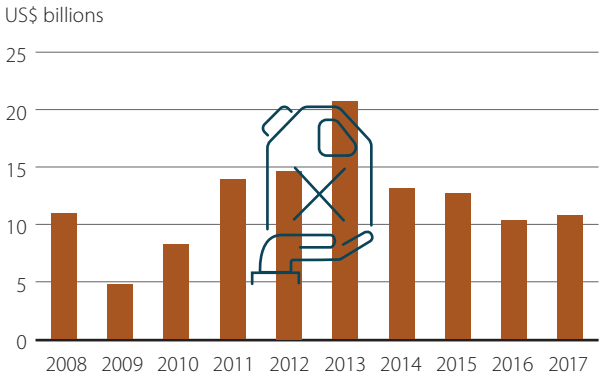
# FINANCE

# INDIA

## Fiscal policy levers

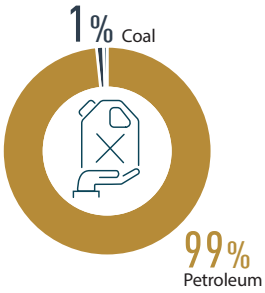
**Fiscal policy levers raise public revenues and direct public resources. Critically, they can shift investment decisions and consumer behaviour towards low-carbon, climate-resilient activities by reflecting externalities in prices.**

### Fossil fuel subsidies




*Source: OECD-IEA 2019*

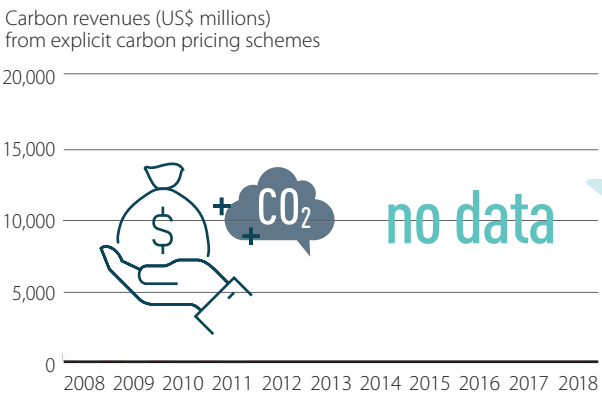
### Subsidies by fuel type




*Data for 2017 | Source: OECD-IEA 2019*

In 2017, India's fossil fuel subsidies totalled US$10.8bn (compared to US$11bn in 2008 and the last decade's peak of US$20.7 in 2013). Of the subsidies quantified, 97% were for the consumption of fossil fuels, with the remainder for production. Most of the subsidies were for petroleum use, at US$10.6bn. The two measures with the highest amounts of subsidies are the customs duties reductions on fuels (US$4.3bn) and the direct benefit transfer scheme for LPG cylinders intended for household use (US$3.2bn).

### Carbon revenues

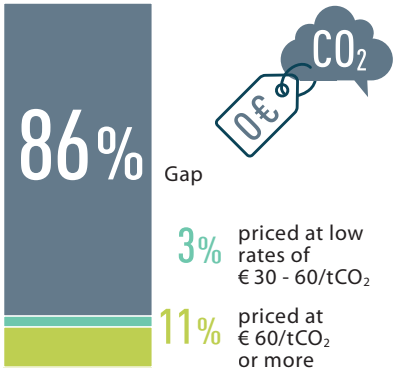



*Source: I4CE 2019*

India does not have a national carbon tax or emissions trading scheme, nor are any schemes planned. Despite this, 64% of carbon emissions from energy usage are subject to other taxes. In 2017, India phased out the earmarking of revenues from the Clean Environment Cess (taxing coal) for environmental purposes, subsumed under the introduction of the centralised Goods and Services Tax.

### Carbon pricing gap[15]

% of energy-related $CO_2$ emissions




*Data for 2015 | Source: OECD 2018*

Only 14% of India's $CO_2$ emissions are priced at EUR30 or higher (the low-end benchmark), creating a carbon pricing gap of 86%. 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

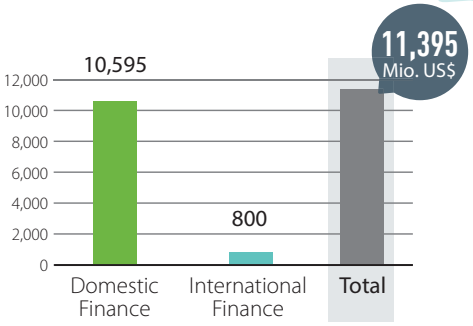
# INDIA

## 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$)




In 2017, the public finance institution Export-Import Bank of India provided $1.6 billion for a coal-fired power plant in Bangladesh. India's domestic public finance institutions, which mostly operate as commercial banks, continue to provide high levels of support for coal and coal-fired power, which amounted to $10.6 billion per year between 2016-2017.

- 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 were identified. |

X yes – no not applicable

*Source: own research*

### Provision of international public support[18]

India is not listed in Annex II of the UNFCCC and is therefore not formally obliged to provide climate finance. Nonetheless, it has provided international public finance for mitigation via the Global Environment Facility (GEF) Trust Fund climate change mitigation focal area. While India 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% |

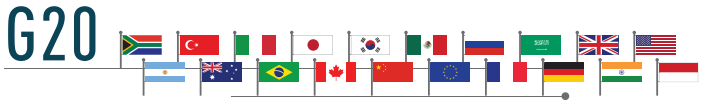
*Source: Country reporting to UNFCCC*

**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 finance. 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.

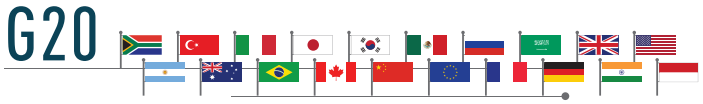
3) See the Brown to Green 2019 Technical Note for the sources used for this assessment.

4) The Decarbonisation Ratings assess the relative performance across the G20. A high scoring reflects 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 five 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 increase 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 incentives 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 incentives for low-emissions options) | Policies + retrofitting strategy | 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 efficiency policies cover more than 26-50% of industrial energy use | Mandatory energy efficiency 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 sources 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 reflected 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 Profile, 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 taxes 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 for 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 contributions 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

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Data Partners:

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