



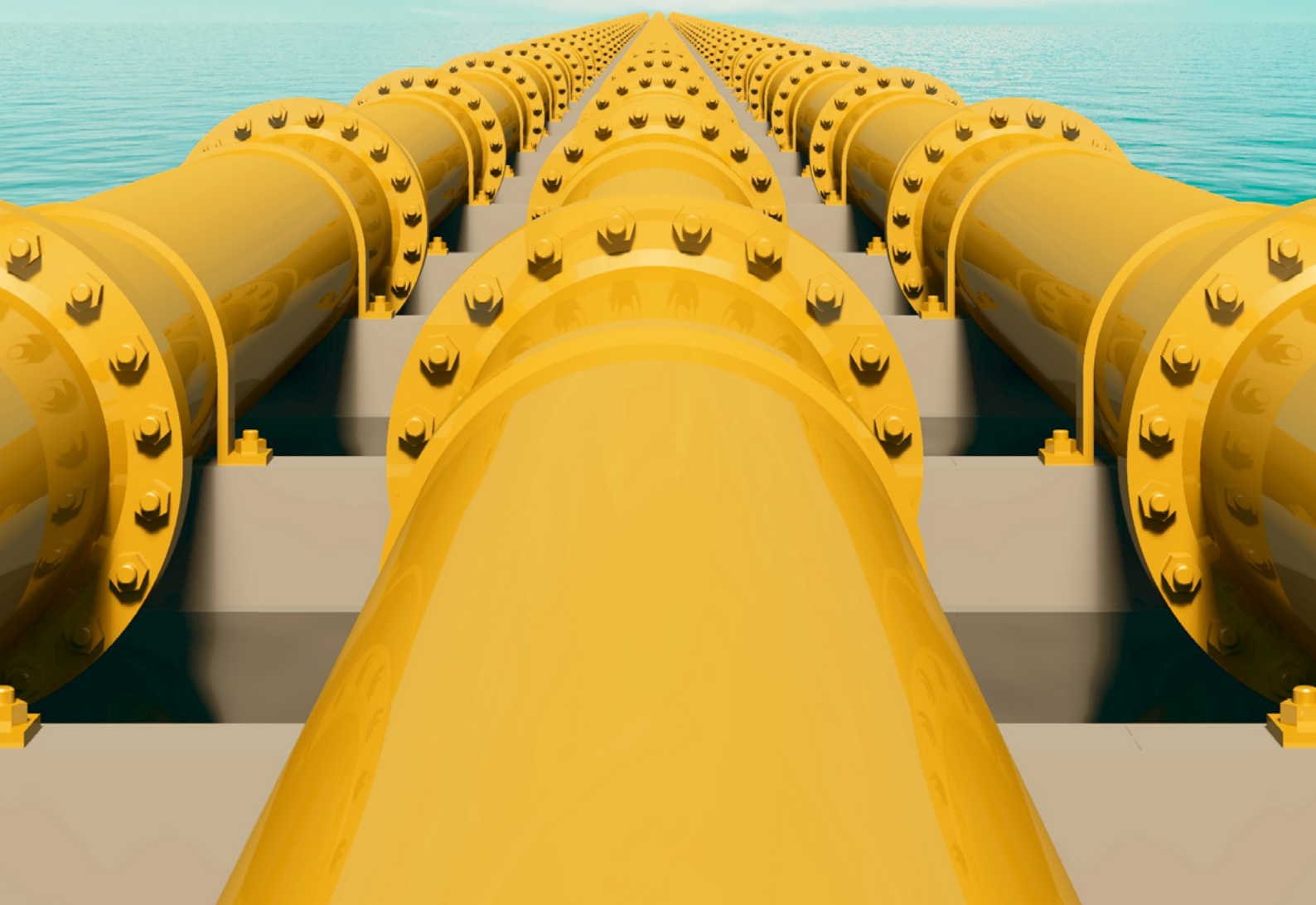
CLIMATE
CHANCE

2022

KEY

TAKEAWAYS

GLOBAL SYNTHESIS REPORT ON CLIMATE ACTION BY SECTOR





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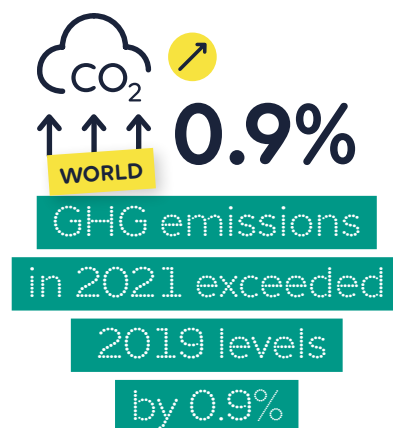
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A LOW-CARBON TRANSITION FORCED TO ADAPT TO GEOPOLITICAL AND CLIMATE CONDITIONS

Evolution of greenhouse gas emissions

The year 2021 marked a rebound of emissions, more or less rapid depending on the sectors, and with regional variations, to their 2019 levels. Global temperatures have already risen by 1.2° C compared to the pre-industrial era. The reports of the Sixth Assessment cycle of the Inter-government Panel on Climate Change (IPCC) published from August 2021 to April 2022 are clear about the drastic consequences of this alteration of the planet's climate balance. But the IPCC also insists on another fact: every tonne of GHG avoided will contribute to limiting global warming. Commitments for 2030 need to be seven times greater ([UNFCCC](#)) to respect the target of the Paris Agreement (1.5° C). Together, the actions announced by the new NDCs for 2030 are heading towards a 2.4° C temperature rise ([Climate Action Tracker](#)).

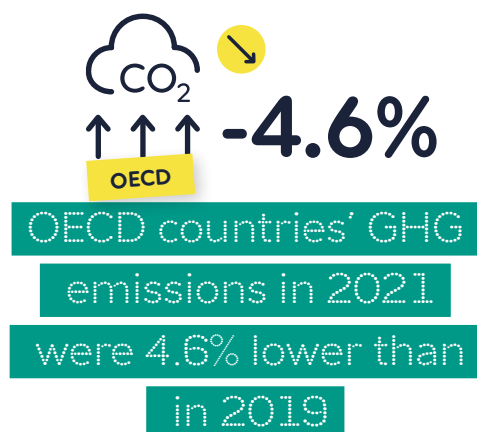


Global emissions are back to 2019 levels following a historic dive in 2020

At 37,061.24 MtCO₂e¹, global emission levels in 2021 were the highest in history. From 2019 to 2020, emissions had dropped 5% as a result of the pandemic, remaining at 35,137.86 MtCO₂e, down to the level of 2012-2013. In 2022, emissions are maintaining their momentum. Global emissions observatories — in Hawaii and Australia — evaluated GHG concentrations at between 417 and 420 ppm in May 2022, which is higher than in May 2021 ([UNFCCC](#)). Prior to 2015, the atmosphere had never exceeded 300 ppm during the 800,000 years observed by paleoclimatologists ([Luthi et al.](#)). Nevertheless, the level of global emissions per capita (4.22 tCO₂ per cap.) is lower than that of previous years, except for 2020 (4.04 tCO₂ in 2020 compared to 4.27 tCO₂ in 2019 and 4.32 tCO₂ in 2018).

The level of global CO₂ emissions in 2021 therefore cancelled out the reduction observed in 2020. The emissions upswing in 2021 is 40% due to increased coal consumption, which explains why the GHG emissions generated by energy reached their highest level ([IEA](#)).

The Covid-19 crisis was only a hiccup in the emissions trajectory, which was back on an upward track in 2021. However, regional trends differ.



In advanced economies, emissions picked up but did not touch their 2019 levels

Average emissions generated by OECD countries are still 4.6% below their 2019 levels. The main European and North American countries all saw emissions rise in 2021 compared to 2020, but did not go back to 2019 levels. Global economic output has recovered more strongly than emissions ([IEA](#)) — despite significant differences between countries.

Among European Union countries — which emitted 6% more in 2021 than in 2020 — emissions from France and Italy increased by 9.9% and 8.6%, but without reaching 2019 levels. In the first quarter of 2022, Europe was still at a lower level than at the same period in 2019, and countries like France ([Citepa](#)) — which has changed its target — and the United Kingdom ([Climate Change Committee](#)) are sticking to their respective carbon budgets. We do not yet measure the consequences of the war in Ukraine initiated by the Russian army in February 2022, which was a huge shock for European energy supplies. The geopolitical decision to go without Russian gas led European states to substitute it with oil, in particular to produce electricity, due to a limited gas supply and a hike in prices. The increased use of oil and the move from gas to oil could slow down European decarbonization efforts.

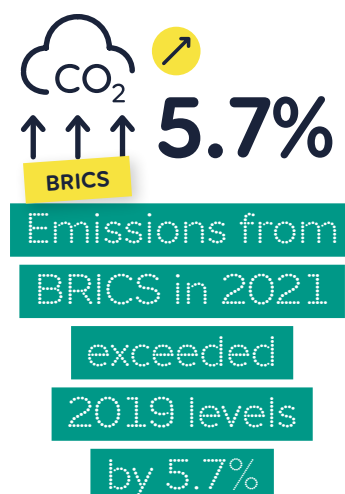
In North America, the United States has seen a similar return to emissions as the European Union (about +6%), while Canada's pick-up is more moderate (+3%), but without returning to 2019 levels. Japan and South Korea recorded a moderate increase from 2020 to 2021 (+0.8% and 2.8% respectively) (**see Table 1 in the appendix**). For Australia, updated data (different from Enerdata) from

the government indicated that its GHG emissions had increased by 1% compared to 2021, driven by the recovery of transport in particular ([Australian Government](#)).

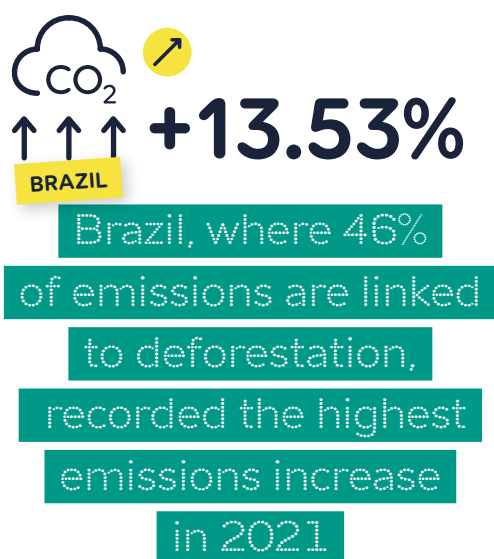
Emissions exceed 2019 levels for emerging economies

The decrease in emissions during the Covid-19 crisis in 2020 for non-OECD members (-2%), BRICS (-1%) and G20 countries (-4.6%) have been less significant than the drops recorded by advanced economies, and these groups have all returned to or exceeded their 2019 emissions levels (+3.6% for countries outside the OECD, +5.7% for BRICS and +1.1% for G20 countries). Despite disparate trends, the major emitting countries in Asia have overshoot their 2019 emissions levels (**Table 2**): Turkey by 11.2%, China by 7.6%, Russia by 4.6%, and India by 0.07%. Russia, whose emissions increased by 9.5 %, has returned to a level not seen since 1993. With 470.7 MtCO₂e, Turkey has reached an unprecedented level of national emissions. A few exceptions exist, such as Indonesia, whose emissions rose by 3.45% in 2021, but remained 10% lower than 2019 levels.

China was one of the only countries to record a growth in emissions in 2020 despite the pandemic (+1.62%). In 2021, its emissions reached 6% growth, exceeding its 2019 level by 7.6%, and continued to grow in early 2022. This increase mostly comes from greater demand for electricity produced from coal, which has significantly compensated for the decline in hydroelectricity and has replaced gas, which has become too expensive ([IEA](#)). The move from gas to coal has also increased demand for coal in the region, stimulated by economic growth in countries like India (whose emissions rose by 7.2% from 2020 to 2021).



In Latin America, whereas the decrease in emissions in 2020 in Brazil and Argentina ranked among the biggest drops of the year, these countries went on to outstrip their 2020 levels by 10% in 2021 (**Table 1**). Argentina has returned to its 2019 level, while Brazil has already exceeded it by 7% — outdoing its 2017 record. Brazil, where 46% of emissions are caused by deforestation ([Climate Home News](#)), saw the highest increase in CO₂ emissions in the world in 2021.



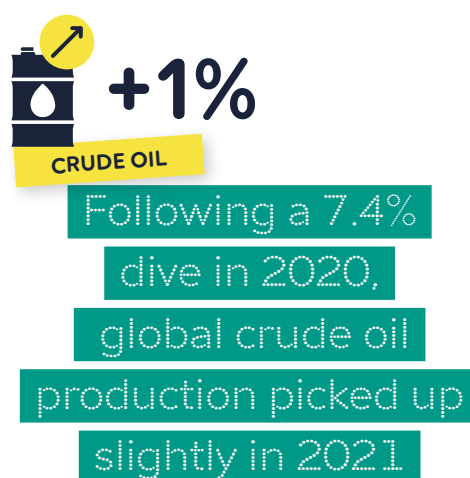
Concerning their carbon footprint², the export carbon footprint of these countries is larger than their domestic footprint, unlike countries in Europe and North America. For example, net exports of emissions from China and India are about 10% greater than emissions linked to imports, while the United Kingdom's net imported emissions are 40% higher than its export-related emissions ([Global Carbon Budget](#)). Therefore, China has a higher level of GHG emissions when calculated according to the territorial approach, compared to the consumption approach (footprint), while the opposite will be true for the EU and the US. Taking a domestic approach, emissions per capita in China only just exceeded the EU level in 2018 (about 7 t/CO₂ per cap. per year). However, in terms of footprint, China's emissions per capita are 20% lower than those of the EU-27 (6 t/CO₂ per cap. per year compared to 8 t/CO₂ per cap. per year) ([Ministry of Ecological Transition](#)). But studies converge to indicate that changes in consumption patterns and the expansion of the middle and affluent classes are generating exponential growth in China's carbon footprint and household emissions ([Wiedenhofer et al., 2016](#); [Wei, L., et al. 2020](#)), as well as increasing disparities with a large section of rural populations.

Varying upturns in Africa and the Middle East

With 1,493.71 MtCO₂e in 2021, the African continent exceeded its 2019 emissions level (1,483.86 MtCO₂e) but still only constitutes 3.8% of global emissions. The Middle East reached 2,005.29 MtCO₂e in 2021, not quite returning to its 2019 level (2,077.27 MtCO₂e). From 2020 to 2021, different countries saw disparate emissions growth, with a slight stagnation for Qatar, Saudi Arabia and South Africa for example, and an increase of over 11% for Iraq and Kuwait.

In Africa and the Middle East, emissions have shot up since 2015 (+6.6% in Africa from 2015 to 2019, +3.5% in the Middle East), but have diminished when compared to the number of inhabitants (-3.7% in Africa from 2015 to 2019, -3.4% in the Middle East): the population is growing faster than emissions. Economies were strongly impacted by the pandemic due to the oil production cuts organized by OPEC+, which led to large drops in emissions (-6.9% in Africa from 2019 to 2020, -3.6% in the Middle East). However, in 2021, some countries exceeded their 2019 emissions levels: Kuwait (+12.4%), Qatar (+5%), Egypt (+4.5%) and Nigeria (+8.5%) (**Table 3**).

Emissions do not generally include the land use sector, which is a nevertheless major factor in Africa. With an estimated 2,200 MtCO₂e, it probably makes up about 40% of African and Middle Eastern emissions ([Climate Analytics](#)), mainly due to deforestation for farming.



² The consumption or footprint approach is calculated as follows: territorial emissions - export emissions + import emissions



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GLOBAL
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2022

KEY TAKEAWAYS

The 10 Key Takeaways presented here synthesise the conclusions drawn from the analyses of the 2022 edition of the Global Synthesis Report on Climate Action by Sector. They provide a cross-sectional view of the evolution of emissions and climate action at the global level during 2021 and the first half of 2022, based on available specialized publications. The full report will be published on 08 December 2022.



1

Faced with the explosive growth in demand, use of fossil fuels is outpacing the renewables boom



2

Despite a carbon-intense recovery, industrialized economies are back on their transition trajectories



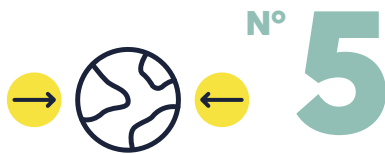
3

Record sales of electric vehicles are still outpaced by the growth of SUVs



4

Forests: Beyond national differences, funding is shifting towards results-based payments



Transition policies are increasingly marked by economic nationalism and a capitalistic concentration of industries



The consequences of global warming are negatively impacting mitigation policies



Adaption is increasingly well financed and planned but measuring its impact remains difficult



Swept up by the Net Zero wave, the voluntary carbon market shifts into another dimension



Under legal and shareholder pressure, carbon-intensive industries are adapting their pace of transition



Communities and local governments are adapting the transition to the scale of their territories

Faced with the explosive growth in demand, the use of fossil fuels is outpacing the renewables boom

In 2021, global emissions due to energy use shot up and exceeded 2019 levels. Subject to OPEC production quotas and price hikes, oil is the only fossil fuel whose emissions remained below 2019 levels. Gas, despite inflation, has seen higher demand in all sectors. Most importantly, coal covers half of the global increase in electricity demand. The exceptional growth of renewable energy during the pandemic has slowed slightly, but renewable capacity additions continued to grow in 2021. The war in Ukraine is not a trigger, but an accelerator of tensions in the gas market generated by the economic recovery following lockdowns. While the energy crisis represents an opportunity to accelerate the energy transition in the long term, it is also an obstacle in the short term because it pushes up prices and involves a comeback for coal.

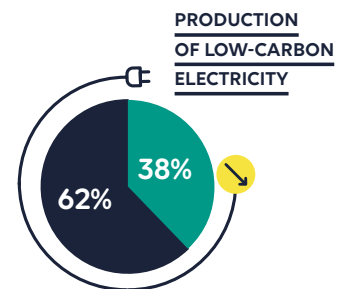
KEY FIGURES

Energy and electricity demand picked up in 2021

- **5.8% increase** in the demand for primary energy, with fossil fuels representing **82% of primary energy use** (BP).
- **5.4% increase in global electricity consumption**, compared to a **0.6% drop** from 2019 to 2020 (Ember).
- **12.83 GtCO₂ of emissions** due to the production of electricity, a record, and **7% higher** than the 2020 level of **11.99 GtCO₂** (Enerdata).

A renaissance of fossil fuels with the economic recovery

- **14.8 GtCO₂ of emissions** from coal in 2021 (+5.7% compared to 2020), responsible for **40% of the growth in global emissions** (Enerdata).
- **10.1 GtCO₂ of emissions** from oil in 2021 (+5.6% compared to 2020) (Ibid.).
- **7.9 GtCO₂ of emissions** from gas in 2021 (+5.1% compared to 2020) (Ibid.).
- **+223%, +60%, +131%** - the respective increases in the price of coal, oil and gas, from June 2021 to June 2022 (IMF). The hike has generated sizeable profits for companies in these sectors.



Renewable energy keeping up the 2020 momentum

- **260 GW of renewable capacities installed** in 2021, or **81% of new power generation capacity**, taking the global total to **3,068 GW** (IRENA).
- **133 GW of solar** and **93 GW of wind** added in 2021, mostly in China (Ibid.).
- **+225% on tariffs of corporate PPAs**, in high demand to avoid wholesale prices (Pexapark).



TRENDS

ENERGY • The growth of renewables is still not enough to feed the insatiable energy appetite of the economic recovery.

- Driven by the economic recovery and climate conditions, fossil fuels have seen demand explode, pushing up prices at the same time, even before the war in Ukraine.
- Europe has reduced its demand for Russian gas, but is turning towards LNG, with a higher carbon impact (American shale oil).
- The crisis fosters market concentration in the hands of a few players and leads to bankruptcy for the smallest players.



CASE STUDIES

GEORGIA • Gender-sensitive energy cooperatives in Georgian rural areas

MALI • Access to “clean” energy thanks to decentralized mini solar grids

CAMBODIA • A sustainable woodfuel value chain to combat deforestation



SIGNALS

UNIVERSITIES • The difficult branching out of university investments into energy fossils



Despite a carbon-intense recovery, industrialized economies are back on their transition trajectories

In 2020, the world was on hold. Although some transitions were accelerated (like the massive uptake of cycling in major cities round the world), the momentum in place before the pandemic lost steam. Despite a first quarter marked by lockdown measures that still affect emissions figures, 2021 confirms the transition trends that industrialized economies have embarked upon: coal was declining, gas increasingly in competition with booming renewables, and the decarbonization of transport was at last underway in some European countries, mostly thanks to electrification. The inflation of gas prices, triggered in the second quarter of 2021 by the global economic recovery, then accelerated by the war in Ukraine, is forcing States to implement new investment plans to achieve energy independence based on low-carbon energy sources.

KEY FIGURES

Gas caught in the crossfire

- **In the United States, gas consumption (30% of the G20) stagnated in 2021**, faced with competition from renewable energy and slowed down by inflation ([Enerdata](#)).
- **In Japan, gas consumption even decreased from 2020 to 2021 (-5.7%)**, following a trend that continued from the 2012 peak (-22%) (*Ibid.*).
- **The EU is struggling to pursue its transition without gas: with 416.7 bcm** in 2021, consumption exceeded 2019 levels (419.6 bcm) and remains below the 2008 peak (442.8 bcm), but much higher than in 2015 (371.7 bcm) (*Ibid.*).

The decline of coal clearly underway

- In Australia, following a prolonged lockdown in 2021, and in Japan, coal consumption in electric power stations dropped from 2020 to 2021, following on from their respective peaks: **-36% since 2009 for Australia and -11% since 2013 for Japan** ([Enerdata](#)).
- Consumption of coal in electric power stations is picking up again in the United States (+15%) and in the EU (+16%), but without reaching the 2019 pre-pandemic level (*Ibid.*).

Renewables forge ahead

- Renewable energies constitute **22.35%** of electricity production in Japan (10.08% in 2012), **20.52%** in the United States (12.69% in 2012), and **37%** in Europe (25.73% in 2012).
- \$369 bn of tax credits and investments for the energy transition were voted in the United States in August 2022 ([White House](#)).

The first signs of a transport transition in Europe

- The only growing emission sector in Europe since 1990 (+20%), driven by demand, **transport emissions are dropping as electrification progresses**: e.g. in Norway (-14.5% since 2014; 86.2% of EVs sold in 2021) and in Sweden (-28% since 2000) ([Enerdata](#)).
- In 2021, the average emissions by automobile manufacturers amounted to **115 g/km** in Europe, compared to **131 g/km** in 2020 (12%) thanks to EV sales ([ICCT](#)).



READ MORE IN THE REPORT

TRENDS

ENERGY • The growth of renewables is still not enough to feed the insatiable energy appetite of the economic recovery

ROAD TRANSPORT • Electric cars join the rat race for battery production

URBAN MOBILITY • Beyond the mobility transition, cities are making efforts to decarbonize their modes of transport by reorganizing the urban space



CASE STUDIES

BARCELONA • Suberblocks: Sant Antoni, the green street inspiring the city

ANGERS • EnergieSprong, a zero-energy industrial renovation project ready for mass development



SIGNALS

EMPLOYMENT • "Green jobs" are all the rage, to the detriment of carbon-intensive activities

RAIL • Europe gets back on the rails with climate tickets



Record sales of electric vehicles are still outpaced by the growth of SUVs

The upswing in sales of new vehicles observed in 2021 featured an accelerated penetration of electric vehicles (EVs). From rail to urban mobility, electric engines are gaining ground in every sector, with regional variations: motorized two-wheelers in India, buses in Latin America, and bikes in Europe. Greater public subsidies for electric purchases are driving a very efficient market, with faster installation of charging stations and a lever effect on private expenditure that is more than proportional. Nevertheless, the popularity of SUVs, the second biggest source of the growth in global emissions behind fossil-fired power generation, with both carmakers and consumers, tends to outweigh the gains in efficiency made by electric vehicles. Added to this, since the efficiency of vehicles is almost proportional to their weight, the move towards heavy EV models indicates the persistent attractiveness of power symbols, underlining one of the main contradictions of the transition at global level.

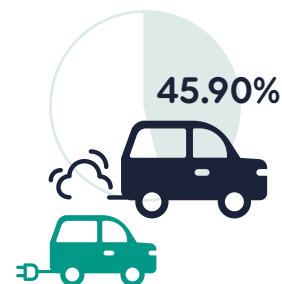
KEY FIGURES

The electrification of transport follows different regional profiles

- **10% of sales of new vehicles** in 2021 were EVs (battery and hybrid), and up to 20% in Europe and China, the leading global market ([IEA](#)).
- **+27% electric buses** in Latin American cities in 2021, mainly models of the Chinese brand BYD ([E-Bus Radar](#)).
- **\$19.3 bn-worth of bikes** sold in Europe in 2021, almost a quarter of them electric ([Conebi](#)).
- **+132% sales of electric two-wheelers** in India in 2021 ([ET Auto](#)).

...boosted by effective public investments

- **\$273 bn of public investments** in EVs in 2021 (+77%), which is **10%** of total expenditure, compared to **20%** in 2017 ([IEA](#)).
- **\$132/KWh** at end 2021 compared to **\$1,200/KWh** in 2010: **divided by 10 in 10 years**, battery prices rise again in 2022 due to raw material price inflation ([BNEF](#)).
- **+40% charging stations** for electric vehicles in 2021: **500,000** installed around the world ([IEA](#)).



... but offset by record SUV sales

- SUVs make up **45.9% of sales of new vehicles** in the world, and **55% of electric cars**. They are the 2nd largest driver of global emissions growth behind electricity production ([IEA](#)).
- **1,940 kg** is the average weight of an electric vehicle on the market, compared to an average vehicle weight of **1,240 kg** in France and **1,857 kg** in the USA ([InsideEVs](#)).



TRENDS

ROAD TRANSPORT • Electric cars join the rat race for battery production

URBAN TRANSPORT • Beyond the mobility transition, cities are reorganizing the urban space for low-carbon mobility

AIR TRANSPORT • Air traffic takes off again, leaving the transition on the tarmac



CASE STUDIES

ZIMBABWE • Autonomy for women thanks to electric mobility in rural areas

BARCELONA • Superblocks: Sant Antoni, the green street inspiring the city



SIGNALS

EGYPT • Cairo launches its first bike-sharing service

BUSINESS • French driving schools move to all-electric



Forests: Beyond national differences, funding is shifting towards payment by results

2021 saw a slowdown of loss in tree cover and primary forests, but did not buck the trend. Among the drivers of deforestation, fires have increased their share of forest destruction, generating even more emissions. While the main economic industries with high forest risk (livestock, palm oil, leather, paper) are making greater but unequal commitments, the indicators available to measure progress in reaching international objectives have a long way to go. The attractiveness of financing projects with a dual impact on the climate and biodiversity is combined with more holistic types of action, like rights of nature, lifecycle approaches to measure corporate footprints, the socio-economic shift of production chains, and the certification of offset projects with co-benefits for biodiversity.

KEY FIGURES

Deforestation is slowing down slightly...

- **25.3 Mha of tree cover lost** in 2021 (-2%) compared to **25.8 Mha** in 2020 ([Global Forest Watch](#)).
- **3.75 Mha of primary forest lost** in 2021 (-11%), compared to **4.21 Mha** in 2020. The loss of tropical rainforest amounted to 11.1 Mha in 2021 (12.2 in 2020) (*Ibid.*).
- Deforestation has decreased in Indonesia (-25%) and Brazil (-8%) since 2020, but went up by **+1.6%** in the DRC (*Ibid.*).

but with no impact on emissions and biodiversity...

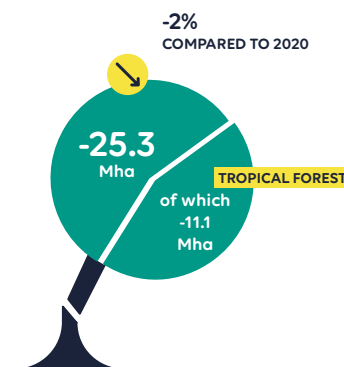
- The land use sector emitted about **2,926 MtCO₂** in 2021, which is **3%** less than in 2020 ([Global Carbon Budget](#)).
- A **4% increase in emissions** related to forest fires in 2021. Monthly emissions record beaten in August: **378 MtCO₂** ([Copernicus](#)).
- The net carbon sink depleted by **2.44%** from **-7,350 Mt CO₂e/year** in 2020 to **-7,170 Mt CO₂e/year** in 2021 ([Global Forest Watch](#)).

- **0/17 of the Aichi biodiversity targets** were reached in 2020 ([CBD](#)).

...despite greater financial resources and commitments

- **58% of 500 companies** and financial institutions in supply chains with high forest risk made commitments to stop deforestation ([Forest 500](#)).
- **\$130 bn of funding** for biodiversity in 2020 ([The Nature Conservancy](#)).

- **+166% REDD+ credits** against unplanned deforestation from 2020 to 2021; **+972%** against planned deforestation ([Ecosystem Marketplace](#)).
- **46% of voluntary carbon credits** exchanged are related to forestry and land use, totalling **\$1.327 bn** (*Ibid.*).



READ MORE IN THE REPORT

TRENDS

- LAND USE** • Strengthening ecological connectivity to adapt ecosystems to climate change
- LAND USE** • How the coffee industry is dealing with climate change
- LAND USE** • Rights of nature as a bastion against the destruction of natural ecosystems



CASE STUDIES

- SUNDARBANS** • Banking on mangroves for land, life and livelihood



SIGNALS

- INDIGENOUS PEOPLES** • Onondaga Nation regains ownership and management of over 1,000 ha of ancestral lands



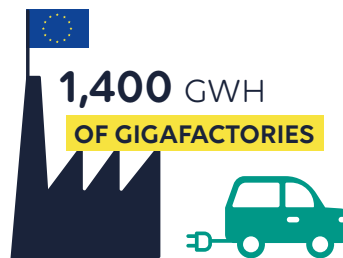
Transition policies are increasingly marked by economic nationalism and a capitalistic concentration of industries

In 2021-22, the global economic recovery, extreme climate events, and the war in Ukraine highlighted the vulnerability of value chains and the strategic interdependence of transition industries. The automobile industry, for example, faced with the concentration of strategic mineral resources (lithium, nickel, cobalt), seeks long-term supply contracts and vertically integrated value chains. From the opening of lithium mines to the production of renewable energy, reindustrialization hovers between cooperation and competition. In Europe, the USA and China, and in emerging countries with considerable primary resources, the State is taking control to relocate value chains, or even nationalize domestic champions (EDF, Uniper). At the same time, the inflation of energy prices is leading to a natural selection of market players, to the advantage of major capital-intensive companies, supported by their country of residence.

KEY FIGURES

Strategic metals in the hands of a few actors

- **77% of lithium-ion batteries** in the world are produced in China. The Chinese companies CATL (33.7%) and BYD (12.1%) dominate the market ([S&P Global](#)).
- The Democratic Republic of the Congo extracts **70.9% of the world's cobalt**, China **59% of rare earths** and **67.1% of graphite**, and Australia **52.3% of lithium** ([BP](#)).
- Prices of lithium (x4), cobalt and nickel (x2) have been subject to soaring inflation since the second half of 2020 under pressure from demand ([IMF](#)).



The relocation of transition industries...

- **1,400 GWh of "gigafactories"** planned in Europe, on **40 sites**, to produce **17.5 M electric vehicles** in 2030 ([Les Echos](#)).
- **\$369 bn tax and investment credits** for the energy transition voted in the USA in August 2022 ([White House](#)).

...accompanied by concentration around major groups

- **\$210 bn profits** earned by maritime freight in 2021, against just **\$7 bn** in 2019 and **\$26 bn** in 2020 ([Financial Times](#)).
- **963 mergers and acquisitions** in the energy sector in 2021 — a record ([White & Case](#)).
- **31 energy suppliers** (gas and electricity) have gone bankrupt in the UK since 2021 ([CNBC](#)); **25** have disappeared in France ([Le Monde](#)); **14** in Spain ([El Independiente](#)).



TRENDS

- President Biden invokes the Defense Production Act to support US-made renewable energies.
- UNIPER and EDF nationalized by German and French governments.
- In Serbia, Portugal, Indonesia and the United States mining projects for the transition come up against local opposition.



CASE STUDIES

ALSACE • Towards a made in Europe production of low carbon lithium with the EuGeLi project



SIGNALS

ENERGY • A niche of French maritime freight picks up wind



The consequences of global warming are negatively impacting mitigation policies

The last seven years were the hottest ever recorded in the world. In 2021, the intensification of climate events led to massive human and agricultural losses and perturbed the operation of electric networks (nuclear, hydropower, transmission, etc.) and transport infrastructures (especially rail). At the same time, the need to adapt in the short term (air conditioning, refrigeration, irrigation, etc.) generates a rise in energy expenditure — mainly provided by fossil fuels — that undermines transition scenarios and outweighs the gains made by long-term action, such as the thermal renovation of buildings and agroecology, which are slow to take hold. On the other hand, the emergence of “State sufficiency” in the public debate in reaction to tensions in the energy market opens a new arena of action, the medium-term impacts of which are difficult to measure.

KEY FIGURES

The intensification of climate change...

- The average global temperature in 2021 exceeded the **pre-industrial average** (1850-1900) by **1.11 ± 0.13 °C** ([WMO](#)).
- **417-420 ppm** was the concentration of GHG in the atmosphere measured in May 2022, compared to less than **300 ppm during the previous 800,000 years** ([UNFCCC](#)).
- **54.4°C measured in Death Valley**, California on 9 July 2021, a record ([WMO](#)).

... fosters carbon-intense end-uses...

- **2.27 bn air conditioning systems in the world** in 2020 ([IEA](#)). In India, in April 2022, the increase in air conditioning demand (+13.5%) exceeded electricity generation by 2%, leading to the emergency reopening of coal-fired power plants ([Reuters](#)).
- **+200% of LNG imports in Brazil** in 2021 to make up for hydropower deficits caused by the country's worst drought for 90 years ([Reuters](#)).
- **-11% hydropower production** in August 2022 in China due to drought, triggering a **15%** increase in coal production ([Stats.gov.cn](#)).

... and calls for combined mitigation and adaptation action

- **1.1 M m² of reflective surfaces** installed from 2018 to 2021 in the Million Cool Roofs Challenge, reducing temperatures by an average **2 to 3° C** ([SEforAll](#)).
- **Decrease of 600 ktCO₂/year** to date with the NYC Carbon Challenge, extended to 2021, thanks to more insulating building designs and less energy-intensive equipment ([NYC](#)).



READ MORE IN THE REPORT

TRENDS

BUILDINGS • Real estate players are re-examining their foundations to adapt to climate change

ENERGY • Between the revival of fossil fuels and emergency sufficiency, the difficult process of adapting electricity grids

LAND USE • How the coffee industry is dealing with climate change



CASE STUDIES

INDONESIA • Reflective roofs to avoid air conditioning

SOUTH AFRICA • In Durban, agroecology works to combat food inequality



SIGNALS

NEPAL • Adapting to climate change through a community network of seed banks

ARCHITECTURE • Francis Kéré combines ancestral and modern techniques to adapt buildings to climate change



Adaption is increasingly well financed and planned but measuring its impact remains difficult

As the extreme and structural impacts of climate change intensify, the need to invest and provide insurance to cover and anticipate risks is greater than ever. Although major bilateral and multilateral donors devote a rising share of their finances for climate to adaptation, the parity with mitigation funding targeted by the Paris Agreement is far from achieved. Through NDCs, communications on adaptation mentioned in the Paris Agreement, and the National Adaptation Plans under the Cancun Adaptation Framework, most states have begun implementing their adaptation plans. However, on the field, adaptation projects still lack measurement of their concrete impacts, as shown by the scarcity of quantitative or qualitative indicators of climate risk reduction in those academic publications that attempt to evaluate the situation.

KEY FIGURES

Increasingly costly damages

- **\$112 bn in insured losses** in 2021, the **4th highest annual total** recorded ([SwissRE](#)).
- **33 M displaced people, 1,100 fatalities, 735,000 heads of livestock lost, 287,000 houses and 2 Mha of agricultural land destroyed** by flooding in Pakistan in September ([UNHCR](#)).
- **800% additional funds** to deal with emergencies related to extreme climate conditions in UN appeals ([Oxfam France](#)).

More funding mobilized

- **+53 % financial flows for adaptation** (\$46 bn) in 2019-2020 compared to 2017-2018; that is only **7.3% of the \$632 bn of financial flows for climate**, far from the parity targeted by the Paris Agreement ([Climate Policy Initiative](#)).
- **+40% financing for adaptation** out of the **\$83 bn of funding for the climate** mobilized by countries in the North for countries in the South in 2020 compared to 2019 ([OECD](#)).
- **+24% funding** from regional and national development banks for adaptation: **\$27.4 bn** of the **\$185 bn** of green financing in 2020 ([IDFC](#)).

But insufficient evaluation of action's impact

- **79% of countries** adopted at least one adaption planning instrument at national level in 2021 ([UNEP](#)).
- **188 regions** signed the European Commission's "Climate Adaptation Mission" as part of the European Green Deal to manage climate risks and develop resilience ([Committee of the Regions](#)).
- **2,600 projects** focused on adaptation financed by the **10 main donors** from 2010 to 2019, with a tendency for large-scale projects **> \$10 M** ([UNEP](#)).
- **< 2% of academic publications** on the implementation of adaptation action feature indicators of risk reduction ([Berang-Ford et al.](#)).



TRENDS

ENERGY • Between the revival of fossil fuels and emergency sufficiency, the difficult process of adapting electricity grids

RAIL TRANSPORT • Heatwaves pushing a sector off its rails

BUILDINGS • Real estate players are re-examining their foundations to adapt to climate change

LAND USE • How the coffee industry is dealing with climate change



CASE STUDIES

SUNDARBANS • Banking on mangroves for land, life and livelihood

INDONESIA • Reflective roofs to avoid air conditioning



SIGNALS

AGRICULTURE • Adapting to climate change in Nepal through a community network of seed banks

BUILDINGS • In the Netherlands, floating houses on a rising sea



Swept up by the Net Zero wave, the voluntary carbon market shifts into another dimension

In 2021, the voluntary carbon market beat every record, driven by a wave of commitments by companies to reach “Net Zero emissions”. In particular, credits certifying nature-based solution projects (afforestation, reforestation, conservation, etc.) are booming and rank first in the market. Co-benefits for biodiversity and the socio-economic development of local communities are also highly sought after. However, carbon offset credits, which allow the long-term capture and sequestration of CO₂, are still largely undeveloped. While this can be a way of channeling private financial resources into projects that help mitigate greenhouse gas emissions, the possibility for companies and other organizations to claim “carbon neutrality” in the absence of universal standards remains controversial.

KEY FIGURES

A wave of Net Zero commitments

- **137 countries** have a “Net Zero” objective: **83%** of global emissions, **90%** of GDP, and **85%** of the population ([Net Zero Tracker](#)).
- **67 regions, 1,049 cities, 5,235 companies, 1,039 educational institutions, 441 financial institutions and 3,000 hospitals** involved in the Race to Zero campaign: **25%** of global CO₂ emissions, **50%** of GDP ([Race to Zero](#)).
- **64 corporate net-zero strategies** certified by the Science-based Target initiative ([SBTi](#)).

VOLUNTARY CARBON CREDITS



\$1.985 bn

OF TRANSACTIONS

The voluntary carbon market is taking off...

- **\$1.985 bn** of carbon credit transactions on the voluntary market in 2021, which is **4x more** than in 2020 ([Ecosystem Marketplace](#)).

- **\$4 per tonne** is the average price of carbon credits on the market, considering all categories; **\$2.25 per tonne** in 2020 (*Ibid.*).

... driven by nature-based carbon credits

- **46% of credits** exchanged are related to forestry and land use, **or \$1.327 bn** (*Ibid.*).
- **227.7 MtCO₂**: potential emissions avoided, reduced, or offset by nature-based carbon credits exchanged in 2021 (*Ibid.*).
- **277% growth** in CCB credits certified by Verra for their positive benefits for local communities and biodiversity.

Carbon offset credits still in the embryo stage

- **3%** of pure offset projects among the credits emitted in 2021 ([Carbon Direct](#)).
- **0 sustainable carbon offset projects** involving long-term carbon sequestration (*Ibid.*).



READ MORE IN THE REPORT

TRENDS

MARKET STANDARDIZATION

- October 2021: The Integrity Council for Voluntary Carbon Markets develops Core Carbon Principles (CCPs), a “meta-standard” for certification of high-quality, transparent carbon credits ([IC-VCMI](#)).
- October 2021: SBTi publishes the “Corporate Net-Zero Standard” to assess corporate net-zero strategies.
- June 2022: The Voluntary Carbon Markets Integrity Initiative launches a Claim Code of Practice to regulate the credibility and integrity of net-zero claims ([VCMI](#)).



CASE STUDIES

TANZANIA • Yaeda Valley: By protecting their land and wildlife, local populations obtain income through the carbon compensation mechanism



SIGNALS

CARBON FARMING • In South Africa, AgriCarbon certifies dairy farms’ emissions reductions



Under legal and shareholder pressure, carbon-intensive industries are adapting their pace of transition

2021 did not see much change or acceleration in shareholder activism. Increasing numbers of environment-related proposals are made — in particularly climate-related ones — but only a small number are voted on, and very few are voted through. The practice of taking legal action against climate policies of States and companies, which was still marginal in the early 2000s and is particularly concentrated in the United States, has become a major trend in recent years. A small majority of the decisions rendered are favorable to climate action, but their long-term effects have been little studied. Nevertheless, this dual pressure directs carbon-intensive industries a little closer towards a transition whose pace they control: no major actor has abandoned its most carbon-intensive historic activities (oil, gas, coal, etc.) — which are also the most lucrative, and potential levers for investments in the transition.

KEY FIGURES

Legal action serves up complex results

- **1,629 cases** of litigation related to climate change recorded in the world from 2011 to 2022 — **1,233 of them in the USA** — against 455 from 2000 to 2010 ([Climate Change Litigation Databases](#)).
- **70% of cases** are aimed at States; **90%** of recent cases were led by NGOs; **30 new cases** recorded in the Global South, for a total of **88** ([LSE](#)).
- **6 of the 8 cases** aimed at national climate policies dealt with by the highest national courts received a decision favorable for the climate, out of a total of 73 cases that are being processed (*Ibid.*).

- **54% of the decisions rendered** in cases outside the US since 2000 have been favorable for the climate; which is less than in 2020 because 11 German cases were lost against the Länder (*Ibid.*).

Dynamic shareholder pressure but with a lack of following

- **172 environmental proposals** made by shareholders at AGMs of the **3,000 biggest US companies** in 2022, which is **18% of ESG proposals** and **39%** more than in 2021 ([Freshfields](#)).

- Of these, **130 climate-related proposals** in 2022 (73%). **12** won a majority of votes (*Ibid.*).

- **62 proposals** related to emissions reduction targets. **36 were withdrawn, 6 were voted by a majority. Only 1 resolution adopted** on the publication of Scope 3 emissions with support from the board, at Boeing (*Ibid.*).

Carbon-intensive industries respond then set the direction... and the pace

- **21 of the 30 biggest mining companies** have a net-zero target ([S&P Global](#)). **13 have**

formulated a Scope 3 target, representing up to 95% of the sector's emissions.

- **19 of the 30 biggest oil companies** have a net-zero target ([S&P Global](#)). **Only 9 cover Scope 3**, which represents 80% of the sector's emissions.

- Only **4%** of upstream investments by oil and gas companies are in "clean energy": **\$10 bn** in 2021, twice as much as in 2020 ([IEA](#)).

- **231 of dispute settlement systems** between investors and states (ISDS) triggered by the fossil-fuel sector around the world ([Tienhaara et al.](#)).



TRENDS

ENERGY • The growth of renewables is still not enough to feed the insatiable energy appetite of the economic recovery

TRANSPORT • Electric cars join the rat race for battery production

LAND USE • Rights of nature as a bastion against the destruction of natural ecosystems



SIGNALS

TRANSPARENCY • 89% of Boeing shareholders vote to publish the company's Scope 3 emissions

JUSTICE • New York and Paris join legal action against TotalEnergies

PERU • German judges investigate the responsibility of RWE in the melting of glaciers

OIL • French businesses unite against Total's oil pipeline project in East Africa



Communities and local governments are adapting the transition to the scale of their territories

Local governments are on the front line for implementing climate policies adapted to the needs of citizens. In terms of mobility, major European cities are spurring more electric bus fleets and reorganizing the public space to promote walking and cycling, while limiting car traffic with low-emission and car-free zones. While most electric buses in circulation are in China, European and Latin American cities are also making the move to electric. Local governments are even going further than national targets by improving the energy efficiency of their buildings and infrastructures, introducing minimum energy performance requirements and adaptation standards in buildings codes, and adopting low-carbon heating policies. Local cooperatives are suffering from the energy crisis but are proving efficient at adaptation.

KEY FIGURES

Cities are committing...

- **12,611 cities (1 bn inhabitants)** have signed the Global Covenant of Mayors calling for the adoption of ambitious targets for mitigation and adaptation ([GCoM](#)).
- **1,049 cities** have set a "Net Zero emissions" target as part of the Race to Zero project ([UNFCCC](#)).

... and acting for the energy transition

- **925 cities** in 73 countries have set renewable energy objectives — including electricity (793), heating and cooling (170) ([REN21](#)).
- **59 cities** prohibit fossil fuels in new buildings, mainly in Europe and the USA (*Ibid.*).

...and promoting soft and low-carbon mobility

- **17% of buses in China are electric** — 98% of the global e-bus fleet ([Sustainable Bus](#)). Sales of e-buses increased by **40%** in 2021 ([REN21](#)).

- **270 cities** had established low-emission zones at end 2021, compared to 231 in 2020 (*Ibid.*).

- More than **2,600 km of cycle lanes** announced by cities in Europe since the pandemic ([ECF](#)).

Local communities central to adaptation

- **1,900 energy cooperatives** (1,250,000 citizens) listed in Europe for the development of renewable, citizen-focused, decentralized energy ([RES-coop](#)).

- **50,000 households** in Uganda and **3,000 women** in Rwanda benefit from of cooperatives to protect themselves from economic risks related to the impact of global warming on coffee production ([ICP](#); [Fairtrade](#)).



READ MORE IN THE REPORT

TRENDS

URBAN TRANSPORT • Beyond the mobility transition, cities are reorganizing the urban space for low-carbon mobility

BUILDINGS • Real estate players are re-examining their foundations to adapt to climate change

WASTE • From illegal flows to local recycling, waste treatment is being reorganized



CASE STUDIES

KAMIKATSU • Behind its zero-waste target, a project for society

BARCELONA • Suberblocks: Sant Antoni, the green street inspiring the city

SÃO PAULO • A circular food system to reduce organic waste



SIGNALS

LAND USE • Urban planning: Greening the American "Rust Belt"

EGYPT • Cairo launches its first bike-sharing service



APPENDIX

GREENHOUSE GAS EMISSIONS (EXCEPT LAND USE), IN MTCO₂e

For advanced economies, emissions picked up but did not reach their 2019 levels

							Medium-term trends	Continuity with pre-pandemic trends	Post-pandemic upswing
TABLE 1	2016	2017	2018	2019	2020	2021	Evolution 2016-2019 (%)	Evolution 2019-2021 (%)	Evolution 2020-2021 (%)
Canada	617.73	627.46	640.74	641.12	579.00	599.80	3.79%	-6.44%	3.59%
France	345.48	351.40	340.16	332.06	294.14	323.50	-3.88%	-2.58%	9.98%
Germany	800.93	781.36	754.27	707.55	648.94	690.25	-11.66%	-2.44%	6.37%
Italy	350.86	347.36	342.16	333.80	297.80	323.52	-4.86%	-3.08%	8.64%
United Kingdom	399.13	385.61	378.63	366.36	316.81	337.79	-8.21%	-7.80%	6.62%
United States	5142.63	5084.83	5210.12	5116.12	4561.21	4843.99	-0.52%	-5.32%	6.20%
Japan	1220.47	1206.81	1168.38	1132.93	1094.45	1103.20	-7.17%	-2.62%	0.80%
South Korea	707.55	717.38	721.81	703.36	644.14	662.49	-0.59%	-5.81%	2.85%
Australia	417.18	423.26	422.68	423.92	411.49	396.59	1.61%	-6.45%	-3.62%
European Union	3160.68	3192.26	3121.46	2976.95	2692.41	2862.32	-5.81%	-3.85%	6.31%

Emissions exceeded their 2019 level in emerging economies

							Medium-term trends	Continuity with pre-pandemic trends	Post-pandemic upswing
TABLE 2	2016	2017	2018	2019	2020	2021	Evolution 2016-2019 (%)	Evolution 2019-2021 (%)	Evolution 2020-2021 (%)
China	11129.17	11240.76	11409.11	11562.74	11710.50	12442.76	3.90%	7.61%	6.25%
India	2299.47	2431.76	2557.87	2555.51	2384.78	2557.29	11.13%	0.07%	7.23%
Indonesia	517.23	548.32	611.54	664.36	577.45	597.38	28.45%	-10.08%	3.45%
Russia	1751.66	1802.80	1887.56	1936.60	1848.68	2024.86	10.56%	4.56%	9.53%
Turkey	400.56	442.72	439.75	423.10	421.88	470.67	5.63%	11.24%	11.57%
Brazil	488.41	497.16	471.36	473.34	448.48	509.15	-3.08%	7.57%	13.53%
Argentina	189.39	185.21	182.07	173.81	158.77	174.86	-8.23%	0.60%	10.13%

In Africa and the Middle East, diverging recoveries

							Medium-term trends	Continuity with pre-pandemic trends	Post-pandemic upswing
TABLE 3	2016	2017	2018	2019	2020	2021	Evolution 2016-2019 (%)	Evolution 2019-2021 (%)	Evolution 2020-2021 (%)
Iran	655.29	682.95	696.61	692.81	689.14	n.a.	5.73%	n.a	n.a
Iraq	138.65	152.34	160.44	174.64	148.78	166.59	25.96%	-5%	11.97%
Kuwait	92.87	92.70	92.85	93.71	94.29	105.28	0.90%	12%	11.65%
Qatar	99.66	100.75	99.74	105.30	110.88	110.63	5.65%	5.07%	-0.22%
Saudi Arabia	573.31	559.66	534.43	540.35	540.98	536.17	-5.75%	-0.77%	-0.89%
United Arab Emirates	207.95	204.18	184.65	197.41	192.34	195.21	-5.07%	-1.12%	1.49%
Algeria	150.30	149.83	160.46	165.50	158.14	160.04	10.11%	-3.30%	1.21%
Egypt	237.87	252.28	268.89	272.01	266.75	284.28	14.35%	4.51%	6.57%
Nigeria	114.98	115.44	115.90	121.78	122.67	132.12	5.91%	8.49%	7.70%
South Africa	444.14	451.43	456.03	464.01	429.80	432.53	4.47%	-6.78%	0.64%

AN OBSERVATORY TO UNDERSTAND THE COMPLEXITY OF THE EVOLUTION OF EMISSIONS AND CLIMATE ACTION

Since 2015, Climate Chance has endeavoured to create a favourable environment to strengthen the climate action of local governments, businesses and civil society, and contribute to the attainment of the goals of the Paris Agreement. Within this framework, the Observatory of Non-State Climate Action observes and analyses what is actually being done to reduce global greenhouse gas emissions, presenting the same in its Reports.

Therefore, to the question of "What is to be done?", the Observatory responds by showcasing what has already been done. In main emitting sectors at the global level (**energy, transport, buildings, industry, waste, and land use**), it shows what non-state actors around the world are currently doing to reduce their emissions, and what they are not. It thus becomes easier for policymakers to identify the levers they can use, and the difficulties they might encounter.

The Observatory thus recounts the story of climate action behind the figures of evolving emissions that permeate the news. Its approach aims to give meaning to the events that structure international climate action at the level of private actors and local governments, by weaving together all the publications, initiatives and events produced by the constellation of non-state actors in the climate domain.

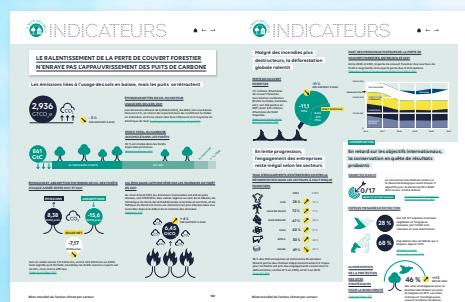
"The Observatory shows climate action for what it is, and not what it should be."

5th EDITION

TO BE PUBLISHED ON 8TH DECEMBER 2022



GLOBAL SYNTHESIS REPORT ON CLIMATE ACTION BY SECTOR 2022



The Global Synthesis Report is a comprehensive review of available publications on climate action, based on contributions from experts and specialised organisations. This fifth edition traces the evolution of emissions and climate action from 2021 to the first half of 2022. This year, a special report on carbon offsetting will enrich our analyses. Based on objective data on emissions and actions taken **[INDICATORS]**, the Observatory analyses recent trends in the actions of companies, local authorities and all civil society organisations that help explain changes in emissions **[TRENDS]**. It highlights remarkable initiatives **[CASE STUDIES]** that help identify the most effective levers for moving towards a low-carbon society. Finally, it tracks down the weak signals for action in international news **[SIGNALS]**, which today foreshadow the trends of tomorrow.



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