PAKISTAN

Climate Transparency

2020

www.climate-transparency.org

PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS

In recent years, Pakistan's greenhouse gas emissions, excluding forestry, have grown at a rate of 8.5% (2012-2017).

2.18
tCO_2e/capita

5-year trend (2012-2017)

+8.5%

Data for 2017. Sources: Enerdata, 2020; UN Department of Economic and Social Affairs Population Division, 2020; Gütschow et al., 2019

2030 NDC TARGET

1.5°C

Pakistan's 2030 NDC target is a 20% reduction below the projected 300% increase in levels of emissions from 2015 levels. This translates to an emissions level of 1259$MtCO_2e$ by 2030 (excl LULUCF). There is no Climate Action Tracker analysis for Pakistan.[1,2]

NDC target range

456 $MtCO_2e$

2017   2030
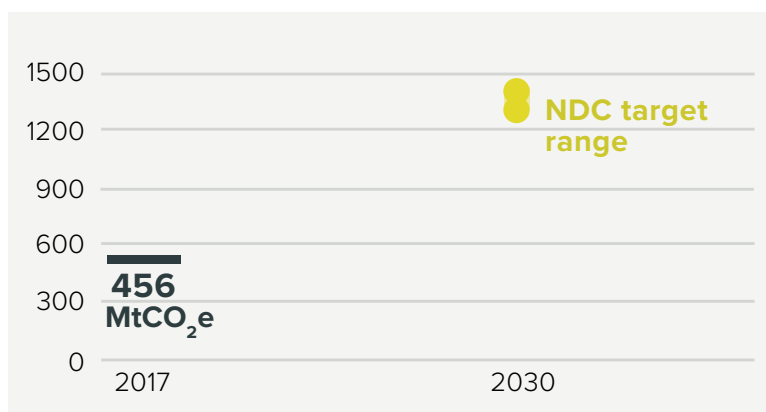
Since the preparation of this profile, Pakistan has submitted updated NDCs to the UNFCCC.

KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION

FINANCE VIA TREE PLANTING
Implement reforestation opportunities through the Plant4Pakistan project.

SOLAR COULD MEET DEMAND
Utilising 0.071% of the country's surface area for solar photovoltaic power could meet Pakistan's current electricity demand.

BOOST EV INDUSTRY
Stimulate investment in burgeoning domestic electric vehicle industry.

Sources: Climate Analytics, 2019a; Farand, 2021; Schmitt et al., 2020; Uddin, 2020

RECENT DEVELOPMENTS

Alternative and Renewable Energy Policy 2019 envisions 20% renewable energy power production from solar, wind and bagasse by 2025, 30% by 2030.

Electric Vehicle Policy aims to electrify all passenger vehicles and heavy-duty trucks to reach 30% by 2030 and 90% by 2040.

Plans to pursue coal mining in Thar Desert include coal-to-gas, and coal-to-liquid operations.

References: Government of Pakistan 2019; Ministry of Climate Change Government of Pakistan 2019; Ministry of Information and Broadcasting Government of Pakistan 2020; Isaad, 2021; Nicholas, 2021
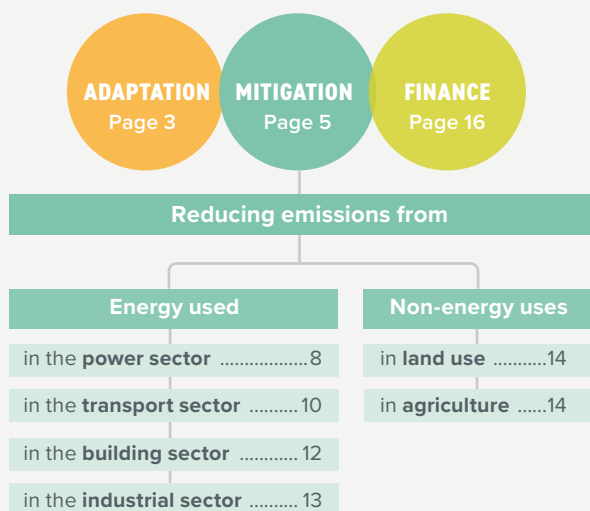
✿ CORONAVIRUS RECOVERY

As part of the government's response to the coronavirus epidemic, Pakistan launched the Green Economic Stimulus, focused on job creation and restoring the country's natural ecosystems. In June 2021, the World Bank approved US $188 million for this initiative.

References: M Khan, 2020; Pakistan Today, 2021

CONTENTS

We unpack Pakistan's progress and highlight key opportunities to enhance climate action across:

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Reducing emissions from

Energy used

Non-energy uses

LEGEND

Trends show developments over the past five years for which data are available. The thumbs indicate assessment from a climate protection perspective.

Policy Ratings[5] 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

SOCIO-ECONOMIC CONTEXT

Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. Pakistan ranks medium, albeit at the lower end.

Very high
High
Medium

Low

MEDIUM
0.560
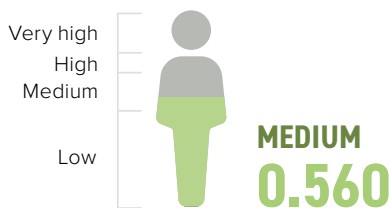
Data for 2018. Source: UNDP, 2019

Population and urbanisation projections

(in millions)

Pakistan's population is expected to increase by about 59% by 2050 and become more urbanised. While urbanisation is generally correlated with economic growth, Pakistan faces challenges related to housing access and waste generation.

212
36.7% urban
2018

263
40.7% urban
2030

338
52.2% urban
2050
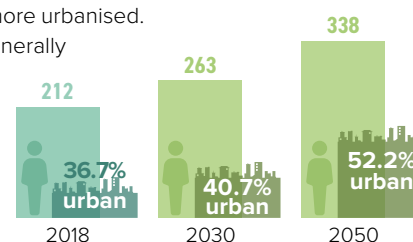
Sources: The World Bank, 2019; United Nations, 2018

Gross Domestic Product (GDP) per capita

5,062
PPP constant 2015 international $

Data for 2018. Source: United Nations Department of Economic and Social Affairs Population Division, 2020

Death rate attributable to air pollution

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

0.98

As a result of outdoor air pollution, over 121,000 people die in Pakistan every year from stroke, heart disease, lung cancer and chronic respiratory diseases.

121,301 deaths per year

Data for 2016. Source: WHO, 2018

JUST TRANSITION

JOB CREATION & UPGRADING INFRASTRUCTURE

As a country in the global south, and one that is highly susceptible to climate change, Pakistan faces the simultaneous challenges of mitigation, adaptation, and "just" economic development. The government has developed domestic policies to deal with these challenges, such as the Green Economic Stimulus initiative and its focus on job creation. However, foreign investment, such as coal mining in the Thar desert, has the potential to impede progress and increase environmental degradation and economic inequality.

Even though construction of new large-scale power plants has boosted the country's energy capacity, more than 50 million people still lack access to electricity, and this is mainly due to a lack of transmission infrastructure.

On the other hand, the adoption of competitive bidding procedures in the National Electricity Policy should benefit the country and consumers through lower tariffs.

References: Sheikh, 2020; M Khan, 2020; Isaad, 2021

1. ADAPTATION
ADDRESSING AND REDUCING VULNERABILITY TO CLIMATE CHANGE

PARIS AGREEMENT **Increase the ability to adapt to the adverse effects of climate change and foster climate resilience and low-GHG development.**

VULNERABLE TO CLIMATE CHANGE

On average, 499 fatalities and almost USD 3.79bn in losses occur annually due to extreme weather events.

RISING SEA LEVELS

With global warming, Pakistani society will be exposed to increased monsoon variability, flooding caused by receding Himalayan glaciers, reduced crop yields, heatwaves and reduced hydropower during droughts.

ADAPTING TO CLIMATE CHANGE

In its NDC, Pakistan has estimated that adaptation to climate change-induced extreme events such as floods, heat waves, and droughts would require USD 7-14bn per annum.

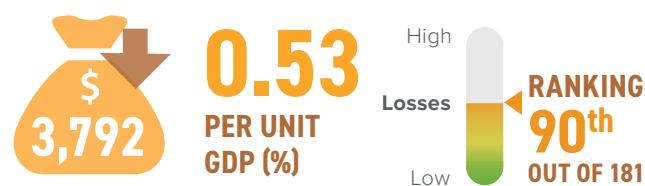## ADAPTATION NEEDS

Climate Risk Index

Impacts of extreme weather events in terms of fatalities and economic losses that occurred in 2018.

Annual weather-related fatalities

499 DEATHS

0.3 PER 100,000 INHABITANTS

High
Death rate
Low

RANKING 19th OUT OF 181

Source: Germanwatch, 2019

Annual average losses (USD mn PPP)

$ 3,792

0.53 PER UNIT GDP (%)

High
Losses
Low

RANKING 90th OUT OF 181

Source: Germanwatch, 2019

✿ CORONAVIRUS RECOVERY During 2020 the government mandated lockdowns to curb the spread of COVID-19, initially impeding its Ten Billion Tree Tsunami adaptation campaign; however, by April 2020 the Prime Minister allowed an exemption for the forestry agency and planting resumed. In response to the pandemic, Pakistan launched a 'green stimulus package' focussed on protecting nature and creating green jobs. Interventions included planting more trees, expanding and reviving protected areas, and improving urban sanitation. Through government finance, 85,000 daily wage jobs were created in nurseries, plant care, protection of natural forests and firefighting activities.

References: Ministry of Climate Change Government of Pakistan, 2019; R Khan, 2020

ADAPTATION POLICIES

National Adaptation Strategies

Document name	Publication year	Fields of action (sectors)													M&E process
		Agriculture	Biodiversity	Coastal areas and fishing	Education and research	Energy and industry	Finance and insurance	Forestry	Health	Infrastructure	Tourism	Transport	Urbanism	Water	
Pakistan 2025 - One Nation, One Vision	2017	●	●		●	●	●	●	●	●		●	●	●	n/a
National Climate Change Policy	2012	●	●					●	●						n/a
Framework for the Implementation of Climate Change Policy	2014	●	●					●				●	●	●	n/a

Nationally Determined Contribution (NDC): Adaptation

Targets

Long-term Vision: Build a climate-resilient society and economy inclusive of economically and socially vulnerable sectors of the economy.

Actions

Medium-term (up to 2030) actions include improving irrigation systems, enhancing water resource management, building climate-resilient infrastructure, and strengthening risk management systems for the agriculture sector.

Near-term (2020-2025) actions include development of a National Adaptation Plan and enhancing adaptation and disaster risk management capacity.

*Reference: Government of Pakistan, 2015*

2. MITIGATION
REDUCING EMISSIONS TO LIMIT GLOBAL TEMPERATURE INCREASE

PARIS AGREEMENT **Hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit to 1.5°C, recognising that this would significantly reduce the risks and impacts of climate change.**

EMISSIONS OVERVIEW

CO₂ DECREASE EMISSIONS
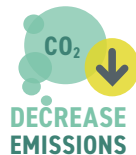
Pakistan's GHG emissions have increased by 140% (1990-2017). Pakistan's 2030 emissions pathway, as proposed in its NDC, increase its emissions nearly 300% by 2030 above 2015 levels, instead of reducing emissions.
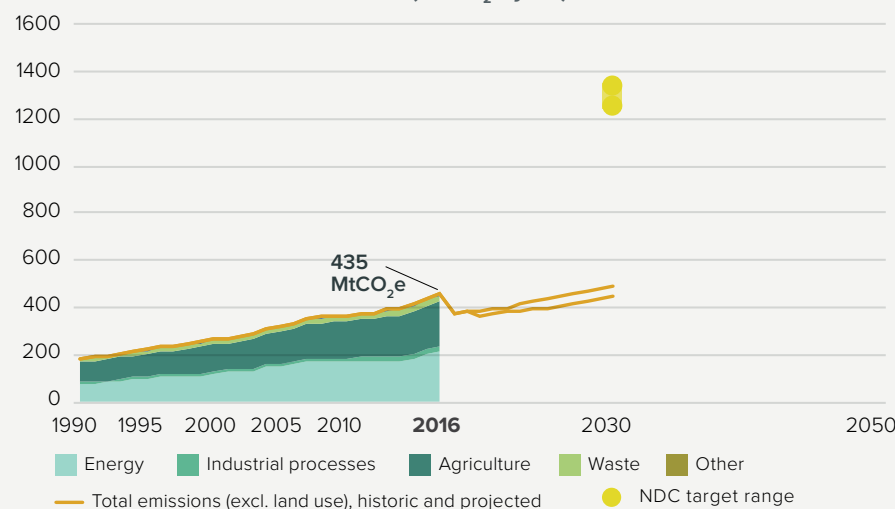
1.5°C COMPATIBILITY
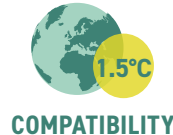
In 2030, global CO_2 emissions need to be 45% below 2010 levels and reach net zero by 2050. Global energy-related CO_2 emissions must be cut by 40% below 2010 levels by 2030 and reach net zero by 2060.

Source: Rogelj et al., 2018

GHG emissions across sectors and NDC target (MtCO₂e/year)[3]

Total GHG emissions across sectors (MtCO₂e/year)

435 MtCO₂e

Energy · Industrial processes · Agriculture · Waste · Other
— Total emissions (excl. land use), historic and projected · NDC target range
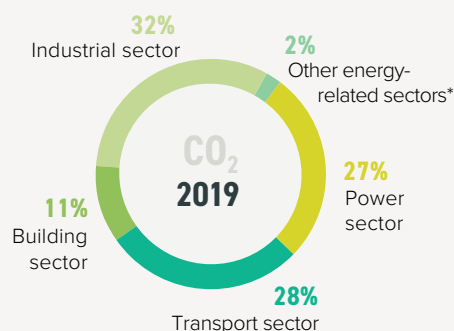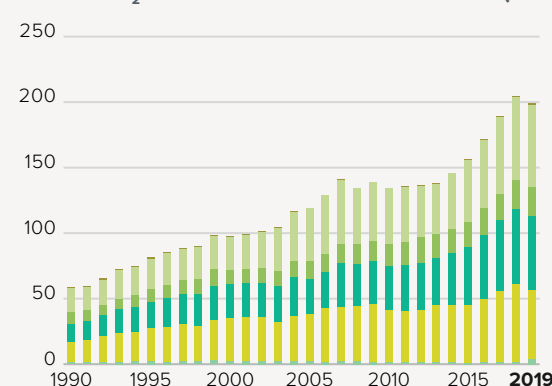
Pakistan's emissions (excl. land use) have increased by 140% between 1990 and 2017. When considered by category, increases are evident in all sectors. The largest absolute increases have occurred in the energy and agriculture sectors, while industrial processes have seen the greatest relative increase. The country's NDC states that by 2030 emissions are expected to grow by close to 300% relative to 2015 levels. The NDC reduction target of 20% below the anticipated 300% increase (from 2015 levels) by 2030 is not sufficient to reach 1.5°C compatibility, which would require **an emissions level of 244 MtCO₂e by that year instead of the lowest end of Pakistan's range of 1,259 MtCO₂e.**

Source: Gütschow et al. 2019; Climate Analytics, forthcoming

Energy-related CO₂ emissions by sector

Annual CO₂ emissions from fuel combustion (MtCO₂/year)

32% Industrial sector
2% Other energy-related sectors*
27% Power sector
28% Transport sector
11% Building sector

CO₂ 2019

* 'Other energy-related sectors' covers energy-related CO_2 emissions from extracting and processing fossil fuels. Due to rounding, some graphs may sum to slightly above or below 100%.

The largest driver of overall GHG emissions are CO_2 emissions from fuel combustion. In Pakistan, following a decade of relative stability, energy related CO_2 emissions have increased since 2015. The industrial sector – at 32% – is the largest contributor, followed by transport and electricity at 28% and 27% respectively.

Source: Enerdata, 2020

⚙ CORONAVIRUS RECOVERY A recent analysis of Pakistan's energy regulatory authorities has found that these entities could have managed the changes in energy consumption patterns and energy prices due to the COVID-19 epidemic better. Operational effectiveness of the country's energy system could be enhanced by using renewable energy sources to meet future demand, particularly as oil price variability during the epidemic was a major driver of CO_2 emissions reduction.

Reference: Iqbal, S et al., 2020

ENERGY OVERVIEW

60%

OF PAKISTAN'S ENERGY MIX IS FOSSIL FUELS

Fossil fuels make up around 60% of Pakistan's energy mix (counting power, heat, transport fuels, etc). The shares of fossil fuels and zero carbon technologies in the country's energy mix remained at essentially the same levels over the decade ending in 2019. However, carbon intensity has grown by 15% over that same period, reflecting increases in the country's total energy supply.
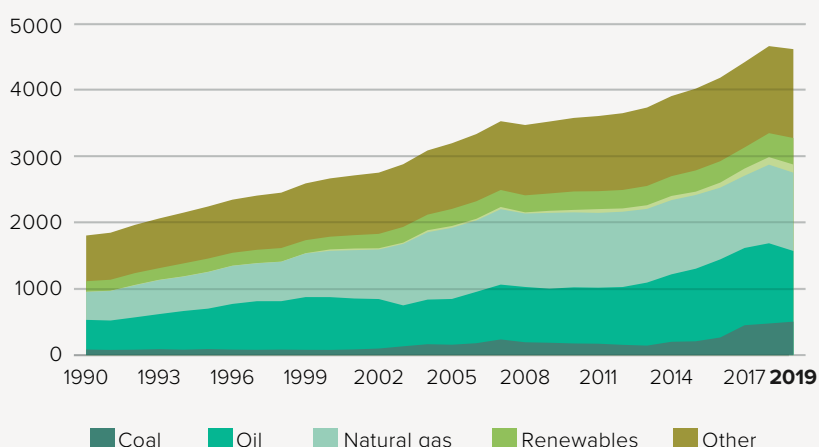
1.5°C

COMPATIBILITY

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.
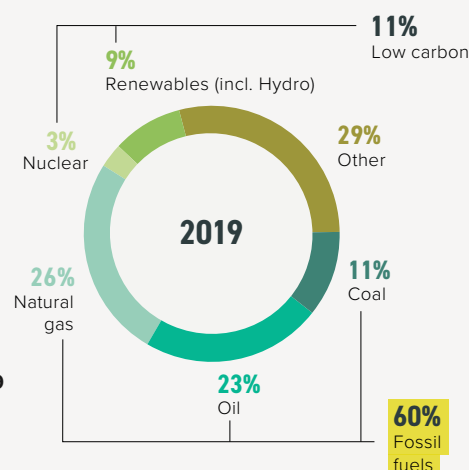*Source: Rogelj et al., 2018*

Energy Mix

Total primary energy supply (PJ)

Coal — Oil — Natural gas — Renewables — Other

2019

11% Low carbon

9% Renewables (incl. Hydro)

3% Nuclear

26% Natural gas

23% Oil

29% Other

11% Coal

60% Fossil fuels

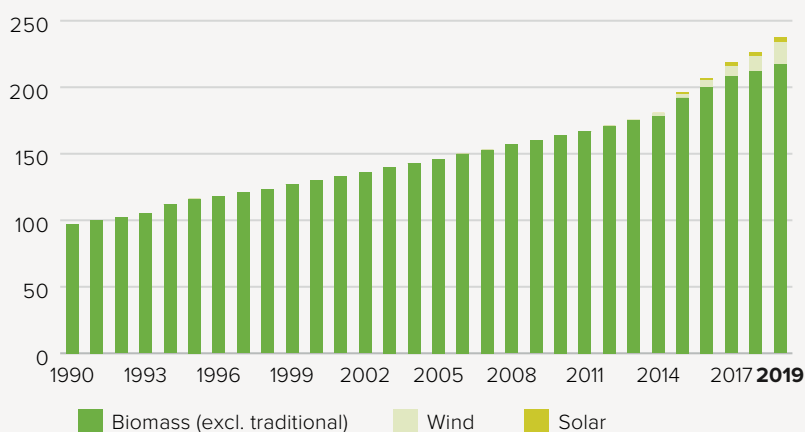*Data for 2019. Source: Enerdata, 2020*

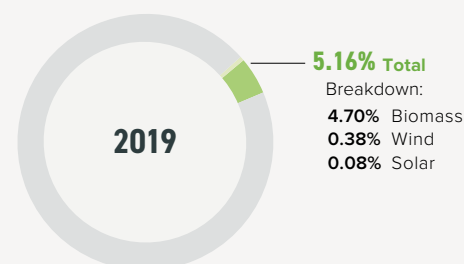*Due to rounding, some graphs may sum to slightly above or below 100%.*

This graph shows the fuel mix for all energy supply, including energy used not only for electricity generation, heating, and cooking, but also for transport fuels. Fossil fuels (oil, coal and gas) still make up 60% of Pakistan's energy mix. While the share of renewables (mostly hydro) and nuclear in the energy mix increased slightly since 2015, the percentage of coal more than doubled between 2015 and 2019. "Other" includes waste and non-traditional biomass.

Solar, Wind, Geothermal, and Biomass Development

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

Biomass (excl. traditional) — Wind — Solar

Solar, wind, geothermal and biomass account for just over 5% of Pakistan's energy supply

2019

5.16% Total
Breakdown:
4.70% Biomass
**0.38%** Wind
0.08% Solar

Source: Enerdata, 2020

Large hydropower and solid fuel biomass in residential use are not reflected due to their negative environmental and social impacts.
Due to rounding, some graphs may sum to slightly above or below 100%.

Solar, wind and biomass account for slightly over 5% of Pakistan's energy supply. The share of renewables in total energy supply has increased by around 8% over the last five years in Pakistan (2014-2019). Bioenergy (for electricity and heat) makes up the largest share.

Carbon Intensity of the Energy Sector

Tonnes of CO$_2$ per unit of total primary energy supply (tCO$_2$/TJ)

43.08 tCO$_2$/TJ
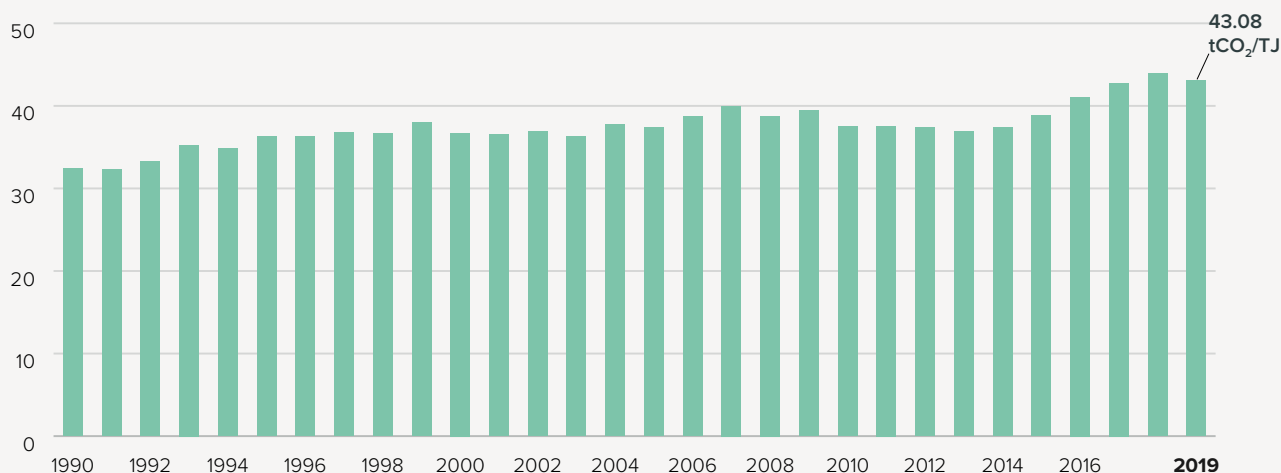
Source: Enerdata, 2020

Carbon intensity shows how much CO$_2$ is emitted per unit of energy supply. In Pakistan, carbon intensity remained fairly constant at around 38 tCO$_2$/TJ between 2000-2015, but has increased since then. This current high level of 43 tCO$_2$/TJ reflects the high share of fossil fuels in the energy mix.

Source: Enerdata, 2020

Energy supply per capita

21
GJ/capita

Sources: Enerdata, 2020; The World Bank, 2019

TPES per capita (GJ/capita): 5-year trend (2014-2019)   👎 **+9%**

The level of energy use per capita is closely related to economic development, climatic conditions and the price of energy. Energy use per capita in Pakistan stands at 21 GJ/capita, but is increasing (9%, 2014-2019). The increase in per capita energy use reflects the government's policies on energy access and industrial development.

Source: Ministry of Planning, Development & Reform, 2018

Energy intensity of the economy

⚡4.34
TJ/PPP USD2015 millions

Data for 2018. Sources: Enerdata, 2020; The World Bank, 2019

Energy intensity of the economy: 5-year trend (2013-2018)   👍 **-3.9%**

This indicator quantifies how much energy is used for each unit of GDP. This closely relates to the level of industrialisation, efficiency achievements, climatic conditions or geography.

POWER SECTOR

Emissions from energy used to make electricity and heat

Pakistan currently produces 10% of its electricity from coal. Despite an announced moratorium on new coal plants, coal capacity is set to increase further, with up to 6,600 MW already in planning or under development.

27%
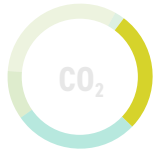
27% share in energy-related CO_2 emissions from electricity and heat production in 2018

Source: Enerdata, 2020

1.5°C

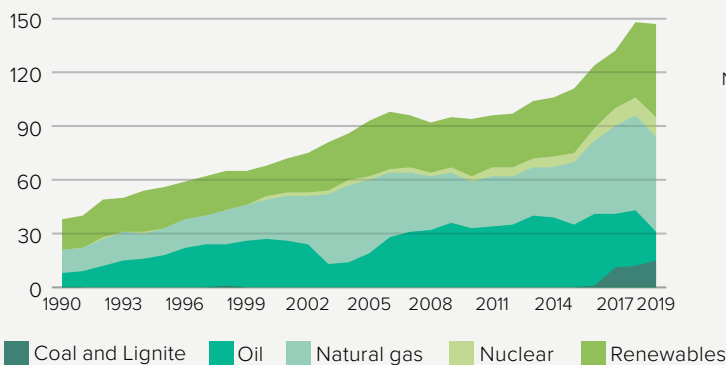**COMPATIBILITY**
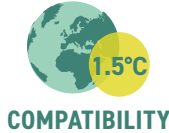
Coal and decarbonisation

Worldwide, **coal use for power generation needs to peak by 2020** and, between 2030 and 2040, all the regions of the world need to phase out coal-fired power generation. **Electricity generation has to be decarbonised before 2050**, with renewable energy the most promising alternative.

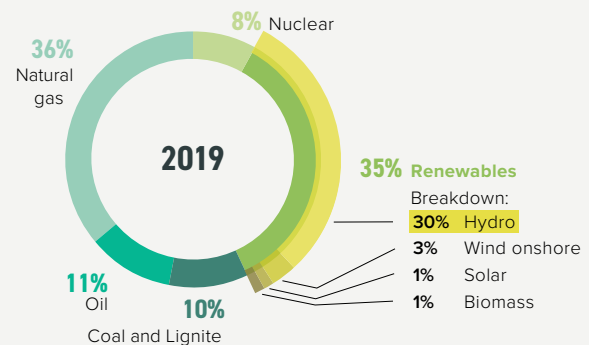*Sources: Climate Analytics, 2016; Climate Analytics, 2019; Rogelj et al., 2018*

STATUS OF DECARBONISATION

Electricity mix

Gross power generation (TWh)

Coal and Lignite   Oil   Natural gas   Nuclear   Renewables

2019

8% Nuclear

36% Natural gas

35% **Renewables**
Breakdown:
30% Hydro
3% Wind onshore
1% Solar
1% Biomass

11% Oil

10% Coal and Lignite

Source: Enerdata, 2020

Due to rounding, some graphs may sum to slightly above or below 100%.

Pakistan produces about a third of its power from renewables, with hydroelectricity making up the lion's share. Although wind and solar projects have recently come on line, this has not affected the use of unabated fossil fuels, mostly gas and oil, which still produce about two-thirds of the country's power. The level of coal, oil and natural gas in the mix has barely decreased, and still accounts for 57% of the electricity mix in 2019.

Source: National Electric Power Regulatory Authority, 2021

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

35%

Share of renewables in power generation: 5-year trend (2014-2019)

+2%

Source: Enerdata, 2020

Emissions intensity of the power sector

359

gCO$_2$/kWh

Emissions
intensity:
5-year trend
(2014-2019)

👍 **-7.7%**

Source: Enerdata, 2020

For each kilowatt hour of electricity, 359 gCO$_2$ is emitted in Pakistan. The emissions-intensity has only dropped marginally because the use of fossil fuels for power generation has barely dropped (still 57% of the power mix).

POLICY ASSESSMENT

Renewable energy in the power sector

Medium

Pakistan's Alternative and Renewable Energy Policy 2019 targets a 20% share of renewables in installed capacity of Pakistan's power mix by 2025 and 30% by 2030.

At the Climate Ambition Summit in December 2020, Prime Minister Khan said that by 2030 60% of electricity produced will come from clean energy, including solar, hydro, wind and nuclear. The promotion of renewables is supported by tax benefits to investors, competitive auctions and incentives for local production of renewable energy equipment.

References: own evaluation based on Government of Pakistan, 2019; Lo, 2020

Coal phase-out in the power sector

Medium

In December 2020, Prime Minister Khan announced that no new coal power plants will be constructed. However, this does not include coal plants under construction: seven coal projects financed as part of the China-Pakistan Economic Corridor (CPEC). From 2020 onward, according to the government, the only new coal in the electricity generation mix will be projects already under development, and there is no new coal planned after 2024. Most of the new generation capacity will be renewables and large hydro.

References: own evaluation based on Lo, 2020; Millan Lombrana et al., 2020; M Khan, 2021

TRANSPORT SECTOR

Emissions from energy used to transport people and goods

Emissions from transport in Pakistan are increasing, with per capita emissions in this sector showing a **44% increase over the period 2013-2018.** Transport accounted for 76% of the 19 million tonnes of oil consumed in Pakistan in 2018-2019, and 28% of the 199 $MtCO_2$ emissions from fuel combustion in 2019. To stay within a 1.5°C limit, passenger and freight transport need to be decarbonised.

Share in energy-related CO_2 emissions from transport sector

CO_2
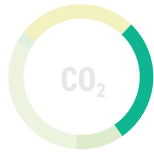
28%
Direct emissions

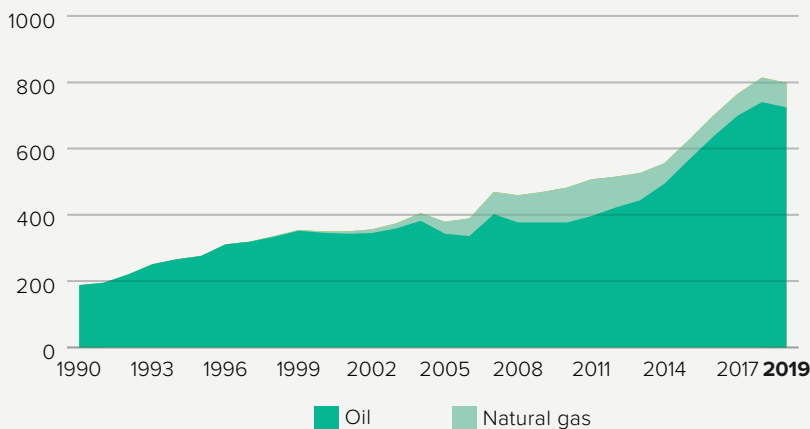*Source: Enerdata, 2020*

1.5°C

COMPATIBILITY

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

Source: Rogelj et al., 2018

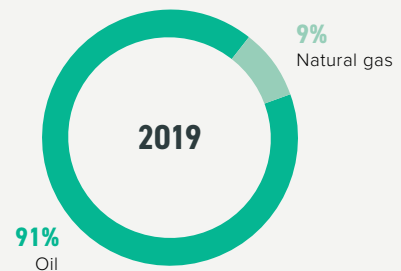## STATUS OF DECARBONISATION

Transport energy mix

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

9%
Natural gas

2019

91%
Oil

Oil   Natural gas

Source: Enerdata, 2020

Due to rounding, some graphs may sum to slightly above or below 100%.

Fossil fuels, in the form of oil and natural gas, make up 100% of Pakistan's energy mix in the transport sector.

Transport emissions per capita

excl. aviation (tCO_2/capita)

0.27
tCO_2/capita

Transport emissions: 5-year trend (2013-2018)   **+44%**

Data for 2018. Source: Enerdata, 2020

Aviation emissions per capita[6]

0.01

tCO$_2$/capita

Aviation emissions:
5-year trend
(2012-2017)   👍 **-1.1%**

Data for 2017. Source: Enerdata, 2020

POLICY ASSESSMENT

Phase out fossil fuel cars

Medium

Pakistan's 2019 National Electric Vehicles Policy aims for 30% of all passenger vehicle sales being electric vehicles by 2030 and 90% by 2040 (100% by 2035 would be 1.5°C compatible). So far, the implementation of this policy has been delayed by the government's focus on responding to COVID. Electric vehicles are promoted by incentives for direct foreign investment; lower taxes for EV manufacturing, assembly and related industries; and lower import duty for charging equipment. The government also invests in charging stations. In 2020, Pakistan updated its vehicle emissions standards to be compliant with Euro 5 for both diesel and petrol fuel.

References: own evaluation based on Pakistan's National Electric Vehicles Policy, 2019; Ministry of Water & Power, 2007; The International Council on Clean Transportation, 2020

Phase out fossil fuel heavy-duty vehicles

Medium

Pakistan's National Electric Vehicles Policy 2019 aims for 30% of all heavy-duty truck sales to be electric vehicles by 2030 and 90% by 2040 (100% by 2035 would be 1.5°C compatible).

References: own evaluation based on Pakistan's National Electric Vehicles Policy, 2019; The International Council on Clean Transportation, 2020

Modal shift in (ground) transport

Medium
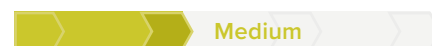
Pakistan is expanding its railway infrastructure as part of the China Pakistan Economic Corridor (CPEC). The project covers both passenger and freight trains. The goals of the National Energy Conservation Policy (2006), such as the promotion of public transport, a cycling culture and pedestrianisation, have been reiterated in the "Pakistan Vision 2025". In 2019, the Government of Pakistan signed a memorandum of understanding on introducing electric buses in cities of Karachi and Lahore.

References: own evaluation based on Ministry of Planning, Development & Reform, 2018; Ministry of Water & Power, 2007

BUILDING SECTOR

Emissions from energy used to build, heat and cool buildings

Pakistan's direct building emissions – counting heating, cooking but not electricity use – made up 10% of total CO_2 emissions in 2019. Additionally, buildings accounted for 15% of electricity-related CO_2 emissions.

Building emissions occur directly (burning fuels for heating, cooking, etc) and indirectly (grid-electricity for air conditioners, appliances, etc. In the decade to 2019, the share of total CO_2 emissions from Pakistan's buildings, has remained fairly stable at 10% and 15% respectively. As the country's total CO_2 emissions have risen substantially since 2015, emissions from buildings have likewise increased.

Recent analysis shows that use of roof insulation in residential buildings is rare, suggesting a need to implement energy audits and other measures to encourage energy efficiency.

Source: Ghafoor, et al., 2020

15%
Electricity-related emissions

CO_2

10%
Direct emissions

1.5°C
COMPATIBILITY
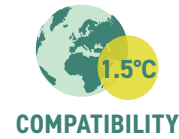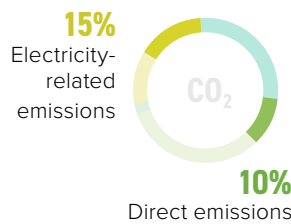
Global emissions from buildings need to be halved by 2030, and be 80-85% below 2010 levels by 2050, mostly through increased efficiency, reduced energy demand, and electrification in conjunction with complete decarbonisation of the power sector.

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Building emissions per capita

(incl. indirect emissions)

0.26
tCO$_2$/capita

**Building emissions:
5-year trend
(2014-2019)**

+17.61%

Building-related emissions per capita reflect increasing income levels, climate conditions (leading to high use of air conditioning during heat waves), low energy efficiency in buildings, and also the high ratio of square footage per person. Pakistan has increased this level by 17.6% (2014-2019).

*Source: Enerdata, 2020*

POLICY ASSESSMENT

Near zero energy new buildings

Medium
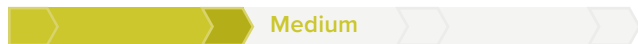
Pakistan's Building Energy Code from 1986 and its updates, including the Energy Provisions 2011, provide minimum requirements for energy-efficient design and construction of buildings. However, Pakistan has no national strategy for near-zero new energy buildings.

References: own evaluation based on Ministry of Planning, Development & Reform, 2018; Ministry of Housing & Works, 1990

Renovation of existing buildings

Low
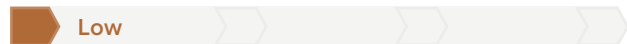
Pakistan's Building Code and related Energy Provisions 2011 provide minimum energy efficiency requirements for the design and construction of **new** systems and **new** equipment in existing buildings. In contrast, the government has no strategy nor incentives to promote the retrofitting of existing buildings.

*Reference: own evaluation based on Ministry of Housing and Works, 2013*

INDUSTRY SECTOR
Emissions from energy in the industrial sector

Industry-related emissions make up 38% of CO_2 emissions in Pakistan. Pakistan has only managed to slightly reduce emissions from this sector.

Share in energy-related CO_2 emissions from industrial sector

*Data for 2018.
Source: Enerdata, 2020*

7%
Electricity-related emissions

CO_2

32%
Direct emissions

1.5°C
COMPATIBILITY
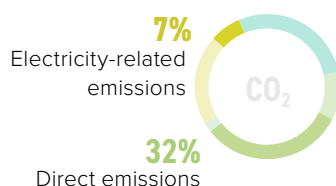
Industrial emissions need to be reduced by 75-90% from 2010 levels by 2050.

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Industry emissions intensity[7]

1.89
tCO$_2$e/USD2015 GVA

Industry emissions: 5-year trend (2012-2017)   **+11%**

Data for 2017. Sources: Gütschow et al., 2019; Enerdata, 2020

Carbon intensity of cement production[8]
(kgCO$_2$/tonne product)

In 2012, cement production emitted 14.73 MtCO$_2$e. With a production of 29.56 Mt that year, the country's emissions-intensity of cement production was 498 kgCO$_2$e/tonne. More recent data is not available for Pakistan.

Data for 2018. Sources: CAT Decarbonisation Data Portal, 2020; Mir et al., 2017

Carbon intensity of steel production[8]
(kgCO$_2$/tonne product)

1,900
World average

Steel production and steelmaking are significant GHG emission sources, and challenging to decarbonise. In 2012, Pakistan produced 0.25 MT of metal (iron and steel). With associated emissions of 0.59 MtCO$_2$e, the country's emissions-intensity of steel production stood at 2,360 kgCO$_2$e/tonne. More recent data is not available for Pakistan.

Data for 2018. Sources: Mir et al., 2017; World Steel Association, 2018

POLICY ASSESSMENT

Energy Efficiency

Pakistan is planning to set sectoral energy efficiency targets via its NEECA Strategic Plan 2020-2030. The 2006 National Energy Conservation Policy lists several initiatives for the industry sector. These include the facilitation of **energy audits; the implementation of low-cost, fast-payback energy conservation measures; the promotion of energy efficient combustion processes, instrumentation and control; the development of management information systems; and the promotion of small-scale technology programmes** in small and medium scale industrial units.

Source: Ministry of Water & Power, 2007

LAND USE SECTOR

Emissions from changes in the use of the land

NET SINK OF EMISSIONS

To stay within the 1.5°C limit, Pakistan needs to make the land use and forest sector a net sink of emissions, a goal which the Ten Billion Tree Tsunami project will aid. In addition, the country needs to halt the expansion of residential areas, discontinue the degradation of peatland, and convert cropland into wetlands.
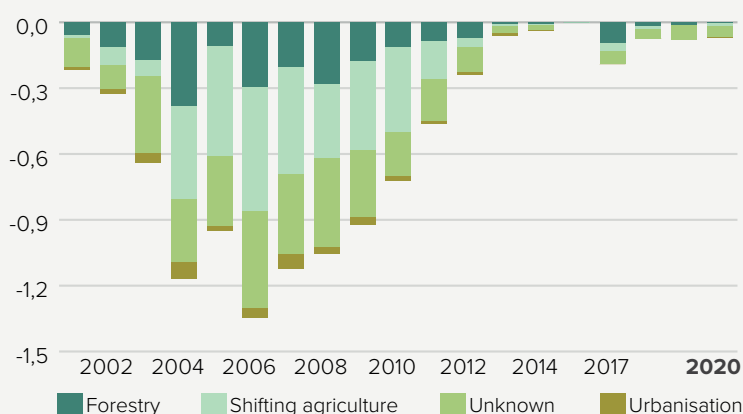
1.5°C COMPATIBILITY

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

Source: Rogelj et al., 2018

Global tree-cover loss

Gross tree-cover loss by dominant driver (thousand hectares)

■ Forestry ■ Shifting agriculture ■ Unknown ■ Urbanisation

Between 2001 and 2018, Pakistan lost 9.68 kha of tree cover, equivalent to a 99% decrease from 2000. This does not take tree-cover gain into account.

Source: World Resources Institute, 2020

POLICY ASSESSMENT
Target for net-zero deforestation

Medium

The 2015 National Forest Policy aimed for a national level mass afforestation programme: to control deforestation through regulating the movement and inter-provincial trade of timber.

In 2020 the Prime Minister announced the one billion trees target would increase to 10 billion by 2023. With one of the highest deforestation rates in Asia in 2020, Pakistan has no net zero deforestation target.

References: own evaluation, based on Ministry of Climate Change, 2015; FAO, 2003

AGRICULTURE SECTOR

Emissions from agriculture

DIETARY SHIFTS ARE NEEDED

Pakistan is one of the top 10 countries for non-CO_2 emissions from crops and livestock. The country's agricultural emissions are mainly from digestive processes in animals, livestock manure and the use of synthetic fertilisers. A 1.5°C pathway requires dietary shifts, increased organic farming and less fertiliser use.
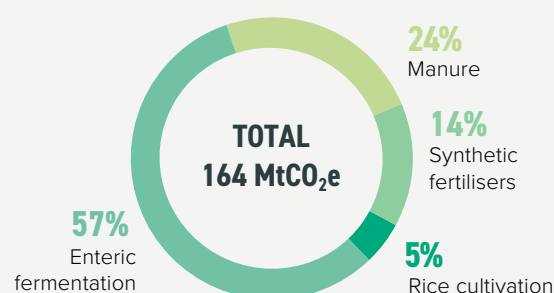
Source: FAO, 2020

1.5°C COMPATIBILITY

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 fertilisers and manure) need to be reduced by 10% by 2030 and by 20% by 2050 (from 2010 levels).

Source: Rogelj et al., 2018

Emissions from agriculture (excluding energy)

TOTAL 164 MtCO₂e

24% Manure

14% Synthetic fertilisers

5% Rice cultivation

57% Enteric fermentation

Data for 2018. Source: FAO, 2019

Pakistan's largest sources of GHG emissions in its agricultural sector are digestive processes in animals (enteric fermentation), livestock manure, and the use of synthetic fertilisers. In 2017, livestock accounted for 65% of the country's CH_4 emissions. Note that while the emissions-intensity of the agricultural sector and its share in the country's GDP have been steadily declining since 2000, the government, in its NDC, projects an increase of around 160% in emissions from this sector between 2015 and 2030. A shift to organic farming, more efficient use of fertilisers and diet changes can help reduce emissions.

Due to rounding, some graphs may sum to slightly above or below 100%.

Sources: Government of Pakistan, 2015; Pakistan Bureau of Statistics, 2021

MITIGATION: TARGETS AND AMBITION

The combined mitigation effect of nationally determined contributions (NDC) submitted by September 2020 is not sufficient and will lead to a warming of 2.7°C by the end of the century. This highlights the urgent need for all countries to submit more ambitious targets by 2020, as they agreed in 2015, and to urgently strengthen their climate action to align to the Paris Agreement's temperature goal.

AMBITION: 2030 TARGETS

Nationally Determined Contribution (NDC): Mitigation

Targets

Pakistan anticipates a baseline increase of 300% from 2015 emission levels by 2030. Its NDC is a 20% reduction of GHG emissions (incl. LULUCF) from that baseline by 2030, subject to availability of international funding to the amount of USD 40bn (2016 prices).

Actions

No concrete actions are mentioned in Pakistan's NDC, but instead a number of priority areas for mitigation. Examples are: increased grid efficiency and large-scale renewable energy (energy supply); energy efficient appliances for irrigation, cooking and heating (energy demand); improved irrigation and water management techniques (agriculture).

TRANSPARENCY: FACILITATING AMBITION

Countries are expected to communicate their NDCs in a clear and transparent manner in order to ensure accountability and comparability.

The NDC Transparency Check has been developed in response to Paris Agreement decision (1/CP.21) and the Annex to decision 4/CMA.1. While the Annex is only binding from the second NDC onwards, countries are "strongly encouraged" to apply it to updated NDCs, due in 2020.

NDC Transparency Check recommendations
For more visit www.climate-transparency.org/ndc-transparency-check

Pakistan's NDC has yet to be assessed using the NDC Transparency Check tool.

AMBITION: LONG-TERM STRATEGIES

Status	NDC submitted to UNFCCC in 2015
2050 target	No
Interim steps	No
Sectoral targets	No
Net-Zero target	No
Net-Zero year	No

The Paris Agreement invites countries to communicate mid-century, long-term, and low GHG emissions development strategies by 2020. Long-term strategies are an essential component of the transition toward net-zero emissions and climate-resilient economies.

3. FINANCE
MAKING FINANCE FLOWS CONSISTENT WITH CLIMATE GOALS

PARIS AGREEMENT **Make finance flows consistent with a pathway towards low-GHG emissions and climate-resilient development.**

NO EXPLICIT CARBON PRICE Pakistan spent **USD 5,047m on fossil fuel subsidies in 2018, mostly on gas and electricity (52% and 46% of total respectively)**. Pakistan has no explicit carbon price.

1.5°C COMPATIBILITY Investment in green energy and infrastructure needs to outweigh fossil fuel investments by 2025.

Source: Rogelj et al., 2018

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 the price.

Fossil Fuel Subsidies

According to IEA (2020), in 2019 Pakistan subsidised the consumption of fossil fuels for a total of USD 1.9bn. The large share of these subsidies went to subsidising the consumption of gas (USD 1.745bn), and a smaller share was directed to oil consumption (USD 155million).

Broadly in line with the IEA figures, according to Government of Pakistan (2020), a total of USD 1.7bn is reported in the state budget as subsidies to electricity, oil and gas for the fiscal year 2019-2020. The subsidies directed to support electricity consumption amounted to around USD 1.4bn* – the large majority of these (USD 1.0bn) went to distribution companies (DISCOs) to cover the difference between the National Electric Power Regulatory Authority-approved tariff schedules, which can differ across DISCOs, and the uniform tariff schedule notified by the Ministry of Water and Power in all regions of the country.

While the government has made considerable efforts to reduce electricity consumption subsidies over the last few years, it is now trying to further cut subsidies by reducing transmission losses, i.e. with a limited impact on electricity prices. The remaining reported subsidies are those directed at the oil and gas sector: a USD 154m consumption subsidy to LNG sector for providing gas on lower rates to industry, and the USD 148m subsidy provided to the production and distribution of oil and gas by means of supporting companies such as PSO, APL and others.

Sources: Ahmed, 2019; Department of Energy, 2003; IMF, 2019

The other subsidies to fossil fuel production recorded are those representing incentives to investors in the upstream oil and gas sector (Ministry of Energy, 2020), namely:

- The establishment of a specific gas pricing formula for local and foreign companies, as well as transparent criteria for the award of exploration licenses on the basis of work units (per unit cost is USD 10,000)

- Concessionary rates of duty for import of machinery/ equipment/material, etc. vehicles, vessels

- Capping of the corporate tax for the sector at 40%

- A bonanza of USD 1/MMBTU for the first three discoveries in any offshore areas.

Data on the total amount of subsidies provided so far through these channels are not available.

In 2020 the government of Pakistan incurred around USD 820m in foregone revenues related to fossil fuel production and sales activities in the form of tax expenditures (Redonda et al. 2021)**. The favourable tax treatments went to oil refining activities, to the sales of electricity, coal, lignite and LPG, and - to a smaller extent - to the aviation and automotive sectors.

* An average 2019-2020 exchange rate of 0.00645 has been applied to all calculations, using the 2019 and 2020 exchange rates.

** Based on the authors' own calculations using the GTED data.

Carbon pricing and revenue

Pakistan has no explicit carbon price, but is considering this option. In December 2019, Pakistan launched the National Committee on Establishment of Carbon Markets, tasked with assessing the role and scope of carbon markets in delivering Pakistan's NDC and identifying opportunities for and challenges to improving emissions data. The ongoing work is focused on developing recommendations for the government on a domestic ETS and credit-based trading mechanisms linked to international carbon markets.

Sources: Carbon Tax Centre, 2021, International Carbon Action Partnership, 2020; Postic and Fetet, 2020

⚙ CORONAVIRUS RECOVERY As part of the government's response to the coronavirus pandemic, Pakistan launched the Green Economic Stimulus, focused on job creation and restoration of the country's natural ecosystems. In June 2021, the World Bank approved USD 188m for this initiative. This funding is part of a larger Ecosystem Restoration Fund platform for public and private investment. Further initiatives include a 'Debt-for-nature' scheme targeting USD 1bn in funding, the launch of a USD 500m 'Green Euro' Bond and a variety of so-called 'Nature Bonds'.

Sources: M Khan, 2020; M Khan, 2021; Pakistan Today, 2021

FINANCIAL POLICY AND REGULATION

Financial policy and regulation

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.

Between 2017 and 2019 Pakistan moved from preparation to implementation stage with regards to sustainable finance policy action. Pakistan's central bank, the State Bank of Pakistan, introduced guidelines that require financial institutions to monitor their climate risk exposure at portfolio level and encourage them to take steps to mitigate the risks they identify.

Stress testing is used to evaluate the resiliency of the financial sector to economic shocks that are caused by the effects of severe but plausible scenarios. In 2020, the State Bank of Pakistan revised its guidelines on stress-testing in a bid to further strengthen the risk management capacity of banks, development finance institutions and microfinance banks in the country. The revised measures replace earlier guidelines issued in 2012. While the stress testing guidelines do not consider climate change explicitly, they include guidance on macro stress-testing and reverse stress-testing aside from sensitivity analysis, with an enhanced number of shock scenarios including sectoral shocks. The central bank also requires Islamic banks, Islamic banking branches and microfinance banks to perform sensitivity analysis exercises. In addition, domestic, systemically important banks must conduct annual macro stress-testing and reverse stress-testing.

The state bank of Pakistan also provides an incentive scheme for renewable energy through three distinct categories for borrowing. There is no such incentive scheme available for fossil fuel-based projects.

Sources: Gambe, 2020; Sustainable Banking Network, 2019

Nationally Determined Contribution (NDC): Finance

Conditionality	Yes
Investment needs	USD 7-14bn per annum
Actions	Not mentioned
International market mechanisms	No contribution from international credits for the achievement of the target

ENDNOTES

For more detail on the sources and methodologies behind the calculation of the indicators displayed, please download the Technical Note at: www.climate-transparency.org/g20-climate-performance/g20report2020

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 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 emissions 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.

3   In order to maintain comparability across all countries, this report utilises the PRIMAP year of 2017. However, note that Common Reporting Format (CRF) data is available for countries which have recently updated GHG inventories.

4   The Decarbonisation ratings appear only in the

CTR profiles for the G20 countries, on which this profile is based.

5   The selection of policies rated and the assessment of 1.5°C compatibility are informed by the Paris Agreement, the IPCC's 2018 SR15 and the Climate Action Tracker (2016). The table below displays the criteria used to assess a country's policy performance.

6   This indicator adds up emissions from domestic aviation and international aviation bunkers in the respective country. In this Country Profile, however, only a radiative forcing factor of 1 is assumed.

7   This indicator includes only direct energy-related emissions and process emissions (Scope 1) but not indirect emissions from electricity.

8   This indicator includes emissions from electricity (Scope 2) as well as direct energy-related emissions and process emissions (Scope 1).

On endnote 5.	Low	Medium	High	Frontrunner
Renewable energy in power sector	No policies 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 targets or policies 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 policies 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 policies	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)
Energy efficiency in industry	0-49% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard	50-79% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard	80-89% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard	Over 90% average score on the policy-related metrics in the ACEEE's International Energy Efficiency Scorecard
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
Net-zero deforestation	No policies or incentives 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

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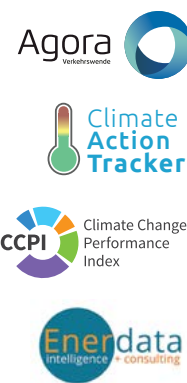# ABOUT CLIMATE TRANSPARENCY

Climate Transparency

Climate Transparency is a global partnership with a shared mission to stimulate a "race to the top" in climate action in G20 countries through enhanced transparency.

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