THE G20 TRANSITION TOWARDS A NET-ZERO EMISSIONS ECONOMY
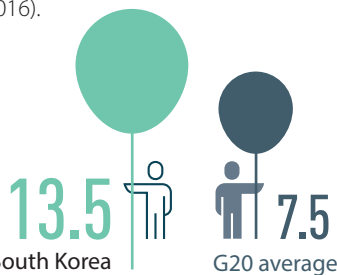
SOUTH KOREA

South Korea's greenhouse gas (GHG) emissions are – per capita – well above the G20 average.

Total GHG emissions (excl. land use) have increased by 32% (1990-2016).

Greenhouse gas (GHG) emissions (incl. land use) per capita[1]
(tCO$_2$e/capita)

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

13.5
South Korea

7.5
G20 average

Trend
(2011-2016)   +2%   -1%

South Korea is not on track for a 1.5°C world.

South Korea's fair-share range is below 213 MtCO$_2$e by 2030 and below -317 MtCO$_2$e by 2050. Under South Korea's 2030 NDC target, emissions would only be limited to 530 MtCO$_2$e. 1.5°C-compatibility can be achieved via strong domestic emissions reductions, supplemented with contributions to global emissions-reduction efforts. All figures are drawn from the Climate Action Tracker and exclude land use.

1.5°C compatible pathway[2]
(MtCO$_2$e/year)

733 MtCO$_2$e   NDC

max. **213** MtCO$_2$e

max. **-317** MtCO$_2$e

1,000
500
0
-500
-1,000

2016   2030   2050
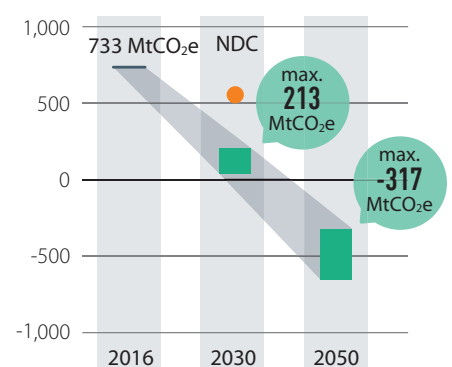
Source: CAT 2019

Recent developments[3]

South Korea announced its Third Five-Year Plan for Green Growth (2019-2023), with a political commitment to become an 'inclusive green nation'.

South Korea's 'Third Energy Master Plan (2019-2040)' plans to significantly cut back coal power and raise the share of renewables to 35% by 2040.

South Korea provided around US\$1.1 billion of public finance for construction of new coal plants overseas.

Key opportunities for enhancing climate ambition[3]

South Korea sources 44% of its electricity from coal and plans to increase coal capacity until 2030.

→ **Commit to a coal phase-out no later than 2030.**

#1

South Korea's economy is much more energy intensive than the G20 average.

→ **Create better incentives and raise public awareness of energy-efficiency policies.**
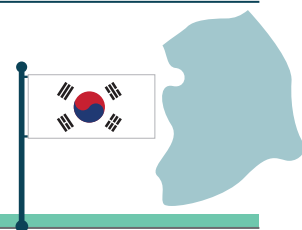
#2

Transport emissions per capita are much higher than the G20 average and continue to rise.

→ **Adopt goal of 100% sales of zero-emission cars by 2035.**

**#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*

SOUTH KOREA – SOCIO-ECONOMIC CONTEXT

Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. South Korea ranks among the highest countries.

Data for 2017 | Source: UNDP 2018

0.903

low   very high
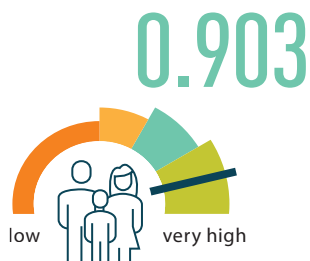
Gross Domestic Product (GDP) per capita

(PPP US$ const. 2018, international)

Data for 2018 | Source: World Bank 2019

41,373 South Korea

22,694 G20 average

Population projections

(millions)

South Korea's population is expected to decrease slightly by 3% by 2050.
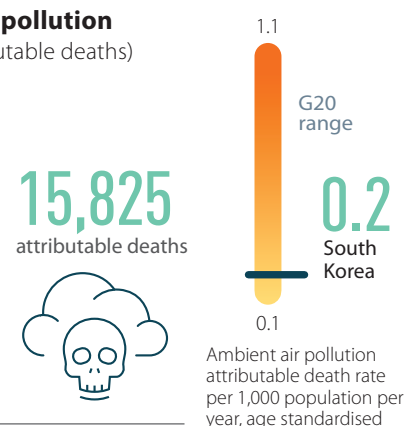
51.6 2018
53.0 2030
50.1 2050
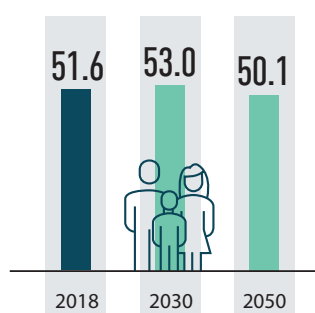
Source: World Bank 2019

Death through ambient air pollution

(total ambient air pollution attributable deaths)

Almost 16,000 people die in South Korea 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 one of the lower levels in the G20.

Data for 2016
Source: World Health Organization 2018

15,825 attributable deaths

1.1
G20 range

0.2 South Korea

0.1

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

JUST TRANSITION[3]

Following President Moon Jae-in's election in May 2017, the government pledged to shut down old nuclear and coal power plants, abolish plans for new reactors, and increase the share of renewable energy to 20% by 2030. However, the share of gas-based electricity is also planned to increase to 38.4%. Discussions on whether to go ahead with planned construction of Kori 5 and 6 nuclear reactors sparked much public debate on the impacts of plant closures on workers.

After three months of public hearings, the government restarted and completed the construction of Kori 5 and 6, which will become the last nuclear power plants in South Korea.

Notably, South Korean unions representing energy, transport and public service workers announced a call for a 'just energy transition', stating their support for the phase-out of coal but that a "roadmap for energy transition that ensures public accountability and strengthens democratic control of the energy industry" must also be developed. In response, the 9th Basic Plan for Long-Term Electricity Supply and Demand 2019-2033 is under development with refinements on the speed and scale of implementation for an energy transition for achieving 35% of renewables in the energy mix by 2040 in line with South Korea's GHG reduction target.

## Legend for all country profiles

Trends

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

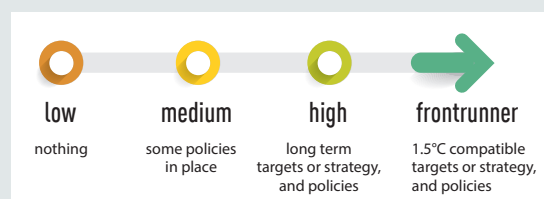The thumbs indicate assessment from a climate protection perspective.

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.

very low   low   medium   high   very high
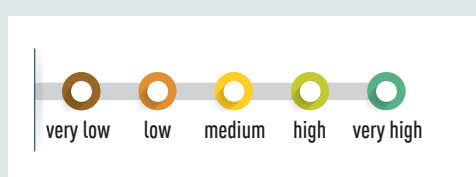
Policy Ratings[5]

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.

low	medium	high	frontrunner
nothing	some policies in place	long term targets or strategy, and policies	1.5°C compatible targets or strategy, and policies

For more information see the Annex and Technical Note

MITIGATION BIG PICTURE

SOUTH KOREA

> (!) South Korea's GHG emissions have increased by 132% (1990-2016) and the government's climate target for 2030 (-37% from business as usual) is not in line with a 1.5°C pathway.
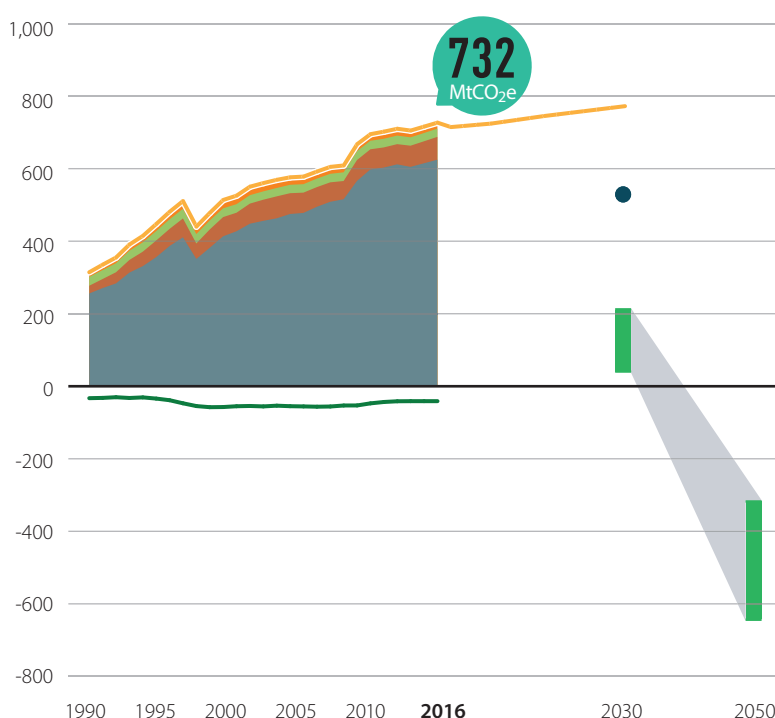
In 2030, global GHG emissions need to be 45% below 2010 levels and reach net zero by 2070.

1.5°C [6]

Source: IPCC SR1.5 2018

Total GHG emissions across sectors[2]

MtCO$_2$e/year

732 MtCO$_2$e

Total emissions (excl. land use), historic and projected

Historical emissions/removals from land use

● NDC

▌ 1.5°C fair share range

GHG emissions by sector

- Other sectors
- Waste
- Agriculture
- Industrial processes
- Energy

> South Korea's GHG emissions (excl. land use) more than doubled between 1990 and 2016 (+132%) and are projected to increase slightly until 2030. Without substantially scaling up climate action, South Korea is poised to miss its 2030 NDC and will be far from reaching 1.5°C compatible status. 1.5°C-compatibility can be achieved via strong domestic emissions reductions. This can be supplemented with contributions to global emissions-reduction efforts.

Source: PRIMAP 2018; CAT 2019
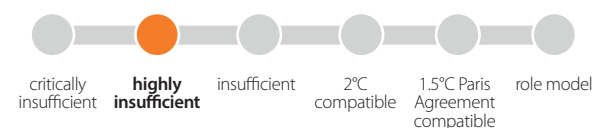
Nationally-determined contribution (NDC): Mitigation

Targets	To reduce its greenhouse gas emissions by 37% from the business-as-usual level (850.6 MtCO$_2$e) by 2030 across all economic sectors
Actions	Actions mentioned but not further specified

Source: UNFCCC, NDC of respective country

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

Status	In preparation. Draft expected in late 2019, with submission to UNFCCC in 2020
2050 target	–
Interim steps	–
Sectoral targets	–

Source: UNFCCC, LTS of respective country

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

○ ━ ● ━ ○ ━ ○ ━ ○ ━ ○

critically insufficient | **highly insufficient** | insufficient | 2°C compatible | 1.5°C Paris Agreement compatible | role model

Source: CAT 2019

MITIGATION ENERGY

SOUTH KOREA

Fossil fuels make up around 81% of South Korea's energy mix (including power, heat, transport fuels, etc). Despite the increase in renewable energy over the last two decades, the carbon intensity of the energy mix has barely changed.
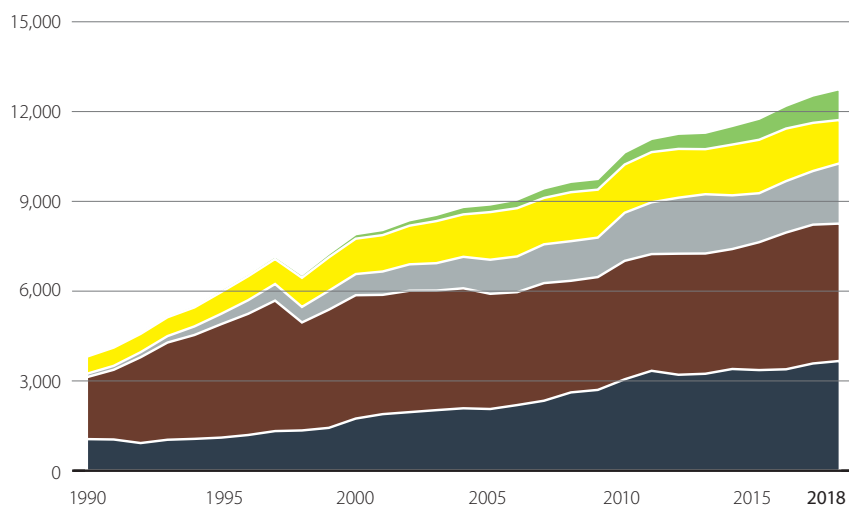
The share of fossil fuels globally needs to fall to 67% of global total primary energy by 2030 and to 33% by 2050 and to substantially lower levels without Carbon Capture and Storage.
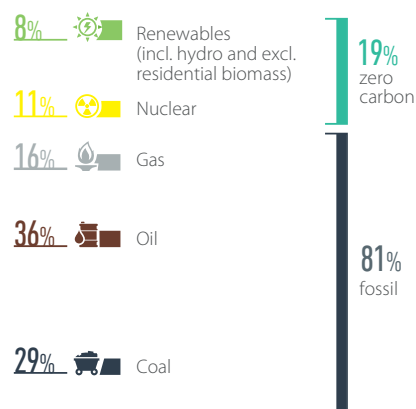
1.5°C [6]

Source: IPCC SR1.5 2018

Energy mix[7]

Total primary energy supply (PJ)

Share in 2018

8% Renewables (incl. hydro and excl. residential biomass)

11% Nuclear

19% zero carbon

16% Gas

36% Oil

**81%** fossil

29% Coal

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) still make up 81% of the South Korean energy mix, which is around the G20 average.

Carbon intensity of the energy sector

Tonnes of CO_2 per unit of total primary energy supply (tCO₂/TJ)

■ SOUTH KOREA — G20

55 tCO₂
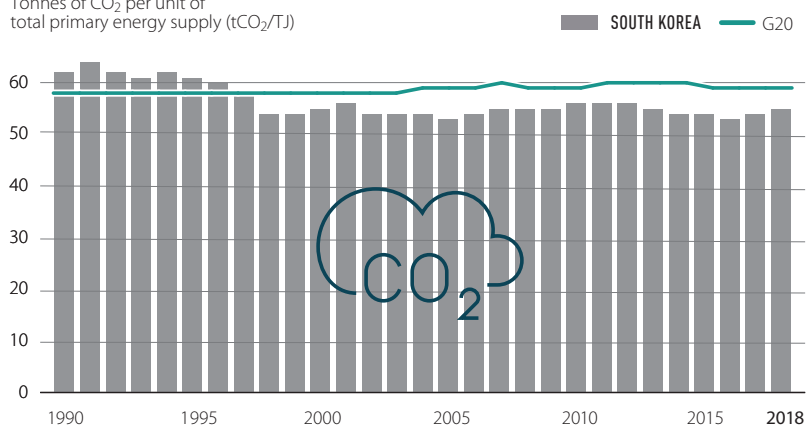
Rating of carbon intensity compared to other G20 countries[4]

Rating trend (2013-2018)
low

Rating current level (2018)
medium
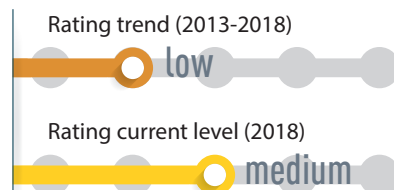
Source: own evaluation

Carbon intensity shows how much CO_2 is emitted per unit of energy supply. The carbon intensity of South Korea's energy sector has remained almost constant at around 55 tCO₂/TJ over the last ten years, slightly below the G20 average. This high level reflects the continual high share of fossil fuels in the energy mix.
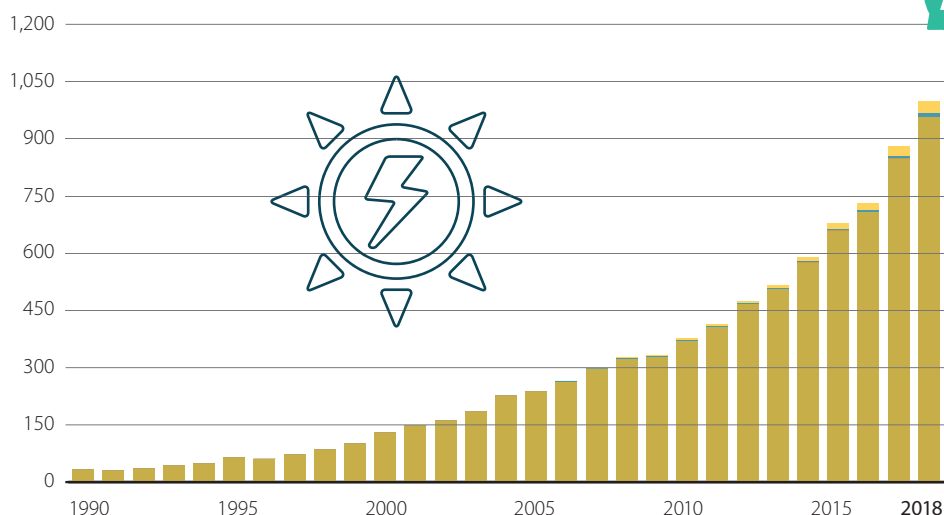
Source: Enerdata 2019

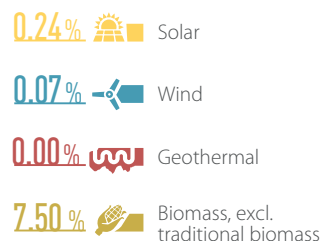| MITIGATION	ENERGY		SOUTH KOREA

Solar, wind, geothermal and biomass development[8]

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

7.8 %

Source: Enerdata 2019

Share of TPES in 2018

0.24 % Solar

0.07 % Wind

0.00 % Geothermal

**7.50 %** Biomass, excl. traditional biomass

Solar, wind and biomass account for almost 8% of South Korea'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 71%, significantly more than the G20 average (+29% 2013-2018). Bioenergy (for electricity, 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)
very high

Rating current level (2018)
medium

Source: own evaluation

Energy supply per capita

Total primary energy supply per capita (GJ/capita)

248 South Korea

98 G20 average

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

Data for 2018 |
Source: Enerdata 2019;
World Bank 2019
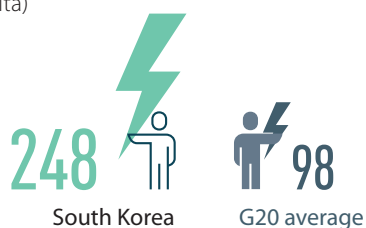
The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy.

Energy supply per capita in South Korea (248 GJ/capita) is one of the highest levels in the G20, and rising (+11%, 2013-2018) much more than the G20 average (+1%).

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

Rating trend (2013-2018)
very low

Rating current level (2018)
very low

Source: own evaluation

MITIGATION ENERGY

SOUTH KOREA

South Korea's economy is very energy intensive and per capita energy supply is one of the highest levels in the G20. Energy-related CO_2 emissions continue to rise.
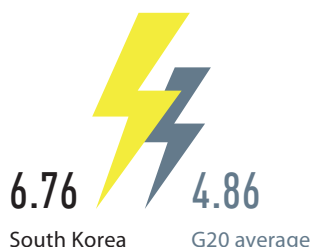
Global energy and process-related CO_2 emissions must be cut by 40% below 2010 levels by 2030 and reach net zero by 2060.

1.5°C [6]

Source: IPCC SR1.5 2018

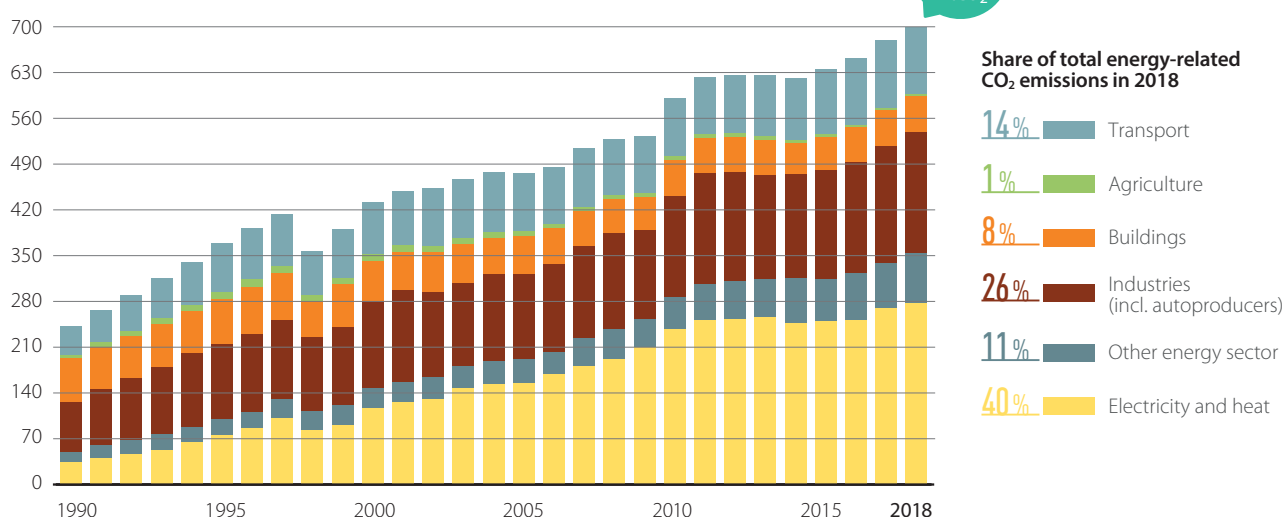## Energy intensity of the economy
(TJ/PPP US$2015 million)

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. The energy intensity of South Korea's economy is one of the highest in the G20 and has decreased less (-2%, 2013-2018) than the G20 average (-12%).

6.76 South Korea

4.86 G20 average

Trend (2013-2018)   👍 **-2%**   👎 **-12%**

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

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

Rating trend (2013-2018)
low

Rating current level (2018)
very low
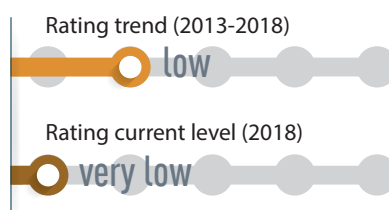
Source: own evaluation

Energy-related CO_2 emissions [9]

CO_2 emissions from fuel combustion (MtCO₂/year)

704 MtCO₂

Source: Enerdata 2019

Share of total energy-related CO_2 emissions in 2018

14% Transport

1% Agriculture

8% Buildings

26% Industries (incl. autoproducers)

11% Other energy sector

40% Electricity and heat

The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. In South Korea, emissions have begun to increase again after 2014. The electricity and heat sector is the largest contributor at 40%, followed by industry at 26%.

MITIGATION | POWER SECTOR

SOUTH KOREA

(!) South Korea produces 44% of electricity from coal, and several new coal-power plants are due to be built by 2022. To be in line with a 1.5°C pathway, the country should phase out coal by 2030.

Share in energy-related CO_2 emissions

40%

Data for 2018 | Source: Enerdata 2019
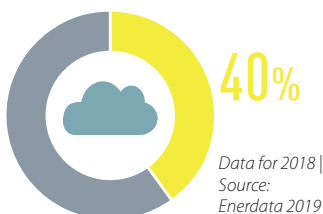
Coal must be phased out in the EU/OECD no later than 2030, in the rest of the world no later than 2040. Electricity generation needs to be decarbonised before 2050, with renewable energy the most promising option.[5]
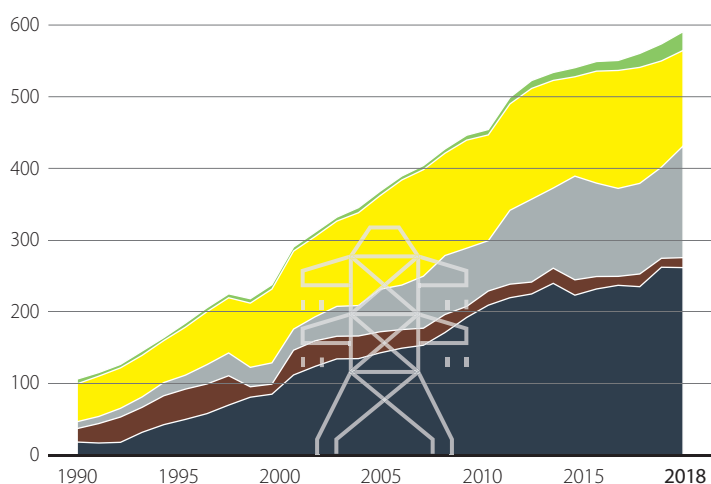
1.5°C[6]

Source: IPCC SR1.5 2018; Climate Analytics 2016; Climate Analytics 2019
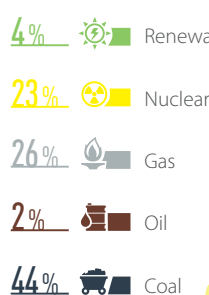
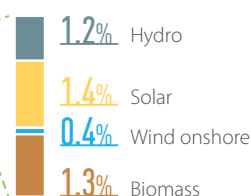## STATUS OF DECARBONISATION

### Power mix

Gross power generation (TWh)

Source: Enerdata 2019

Shares in 2018

4%	⚡	Renewables
23%	☢	Nuclear
26%	🛢	Gas
2%	🛢	Oil
44%	🛒	Coal

Renewables shares

1.2%	Hydro
1.4%	Solar
0.4%	Wind onshore
1.3%	Biomass

South Korea produces only 4% of electricity from renewables (the G20 average is 25%), mainly solar, modern biomass and large hydropower. Coal still accounts for the largest share of the power mix, at 44%. Electricity supply from coal and gas has increased slightly.

### Emissions intensity of the power sector
(gCO₂/kWh)
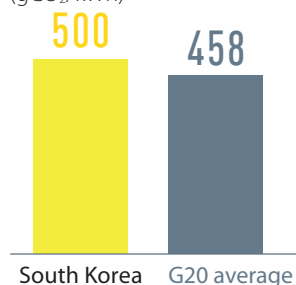
500 South Korea
458 G20 average

Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

+2% South Korea   -11% G20 average

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

Rating trend (2013-2018)
very low

Rating current level (2018)
low

Source: own evaluation

Share of renewables in power generation
(incl. large hydro)

G20 average **25%**

4% South Korea

Data for 2018 | Source: Enerdata 2019

Trend (2013-2018)

+113% South Korea   +20% G20 average
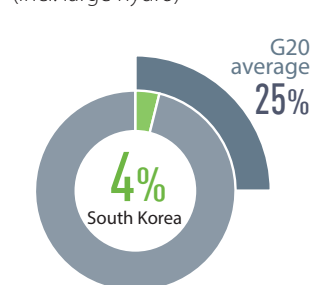
Rating of share of renewables compared to other G20 countries[4]

Rating trend (2013-2018)
very high

Rating current level (2018)
very low

Source: own evaluation

For each kilowatt hour of electricity, 500 gCO₂ are emitted in South Korea. This is slightly above the G20 average. Emission intensity has increased slightly (+2%, 2013-2018) due to the higher use of fossil fuels (72% of the power mix) for electricity generation.

SOUTH KOREA

MITIGATION POWER SECTOR

POLICIES[5]

Renewable energy in the power sector

medium

low   medium   high   frontrunner

South Korea aims to increase the share of renewables in the power mix to 20% by 2030, requiring an increase of installed capacity from 11.3 GW in 2017 to 58.5 GW in 2030 according to its 2017 Electricity Plan. The 3rd Energy Master Plan 2019–2040 includes a target of up to 35% share of renewable energy in total power generation by 2040. No 2050 target exists.

Source: own evaluation

Coal phase-out in the power sector

low

low   medium   high   frontrunner

South Korea has no policy in place for phasing out coal. The coal import tax was raised by 28% in 2019 to US$40/t. Ten coal-power plants older than 30 years will be shut down by 2022. While several already approved plants are to be built by 2022, the 3rd Energy Master Plan 2019–2040 clarified that no additional plants will be built.

Source: own evaluation

MITIGATION TRANSPORT SECTOR

! **In South Korea, per capita emissions from transport are increasing significantly. The transport sector is still dominated by fossil fuels, and electric vehicles (EVs) make up only 2% of car sales. For staying within a 1.5°C limit, passenger and freight transport need to be decarbonised.**

Share in energy-related CO_2 emissions

14% direct
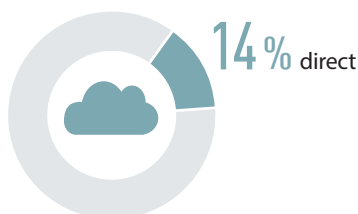
Data for 2018 | Source: Enerdata 2019

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

1.5°C[6]

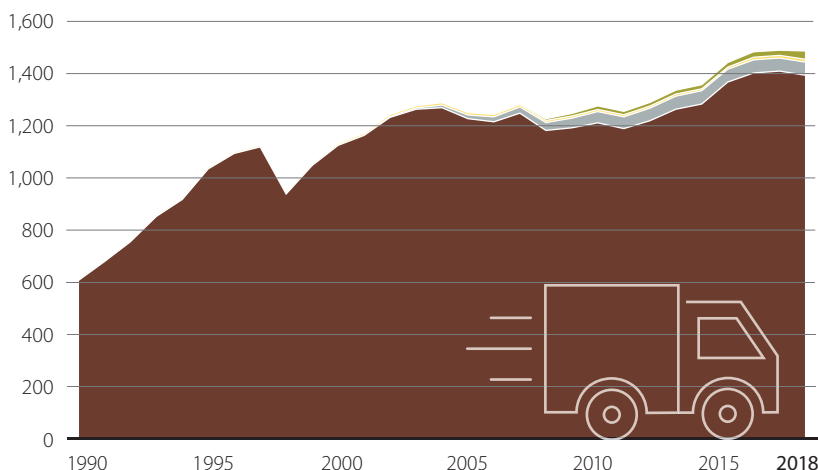*Source: IPCC SR1.5 2018*

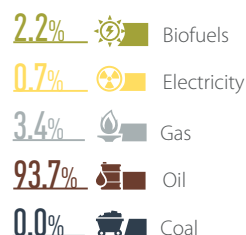## STATUS OF DECARBONISATION

Transport energy mix

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

Electricity and biofuels make up only 3% of the energy mix in transport (the G20 average is 6%).

Share in 2018

2.2%	Biofuels
0.7%	Electricity
3.4%	Gas
93.7%	Oil
0.0%	Coal

Source: Enerdata 2019

MITIGATION | TRANSPORT SECTOR

SOUTH KOREA

STATUS OF DECARBONISATION (continued)

Transport emissions per capita[10]
(tCO$_2$/capita,
excl. aviation emissions)

1.98 South Korea
1.13 G20 average

Trend (2013-2018)

+9% South Korea +5% G20 average

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

Rating trend (2013-2018) — low
Rating current level (2018) — low

Data for 2018
Source: Enerdata 2019; World Bank 2019
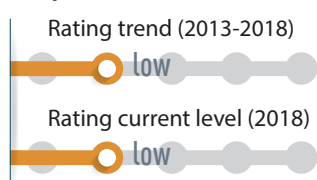
Source: own evaluation

Aviation emissions per capita[11]
(tCO$_2$/capita)

0.36 South Korea
0.15 G20 average

Trend (2011-2016)

+22% South Korea +10% G20 average

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

Rating trend (2011-2016) — low
Rating current level (2016) — low

Data for 2016
Source: Enerdata 2019; IEA 2018
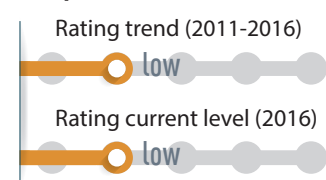
Source: own evaluation

Motorisation rate
(vehicles per 1,000 inhabitants)

464

Data for 2015 | Source: Agora 2018

Market share of electric vehicles in new car sales (%)

2.2%

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)

no data

Source: Agora 2018

POLICIES[5]

Phase out fossil fuel cars

low — medium — high — frontrunner : **medium**

There is no target for the phase-out of fossil fuel cars. South Korea aims to deploy 3 million EVs by 2030, and 8.3 million EVs as well as 2.9 million hydrogen cars by 2040. South Korea aims to replace all taxis with electric counterparts by 2030 through 10% annual replacements starting in 2019. Since 2018, 70% of public organisations are required to buy zero-carbon vehicles.

Source: own evaluation

Phase out fossil fuel heavy-duty vehicles

low — medium — high — frontrunner : **medium**

There is no strategy to reduce absolute emissions from freight transport. Emission standards for HDVs in South Korea are equivalent to the Euro VI standard. South Korea set goals on fuel efficiency for freight transport (7.5km/l by 2040) by gradually strengthening the standard, starting from 2022. South Korea aims to replace all buses and pickup trucks with electric counterparts by 2030 starting in 2019.

Source: own evaluation

Modal shift in (ground) transport

low — medium — high — frontrunner : **medium**

South Korea aims to promote public transport by expanding its railway networks and bus rapid transit systems. It also supports the shift of freight transport from road to waterways shipping. There is, however, no long-term strategy for modal shift.

Source: own evaluation

MITIGATION | BUILDINGS SECTOR

SOUTH KOREA

(!) South Korea's building emissions – including heating, cooking and electricity use – make up a quarter of total CO_2 emissions. Per capita, building-related emissions are more than double the G20 average, but the country has a strategy for making new buildings meet zero-energy requirements by 2025.

Share in energy-related CO_2 emissions

8 % direct

18 % from electricity
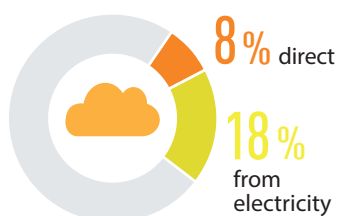
Data for 2018 | Source: Enerdata 2019

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.
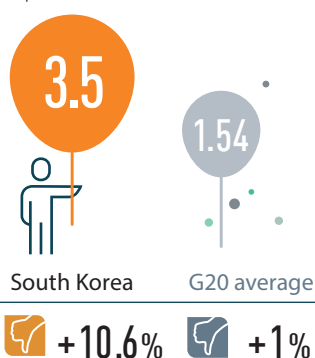
1.5°C [6]

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

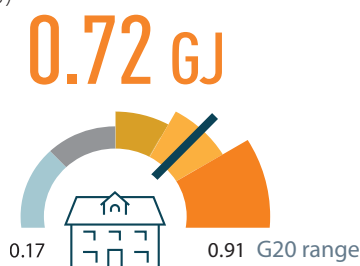## STATUS OF DECARBONISATION

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

3.5

1.54

South Korea   G20 average

+10.6%   +1%

Trend (2013-2018)

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

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

Rating trend (2013-2018)   **low**

Rating current level (2018)   **very low**

Source: own evaluation

Residential buildings: energy use per m²
(GJ)

0.72 GJ

0.17   0.91 G20 range

Data: year different per country | Source: ACEEE 2018

Building-related emissions per capita are more than double the G20 average. In contrast to the stable G20 average, the level of emissions in South Korea has risen by 11% (2013-2018).

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

3.53 GJ

0.15   3.53   G20 range
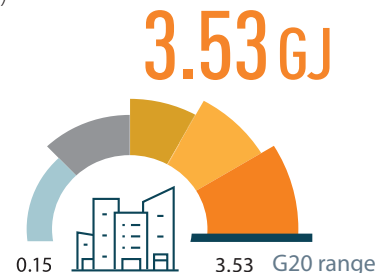
Data: year different per country | Source: ACEEE 2018

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

POLICIES [5]

Near-zero energy new buildings

low   medium   high   frontrunner

high

Mandatory energy codes apply to both residential and commercial buildings. All new buildings will have to meet zero energy requirements by 2030 (2020 would be 1.5°C compatible). South Korea is gradually strengthening energy standards, is offering incentives for the public sector, and since 2017 has implemented a Zero Energy Building Certification System.

Source: own evaluation

Renovation of existing buildings

low   medium   high   frontrunner

medium

South Korea plans to reduce the energy consumption of buildings by 38% by 2040 from 2017 levels. All buildings will need to measure the level of energy efficiency from 2022. For renovations of large commercial and residential buildings, mandatory national building energy codes apply. There is, however, no strategy for reaching deep renovation rates.
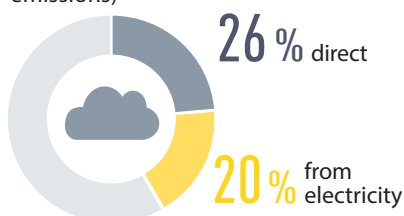
Source: own evaluation

MITIGATION INDUSTRY SECTOR

SOUTH KOREA

! Industry-related emissions make up almost half of CO$_2$ emissions in South Korea – much more than the G20 average. Current policies are not sufficient to reduce energy use and emissions in the sector.

Share in energy-related CO$_2$ emissions (not including process emissions)

26% direct

20% from electricity

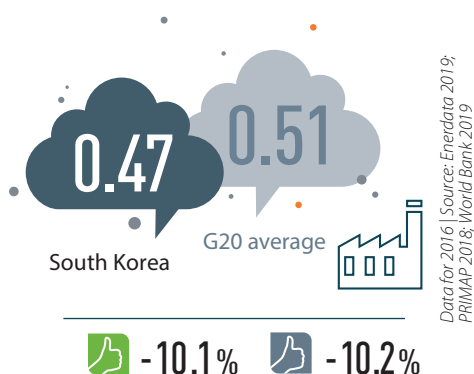*Data for 2018 | Source: Enerdata 2019*

Global industrial CO$_2$ emissions need to be reduced by 65–90% from 2010 levels by 2050.

1.5°C[6]
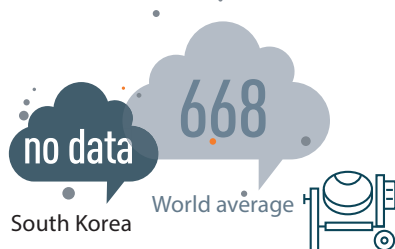
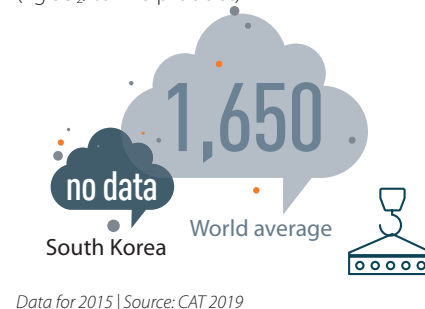*Source: IPCC SR1.5 2018*

STATUS OF DECARBONISATION

Industry emissions intensity[12]
(tCO$_2$e/US$2015 GVA)

0.47 **0.51**

South Korea G20 average

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

👍 **-10.1**% 👎 **-10.2**%

Trend (2011-2016)

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

Rating trend (2011-2016) — **high**

Rating current level (2016) — **low**

Source: own evaluation

Carbon intensity of cement production[13]
(kgCO$_2$/tonne product)

no data **668**

South Korea World average

Data for 2015 | Source: CAT 2019
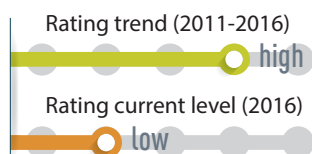
When comparing industrial emissions with the gross value added (GVA) from the industry sector, South Korea is close to the G20 average.

Carbon intensity of steel production[13]
(kgCO$_2$/tonne product)

1,650

no data

South Korea World average

Data for 2015 | Source: CAT 2019

Steel production and steelmaking are significant GHG emission sources, and are challenging to decarbonise. There is no data on the emissions intensities of the steel and cement industries in South Korea.

POLICIES[5]

Energy efficiency

low

low medium high frontrunner

Source: own evaluation

Mandatory energy efficiency policies in South Korea cover only 0-10% of total energy use (as of 2017). In the 2030 National GHG Reduction Roadmap, revised in 2018, energy efficiency is stated as one of the main targets for the industry sector. Various programmes to improve energy efficiency through the use of the smart Energy Management System (EMS) in factories are implemented under the Energy Use Rationalization Act.

SOUTH KOREA

MITIGATION LAND USE

In order to stay within the 1.5°C limit, South Korea needs to make the land use and forest sector a net sink of emissions, eg by halting the expansion of residential areas and by creating new forests.
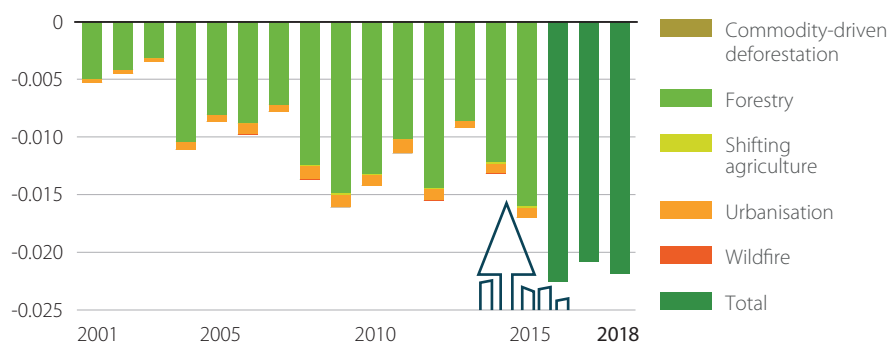
Global deforestation needs to be halted and changed to net CO_2 removals by around 2030.

1.5°C [6]

Source: IPCC SR1.5 2018

Gross tree cover loss by dominant driver[14]

Tree cover loss (million hectares)

- Commodity-driven deforestation
- Forestry
- Shifting agriculture
- Urbanisation
- Wildfire
- Total

Source: Global Forest Watch 2019

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

From 2001 to 2018, South Korea lost 230kha of tree cover, equivalent to a **4.3% reduction since 2000**. This does not take tree-cover gain into account. Forest loss is mainly driven by forest industries.

POLICIES[5]

(Net) zero deforestation

medium

low   medium   high   frontrunner

South Korea has had five National Forest Plans, with the last one ending in 2017. The Carbon Sinks Improvement Master Plan (2015-2019) includes policies to control deforestation or promote afforestation, such as restoring damaged forests. There is no strategy for reducing deforestation to zero and some sections of forests have been destroyed due to increased photovoltaic (PV) installation in recent years.
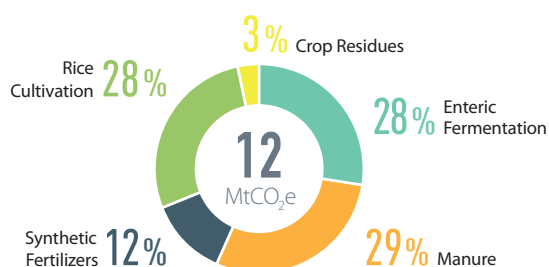
Source: own evaluation

MITIGATION AGRICULTURE

South Korea's agricultural emissions are mainly from livestock manure, rice cultivation, and digestive processes in animals. 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.

1.5°C [6]

Source: IPCC SR1.5 2018

GHG emissions from agriculture (not including energy)

Rice Cultivation 28%
Crop Residues 3%
Enteric Fermentation 28%
Manure 29%
Synthetic Fertilizers 12%
12 MtCO₂e

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

Data for 2016 | Source: FAOSTAT 2019

SOUTH KOREA

ADAPTATION

→ **South Korea is vulnerable to climate change and adaptation actions are needed.**

→ **On average, 56 fatalities and losses amounting to US$1.1 billion occur yearly due to extreme weather events.**

→ **With global warming, society and its supporting sectors are increasingly exposed to severe weather events, such as increasing heat wave frequency.**

ADAPTATION POLICIES

Nationally-determined contribution: Adaptation	
Targets	Not mentioned
Actions	Actions mentioned but not further specified (sectors: water, ecosystems, health)

Source: UNFCCC, NDC of respective country

National adaptation strategies

South Korea is one of the few countries in which climate change adaptation plans are initiated at all levels, including national and local government as well as public and private sectors. The 2nd Master Plan for National Climate Adaptation (2026-2020) was published in 2016, illustrating national climate risks, in particular extreme weather (following IPCC AR5 Scenario) and its impacts on vulnerable communities. The plan includes cross-cutting issues to maximise the co-benefits of mitigation and adaptation based on scientific climate information analysis.

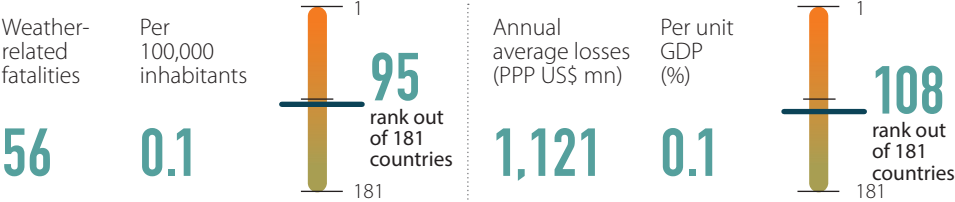| Document name	Publication year	Agriculture	Biodiversity	Coastal areas & fishing	Education & research	Energy & industry	Finance & insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	M&E process (reporting frequency)
							Fields of action (sectors)								
Korea's Adaptation Strategy to Climate Change	2011	x	x	x	x	x		x	x	x				x	Annual M&E and update of the strategy every 5 years

Source: own research

SOUTH KOREA

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

56

Per 100,000 inhabitants

0.1

95
rank out of 181 countries

Annual average losses (PPP US$ mn)

1,121

Per unit GDP (%)

0.1

108
rank out of 181 countries

Source: Germanwatch 2018

South Korea has already been struck by extreme weather events such as droughts, floods, typhoons, storms and heat waves. 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		Rice	Reduction in crop duration			
			Reduction in rainfall			

Source: Based on Arnell et al 2019

Overall, with rising temperatures, all sectors are adversely impacted. In the water sector, water scarcity and time spent in drought conditions slightly increase. Heat wave frequency increases significantly, together with an increase in the number of days when temperatures reach higher than 35°C.

Impact ranking scale

Very low
Low
Medium
High
Very high
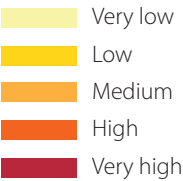
Blank cells signify that there is no data available

National crop production
(share in % of total production quantity in tonnes)

27% Rice

72% Rest

Rice has the largest share of crop production out of the four crops analysed (maize, rice, soybeans, wheat). Rice is affected by an increase in rainfall and a drastic reduction in crop duration.

Data for 2017 | Source: FAOSTAT 2019

FINANCE

SOUTH KOREA

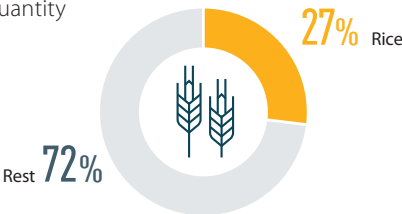> **!** South Korea's fossil fuel subsidies totalled almost US$2 billion in 2017, mostly for petroleum. The new carbon pricing scheme, in contrast, generated only US$95 million.

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 not conditional on international financial support
Investment needs	Not specified
Actions	National actions to align financial flows are mentioned, but not further specified (fiscal levers)
International market mechanisms	South Korea will partly use carbon credits from international market mechanisms to achieve its 2030 mitigation target

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

Source: own research

$ In April 2017, Shinhan Bank (a major private bank), together with the South Korean Ministry of Environment and KEITI, a UNEP FI Supporting Institution, launched its 'Green Management Firm Loan Program', which allocated US$87 million to eco-friendly small and medium enterprises, with below-market interest rates. However, no other evidence was found of green financial policy or regulation, or formal engagement with South Korean initiatives compliant with Task Force on Climate-related Financial Disclosures.
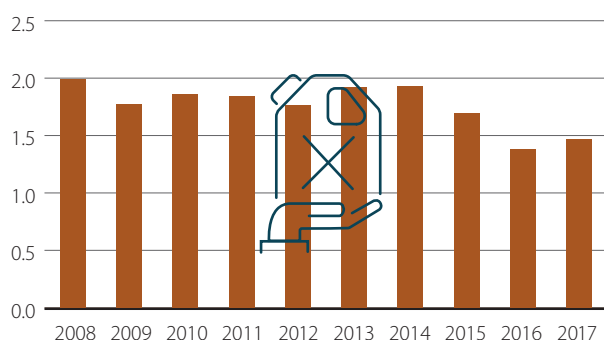
FINANCE

SOUTH KOREA

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.
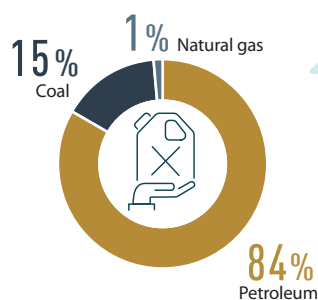
Fossil fuel subsidies
US$ billions

Source: OECD-IEA 2019

### Subsidies by fuel type

15% Coal

1% Natural gas

84% Petroleum

Data for 2017 | Source: OECD-IEA 2019

In 2017, South Korea's fossil fuel subsidies totalled US$1.7bn (compared to US$2.2bn in 2008 and with relatively small annual fluctuations since then). Of the subsidies identified, 82% were for the consumption of fossil fuels, with the remainder for production. The highest amount of subsidies quantified were for petroleum, at US$14.9bn, followed by natural gas at US$1.9bn. The two measures which resulted in the highest amount of subsidies were fuel tax exemptions for fisheries (US$0.5bn) and agriculture (US$0.4bn).

Carbon revenues

Carbon revenues (US$ millions) from explicit carbon pricing schemes
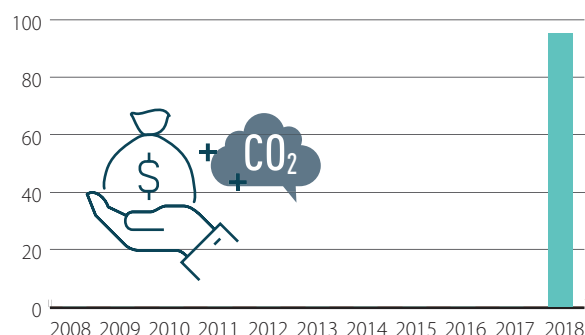
Source: I4CE 2019

In 2015, South Korea introduced a national emissions trading scheme. It covers 68% of domestic emissions (in the power, industry, buildings, transport, aviation and waste sectors), with emissions priced at US$23/$tCO_2$. The scheme generated revenue of US$95 million in 2018.

Carbon pricing gap[15]
% of energy-related CO_2 emissions

43% Gap

21% priced at low rates of € 30 - 60/tCO_2

36% priced at € 60/tCO_2 or more

Only 57% of South Korea's CO_2 emissions are priced at EUR30 or higher (the low-end benchmark), creating a carbon pricing gap of 43%. This gap is much smaller 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.
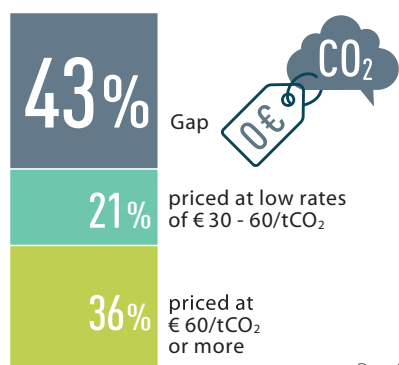
Data for 2015 | Source: OECD 2018

FINANCE

SOUTH KOREA

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 and 2017, South Korea's public finance institutions provided US$1.1 billion per year for coal-fired power production in Indonesia and Viet Nam.
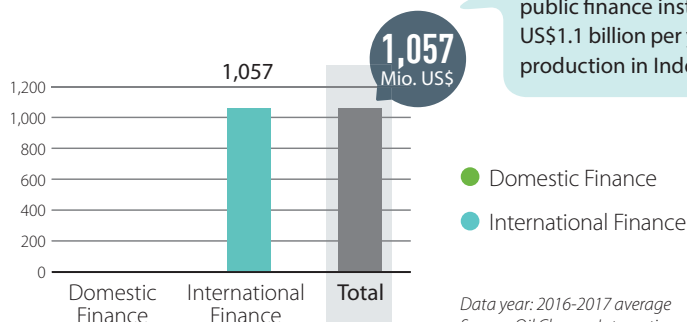
1,057
Mio. US$

1,057

- ● Domestic Finance
- ● International Finance

1,200	
1,000	
800	
600	
400	
200	
0	Domestic Finance · International Finance · Total

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
—	—	—	X	South Korea is part of the OECD Agreement for export credit agencies to restrict coal financing.

X yes   — no   not applicable   *Source: own research*

Provision of international public support[18]

South Korea is not obligated to provide climate finance under the UNFCCC. Despite this, it hosts the headquarters of the Green Climate Fund and pledged US$100 million in 2014 and recently doubled this contribution for 2020-2023 to US$200 million. It has also contributed to a number of multilateral climate change funds spread relatively evenly across themes, and its Biennial Update Report shows it provided bilateral climate-related overseas development aid (as an OECD member) amounting to US$268 million in the period 2015/16. While climate-related spending by multilateral development banks may exist, 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

G20

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.

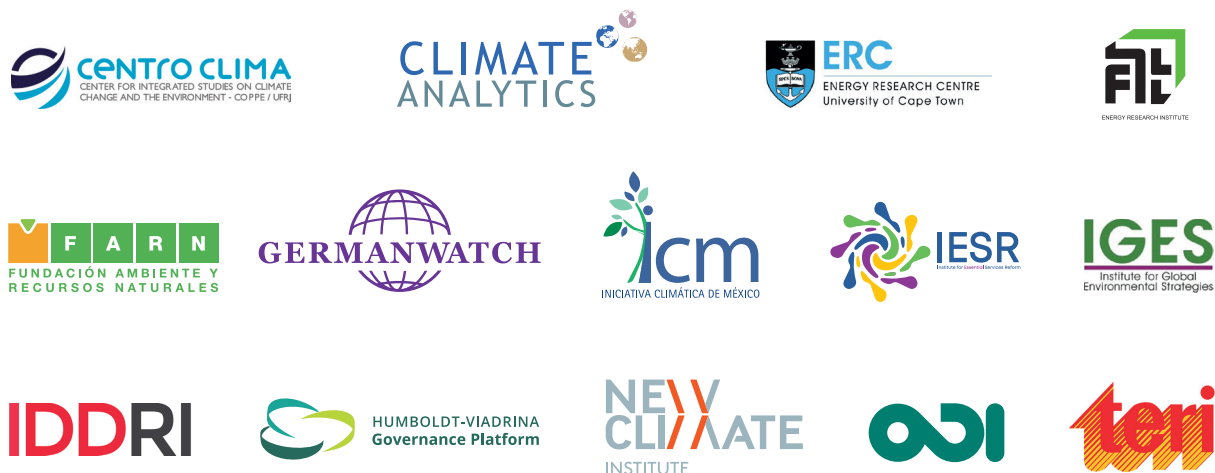| On endnote 5)	low	medium	high	frontrunner
Renewable energy in power sector	No policy to increase the share of renewables	Some policies	Policies and longer-term strategy/target to significantly increase the share of renewables	Short-term policies + long-term strategy for 100% renewables in the power 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 existing 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)

G20

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

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icm INICIATIVA CLIMÁTICA DE MÉXICO

IESR Institute for Essential Services Reform

IGES Institute for Global Environmental Strategies

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Agora Verkehrswende

Climate Action Tracker

CCPI Climate Change Performance Index

Enerdata intelligence + consulting

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