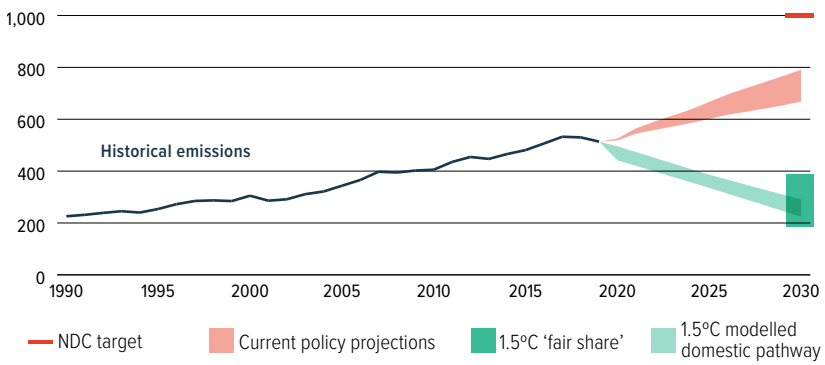
# TURKEY

Climate Transparency

CLIMATE TRANSPARENCY REPORT: COMPARING G20 CLIMATE ACTION 2022

## NOT ON TRACK FOR A 1.5°C WORLD

1.5°C compatible emissions pathway ($MtCO_2e$/year)[1]

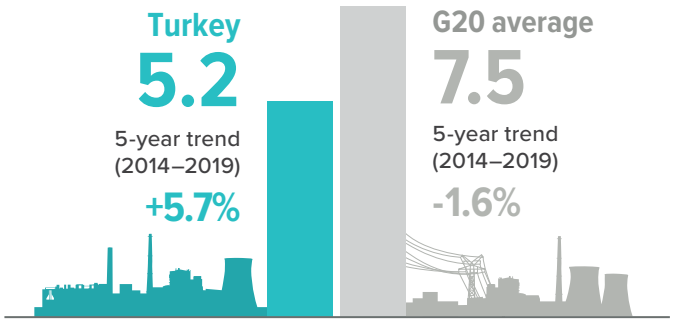



Turkey's NDC target would increase emissions 355% above 1990 levels, or approximately 999 $MtCO_2e$ (excl. LULUCF). To keep below the 1.5°C temperature limit, analysis by the 1.5°C Pathways Explorer shows that its emissions would need to be around 263 $MtCO_2e$ by 2030, leaving an immense 736 $MtCO_2e$, ambition gap. Turkey's current policies put it on track to overachieve its unambitious NDC, indicating significant potential for the government to update its NDC with a much stronger target in line with its 'fair share' contribution to the Paris Agreement's goals.

*Climate Action Tracker, 2022a; 2022b; Climate Analytics, 2022; Gütschow et al., 2021*

## PER CAPITA GREENHOUSE GAS (GHG) EMISSIONS BELOW G20 AVERAGE

$tCO_2e$/capita[2] in 2019




Turkey's per capita emissions are 0.69 times the G20 average. Total per capita emissions have increased by 5.7% between 2014 and 2019.

*Gütschow et al., 2021; World Bank, 2022*

## RECENT DEVELOPMENTS

**Turkey submitted an NDC in October 2021 aiming to reduce emissions by 21% by 2030** below an official business-as-usual scenario, meaning emissions could still increase.

**Turkey plans 20.4 GW of new coal power capacity**, substantially more than the 300 MW of decommissioned coal power in the 2000–2022 period.

An additional **2.9 GW of renewable power generation was approved from the beginning of 2021 to mid-2022,** but this is well below Turkey's renewables potential and a significant missed opportunity to decrease emissions and reduce energy imports.

## KEY OPPORTUNITIES FOR ENHANCING CLIMATE AMBITION

**Turkey could achieve a 32% reduction in all $CO_2$ emissions below 2018 levels by 2030** with ambitious, but realistic measures, in the electricity, buildings, manufacturing, and transport sectors alone.

*Şahin, et al., 2021*

**Turkey has significant renewable energy potential,** but needs to introduce more ambitious renewable energy goals and policies that would support reaching it. Instead, the share of renewables in the power mix has fallen below its 2023 target.

**Turkey could achieve its intention to secure energy independence** through renewable energy rather than its planned increase of domestic coal production, creating new jobs and reducing current inflation partially driven by high fossil fuel prices.

## Contents

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

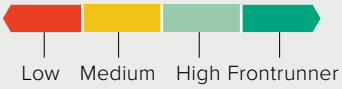


## Legend

**Trends** show developments over the past five years for which data are available. A red exclamation mark indicates negative trends from a climate protection perspective.

**Decarbonisation Ratings**[3] assess a country's performance compared to other G20 Members. A high score reflects a relatively good effort from a climate protection perspective but is not necessarily 1.5°C compatible.


**Policy Ratings**[4] 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

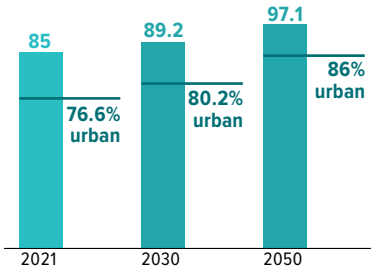
The Human Development Index (HDI) reflects life expectancy, level of education, and per capita income. Turkey ranks very high.

**0.81** very high

*Data for 2019. UNDP, 2020*

## Population and urbanisation projections

(in millions)

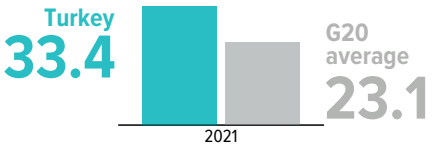



Turkey's population is projected to increase by 14% by 2050, and become more urbanised.

*United Nations, 2018; World Bank, 2022*

## Gross Domestic Product (GDP) per capita

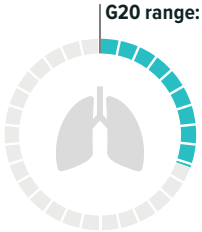
(thousand PPP constant 2015 international $ per person) in 2021




*World Bank, 2021*

## Death rate attributable to ambient air pollution

(death rate per 1,000 population per year, age standardised) in 2019




**0.53** per 1,000 people per year

Over 44,200 people die in Turkey every year due to stroke, heart disease, lung cancer and chronic respiratory diseases as a result of outdoor air pollution. This is one of the higher levels in the G20.

*Institute for Health Metrics and Evaluation, 2020*

## A JUST TRANSITION

Turkey is increasing the share of domestic coal power generation, with 20.4 GW of coal capacity in the pipeline. This undermines the potential to create numerous new jobs in the renewable energy industry, as pointed out in the International Labour Organisation's initiative Decent Work in the Green Economy and the Turkish government's own Industry Strategy Plan for 2015–2018 that states 'green jobs' will likely become a growth engine. The 2019–2023 Industry and Technology Strategy has no such focus. Government policy is making impressive gains in renewable energy installations, as Turkey surpassed its 2023 target for the share of renewables in the power mix (39%) the year it was updated (2019). However, a decrease in hydro power generation in 2021 – from 25% to 18% – reduced the share of renewables from 42% to 36%. Turkey has framed its energy transition as an engineering problem with technological solutions, while no public debates have addressed spatial and social considerations, energy equity, and energy justice.

*Global Energy Monitor, 2022; Ministry of Energy and Natural Resources, 2019; Ministry of Industry and Technology, 2015, 2019; Şahin et al., 2021*

# ADAPTATION

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

The number of forest fires in 2021 was about **450% higher than in 2020,** mainly spread along the Aegean and Mediterranean coasts.

Approximately **30% of all natural disasters in Turkey are flood-related,** with over 2,000 floods recorded between 1930 and 2020.

Temperatures in Turkey are expected to **increase by 2.5°C in east and central Turkey,** while the coasts are likely to experience 1.5°C increases. Temperatures above 40°C are projected to become a regular summer occurrence.

## ADAPTATION NEEDS

### Impacts of a changing climate

Exposure to warming

**1.0°C**
**Higher**

Between 2017 to 2021, the average summer temperatures experienced by people in Turkey were 1°C higher than the 1986–2005 average global mean temperature increase of 0.3°C.

Changes in the ability to work due to exposure to excessive heat

**430,4m** **Labour hours lost**
**4%** **increase**

In 2021, heat exposure in Turkey led to the loss of 430,451 million potential labour hours, a 4% increase from 1990–1999.

Loss of earnings from heat-related labour capacity reduction

**1,591bn** **Loss in labour capacity (USD)**
**0.2%** **of GDP**

Extreme heat can make it unbearable or even dangerous to work in a range of economically important sectors. The potential income loss in 2021 – in the service industry, manufacturing, agriculture, and construction sectors – from labour capacity reduction due to extreme heat was USD 1,591bn in 2021 in Turkey, or 0.2% of its GDP.

*Romanello et al., 2022; World Meteorological Organization, 2022*

### Exposure to future impacts at 1.5°C warming and higher

Different levels of global warming are projected to have a wide range of impacts of varying severity across the world. The percentages at 1.5°C are calculated as an increase/decrease from the reference period of 1986–2006. Using the projected impacts at 1.5°C of warming as a reference, we compare impacts that may occur at higher levels of warming.

| **Climatic** | **At 2°C** | **At 2.5°C** | **At 3°C** |
|---|---|---|---|
| Local **precipitation**: -1.1% at 1.5°C warming | 5.3 times | 9.3 times | 9.6 times |
| Local **snowfall**: -22.6% at 1.5°C warming | 1.6 times | 1.9 times | 2.2 times |

Local precipitation is projected to decrease by 1.1% from the 1986–2006 reference period, if global temperature rises by up to 1.5°C. More warming is projected to further decrease precipitation: under a 2.5°C warming scenario, precipitation is projected to drop by 9.3 times the 1.5°C projection. Snowfall is highly regionalised in Turkey; local snowfall is expected to decrease under a 1.5°C scenario by 22.6% from the reference period's snowfall. At 3°C of warming, the decrease is expected to be 2.2 times that.

| **Fresh water** | **At 2°C** | **At 2.5°C** | **At 3°C** |
|---|---|---|---|
| **Surface run-off:** -3.4% at 1.5°C warming | 3.3 times | 4.7 times | 4.9 times |
| **River discharge:** -8.2% at 1.5°C warming | 2.3 times | 3.2 times | 3.4 times |
| Total **soil moisture content:** -2.8% at 1.5°C warming | 1.9 times | 2.4 times | 2.5 times |

Fresh water supply, in a variety of forms, is projected to be negatively impacted. At 1.5°C of warming, surface run-off is projected to decrease by 3.4% below the reference period of 1986–2006, river discharge by 8.2%, and soil moisture content by 2.8%. Under conditions of 3°C of warming, these decreases would be magnified 4.9, 3.4 and 2.5 times, respectively.

| Agriculture | At 2°C | At 2.5°C | At 3°C |
|---|---|---|---|
| Reduction in **maize yield**: -0.3% at 1.5°C warming | 9.9 times | 13.2 times | 7.1 times |

Agricultural yields tend to decrease as the temperature increases. For example, maize yield is expected to decrease by 0.3% from the 1986–2006 reference period yields at 1.5°C of warming. At different levels of warming, however, the loss is magnified more or less: from nearly 10 times the 0.3% decline under 2°C warming, to an even greater loss projected under 2.5°C warming, before yields might recover slightly and experience less decline under 3°C warming than under 2°C warming. This kind of variability makes it incredibly difficult for countries to plan for the future.

| Hazards | At 2°C | At 2.5°C | At 3°C |
|---|---|---|---|
| Number of people annually exposed to **heatwaves:** 254,372 at 1.5°C warming | 2.2 times | 3.7 times | 4.6 times |
| Number of people annually exposed to **wildfires:** 151,478 at 1.5°C warming | 1.6 times | 1.8 times | 1.9 times |

The number of people annually exposed to hazards is expected to rise with warming. At 1.5°C, approximately a quarter of a million more people than were affected between 1986–2006 per year, are projected to be exposed to heatwaves, and this is estimated to be 4.6 times greater at 3°C of warming. Over 150,000 more people than in the reference period, are projected to be exposed to wildfires at 1.5°C of warming and nearly twice that number of people at warming of 3°C.

| Economic | At 2°C | At 2.5°C | At 3°C |
|---|---|---|---|
| Annual expected damage from **river flood:** -3.2% at 1.5°C warming | 6.5 times | 5.0 times | 2.8 times |
| **Labour productivity** due to heat stress: -1.8% at 1.5°C warming | 1.6 times | 2.1 times | 2.8 times |

Compared to damage experienced during the reference period of 1986–2006, 3.2% less damage from river flooding is projected at 1.5°C of warming. The magnification of the levels of damage declines at higher temperatures – with more damage projected at 2°C than at 3°C of warming. At 1.5°C of warming, productivity is projected to decline by 1.8% from the levels in the reference period, and this decline is expected to be magnified twice at 2.5°C warming and nearly 3 times at 3°C warming.

For further assessments of impacts under different warming scenarios, and a detailed explanation of the methodology, go to https://climate-impact-explorer.climateanalytics.org

*Climate Analytics, 2021*

# ADAPTATION POLICIES

## National Adaptation Strategies

| Document name | Publication year | Fields of action (sectors) | | | | | | | | | | | | Monitoring & evaluation process |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Biodiversity | Coastal areas and fishing | Education and research | Energy and industry | Finance and insurance | Forestry | Health | Infrastructure | Tourism | Transport | Urbanism | Water | |
| Turkey's National Climate Strategy and Action Plan | 2012 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | n/a |

## Nationally Determined Contribution (NDC): Adaptation

### TARGETS

Not mentioned

### ACTIONS

Not mentioned

# MITIGATION

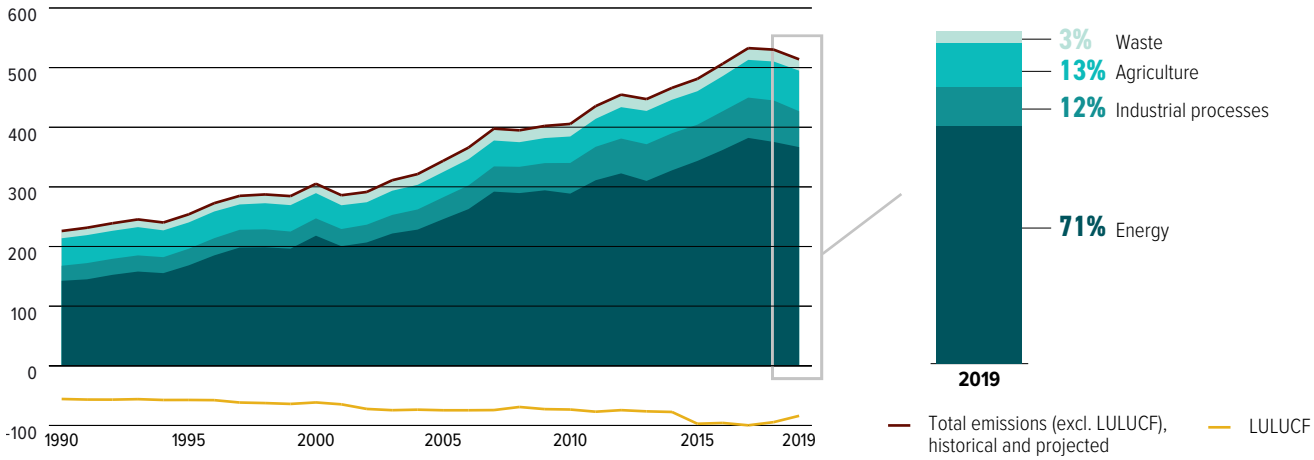
**Paris Agreement:** Hold the increase in the global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit to 1.5°C, recognising that this would significantly reduce the risks and impacts of climate change.

## EMISSIONS OVERVIEW

Turkey's total **greenhouse gas emissions (excl. LULUCF) have increased by 127%** between 1990–2019. In the same period, its total methane emissions (excl. LULUCF) have increased by 42%.

### GHG emissions across sectors[5]

Total sectoral GHG emissions ($MtCO_2e$/year)

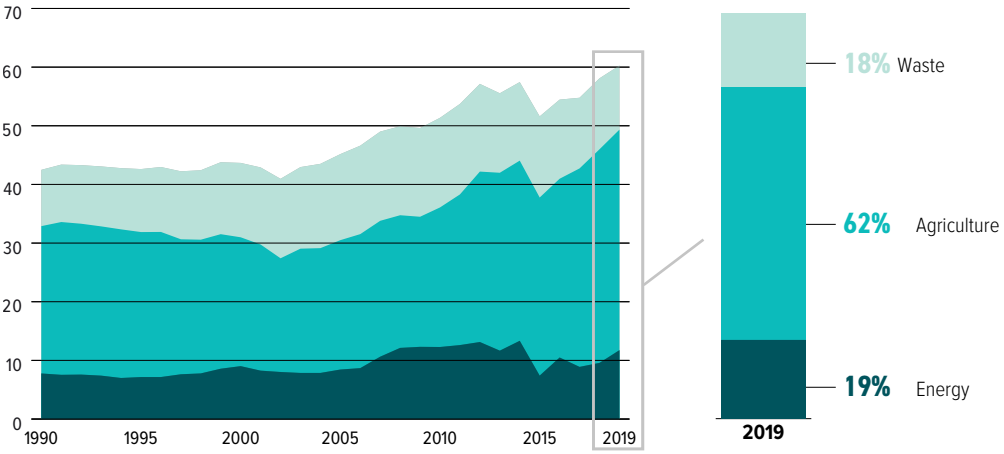



Turkey's GHG emissions (excl. LULUCF) increased by 127% from 226 $MtCO_2e$/yr in 1990 to 514 $MtCO_2e$/yr in 2019. The increase in overall emissions was largely due to a sustained increase of about 157% and 139% in energy-related and industrial process emissions, respectively; emissions growth was seen in all sectors over the same timeframe.

*Gütschow et al., 2021*

### Methane emissions by sector

Total $CH_4$ emissions ($MtCO_2e$/year)




**Turkey did not sign the Global Methane Pledge at COP26 in November 2021.**

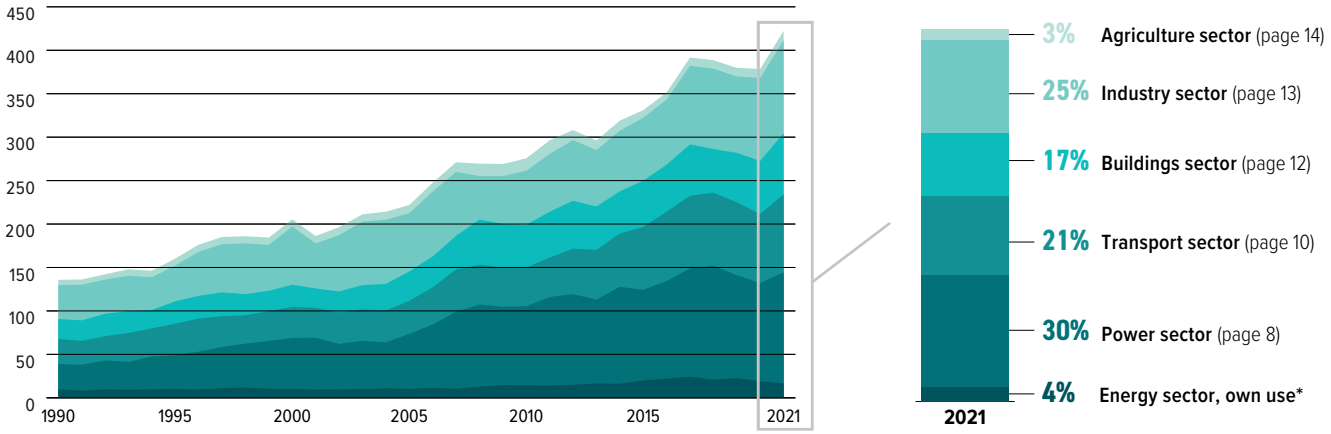
Participating countries pledged to undertake voluntary actions to contribute to a collective reduction of global methane emissions by at least 30% from 2020 levels by 2030. Further scrutiny of plans and implementation will be required.

Methane is a potent, though short-lived, greenhouse gas, accounting for an estimated third of global warming. Turkey's methane emissions (excl. LULUCF) increased by 41.8% between 1990–2019 to 60 $MtCO_2e$/yr. The majority of Turkey's methane emissions came from the agriculture sector in 2019, a trend that has continued since 1990. Methane emissions from the energy and waste sectors peaked in 2010, but have fluctuated since; Turkey's National Inventory indicates overall methane emissions in 2020 reached 64 $MtCO_2e$/yr with waste sector emissions experiencing an uptick.

*Climate and Clean Air Coalition, 2021; Gütschow et al., 2021*

## Energy-related $CO_2$ emissions by sector

Annual $CO_2$ emissions ($MtCO_2$/year)




The largest driver of overall greenhouse gas emissions are $CO_2$ emissions from fuel combustion, which have been steadily increasing since 1990. Electricity generation contributes approximately 30% of these emissions, followed by industry and transport at 25% and 21%, respectively.

Emissions from electricity generation have increased slightly as a percentage of overall emissions: from 22% to 30% between 1990–2019. Emissions from the industry and transport sectors increased in absolute terms, but at a much slower rate than emissions from the electricity sector. As a result, this sector's share as a percentage of overall $CO_2$ emissions decreased.

*Enerdata, 2022*

**Includes energy-related $CO_2$ emissions from extracting and processing fossil fuels.*

# ENERGY OVERVIEW

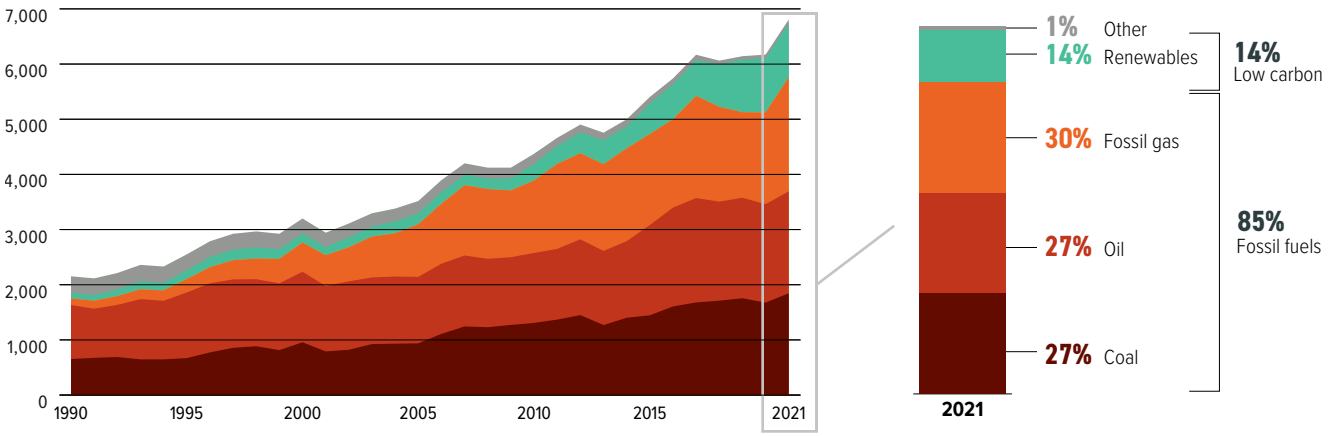
Turkey's energy mix is dominated by fossil fuels: **at 85%, its share in energy supply is higher than the G20 average (81%)**. While coal, oil, and fossil gas each provided under a third of the mix the share of renewables has declined from the high of 16% in 2019 to 14% in 2021 – a trend in contrast to that of other G20 Members.

**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.

*Rogelj et al., 2018*

## Energy mix

Total primary energy supply (PJ)

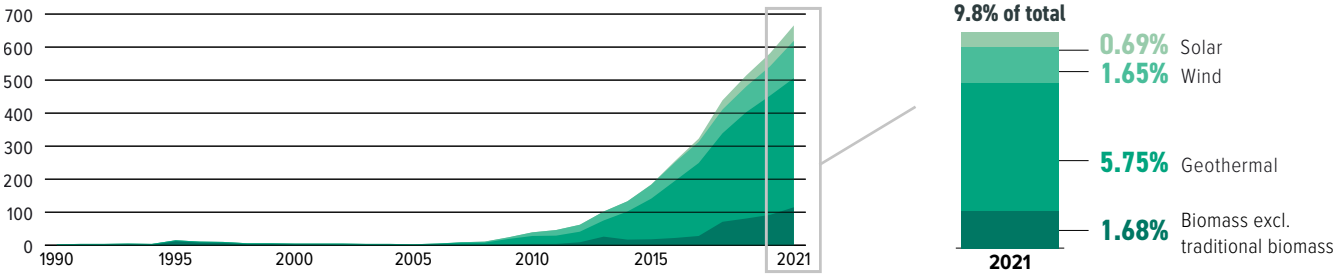



This graph shows the fuel mix for all energy supply, including energy used not only for electricity generation, heating and cooking, but also for transport fuels. Fossil fuels (oil, coal, and gas) make up 85% of Turkey's energy mix, higher than the G20 average. Coal has been the mainstay of the mix, fluctuating little as a proportion of the whole, between 1990 and 2021. Reliance on oil has decreased as fossil gas use has steadily increased over that period. Even though renewables in the energy mix have increased steadily, helping to meet growing demand for energy, they still play a marginal role in the overall supply.

*Enerdata, 2022*

## Solar, wind, geothermal and biomass development

As a share of total primary energy supply (TPES) (PJ)

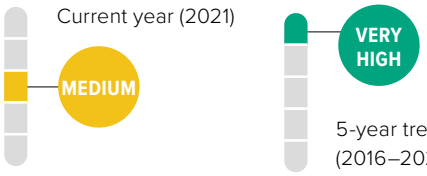



Solar, wind, geothermal and biomass (excluding traditional biomass) account for 9.8% of Turkey's energy supply – the G20 average is 7.5%. The share of renewables in total energy supply has increased by 129% between 2016–2021. Geothermal energy makes up the largest share, at 5.8% of the electricity generation.

*Enerdata, 2022*

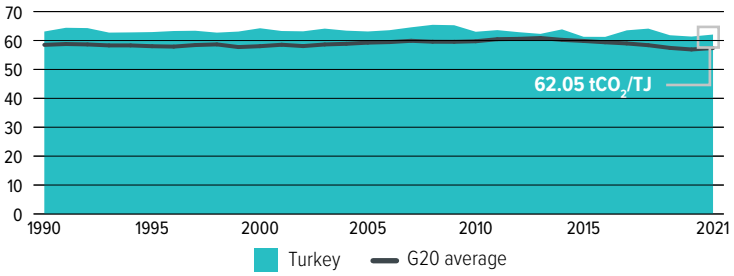
*Note: Large hydropower and solid fuel biomass in residential use are not reflected due to their negative environmental and social impacts.*

**Decarbonisation: a high rating indicates more effort to decarbonise compared to other G20 Members**




## Carbon intensity of the energy sector

Tonnes of $CO_2$ per unit of TPES ($tCO_2/TJ$)

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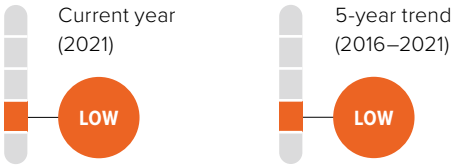
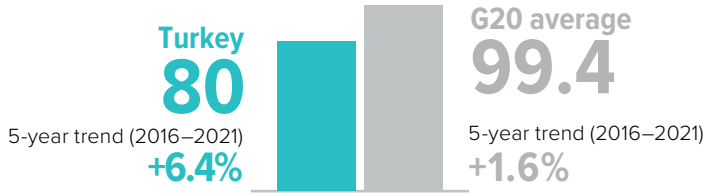



Carbon intensity is a measure of how much $CO_2$ is emitted per unit of energy supply. In Turkey, carbon intensity has remained fairly stable – hovering around 60 $tCO_2/TJ$ since the 1990s. At 62 $tCO_2/TJ$ in 2021, it was slightly higher than the G20 average of 57 $tCO_2/TJ$. This reflects the largely unchanging and high share of fossil fuels in the energy mix.

*Enerdata, 2022*

## Energy supply per capita

TPES per capita (GJ/capita) in 2021

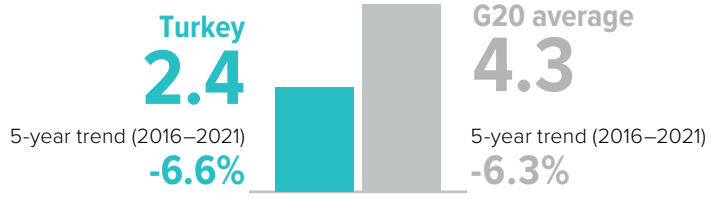



The level of energy supply per capita is closely related to economic development, climatic conditions and the price of energy. At 80 GJ/capita in 2021, energy supply in Turkey was below the G20 average of 99 GJ/capita. This, despite a significantly faster increase between 2016–2021 (6.4%) than the G20 average, which has increased 1.7% over the same period.

*Enerdata, 2022; World Bank, 2022*

## Energy intensity of the economy

(TJ/million US$2015 GDP) in 2021

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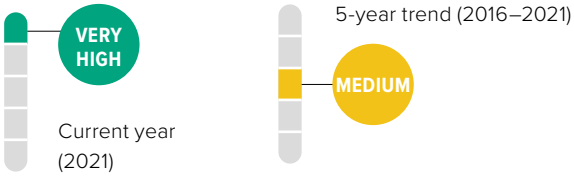



This indicator quantifies how much energy is used for each unit of GDP. This is closely related to the level of decarbonisation, efficiency achievements, climatic conditions or geography. Turkey's energy intensity is lower than the G20 average and has been decreasing at a roughly equivalent rate (2016–2021) to the G20.

*Enerdata, 2022; World Bank, 2021*

# POWER SECTOR

Emissions from energy used to make electricity and heat

Turkey's power mix is made up of equal parts coal and fossil gas (32% each) and 35% renewables, of which the majority is hydropower (17%).

Power generation's share of energy-related $CO_2$ emissions in 2021:

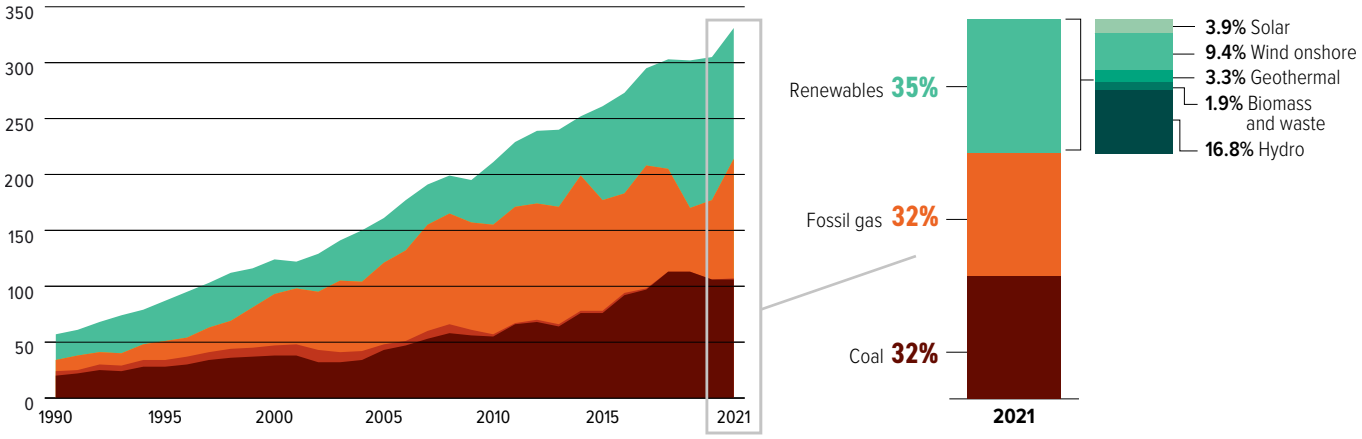
**30%** Direct

**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. By 2040, the share of renewable energy in electricity generation has to be increased to at least 75%, and the share of unabated coal reduced to zero.

*Climate Action Tracker, 2020; Rogelj et al., 2018*

## Electricity generation mix

Gross power generation (TWh)

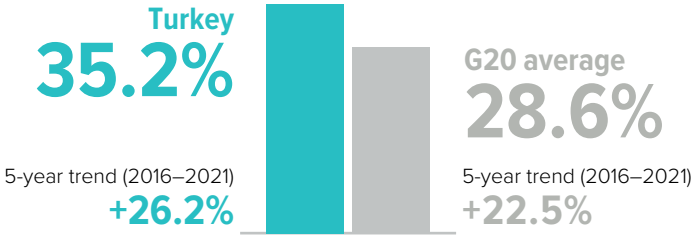



Turkey generated 64% of its electricity from fossil fuels in 2021. Electricity is generated using coal (32%), fossil gas (32%), and renewables (35%), of which the majority is hydropower (17%) and onshore wind power (9%). Drought, therefore, puts pressure on the country's ability to generate low-emission electricity. The share of renewables in Turkey's power sector has been increasing, and at 35%, is higher than the G20 average of 29%.

*Enerdata, 2022*

## Share of renewables in power generation

(incl. large hydro) in 2021

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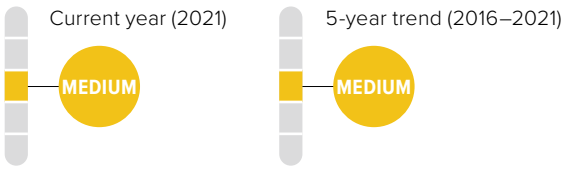
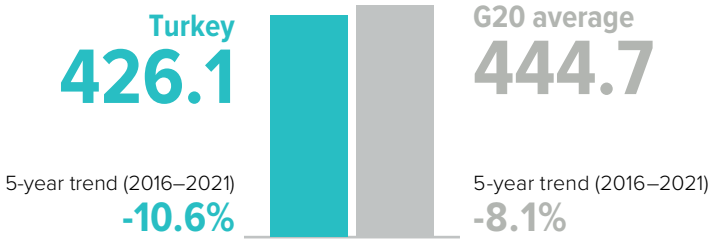



*Enerdata, 2022*

## Emissions intensity of the power sector

($gCO_2$/kWh) in 2021

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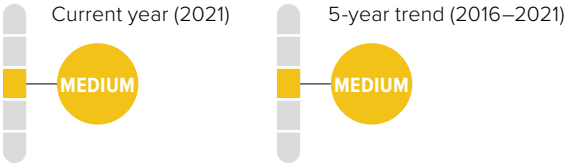
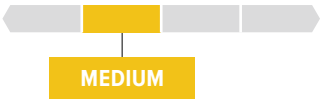



For each kilowatt hour of electricity, 426 g of $CO_2$ are emitted in Turkey, slightly less than the G20 average of 445 g. The overall emissions intensity declined by 10.6% between 2016–2021, primarily due to the large year-on-year increase in renewable energy generation.

*Enerdata, 2022*

# POLICY ASSESSMENT

## Renewable energy in the power sector




The lack of policy support for renewable energy in Turkey is reflected in the drop in the share from 42% in 2020 to 35% in 2021, missing the 11th Development Plan's 39% target. Drought has also impacted the renewables rollout.

To increase renewables, the Turkish government is utilising its renewable energy auction programme (YEKA), but only auctioned 2.9 GW between January 2021 and July 2022. Turkey extended its YEKDEM feed-in tariff (FIT) programme to all renewable energy installations brought online by December 2021, but this FIT facility is mostly idle as capacity announcements are generally made through YEKA auctions.

*Çağatay, 2022; Government of Turkey, 2019; IEA, 2021b*

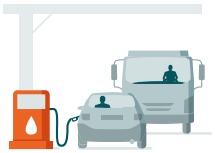
## Coal phase-out in the power sector


Despite the decrease in coal-powered generation in 2021–2022, Turkey has no intention to phase out coal, and has approximately 20.4 GW of new coal capacity in the pipeline, placing it sixth globally. In June 2022, the first block of the China-financed 1.3 GW coal power plant opened in Hunutlu. While the coal capacity pipeline decreased by 63% in comparison to 2020, to limit warming to 1.5°C or achieve Turkey's goal of net zero emissions by 2053, no new coal power plants should be built.

*Global Energy Monitor, 2022; Pitel and Kıraç, 2022*

# TRANSPORT SECTOR

Emissions from energy used to transport goods and people



Emissions from transport are still on the rise, driven by increasing activity levels for road transport, almost exclusively reliant on oil. In 2021, 95% of freight was transported by road, and 150 people per 1,000 had a car. Apart from a few connections between some large cities, the railway system is underdeveloped and requires much more investment.

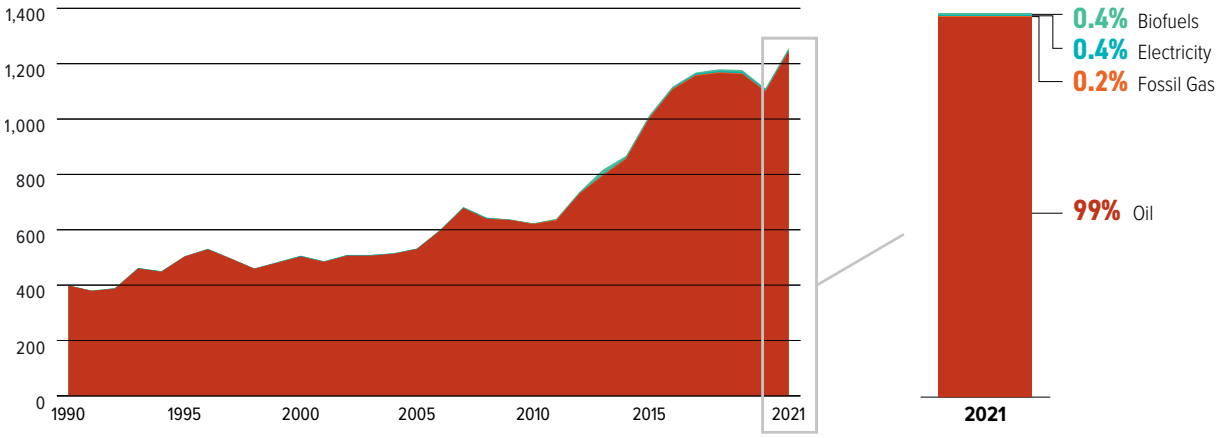
Transport's share of energy-related $CO_2$ emissions in 2021: **21.3%** Direct **0.1%** Indirect

**The share of low-carbon fuels in the transport fuel mix must increase** to between 40% and 60% by 2040 and 70% to 95% by 2050.

*Climate Action Tracker, 2020; Rogelj et al., 2018*

## Transport energy mix

Final energy consumption by source (PJ/year)



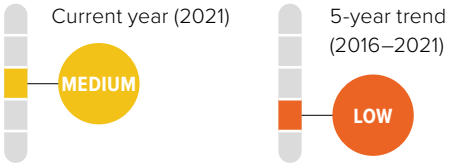

Electricity and biofuels make up only 0.75% of the energy mix in transport.

*Enerdata, 2022*

## Transport emissions per capita

(excl. aviation) ($tCO_2$/capita) in 2021


Decarbonisation: a high rating indicates more effort to decarbonise compared to other G20 Members



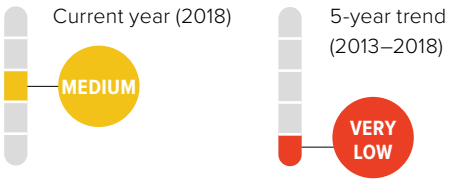

Per capita emissions in 2021 and the 5-year trend have been impacted by COVID-19 pandemic response measures and resulting economic slowdowns. For a discussion of broader trends in the G20 and the rebound of transport emissions in 2022, please see the Highlights Report at www.climate-transparency.org

*Enerdata, 2022; World Bank, 2022*

## Aviation emissions per capita[6]

($tCO_2$/capita) in 2018


Decarbonisation: a high rating indicates more effort to decarbonise compared to other G20 Members




*Enerdata, 2022; IEA, 2021a; World Bank, 2022*

## Motorisation rate

**149.5**
**vehicles per 1,000 inhabitants in 2019**

*Enerdata, 2022*

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

**No data available for Turkey**

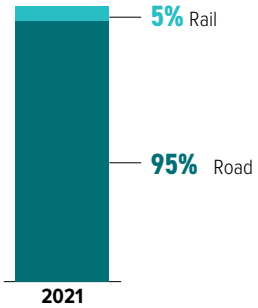
## Modal split passenger transport

(% of passenger-trips): road, rail and air

**No data available for Turkey**

## Modal split freight transport

(modal split in % of tonne-km)




*Due to data availability, only road and rail transport are included in the freight transport category. Other freight modes, e.g. waterways, are excluded due to lack of data for all countries.*

*Enerdata, 2022*

# POLICY ASSESSMENT

## Phase out fossil fuel cars

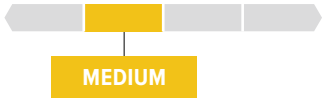

Turkey has not yet fixed a date for the phase-out of internal combustion vehicles. Current policies provide contradicting incentives. While vehicle registration tax increases with engine size, disincentivising fuel-inefficient vehicles, annual ownership tax is lower for older cars, discouraging a change to newer, more efficient vehicles. The existence of tax incentives, an increase in charging infrastructure, and replacing government fleets with EVs has not had a significant impact on sales.

*Ministry of Transport and Infrastructure, 2020; Şenzeybek and Mock, 2019*

## Phase out fossil fuel heavy-duty vehicles


Turkey has no strategy for reducing emissions from freight transport, nor does it have fuel efficiency standards for heavy-duty vehicles (HDVs), and its tax reductions for EVs explicitly exclude HDVs.

## Modal shift in (ground) transport

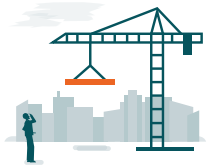



In April 2022, the government released its Transport and Logistics Masterplan, which aims to invest almost USD 200bn in road, rail, maritime, and aviation transport by 2053, and shift some passenger and freight transport from road to rail. In the next 30 years, the aim is to increase the share of passenger transport from less than 1% to 6.2%, and increase the share of freight four-fold, to almost 22%. Despite the investments Turkey has made in its rail networks, including refurbishing and electrifying existing infrastructure, the network is still underdeveloped.

*Daily Sabah, 2022; Government of Turkey, 2019; Ministry of Transport and Infrastructure, 2022*

# BUILDINGS SECTOR

Emissions from energy used to build, heat and cool buildings



Direct and indirect emissions from the buildings sector in Turkey account for 15% and 13.6% of total energy-related $CO_2$ emissions, respectively. Per capita emissions from the buildings sector are approximately the same as the G20 average.

Buildings sector's share of energy-related $CO_2$ emissions in 2021: **14.9%** Direct **13.6%** Indirect

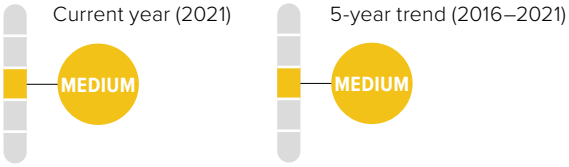
**By 2040, global emissions from buildings need to be reduced by 90%** from 2015 levels, and be 95–100% below 2015 levels by 2050, mostly through increased efficiency, reduced energy demand and electrification in conjunction with complete decarbonisation of the power sector.

*Climate Action Tracker, 2020; Rogelj et al., 2018*

## Buildings sector emissions per capita

incl. indirect emissions ($tCO_2$/capita) in 2021


**Decarbonisation: a high rating indicates more effort to decarbonise compared to other G20 Members**

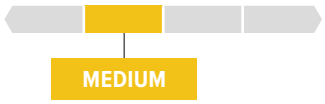



Buildings emissions occur directly (burning fuels for heating, cooking, etc) and indirectly (from grid-electricity for air conditioning, appliances, etc.) Buildings-related emissions per capita (1.6 $tCO_2$) are only just higher than the G20 average of 1.5 $tCO_2$. This reflects the high share of fossil gas responsible for almost 50% of final energy consumed in the sector, counterbalanced to some degree by bioenergy and solar thermal, the latter especially for hot water. In contrast to the downward 5-year trend of the G20 average (0.7%), Turkey has increased the level of per capita emissions by 7% between 2016 and 2021.

*Enerdata, 2022; World Bank, 2022*

# POLICY ASSESSMENT

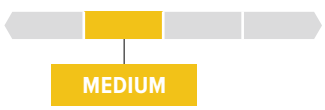
## Near zero energy new buildings




Turkey has produced a number of documents that include measures aimed at increasing the energy efficiency of buildings. These include a code governing the energy performance of buildings, which enforces insulation standards, and the 2018 National Energy Efficiency Action Plan (NEEAP), which outline a goal of "nearly zero energy buildings" for newly built private and public buildings, and considers mandating efficiency classes of at least B Energy Performance Certificate.

*Ministry of Energy and Natural Resources, 2017; Shura, 2019*

## Renovation of existing buildings




Turkey has no long-term retrofitting strategy for buildings. However, there are numerous short-term goals for improving the energy efficiency of existing buildings. These include a 15% reduction in energy use from public buildings by 2023, the transformation of one quarter of the 2010 buildings stock to sustainable buildings by 2023, and the introduction of energy performance contracts to increase energy efficiency investments in public buildings. The first energy efficiency refurbishment projects on public buildings have already begun.

*Ministry of Energy and Natural Resources, 2017; Ministry of Environment, Urbanisation, and Climate Change, 2022; Sustainable Development Turkey, 2012;*

# INDUSTRY SECTOR

Emissions from energy use in industry

Direct and indirect emissions from industry in Turkey make up 25% and 13% of energy-related $CO_2$ emissions, respectively. Turkey lacks effective policies to increase the energy efficiency of the industry sector nor any effective policies to decarbonise the sector.

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

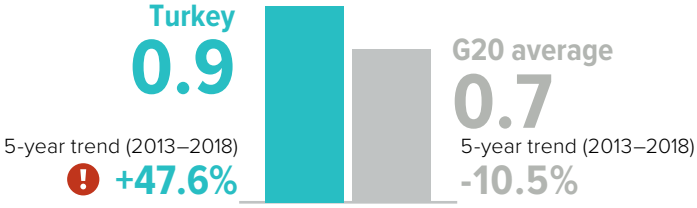
*Rogelj et al., 2018*

Industry sector's share of energy-related $CO_2$ emissions in 2021:

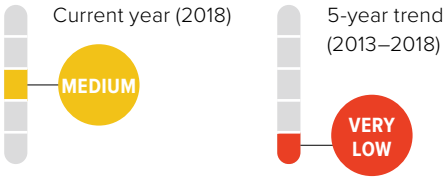
**25.3%** Direct **13.1%** Indirect

## Industry emissions intensity[7]

($kgCO_2e$/USD2015 GVA) in 2018



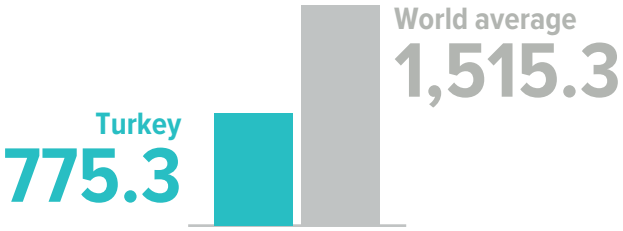

**Decarbonisation: a high rating indicates more effort to decarbonise compared to other G20 Members**




*Enerdata, 2021; World Bank, 2022*

## Carbon intensity of steel production[8]

($kgCO_2$/tonne product) in 2019

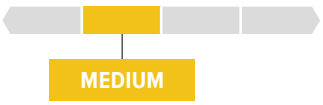



Steel production and steelmaking are significant GHG emissions sources, and challenging to decarbonise.

*Enerdata, 2022; World Steel Association, 2021*

# POLICY ASSESSMENT

## Energy efficiency




The International Energy Efficiency Scorecard 2022 ranks Turkey fifteenth out of 25 key industrial countries for industrial energy efficiency. The scorecard showed Turkey was lacking in R&D for manufacturing, policy to encourage energy management, and minimum efficiency standards for electric motors. In its National Energy Efficiency Action Plan 2017–2023, Turkey aimed to reduce energy intensity by at least 10% in each sub-sector, implement performance standards, scale up cogeneration systems, and support energy efficiency projects through low-interest loans.

*Ministry of Energy and Natural Resources, 2017; Subramanian et al., 2022*

# LAND USE SECTOR

Emissions from land use change and forestry

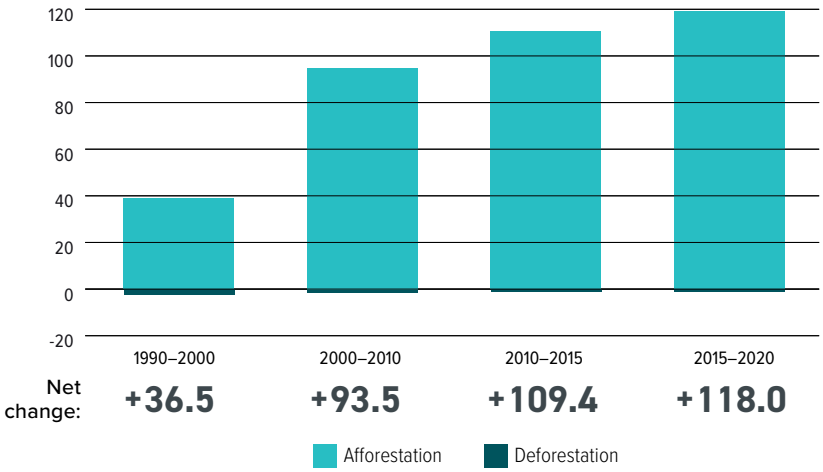
To stay within the 1.5°C limit, Turkey would need to make the land use and forestry sector a net sink of emissions, e.g., by halting the expansion of residential areas, and by creating new forests.

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

*Rogelj et al., 2018*

## Annual forest expansion, deforestation and net change

Forest area change in 1,000 ha/year

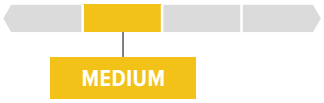



Between 2015-2020, Turkey gained 118 kha of forest area per year.

*Global Forest Assessment, 2020*

# POLICY ASSESSMENT

## Target for net zero deforestation




In its 11th National Development Plan, Turkey outlined plans to increase the percentage of forest coverage to 30% by 2023, but experts suggest that this is highly unrealistic. Turkish authorities also aimed to plant 600 million saplings by the end of 2021.

While the land use sector has been a net sink for Turkey since 2008, and remains so, the sink is diminishing, largely because the government has substantially increased wood production in recent years. Wood production in the Turkish forests increased from 13.9m $m^3$ in 2005 to 18.8m $m^3$ in 2017 and 31.9m $m^3$ in 2021. The rate of increase is 69.5% between 2017–2021 according to official figures.

*Daily Sabah, 2021; General Directorate of Forestry, 2021; Republic of Turkey, 2019; Tolunay, 2021; Türkiye Foresters Association Report, 2022*

# AGRICULTURE SECTOR

Emissions from agriculture

Turkey's agricultural emissions are mainly from the digestive processes of livestock (mainly cattle), livestock manure and use of synthetic fertilisers.

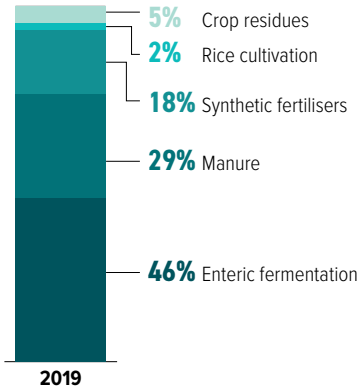
**Methane emissions need to decline by 10% by 2030** and by 35% by 2050 (from 2010 levels). Nitrous oxide emissions (mainly from fertilisers and manure) need to be reduced by 10% by 2030 and by 20% by 2050 (from 2010 levels).

*Rogelj et al., 2018*

## Emissions from agriculture

excluding energy emissions, in 2019

**52.48**
**$MtCO_2e$ in 2019**




In Turkey, the largest sources of GHG emissions in the agriculture sector come from the digestive processes (enteric fermentation, 46%), and manure of farmed animals (29%), and the use of synthetic fertilisers (18%). Adapting the diets of livestock, improving manure storage and handling, reducing or more efficiently using synthetic fertilisers, and making dietary changes in favour of vegetables and fruits could all help reduce emissions from this sector.

*FAO, 2022*

# MITIGATION: TARGETS AND AMBITION

The science from the IPCC on the risks of exceeding 1.5°C warming is clear. The UN science body has projected that to keep the 1.5°C goal alive, the world needs to roughly halve emissions by 2030.

However, despite the Glasgow Climate Pact (1/CMA.3) agreement to "revisit and strengthen" 2030 targets this year, progress on more ambitious targets has stalled. Without far more ambitious government action, the world is heading to a warming of **2.4°C with the current 2030 targets** and even higher warming of **2.7°C with current policies.**

*Climate Action Tracker, 2021a, 2022c; IPCC, 2022; UNFCCC, 2021*

## AMBITION: 2030 TARGETS

### Nationally Determined Contribution: Mitigation

#### TARGETS

A reduction of GHG emissions (incl. LULUCF) in 2030 by 21% below a business-as-usual (BAU) projection. The reference BAU projection provided by Turkey results in a target of 929 $MtCO_2e$ (incl. LULUCF); CAT calculations exclude LULUCF and, therefore, derives a 2030 target of 999 $MtCO_2e$ (excl. LULUCF).

#### ACTIONS

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

### Climate Action Tracker (CAT) evaluation of targets and actions

| Critically insufficient | Highly insufficient | Insufficient | Almost sufficient | 1.5°C Paris Agreement compatible |
|---|---|---|---|---|

The CAT evaluates and rates several elements of climate action: policies and actions, targets and a country's contribution to climate finance (where relevant) and combines these into an overall rating.

The CAT rates Turkey's efforts as "critically insufficient" in relation to three of the elements, namely, policies and actions, domestic target, and 'fair share' contribution to climate action. This rating reflects minimal to no action, and that Turkey's target is not in consistent with the Paris Agreement's 1.5°C limit. Under Turkey's current targets and policies and 'fair share' contribution, emissions will continue to rise and are consistent with more than 4°C warming.

This CAT analysis was updated in September 2022.
For the full assessment of the country's targets and actions, and the explication of the methodology, see www.climateactiontracker.org

*Climate Action Tracker, 2022a*

## AMBITION: LONG-TERM STRATEGIES

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

| | |
|---|---|
| Status | National Strategy on Climate Change adopted in 2010 |
| Net zero target | 2053 |
| Interim steps | 21% reduction in GHG emissions by 2030 |
| Sectoral targets | Yes |

# FINANCE

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

**Fossil fuel subsidies in Turkey have been falling since 2017 to USD 3.3bn in 2020.** The majority (85%) of the consumption subsidies supported petroleum, with coal receiving most of the remainder. Just over half (58%) of the public finance support provided to energy projects went to renewable energy in 2019 and 2020.

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

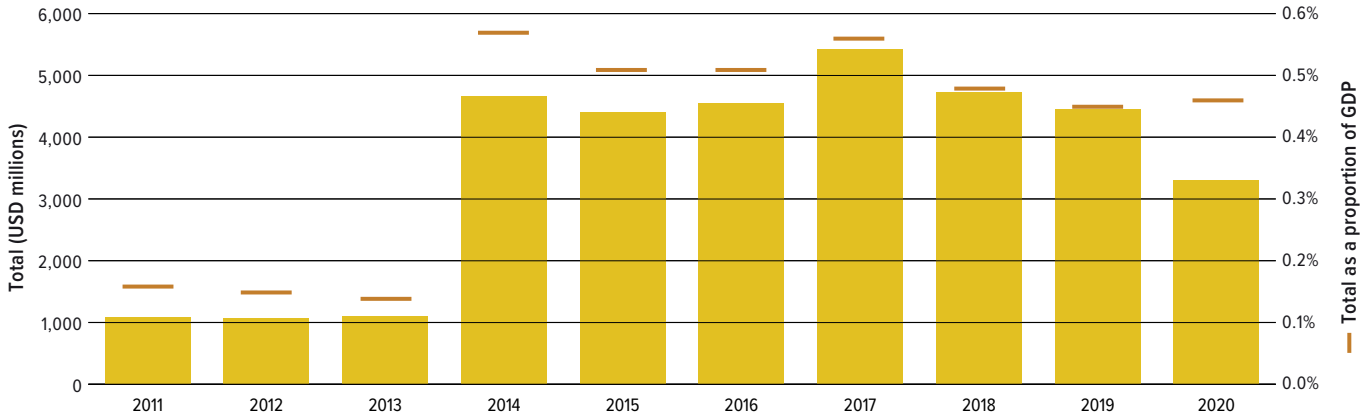
*Rogelj et al., 2018*

## 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 relative to national budgets

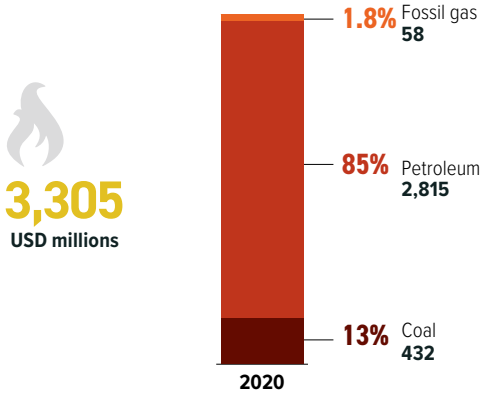
(USD millions)




*OECD-IEA Fossil Fuel Support Database, 2022*

### Fossil fuel subsidies by fuel type

(USD millions) in 2020




Fossil fuel subsidies in Turkey have seen a decline since 2017, to USD 3.3bn in 2020, after a surge between 2014–2017. Of the subsidies in 2020, 86% were for consumption and the rest for production of fossil fuels. The lion's share of the support (85%) went to petroleum, while coal received most of the rest.

Turkish Coal Enterprises, the state-owned coal mining monopoly, supplies coal for heating to low-income households. Increasing energy demand and more people qualifying for the low-income threshold have meant this subsidy has increased in recent years.

The COVID-19 pandemic saw new subsidy measures announced. These included support for national oil and gas production, and compensation for losses to electricity generators suffered through lower demand and volatile exchange rates.

*Energy Policy Tracker, 2022; OECD-IEA Fossil Fuel Support Database, 2022*

### Carbon pricing and revenue

Turkey has no explicit carbon pricing scheme in place. The introduction of a carbon pricing scheme is being considered. The proportion of domestic emissions to be covered or the price to be imposed on emissions are yet to be decided.

*I4CE, 2022*

## 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.

Turkey has taken few steps to green its financial system. While some institutions support the Task Force on Climate-Related Financial Disclosure's (TCFD) recommendations for reporting climate risks, no endorsement has been made by the government. Nor have there been any climate stress tests or relevant prudential policies put in place.

In 2020, the Borsa Istanbul (Turkey's stock exchange) laid out regulatory guidelines for companies on managing financial risk from climate change. This references the UN Sustainable Development Goals and the TCFD.

Turkey is also considering issuing a sovereign green bond and, in 2022, launched guidelines on green debt instruments in line with Green Bond Principles.

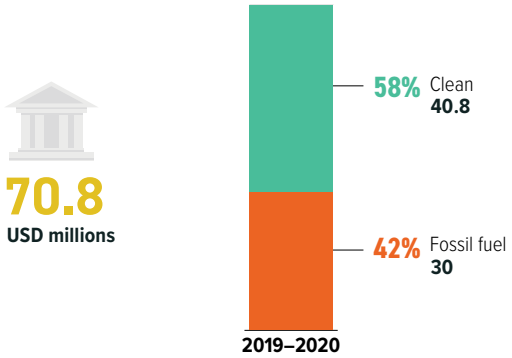
*Borsa Istanbul, 2020; Kandemir and Koc, 2021*

## 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 Members 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 energy

**USD millions (2019–2020 average)**




Between 2019 and 2020 Turkey provided an average of USD 70m per year in public finance to energy projects. Of this amount, 58% went to clean energy; the remainder went to oil and fossil gas. The largest single support measure, at USD 60m in 2020, ensured Turkish assets in Iraqi oil and fossil gas power plants. Other significant measures include the acquisition by the Development and Investment Bank of Turkey of wind farms for USD 40m, as well as financing for the construction of new wind farms in Trabzon for USD 35m.

*Oil Change International, 2022*

### Provision of international public support

Turkey is not listed in Annex II of the UNFCCC and is, therefore, not obliged to provide climate finance under the Convention. It is, however, an Annex I country and submits biennial reporting to the UNFCCC. While Turkey may channel international public finance towards climate change via multilateral and other development banks, it has not been included in this report.

# Endnotes

**For more detail about sources and methodologies, please download the CTR Technical Note at: www.climate-transparency.org/g20-climate-performance/g20report2022**

**Where referenced, "Enerdata, 2022" refers to data provided in July 2022 and, due to rounding, graphs may sum to slightly above or below 100%.**

1 The '1.5°C compatible pathway' is derived from global cost-effective pathways assessed by the IPCC's SR15, selected based on sustainability criteria, and defined by the 5th–50th percentiles of the distributions of such pathways achieving the long-term temperature goal of the Paris Agreement. Negative emissions from the land sector and novel negative emissions technologies are not included in the assessed models, which consider one primary negative emission technology (BECCS). In addition to domestic 1.5°C compatible emissions pathways, the 'fair share' emissions reduction range would almost always require a developed country to provide enough support through climate finance, or other means of implementation, to bring the total emissions reduction contribution of that country down to the required 'fair share' level.

2 '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) data tables, converted to the categories from the IPCC 1996 guidelines, in particular separating Agriculture from LULUCF, which under the IPCC 2006 Guidelines is integrated into Agriculture, Forestry, and Other Land Use (AFOLU).

3 The Decarbonisation Ratings assess the current year and average of the most recent 5 years (where available) to take account of the different starting points of different G20 Members.

4 The selection of policies rated and the assessment of 1.5°C compatibility are primarily informed by the Paris Agreement and the IPCC's 2018 SR15. The Policy Assessment Criteria table below displays the criteria used to assess a country's policy performance.

5 In order to maintain comparability across all countries, this report harmonises all data with PRIMAP 2021 dataset to 2018. However, note that CRF data is available for countries which have recently updated GHG inventories.

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).

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Policy Assessment Criteria

| | 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 and 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 fuel-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 | No policies | Mandatory energy efficiency policies cover more than 26–50% of industrial energy use | Mandatory energy efficiency policies cover 51–100% of industrial energy use | Policies + strategy to reduce industrial emissions by 75–90% from 2010 levels by 2050 |
| 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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