

SAUDI ARABIA



CLIMATE TRANSPARENCY REPORT COMPARING G20 CLIMATE ACTION AND RESPONSES TO THE COVID-19 CRISIS

This country profile is part of the **Climate Transparency Report 2020**. Find the full report and other G20 country profiles at: www.climate-transparency.org

PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS ABOVE G20 AVERAGE

GHG emissions (incl. land use) per capita in Saudi Arabia are the second highest in the G20, only behind Australia. While decreasing on average for the G20, emissions per capita are increasing in Saudi Arabia.

GHG emissions (incl. land use) per capita (tCO₂e/capita)¹



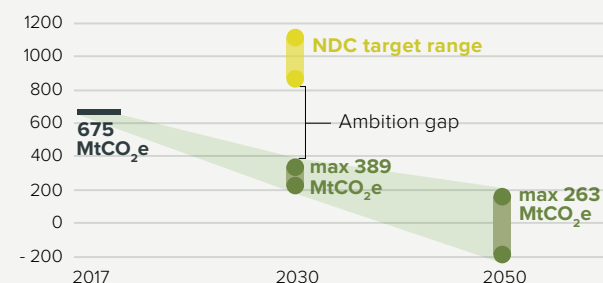
Data for 2017.
Sources: Enerdata, 2020; Gütschow et al., 2019; UN Department of Economic and Social Affairs Population Division, 2020.

NOT ON TRACK FOR A 1.5°C WORLD



Saudi Arabia would need to reduce its emissions to below 389 MtCO₂e by 2030 and to below 263 MtCO₂e by 2050 to be within its emissions allowances under a 'fair-share' range compatible with global 1.5°C. The country's 2030 NDC range of 1,105-861 MtCO₂e by 2030 is critically insufficient. All figures exclude land use emissions and are based on pre-COVID-19 projections.

Saudi Arabia 1.5°C 'fair-share' pathway (MtCO₂e/year)^{1&2}



Source: Climate Action Tracker, 2019

KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION



Fossil fuels make up over 99% of Saudi Arabia's energy mix. Develop a long-term strategy for renewable energy that leads to net CO₂ emissions in the power sector by 2050.



Transport emissions per capita in Saudi Arabia are more than double the G20 average, with oil making up 100% of final energy consumption in transport. Phase out fossil fuel cars by 2035.



Industry emissions account for almost half of Saudi Arabia's direct CO₂ emissions and are growing at a rapid rate. Adopt mandatory energy efficiency policies to reduce industrial energy use.

RECENT DEVELOPMENTS



In 2019, **Saudi Arabia raised its renewable energy target from 9.5 GW in 2023 to 58.7 GW**

by 2030. While slow progress has been made, Saudi Arabia is moving forward with the second round of their National Renewable Energy Programme to procure 1.47 GW of renewable capacity.



At COP25 in Madrid, Saudi Arabia joined other high-emitting countries in **blocking negotiations on emissions trading under Article 6**, pushing to allow double counting of credits and allowing the carry-over of old Kyoto-era credits.



In July 2020, **Saudi Arabia announced plans to build the world's largest green hydrogen plant** in Neom, its planned megacity. The USD 5bn plant is a Saudi-US joint venture powered by 4 GW of wind and solar.

Sources: MEED, 2020; Abdulkareem and Ellaboudy, 2020; Parnell, 2020

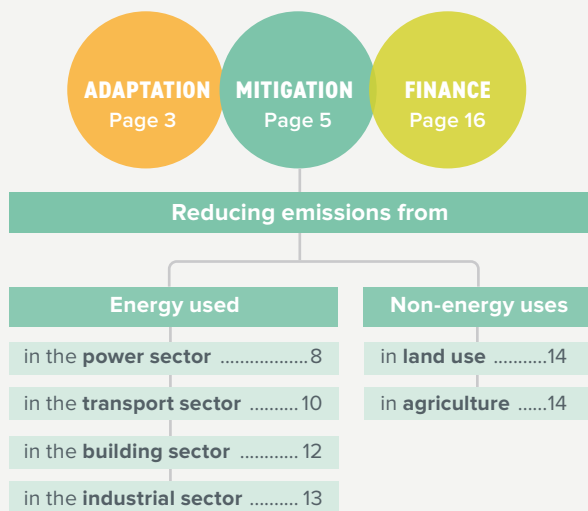
CORONAVIRUS RECOVERY

Saudi Arabia announced a set of support packages for the private sector totalling USD 61bn, coupled with an increase of VAT from 5% to 15%. So far, the government's COVID-19 response has not targeted a green recovery, and has provided for electricity subsidies worth USD 0.24bn. Like other oil-exporting countries, Saudi Arabia has also been hit by a sharp decline in oil prices. In response, Saudi Arabia cut export prices drastically - the biggest one-day drop since 1991.

References: IMF, 2020; Ward, 2020; KPMG, 2020

CONTENTS

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

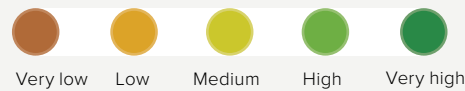


LEGEND

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



Decarbonisation Ratings⁴ assess a country's performance compared to other G20 countries. A high score reflects a relatively good effort from a climate protection perspective but is not necessarily 1.5°C compatible.



Policy Ratings⁵ evaluate a selection of policies that are essential pre-conditions for the longer-term transformation required to meet the 1.5°C limit.



SOCIO-ECONOMIC CONTEXT

Human Development Index

The Human Development Index reflects life expectancy, level of education, and per capita income. Saudi Arabia ranks very high.



Data for 2018. Source: UNDP, 2019

Gross Domestic Product (GDP) per capita (PPP constant 2015 international \$)

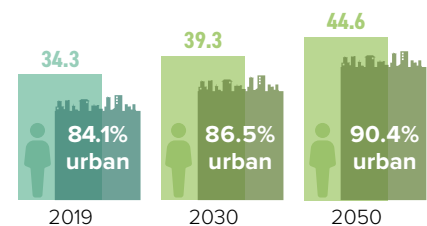


Data for 2019. Source: The World Bank, 2020

Population and urbanisation projections

(in millions)

Saudi Arabia's population is expected to increase by about 21% by 2050 and become more urbanised.



Sources: The World Bank, 2019; United Nations, 2018

Death rate attributable to air pollution

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



Data for 2016. Source: WHO, 2018

Almost 12,000 people die in Saudi Arabia every year as a result of outdoor air pollution, due to stroke, heart disease, lung cancer and chronic respiratory diseases. Compared to total population, this is one of the higher levels in the G20.

11,915
deaths per year

JUST TRANSITION



Oil and gas have historically contributed to more than half of Saudi Arabia's nominal GDP. The country's NDC prioritises diversifying its economy away from its "heavy reliance on income generated from a single resource".

Launched in 2016, the 'Saudi Vision 2030' framework calls for raising the share of non-oil exports from 16% to 50% of export value by 2030, as well as expanding the role of renewables in the energy system and localising the renewable energy and industrial equipment sectors. At the same time, the Vision calls for doubling gas production.

Despite limited public discourse on just transitions in Saudi Arabia, the "Saudi Vision 2030" framework outlined the aim to create 1.2 million private sector jobs by 2020 and reduce unemployment from 11.6% to 9%.

At the Bangkok Climate Conference in 2018, the country described a just transition as "central to [their] ecological future". Nevertheless, the effect on workers and communities in the oil and gas sector remain unclear.

References: OECD, 2017; UNDP and Saudi Energy Efficiency Center, 2019

1. ADAPTATION

ADDRESSING AND REDUCING VULNERABILITY TO CLIMATE CHANGE



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



Saudi Arabia is vulnerable to climate change and **adaptation actions are needed.**



On average, **28 fatalities and almost USD 229m losses** occur yearly due to extreme weather events.



With global warming, society and its supporting sectors are increasingly exposed to extreme weather events such as extreme heat.

ADAPTATION NEEDS

Climate Risk Index

Impacts of extreme weather events in terms of fatalities and economic losses that occurred. All numbers are averages (1999-2018).

Annual weather-related fatalities



0.11 PER 100,000 INHABITANTS

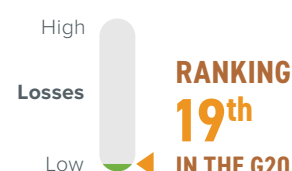


Source: Based on Germanwatch, 2019

Annual average losses (USD mn PPP)



0.02 PER UNIT GDP (%)



Source: Based on Germanwatch, 2019

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

Impact ranking scale:

! Very low ! Low ! Medium ! High ! Very high

		1.5°C	2°C	3°C
WATER	% of area with increase in water scarcity	!	!	!
	% of time in drought conditions	!	!	!
HEAT AND HEALTH	Heatwave frequency	!	!	!
	Days above 35°C	!	!	!
AGRICULTURE	Maize	Reduction in crop duration	!	!
		Hot spell frequency	!	!
		Reduction in rainfall	!	!
	Wheat	Reduction in crop duration	!	!
		Hot spell frequency	!	!
		Reduction in rainfall	!	!

Source: Water, Heat and Health: own research. Agriculture: Arnell et al., 2019.

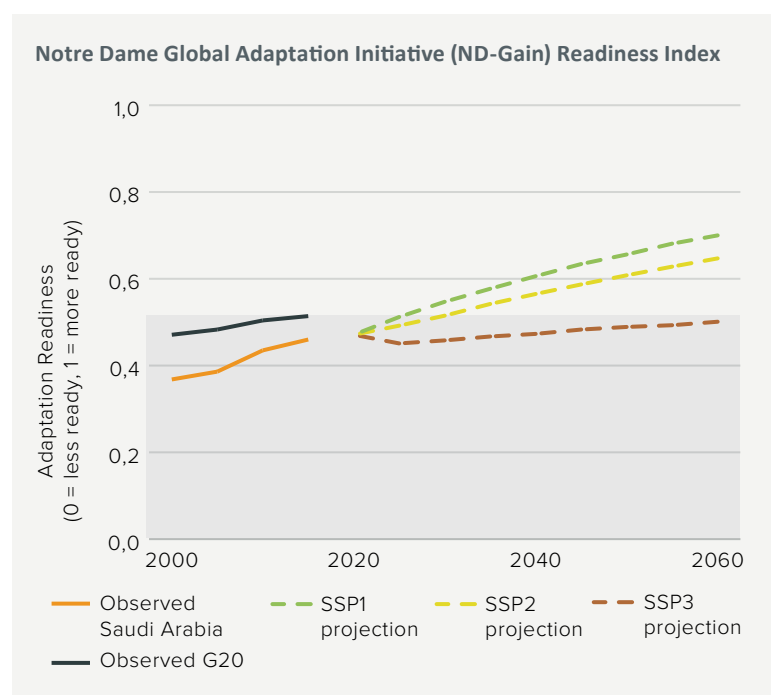
Note: These indicators are national scale results, weighted by area and based on global data sets. They are designed to allow comparison between regions and countries and, therefore, entail simplifications. They do not reflect local impacts within the country. Please see technical note for further information.

CORONAVIRUS RECOVERY

Saudi Arabia's agriculture sector is highly vulnerable to drought and hot spells which are expected to be exacerbated by climate change, threatening Saudi Arabia's food supply. In response to COVID-19, two initiatives worth a total of USD 665m were introduced to support food imports and local farmers. Part of the local production support includes loans to help cover the capital costs of hydroponics systems, which use 90% less water than traditional farming practices.

Adaptation readiness

The figure shows 2000-2015 observed data from the ND-GAIN Index overlaid with projected Shared Socioeconomic Pathways (SSPs) from 2015-2060.



Saudi Arabia is below the observed average adaptation readiness of the G20 and would be much better positioned to adapt if it implemented measures in step with either SSP1 or SSP2. Socio-economic developments compatible with SSP3 would keep its readiness below the 2015 G20 average for the next 40 years.

The readiness component of the Index created by the Notre Dame Global Adaptation Initiative (ND-GAIN) encompasses social economic and governance indicators to assess a country's readiness to deploy private and public investments in aid of adaptation. The index ranges from 0 (low readiness) to 1 (high readiness).

The overlaid SSPs are qualitative and quantitative representations of a range of possible futures. The three scenarios shown here in dotted lines are qualitatively described as a *sustainable development-compatible scenario (SSP1)*, a *middle-of-the-road (SSP2)* and a *'Regional Rivalry' (SSP3)* scenario. The shaded area delineates the G20 average in 2015 for easy reference.

Source: Andrijevic et al., 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	
No adaptation policy														

Nationally Determined Contribution (NDC): Adaptation

Targets	Actions
Not mentioned	Actions specified in the following sectors: water, biodiversity/ecosystems, agriculture, forestry, infrastructure

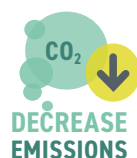
2. MITIGATION

REDUCING EMISSIONS TO LIMIT GLOBAL TEMPERATURE INCREASE



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



Saudi Arabia's GHG emissions have increased significantly, by 197% (1990-2017) and the government's climate targets for 2030 are **not in line with a 1.5°C pathway**.

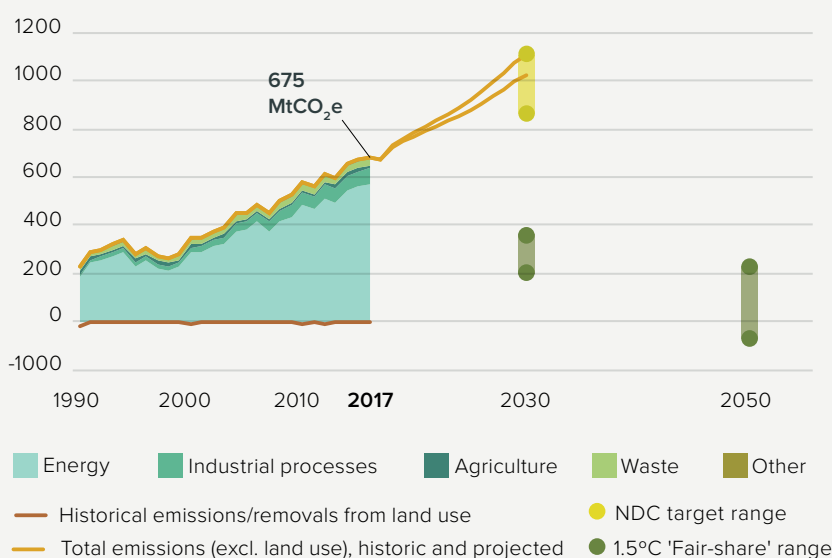


In 2030, global CO₂ emissions need to be **45%** below 2010 levels and reach net-zero by 2050. Global energy-related CO₂ emissions must be cut by 40% below 2010 levels by 2030 and reach net-zero by 2060.

Source: Rogelj et al., 2018

GHG emissions across sectors and CAT 1.5°C 'fair-share' range (MtCO₂e/year)

Total GHG emissions across sectors (MtCO₂e/year)

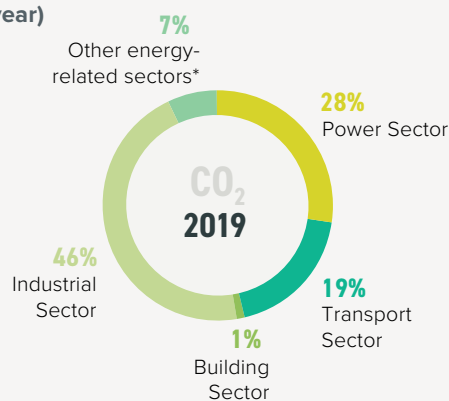
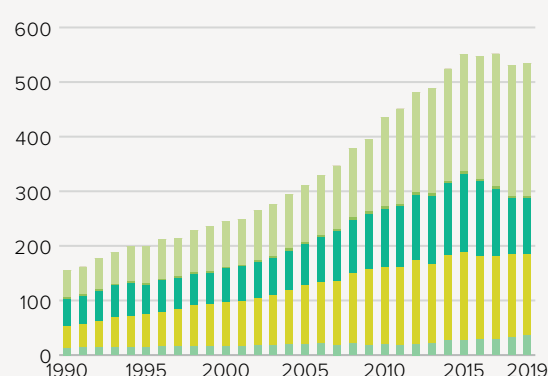


Source: Gütschow et al., 2019; Climate Action Tracker, 2019

Saudi Arabia's emissions (excl. land use) have increased by 197% between 1990 and 2017. When considered by category, increases are seen in all sectors – with energy and industrial processes increasing the most dramatically. The most recent emissions projections show that under current policies, emissions will continue to increase up to 2030 at a sufficient pace to meet the upper range of its national mitigation targets, which are themselves not yet compatible with the Paris Agreement. **Saudi Arabia will need to scale up climate action to meet the more ambitious end of its national targets,** with significant more effort required to become 1.5°C compatible.

Energy-related CO₂ emissions by sector

Annual CO₂ emissions from fuel combustion (MtCO₂/year)



* 'Other energy-related sectors' covers energy-related CO₂ 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 CO₂ emissions from fuel combustion. In Saudi Arabia, emissions have stabilised and began decreasing from 2016. The industry sector, with 46%, is the largest contributor, followed by the electricity and heat generation sector as well as transport with 28% and 19% respectively.

Source: Enerdata, 2020

CORONAVIRUS RECOVERY

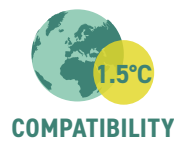
The crash in oil prices accompanying COVID-19 has impacted government revenue and forced Saudi Arabia to cut spending for several programmes, including cost-of-living allowances for public workers. COVID-19 has highlighted the vulnerability of the kingdom's economy to volatile oil prices, presenting a compelling case for decarbonisation. Despite the pandemic, the National Renewable Energy Programme has moved forward, with its second procurement round producing PV bids as low as USD 0.0162/kWh.

References: IMF, 2020; Martín, 2020

ENERGY OVERVIEW



Fossil fuels currently make up over 99% of Saudi Arabia's energy mix (counting power, heat, transport fuels, etc). Over the last three decades, the carbon intensity of the energy mix has hardly changed.

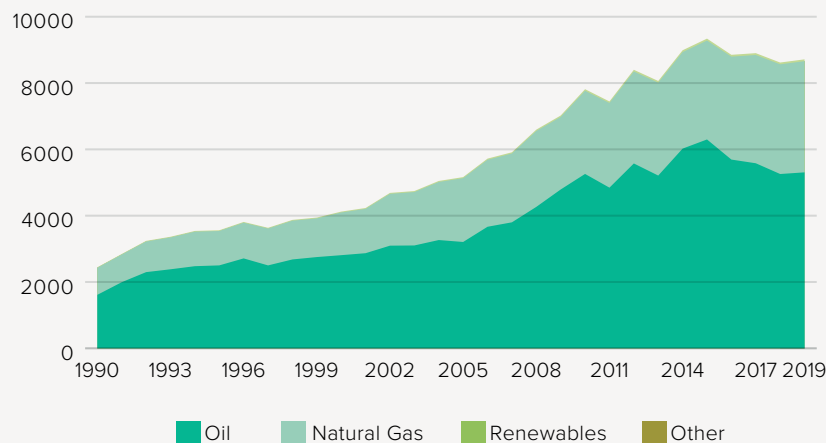


The share of **fossil fuels in the global primary energy mix needs to fall to 67% by 2030 and to 33% by 2050** (and to substantially lower levels without Carbon Capture and Storage).

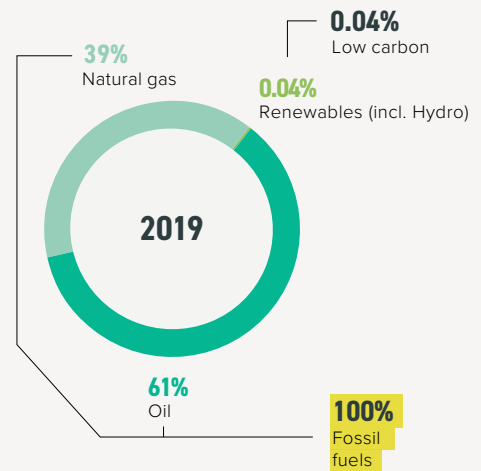
Source: Rogelj et al., 2018

Energy Mix

Total primary energy supply (PJ)



Source: Enerdata, 2020

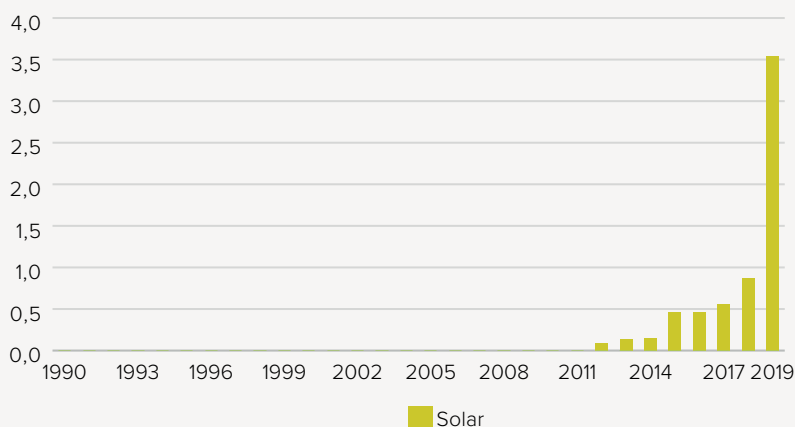


Due to rounding, some graphs may sum to slightly above or below 100%.

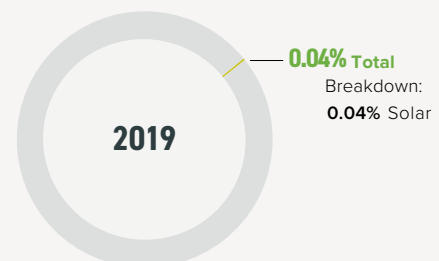
This graph shows the fuel mix for all energy supply, including energy used not only for electricity generation, heating, cooking, but also for transport fuels. Fossil fuels (oil, coal and gas) make up over 99% of the Saudi energy mix, which is higher than the G20 average. While some renewable energy has been added, it is less than 0.1% of the energy mix.

Solar, Wind, Geothermal, and Biomass Development

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



Solar power accounts for less than 0.1% of Saudi Arabia's energy supply



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%.

Decarbonisation rating: RE share of TPES compared to other G20 countries

5-year trend (2014-2019):



Current year (2019):

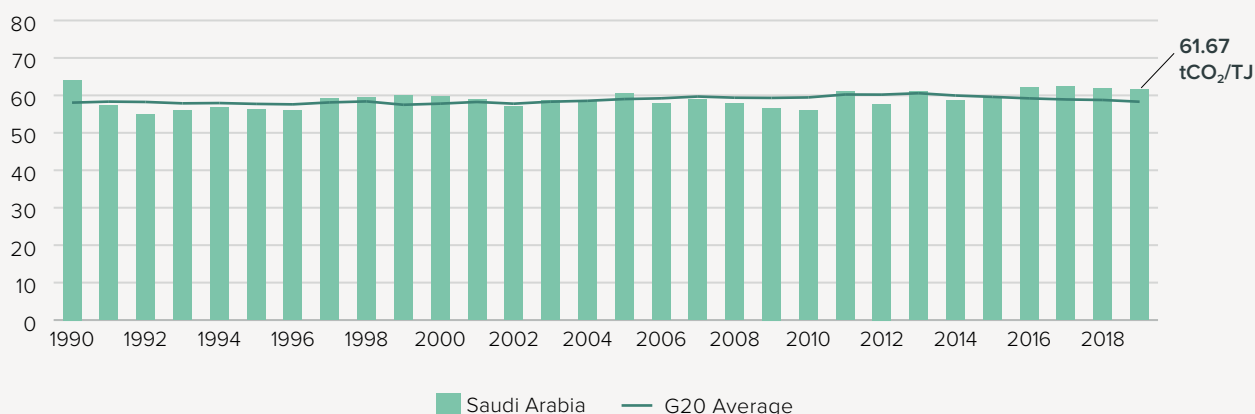


Source: own evaluation

Solar power is the only source of renewable energy in Saudi Arabia, accounting for less than 0.1% of Saudi Arabia's energy supply while the G20 average, including solar, wind, geothermal and biomass, is 6%. The share in total energy supply has increased by 1792% in the last five years in Saudi Arabia (2014-2019); however, this seemingly significant increase is due to the very small initial share of renewables in 2014.

Carbon Intensity of the Energy Sector

Tonnes of CO₂ per unit of total primary energy supply (tCO₂/TJ)



Source: Enerdata, 2020

Decarbonisation rating: carbon intensity of the energy sector compared to other G20 countries

5-year trend
(2014-2019):



Current year
(2019):



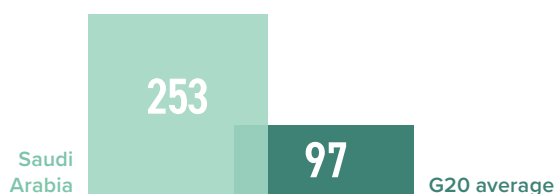
Carbon intensity shows how much CO₂ is emitted per unit of energy supply.

In Saudi Arabia, carbon intensity has increased slightly over the last five years, just surpassing the G20 average. This trend reflects the continuously high share of fossil fuels in the energy mix.

Source: own evaluation

Energy supply per capita

(GJ/capita)



Source: Enerdata, 2020

TPES per capita (GJ/capita): 5-year trend (2014-2019)



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 Saudi Arabia is 253 GJ/capita, well above the G20 average, but is decreasing (-15%, 2014-2019) in contrast to the increasing G20 average (+2%).

Decarbonisation rating: energy supply per capita compared to other G20 countries

5-year trend
(2014-2019):



Current year
(2019):



Source: own evaluation

Energy intensity of the economy

(TJ/PPP USD2015 millions)



Data for 2018. Source: Enerdata, 2020

Energy intensity of the economy: 5-year trend
(2014-2019)



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

Saudi Arabia's energy intensity is only slightly higher than the G20 average but is decreasing at a slower speed (-7%, 2013-2018) than the G20.

Decarbonisation rating: energy intensity compared to other G20 countries

5-year trend
(2013-2018):



Current year
(2018):



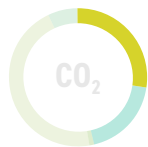
Source: own evaluation



POWER SECTOR

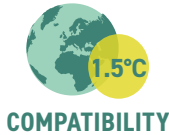
Emissions from energy used to make electricity and heat

Saudi Arabia does not use coal for the generation of electricity; however, the electricity sector is still highly dependent on fossil fuels (65% natural gas, 35% oil). The share of renewables is rising but it is still negligible. In order to be compatible with a 1.5°C pathway, the share of renewables needs to increase significantly and rapidly.



28% Share in energy-related CO₂ emissions from electricity and heat production

Source: Enerdata, 2020



Coal decarbonisation

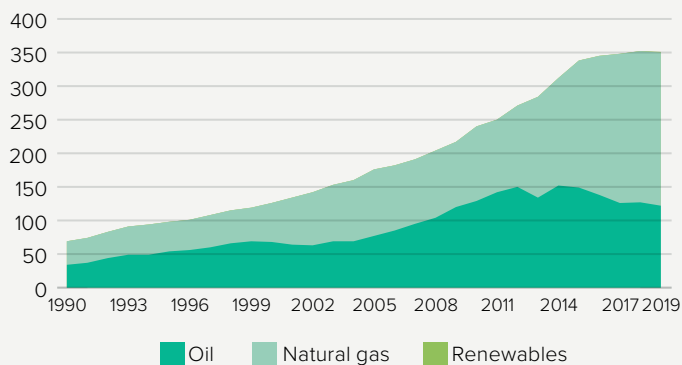
Worldwide, **coal use for power generation needs to peak by 2020** and, between 2030 and 2040, all the regions of the world need to phase out coal-fired power generation. **Electricity generation has to be decarbonised before 2050**, with renewable energy the most promising alternative.

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

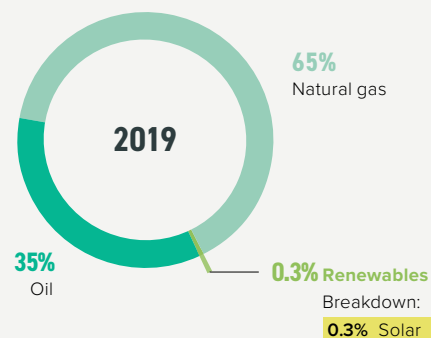
STATUS OF DECARBONISATION

Electricity mix

Gross power generation (TWh)



Source: Enerdata, 2020

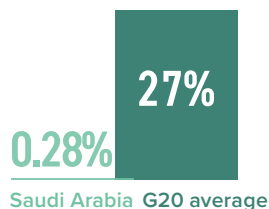


Due to rounding, some graphs may sum to slightly above or below 100%.

Saudi Arabia is producing some electricity from solar, but the amount is so small that it is a negligible contributor to the power mix – over 99% of electricity is produced from fossil fuels. Gas accounts for the largest share in the power mix (65%), followed by oil (35%).

Share of renewables in power generation

(incl. large hydro)



Source: Enerdata, 2020

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



+1521%
Saudi Arabia



+19.5%
G20 average

Decarbonisation rating: share of renewables compared to other G20 countries

5-year trend
(2014-2019):



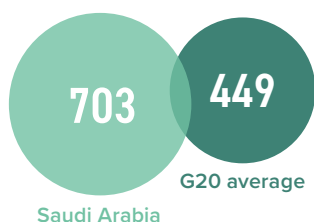
Current year
(2019):



Source: own evaluation

Emissions intensity of the power sector

Country vs G20 average (gCO₂/kWh)



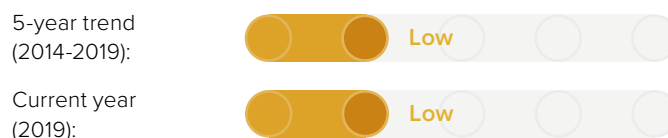
Source: Enerdata 2020

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



For each kilowatt hour of electricity, 703 gCO₂ are emitted in Saudi Arabia, above the G20 average. The emissions intensity has only dropped marginally because of the increasing role of natural gas compared to oil.

Decarbonisation rating: emissions intensity compared to other G20 countries



Source: own evaluation

POLICY ASSESSMENT

Renewable energy in the power sector



In 2019, Saudi Arabia raised its renewable energy target threefold – from 9.5 GW by 2023 to 27.3 GW by 2024 and 58.7 GW installed capacity by 2030.

Tenders for renewable energy projects are overseen by the National Renewable Energy Programme and a public investment fund for renewables, co-financed by the SoftBank Group, ensures the use of domestically manufactured components.

Despite the ambitious targets, actual implementation has been slow. The first three tenders, from 2017 to early 2020, procured a total of only 3.4 GW, despite low prices for wind and solar. No long-term strategy exists.

Sources: own evaluation, based on Petrova, 2020; Renewable Energy Project Development Office, 2019; Martín, 2020

Coal phase-out in the power sector

Not applicable

Saudi Arabia does not use coal for power generation.



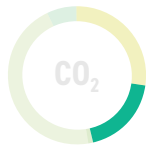
TRANSPORT SECTOR

Emissions from energy used to transport people and goods

Emissions from transport are high compared to the G20, but have decreased 25% (2014-2019). Emissions from aviation are rising steeply. In order to stay within a 1.5°C limit, passenger and freight transport need to be decarbonised.

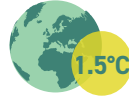
Share in energy-related CO₂ emissions from transport sector

Source: Enerdata, 2020



Electricity-related emissions
No data

19%
Direct emissions



COMPATIBILITY

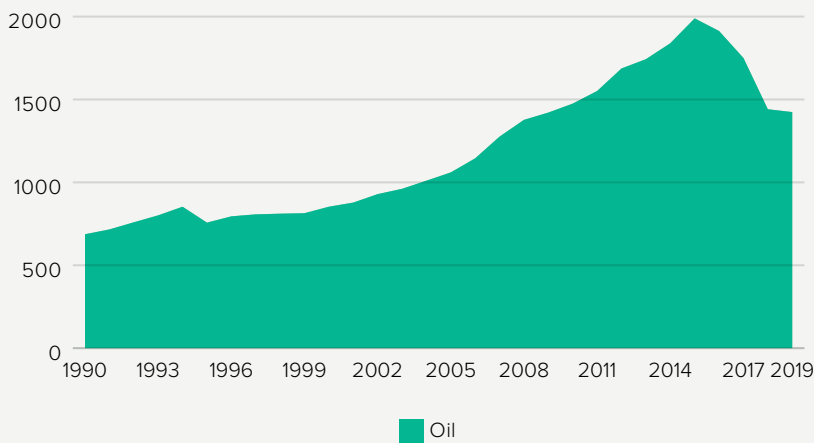
The share of low-carbon fuels in the transport fuel mix must increase to about 60% by 2050.

Source: Rogelj et al., 2018

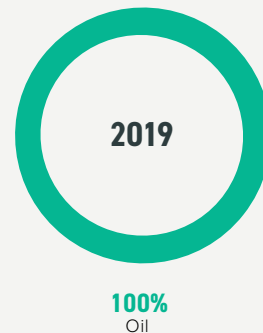
STATUS OF DECARBONISATION

Transport energy mix

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



Source: Enerdata, 2020



100%
Oil

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

Saudi Arabia uses only oil for transport.

Transport emissions per capita

excl. aviation (tCO₂/capita)



Data for 2018. Source: Enerdata, 2020

Transport emissions: 5-year trend (2013-2018)



-25.1%
Saudi Arabia



+5.5%
G20 average

Decarbonisation rating: transport emissions compared to other G20 countries

5-year trend (2013-2018):



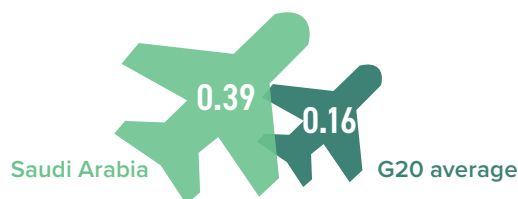
Current year (2018):



Source: own evaluation

Aviation emissions per capita⁶

(tCO₂/capita)



Data for 2017. Source: Enerdata, 2020

Aviation emissions: 5-year trend (2012-2017)



+33.3%

Saudi Arabia



+18.7%

G20 average

Decarbonisation rating: aviation emissions compared to other G20 countries

5-year trend (2012-2017):



Current year (2017):



Source: own evaluation

Motorisation rate

133 VEHICLES PER 1,000 INHABITANTS (2005)

Source: Vieweg et al., 2018

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

No data available

Passenger transport

(modal split in % of passenger-km)

No data available

Freight transport

(modal split in % of tonne-km)

No data available

POLICY ASSESSMENT

Phase out of fossil fuel cars



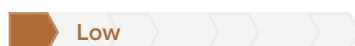
Saudi Arabia does not have a plan to phase out fossil fuel cars. In 2016, however, it implemented a fuel efficiency standard for cars (last updated in 2019), and reduced transport fuel subsidies, leading to a tripling of gasoline prices between 2014 and 2019.

In 2018, its sovereign wealth fund invested USD 1bn in a US-based electric vehicle (EV) manufacturer and signed an agreement with Nissan Motors, Takaoka Toko, and Tokyo Electric Power Co to install EV charging stations.

In response to the pandemic, however, the government reduced the price of fuel by about 50%, undermining the progress made thus far.

Sources: own evaluation, based on Sheldon and Dua, 2019; Mikayilov, Joutz and Hasanov, 2020; Dubyan and Gasim, 2019; Energy Policy Tracker, 2020

Phase out fossil fuel heavy-duty vehicles



Saudi Arabia has no plans for reducing absolute emissions from freight transport. In 2014, it issued new regulations for the "rolling resistance" and "wet grip" of tyres to improve the energy efficiency of heavy-duty vehicles (HDVs).

Saudi Arabia is currently assessing two initiatives to further improve the energy efficiency of HDVs. One initiative was to introduce regulations to improve fuel economy by enforcing anti-idling and aerodynamics. Although the aerodynamics regulations were slated for publication in 2019, they have not yet been issued. The second initiative was aimed at accelerating the retirement of inefficient HDVs.

Sources: own evaluation, based on Saudi Energy Efficiency Center, 2018

Modal shift in (ground) transport



The Vision 2030 sets qualitative objectives to increase the use of public transport and improve the efficiency of railways. The 2015 Saudi Railway Master Plan aims to construct 9,900 km of railway (2010-2040) with an initial investment of USD 97.4bn. So far, 1,500 km of new lines have come online, with two of the four first-phase projects completed. The USD 27bn Riyadh metro project and bus network are scheduled to begin operations by the end of 2020, while the Haramain high-speed rail project between Jeddah, Makkah and Madinah began operations in 2018. Additional metro projects are under construction in the major cities of Jeddah and Makkah, and planned in Dammam.

Sources: own evaluation, based on Oxford Business Group, 2020; Saudi Gazette, 2020a; Saudi Gazette, 2020b; Smith, 2019



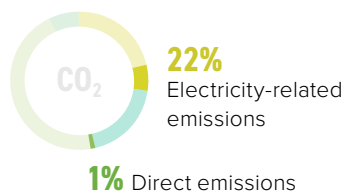
BUILDING SECTOR

Emissions from energy used to build, heat and cool buildings

Saudi Arabia's direct building emissions make up only 1% of total CO₂ emissions and 22% of electricity-related CO₂ emissions. Per capita, building-related emissions are more than double the G20 average.

Building emissions occur directly (burning fuels for heating, cooking, etc) and indirectly (grid-electricity for air conditioning, appliances, etc).

Source: Enerdata, 2020



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) (tCO₂/capita)



Source: Enerdata, 2020

Building-related emissions per capita are more than double the G20 average. This is mainly driven by low electricity prices and increasing need for cooling. In contrast to the G20 average, Saudi Arabia has managed to decrease the level by about 12% (2014-2019).

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



Residential buildings

Energy use per m²

No data available

Commercial and public buildings

Energy use per m²

No data available

Decarbonisation rating: building emissions compared to other G20 countries

5-year trend (2014-2019):



Current year (2019):



Source: own evaluation

Building emissions are largely driven by how much energy is used in heating, cooling, lighting, household appliances, etc. **There is no data on energy use per m² in Saudi Arabia.**

POLICY ASSESSMENT

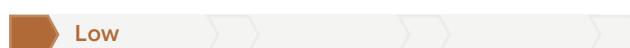
Near zero energy new buildings



Saudi Arabia has no long-term strategy for zero energy new buildings. Mandatory energy efficiency standards and regulations do, however, apply to the residential and commercial sectors. For instance, efficiency standards for split air conditioners have been strengthened by about 50% between 2012 and 2018. The Saudi Green Building Forum promotes the construction of energy- and resource-efficient and environmentally responsible buildings. As of 2020, it has over 3,000 green registered and certified projects.

Source: own evaluation, based on Howarth, Lanza and Shehri, 2020

Renovation of existing buildings



Saudi Arabia has no building retrofit policies or strategy in place.

Source: own evaluation



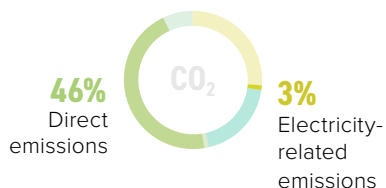
INDUSTRY SECTOR

Emissions from energy in the industrial sector

Industry-related emissions make up 46% of direct CO₂ emissions in Saudi Arabia and 4% of electricity emissions. Industry emissions intensity in Saudi Arabia has increased by about 10% while for the G20, it has decreased by 10% (2011-2016).

Share in energy-related CO₂ emissions from industrial sector

Source: Enerdata, 2020



COMPATIBILITY

Industrial emissions need to be reduced by 65-90% from 2010 levels by 2050.

Source: Rogelj et al., 2018

STATUS OF DECARBONISATION

Industry emissions intensity⁷

(tCO₂e/USD2015 GVA)

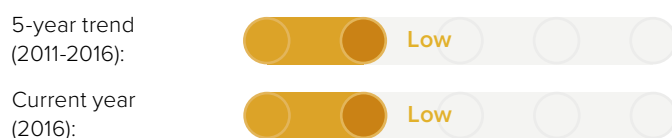


Data for 2016. Sources: Gütschow et al., 2019; Enerdata, 2020

Industry emission: 5-year trend (2011-2016)



Decarbonisation rating: emissions intensity of industry compared to other G20 countries



Source: own evaluation

Carbon intensity of cement production⁸

(kgCO₂/tonne product)

No data available

614

Saudi Arabia World average

Sources: CAT Decarbonisation Data Portal, 2020; Climate Action Tracker, 2019

Carbon intensity of steel production⁸

(kgCO₂/tonne product)

No data available

1,900

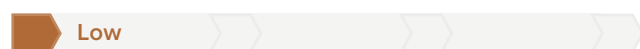
Saudi Arabia World average

Steel production and steelmaking are significant GHG emissions sources, and challenging to decarbonise. There is no data available for Saudi Arabia.

Sources: World Steel Association, 2018; CAT Decarbonisation Data Portal, 2020

POLICY ASSESSMENT

Energy Efficiency



Since 2011, Saudi Arabia has implemented an energy efficiency framework for industrial plants. **The industrial sector had an overall target to improve energy intensity by around 9% from 2010 to 2019, or 1% per year.** The Saudi Industrial Development Fund provides soft loans for energy efficiency-related projects in industry.

Source: own evaluation, based on Howarth, Lanza and Shehri, 2020



LAND USE SECTOR

Emissions from changes in the use of the land



Forests cover less than 1% of Saudi Arabia's territory. However, **coastal mangroves and low density shrublands are relevant carbon stores.**



COMPATIBILITY

Global deforestation needs to be halted and changed to net CO₂ removals by around 2030.

Source: Rogelj et al., 2018

Global tree-cover loss

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

No data available

About **1.2% of Saudi land area is covered by forest**, mainly in the mountainous western provinces. It is under heavy deforestation pressure.

POLICY ASSESSMENT

Target for **net-zero deforestation**

No data available

While fines for tree cutting exist, there is little enforcement.

Source: Arab News, 2020

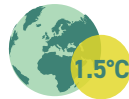


AGRICULTURE SECTOR

Emissions from agriculture



Saudi Arabia'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.

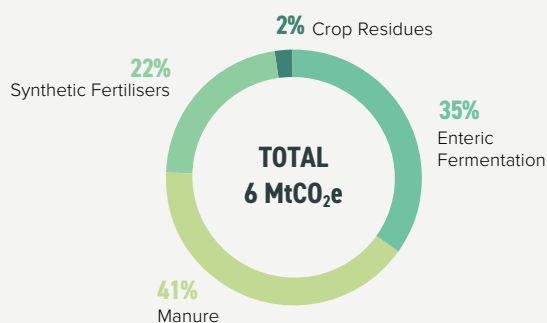


COMPATIBILITY

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)



Data for 2017. Source: FAO, 2019

In Saudi Arabia, the largest sources of GHG emissions in the agricultural sector are livestock manure, digestive processes in animals (enteric fermentation), and the use of synthetic fertilisers. A shift to organic farming, more efficient use of fertilisers and dietary changes can help reduce emissions.

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

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

Annually abate up to 130 MtCO₂e by 2030 through contributions that have co-benefits that diversify the economy and mitigate greenhouse gas emissions.

Actions

Actions specified in the following sectors: energy, industry, buildings, transport

Climate Action Tracker (CAT) evaluation of NDC and actions

●	Critically Insufficient
	Highly Insufficient
	Insufficient
	2°C Compatible
	1.5°C Compatible
	Role Model

NDCs with this rating fall well outside of a country's 'fair-share' range and are not at all consistent with holding warming to below 2°C let alone with the Paris Agreement's stronger 1.5°C limit. If all government NDCs were in this range, warming would exceed 4°C.

Saudi Arabia has put few climate policies in place, and diversification away from an oil-based economy has been slow. Reducing fossil fuel subsidies and accelerating renewable energy development will be crucial to reducing emissions. Saudi Arabia's 2030 climate commitment is highly unclear, due to a lack of data availability, including the absence of any national emissions projections and the fact that Saudi Arabia has not published the baseline corresponding to its Paris Agreement target.

Evaluation as at October 2020, based on country's NDC. Source: Climate Action Tracker

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

Saudi Arabia should adopt good practices in order to ensure clarity, transparency and understanding of its 2020 NDC Update to comply with the Paris Agreement, including:

- Provide quantified information on the baseline of the NDC target
- Provide information on sectors, gases, categories and pools covered by the nationally determined contribution, including, as applicable, being consistent with Intergovernmental Panel on Climate Change (IPCC) guidelines
- Provide information on how Saudi Arabia will account for its NDC
- Provide grounds for why the NDC should be considered to be ambitious and fair
- Provide references to a peaking year, to a year in which the country may reach net-zero emissions, or a link between the long-term temperature goal and the country's NDC

AMBITION: LONG-TERM STRATEGIES

Status	No information
2050 target	
Interim steps	
Sectoral targets	
Net-Zero target	

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

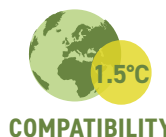


Make finance flows consistent with a pathway towards low-GHG emissions and climate-resilient development.



NO EXPLICIT CARBON PRICE

Saudi Arabia spent USD 28.7bn on fossil fuel subsidies in 2019, mostly on petroleum, followed by natural gas, then electricity. Saudi Arabia has no explicit carbon price. As host of the G20 summit for 2020, Saudi Arabia has worked to remove the term “fossil fuel subsidies” from policy briefs.



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

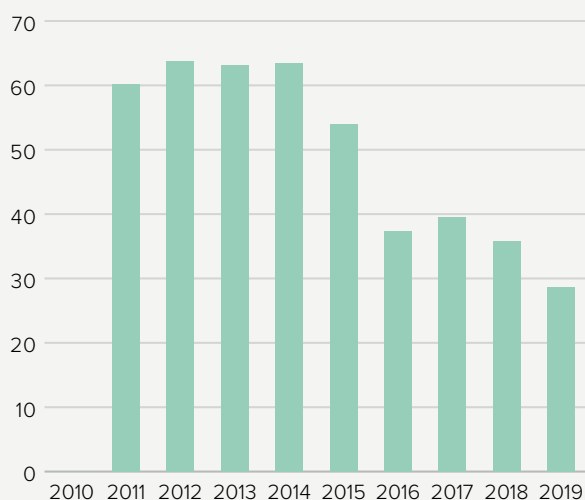
Source: Rogelj et al., 2018

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

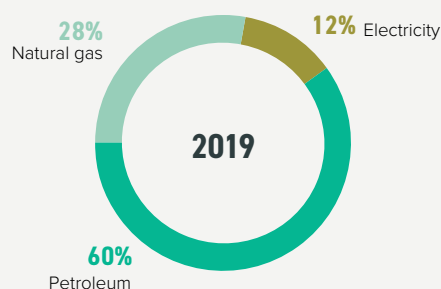
Saudi Arabia Fossil fuel subsidies (USD billions)



Source: OECD-IEA Fossil Fuel Support database, 2020

Fossil Fuel Subsidies by fuel type

Subsidies by fuel type



Source: OECD-IEA Fossil Fuel Support database, 2020
Due to rounding, some graphs may sum to slightly above or below 100%.

Carbon pricing and revenue

No data available

No explicit carbon pricing scheme has existed between 2007 to 2019. Saudi Arabia does not have a national carbon tax or emissions trading scheme; an ETS is currently under consideration but no clear plans or dates for implementation have been proposed to date.

Sources: IACE, 2019; OECD, 2018.

CORONAVIRUS RECOVERY

In response to COVID-19, the Saudi government introduced electricity subsidies – amounting to USD 240m (as of July 21 2020) for the commercial, industrial and agricultural sectors. Further, the government reduced the sales price of transport fuels by about 50% to maintain below-the-market fuel prices, benefitting the oil and gas industry.

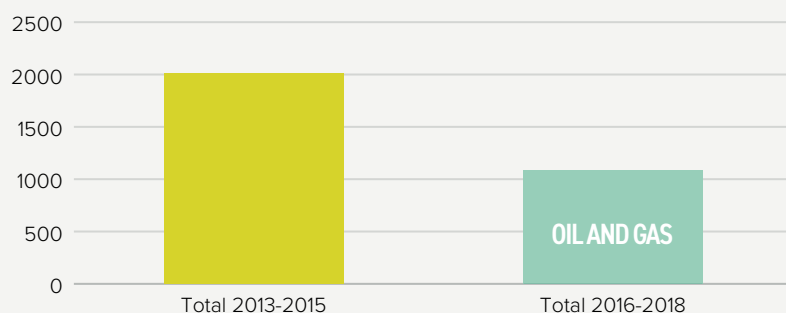
Sources: IMF, 2020; Energy Policy Tracker, 2020

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 fossil fuels

Public finance provided to fossil fuels (in USD millions)



The database used to estimate public finance for fossil fuels is a bottom-up database, based on information that is accessible through various online sources and is, therefore, incomplete.

Source: Oil Change International, 2020

Between 2016 and 2018, Saudi Arabia provided an average of USD 1.1bn per year in public finance for the oil and gas sector. This represents a considerable decrease if compared to the previous period 2013-2015, when around double that amount (an average of USD 2.0bn per year) is estimated to have been directed from public finance institutions to oil and gas projects. The country has no recorded public finance for coal. Saudi Arabia also has majority government-owned banks providing significant levels of public finance for energy, whose support is not captured in the data adopted for this analysis.

Provision of international public support

(annual average 2017 and 2018)

Climate finance contributions are sourced from Party reporting to the UNFCCC.

Bilateral, regional and other channels

Annual average contribution

No data available

Theme of support:

No data available

Multilateral climate finance contributions

No data available

Theme of support:

No data available

Core / General Contributions

Annual average contribution:

No data available

Saudi Arabia is not listed in Annex II of the UNFCCC and it is, therefore, **not formally obliged to provide climate finance**. While Saudi Arabia may channel international public finance towards climate change via multilateral and other development banks, it has not been included in this report. Climate change related finance from Saudi Arabia is channelled through the Islamic Development Bank.

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.

Category	Instruments	Objective	Under Discussion/ implementation		None 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.			●	
			Mandatory	Voluntary	Under Discussion/ implementation	None identified
Enhanced supervisory review, risk disclosure and market discipline	Climate risk disclosure requirements	Disclose the climate-related risks to which financial institutions are exposed				●
	Climate-related risk assessment and climate stress-test	Evaluate the resilience of the financial sector to climate shocks				●
Enhanced capital and liquidity requirements	Liquidity instruments	Mitigate and prevent market illiquidity and maturity mismatch				●
	Lending limits	Limit the concentration of carbon-intensive exposures				●
		Incentivise low carbon-intensive exposures				●
	Differentiated reserve requirements	Limit misaligned incentives and channel credit to green sectors				●

In spite of longstanding international opposition to climate protection agreements, **the Saudi financial sector is increasingly recognising the implications of transition and physical risk for investments**. The Central Bank has indicated its intention to join the Sustainable Banking Network. This notwithstanding, no evidence was found of green financial policy or regulation. In 2018, the Public Investment Fund of Saudi Arabia was one of six founding members of the One Planet Sovereign Wealth Fund Working Group, which seeks to integrate climate issues into asset management, including through disclosure of climate-related data, for example based on TCFD (Task Force on Climate-related Financial Disclosures) recommendations.

Nationally Determined Contribution (NDC): Finance

Conditionality	NDC not conditional on international financial support
Investment needs	Not specified
Actions	Not mentioned
International market mechanisms	Not mentioned

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

- '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).
- 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.
- 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.
 - The Decarbonisation Ratings assess the current year and average of the most recent five years

(where available) to take account of the different starting points of different G20 countries.

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

BIBLIOGRAPHY

- Abdulkareem, A. and Ellaboudy, A. (2020). "Saudi Arabia Joins with Others to Block Progress at COP 25", Climate Scorecard. <https://www.climateactiontracker.org/2020/02/saudi-arabia-joins-with-others-to-block-progress-at-cop-25/>.
- Abu-Nasr, D. and Sousa, A. de. (2020). "Saudi Arabia Boosts Spending on Food to Cope with Virus", Bloomberg Quint. <https://www.bloombergquint.com/onweb/saudi-arabia-boosts-food-spending-home-and-abroad-to-secure-supply>.
- Andrijevic, M. et al. (2020). "Governance in Socioeconomic Pathways and its Role for Future Adaptive Capacity", *Nature Sustainability*. Springer US, 3(1), pp. 35-41.
- Arab News. (2020). "Saudi Arabia Loses 120,000 Hectares of Trees Every Year." <https://www.arabnews.com/node/1631336/saudi-arabia>.
- Arnell, N. W. et al. (2019). "Global and Regional Impacts of Climate Change at Different Levels of Global Temperature Increase", *Climatic Change*. Springer Netherlands, 155(3), pp. 377-391.
- Castro-Alvarez, F. et al. (2018). *The 2018 International Energy Efficiency Scorecard*. Washington, DC: American Council for an Energy-Efficient Economy. <https://www.aceee.org/research-report/11801>
- Climate Action Tracker (CAT). (2019). Saudi Arabia. In *CAT December 2019 Update*. Berlin: Climate Analytics, New Climate Institute. <https://climateactiontracker.org/countries/saudi-arabia>
- CAT Decarbonisation Data Portal. (2020). *Climate Action Tracker, Decarbonisation Data Portal*. Berlin, Germany. <https://climateactiontracker.org/data-portal/>
- Climate Analytics. (2019). *Decarbonising South and South East Asia: Shifting Energy Supply in South Asia and South East Asia*. Berlin, Germany. <https://climateanalytics.org/media/decarbonisingasia2019-fullreport-climateanalytics.pdf>
- Climate Analytics. (2016). *Implications of the Paris Agreement for Coal Use in the Power Sector*. Berlin, Germany. https://climateanalytics.org/media/climateanalytics-coalreport_nov2016_1.pdf
- Dubyan, M. Al and Gasim, A. (2019). "Data Insights Gasoline Price Reform in Saudi Arabia". KAPSARC. <https://www.kapsarc.org/research/publications/gasoline-price-reform-in-saudi-arabia/>.
- El-Juhany, L. (2015). "The Magnitude of Dieback On Juniperus Procera Trees in the Natural Forests in the Southwestern Region of Saudi Arabia", *Biosciences Biotechnology Research Asia*, 12(1), pp. 219-230. doi: 10.13005/bbra/1655.
- Enerdata. (2020). *Global Energy and CO₂ data*. Grenoble, France. <https://www.enerdata.net/research/energy-market-data-co2-emissions-database.html>
- Energy Policy Tracker. (2020). *Saudi Arabia*. <https://www.energypolicytracker.org/country/saudi-arabia/>
- Food and Agriculture Organisation (FAO). (2019). *FAOSTAT: Agriculture Total*. Rome, Italy. <http://www.fao.org/faostat/en/#data/GT>
- Farand, C. (2020). "Saudi Arabia Censors Fossil Fuel Subsidy Discussion as G20 Host", Climate Home News. <https://www.climatechangenews.com/2020/07/14/saudi-arabia-censors-fossil-fuel-subsidy-discussion-g20-host/>
- Germanwatch. (2019). *Global Climate Risk Index 2020. Who Suffers Most from Extreme Weather Events?* Bonn, Germany. <http://www.germanwatch.org/>

- Global Forest Watch. (2019). *Global Annual Tree-Cover Loss by Dominant Driver*. <https://www.globalforestwatch.org/>
- Gütschow, J. et al. (2019). The PRIMAP-hist national historical emissions time series (1850-2017), V.2.1. GFZ Data Services. <https://doi.org/10.5880/PIK.2019.018>
- Howarth, N., Lanza, A. and Alshehri, T. (2020). *Saudi Arabia's 2018 CO₂ Emissions Fall Faster Than Expected*. <https://www.kapsarc.org/research/publications/>
- Institute for Climate Economics (I4CE). (2019). *Global Carbon Account 2019*. Paris, France. <https://www.i4ce.org/wp-core/wp-content/uploads/2019/05/i4ce-PrixCarbon-VA.pdf>
- International Energy Agency (IEA). (2019). *Global Electric Vehicle Outlook 2019: Scaling-up the Transition to Electric Mobility*. <https://www.iea.org/reports/global-ev-outlook-2019>
- International Monetary Fund (IMF). (2020). *Policy Response to COVID-19*. <https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19>
- KPMG. (2020). *Kingdom of Saudi Arabia: Government and Institution Measures in Response to COVID-19*. <https://home.kpmg/xx/en/home/insights/2020/04/saudi-arabia-government-and-institution-measures-in-response-to-covid.html>
- Martin, J. R. (2020). "Bids of USD0.0162/kWh Emerge as Saudi Arabia Shortlists Firms for 1.47 GW Solar Tender", *PV-Tech*. <https://www.pv-tech.org/news/bids-of-us0.0162-kwh-emerge-as-saudi-arabia-shortlists-firms-for-1.47-gw-sol>
- MEED. (2020). "Riyadh Forms Renewable Energy Body", *Power Technology*. <https://www.power-technology.com/comment/saudi-arabia-renewable-energy-programmes/>
- Mikayilov, J. I., Joutz, F. L. and Hasanov, F. J. (2020). "Gasoline Demand in Saudi Arabia: Are the Price and Income Elasticities Constant?", *Energy Sources, Part B: Economics, Planning and Policy*. 15(4), pp. 211-229. doi: 10.1080/15567249.2020.1775325.
- OECD. (2018). *Effective Carbon Rates 2018: Pricing Carbon Emissions Through Taxes and Emissions Trading*. <https://doi.org/10.1787/9789264305304-en> and country profile supplement; <https://www.oecd.org/tax/tax-policy/effective-carbon-rates-all.pdf>
- OECD. (2017). "Chapter 6: Towards an Inclusive Transition", in *Investing in Climate, Investing in Growth*. <https://www.oecd.org/environment/investing-in-climate-investing-in-growth-9789264273528-en.htm>
- OECD-IEA. (2020). *OECD Analysis of Budgetary Support and Tax Expenditures. Fossil Fuel Support Database*. <http://www.oecd.org/fossil-fuels/data/>
- OECD-IEA. (2020). *OECD-IEA Fossil Fuel Support and Other Analysis*. <https://www.oecd.org/fossil-fuels/data/>
- Oil Change International. (2020). *Shift the Subsidies Database*. <http://priceofoil.org/shift-the-subsidies>
- Oxford Business Group. (2020). "Saudi Arabia Moving Ahead with Local and Regional Rail Integration". <https://oxfordbusinessgroup.com/analysis/full-throttle-moving-ahead-local-and-regional-rail-network-integration>
- Parnell, J. (2020). "World's Largest Green Hydrogen Project Unveiled in Saudi Arabia", *Green Tech Media*. <https://www.greentechmedia.com/articles/read/us-firm-unveils-worlds-largest-green-hydrogen-project>
- Petrova, V. (2020). "Saudi Arabia Awaits Bids for 1.2 GW of Solar in Third Renewables Round", *Renewables Now*. <https://renewablesnow.com/news/saudi-arabia-awaits-bids-for-1.2-gw-of-solar-in-3rd-renewables-round-683016/>
- Renewable Energy Project Development Office. (2019). "Dumat Al Jandal Wind Project Beats Record Low Price for Onshore Wind Power". <https://www.powersaudiarabia.com.sa/web/attach/news/Dumat-Al-Jandal-Lowest-LCOE.pdf>
- Rogelj, J. et al. (2018). "Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development", in Masson-Delmotte, V. et al. (eds) *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above preindustrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change*. Geneva, Switzerland: IPCC. https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter2_Low_Res.pdf
- Saudi Energy Efficiency Centre. (2018). "Enhancing Vehicles Energy Efficiency in Saudi Arabia". https://theicct.org/sites/default/files/KSA_AIRoge_Enhancing_Vehicles_Energy_Efficiency_in_Saudi_Arabia.pdf
- Saudi Gazette. (2020a). "Riyadh Metro to Open Partially by End of Year." <https://saudigazette.com.sa/article/595199/SAUDI-ARABIA/Riyadh-Metro-to-open-partially-by-end-of-year>
- Saudi Gazette. (2020b). "Riyadh Public Bus Transport Project Starts Operation Later This Year".
- Sheldon, T. and Dua, R. (2019). "Drivers of New Light-Duty Vehicle Fleet Fuel Economy in Saudi Arabia", *KAPSARC*, pp. 1-20. doi: 10.30573/KS-2019-DP55.
- Smith, K. (2019). "Haramain High-Speed Ridership Exceeds Expectations", *International Railway Journal*.
- United Nations. (2018). *World Urbanisation Prospects*. Geneva: The Population Division of the Department of Economic and Social Affairs of the United Nations. <https://population.un.org/wup>
- United Nations Department of Economic and Social Affairs, Population Division. (2020). *World Population Prospects, 2019 Highlights*. https://population.un.org/wpp/Publications/Files/WPP2019_Highlights.pdf
- United Nations Development Programme (UNDP). (2019). *Human Development Index Ranking | Human Development Reports*. New York, USA: UNDP. <http://hdr.undp.org/en/content/2019-human-development-index-ranking>
- UNDP and Saudi Energy Efficiency Centre. (2019). *Final Evaluation Report National Energy Efficiency Programme: Phase 2 (NEEP 2) Saudi Arabia*. <https://erc.undp.org/evaluation/documents/download/15416>
- Vieweg, M., et al. (2018) *Towards Decarbonising Transport: 2018 Stocktake on Sectoral Ambition in the G20*. Berlin: Agora Verkehrswende, GIZ. <https://www.agora-verkehrswende.de/>
- Ward, A. (2020). "The Saudi Arabia-Russia Oil War, Explained", *Vox*. <https://www.vox.com/2020/3/9/21171406/coronavirus-saudi-arabia-russia-oil-war-explained>
- The World Bank. (2020). *GDP, PPP (current international \$)*. Washington, DC: USA. <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD>
- The World Bank. (2019). *Population, total*. Washington, DC: USA. <https://data.worldbank.org/indicator/SP.POP.TOTL>
- The World Health Organisation (WHO). (2018) *Global Health Observatory data repository | By category | Deaths by country*. Geneva, Switzerland. <https://apps.who.int/gho/data/node.main.BODAMBIENTAIRDTHS?lang=en>
- World Steel Association. (2018). *Steel's Contribution to a Low-Carbon Future and Climate-Resilient Societies*. Brussels, Belgium. <https://www.worldsteel.org/>

ABOUT 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. www.climate-transparency.org

PARTNERS



DATA PARTNERS



FUNDERS



Supported by:



based on a decision of the German Bundestag