Mitigation of climate change

Group 2

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Agenda

1. Why do we need climate mitigation?
2. Current trends
3. Are COVID-19 fiscal measures helping or stunting the emission gap?
4. Market mechanisms in bridging the emission gap

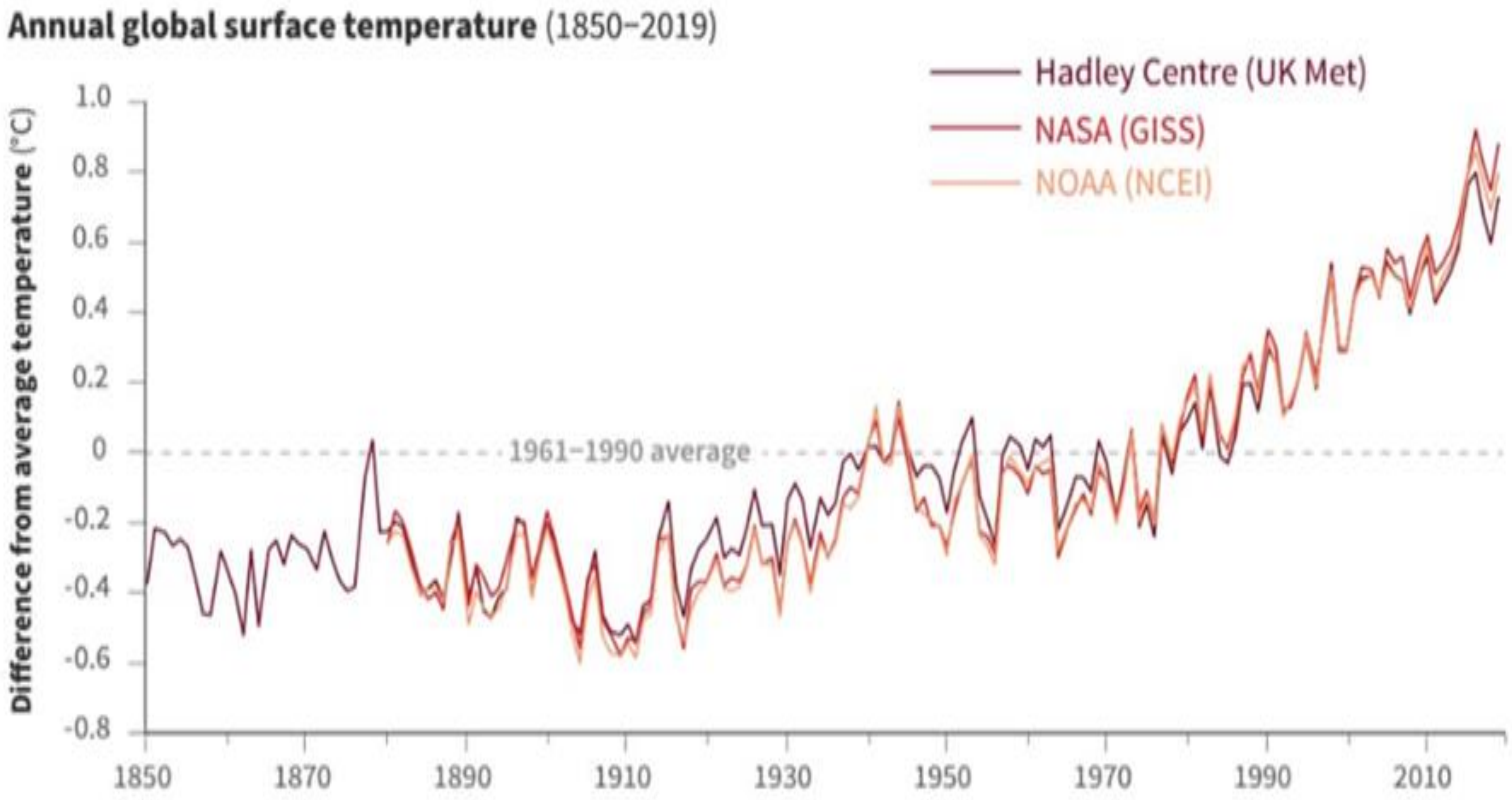
Why do we need climate mitigation?

Amoah Francis Light

CLIMATE CHANGE MITIGATION

INTRODUCTION

Earth’s average surface air temperature has increased by about 1°C since 1900, with over half of the increase occurring since the mid-1970s. A wide range of other observations (such as reduced Arctic sea ice extent and increased ocean heat content) and indications from the natural world (such as pole ward shifts of temperature-sensitive species of fish, mammals, insects, etc.) together provide incontrovertible evidence of planetary-scale warming.


Annual global surface temperature (1850–2019)
Hadley Centre (UK Met)
NASA (GISS)
NOAA (NCEI)
Difference from average temperature (°C)
1.0
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
1961–1990 average
1850
1870
1890
1910
1930
1950
1970
1990
2010

THE GREENHOUSE EFFECT AND THE GREENHOUSE GASES

Scientists have known from an understanding of basic physics, comparing observations with models, and fingerprinting the detailed patterns of climate change caused by different human and natural influences. Human activities from pollution to overpopulation are driving up the world's temperature and fundamentally changing the world around us.

The main cause of this temperature rise is a phenomenon known as the GREENHOUSE EFFECT.

Gases in the atmosphere such as water vapour, carbon dioxide, methane, Nitrous oxide, chlorofluorocarbons etc. let the sun's light in but keep some of the heat from escaping like the grass walls of a greenhouse (for example, when light comes in a glass walls of the green house, it is absorbed by the plants, ground and anything else in the greenhouse, converting it to infrared energy, (aka heat) in the process). The more greenhouse gases in the atmosphere, the more heat get trapped, strengthening the greenhouse effect and increasing the earth's temperature.

Human activities like burning of fossil fuels have increased the amount of CO_2 in the atmosphere. Deforestation and other land use changes have also released carbon from the biosphere (living world) where it normally resides for decades to centuries. The additional CO_2 from fossil fuel burning and deforestation has disturbed the balance of the carbon cycle, because the natural processes that could restore the balance are too slow compared to the rates at which human activities are adding CO_2 to the atmosphere. As a result, a substantial fraction of the CO_2 emitted from human activities accumulates in the atmosphere, where some of it will remain not just for decades or centuries, but for thousands of years. The CO_2 level in 2019 was more than 40% higher than it was in the 19th century. Most of this CO_2 increase has taken place since 1970, about the time when global energy consumption accelerated.

MITIGATION – WHY IT IS IMPORTANT?

According to unep.org, Climate change mitigation refers to efforts to reduce or prevent emission of these greenhouse gases in the atmosphere. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior.

THE NEED FOR MITIGATION OF CLIMATE CHANGE

Greenhouse emissions causing climate change has consequences on Oceans, the Weather, Food sources and our Health:

OCEANS - Sea ice extent is affected by winds and ocean currents as well as temperature. Sea ice in the partly-enclosed Arctic Ocean seems to be responding directly to warming, ice sheets like Greenland and Antarctica are melting.

The extra water that once held in glaciers have caused sea levels to rise and spills out of the ocean flooding coastal regions. Conditions like sea-level rise and saltwater intrusion have advanced to the point where whole communities have had to relocate, and protracted droughts are putting people at risk of famine. In the future, the number of “climate refugees” is expected to rise.

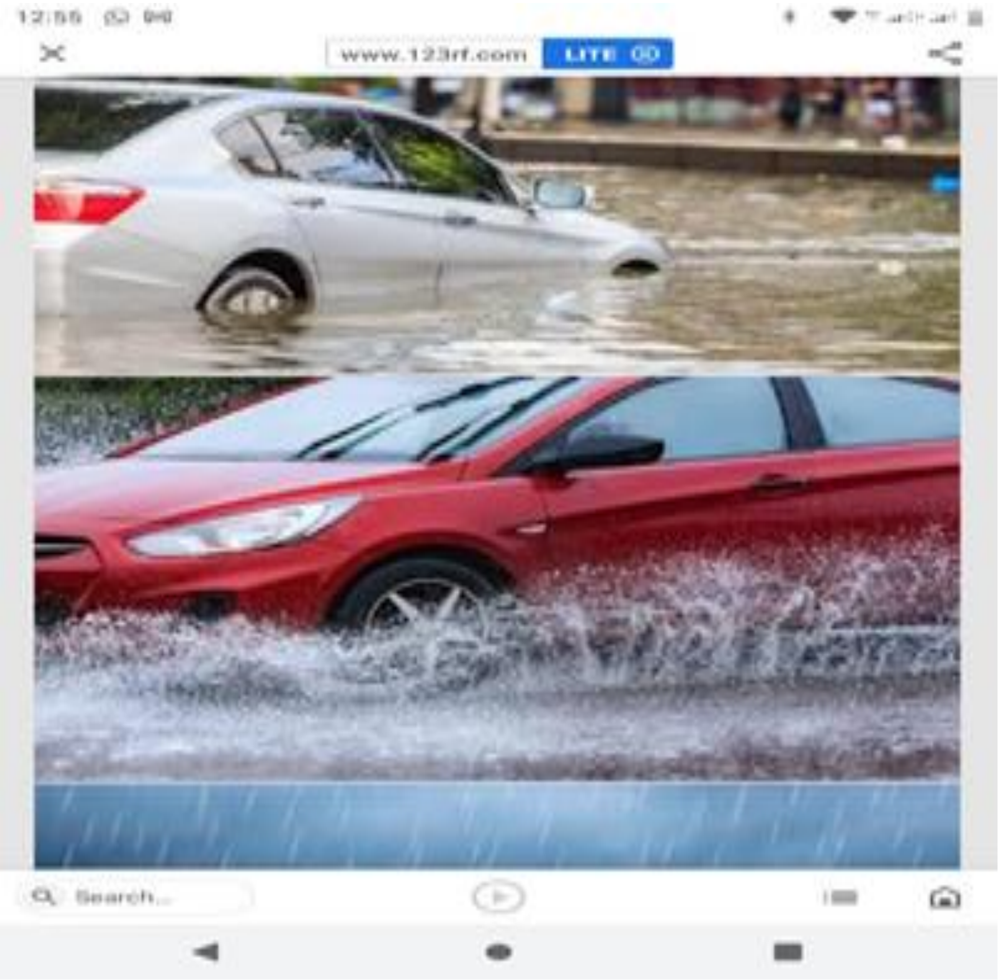
OCEAN ACIDIFICATION

Direct observations of ocean chemistry have shown that the chemical balance of seawater has shifted to a more acidic state (lower pH). Some marine organisms (such as corals and some shellfish) have shells composed of calcium carbonate, which dissolves more readily in acid (CO_2 dissolves in water to form a weak acid, and the oceans have absorbed about a third of the CO_2 resulting from human activities, leading to a steady decrease in ocean pH levels. With increasing atmospheric CO_2, this chemical balance will change even more during the next century). As the acidity of sea water increases, it becomes more difficult for these organisms to form or maintain their shells. This is ocean acidification.

Results for ocean acidification

WEATHER

Earth’s lower atmosphere is becoming warmer and moister as a result of human-caused greenhouse gas emissions. This gives the potential for more energy for storms and certain extreme weather events. Consistent with theoretical expectations, the types of events most closely related to temperature, such as heat waves and extremely hot days, are becoming more likely. Heavy rainfall and snowfall events (which increase the risk of flooding) are also generally becoming more frequent. These changes in weather pose challenges.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Flooded villages
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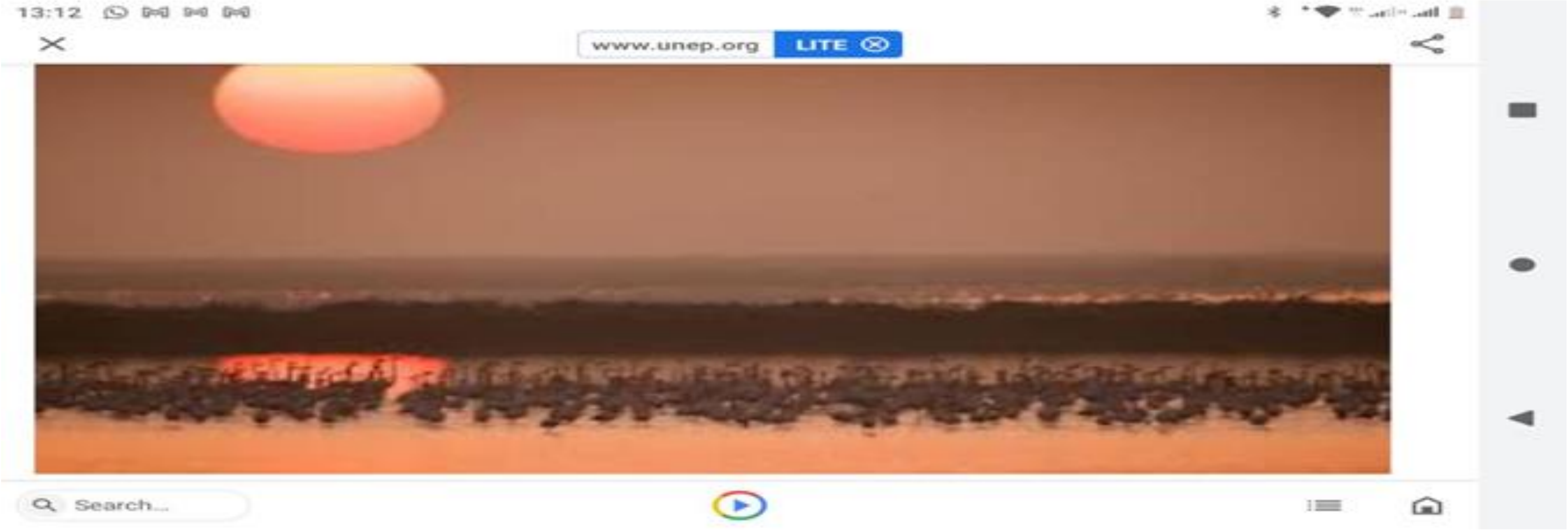
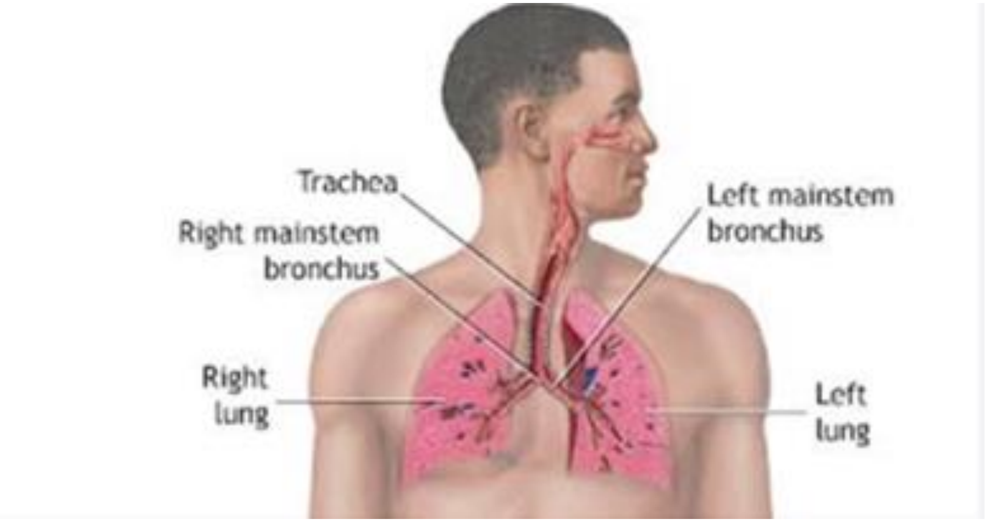
FOOD SOURCES – Growing crops become more difficult, areas where plants and animals can live shifts and water supplies are diminished



HEALTH

In urban areas the warmer atmosphere creates an environment that traps and increases the amount of smog, this smog contains ozone particles which increase rapidly at higher temperatures, exposure to higher levels of smog can cause health problems such as Asmah, heart disease, lung cancer etc.



PREPARING FOR TOMORROW, TODAY

Scientists are very confident that if emissions continue on their present trajectory, without either technological or regulatory abatement, then warming of 2.6 to 4.8 °C in addition to that which has already occurred would be expected during the 21st century. Science is a continual process of observation, understanding, modeling, testing, and prediction. The prediction of a long-term trend in global warming from increasing greenhouse gases is robust and has been confirmed by a growing body of evidence. Nevertheless, understanding of certain aspects of climate change remains incomplete. Examples include natural climate variations on decadal-to-centennial timescales and regional-to-local spatial scales and cloud responses to climate change, which are all areas of active research.

While rapid rate climate change is caused by humans, they are the ones who can also combat it.

In a 2018 UN report, thousands of scientists and government reviewers agreed that limiting global temperature rise to no more than 1.5°C would help us avoid the worst climate impacts and maintain a livable climate.

CLIMATE CHANGE MITIGATION STRATEGIES

According to Global Environmental Facility (GEF) to achieve the ambitious goal of reducing (or avoiding) emissions of greenhouse gases equivalent to at least 1.5 billion tons of CO_2, many climate change solutions can deliver economic benefits while improving our lives and protecting the environment. We also have global agreements to guide progress, such as the UN Framework Convention on Climate Change and the Paris Agreement.

Three broad categories of action are: cutting emissions, adapting to climate impacts and financing required adjustments. Mitigation strategy hinges upon the following fundamental pillars:

PROMOTE INNOVATION AND TECHNOLOGY TRANSFER FOR SUSTAINABLE ENERGY BREAKTHROUGHS.

Technology is one of the keys to reducing or slowing the growth in greenhouse gas emissions, and to stabilize their concentrations by:

(i) de-centralized renewable power with energy storage;

(ii) electric drive technologies and electric mobility;

(iii) accelerating energy efficiency adoption;

(iv) And clean-tech innovation.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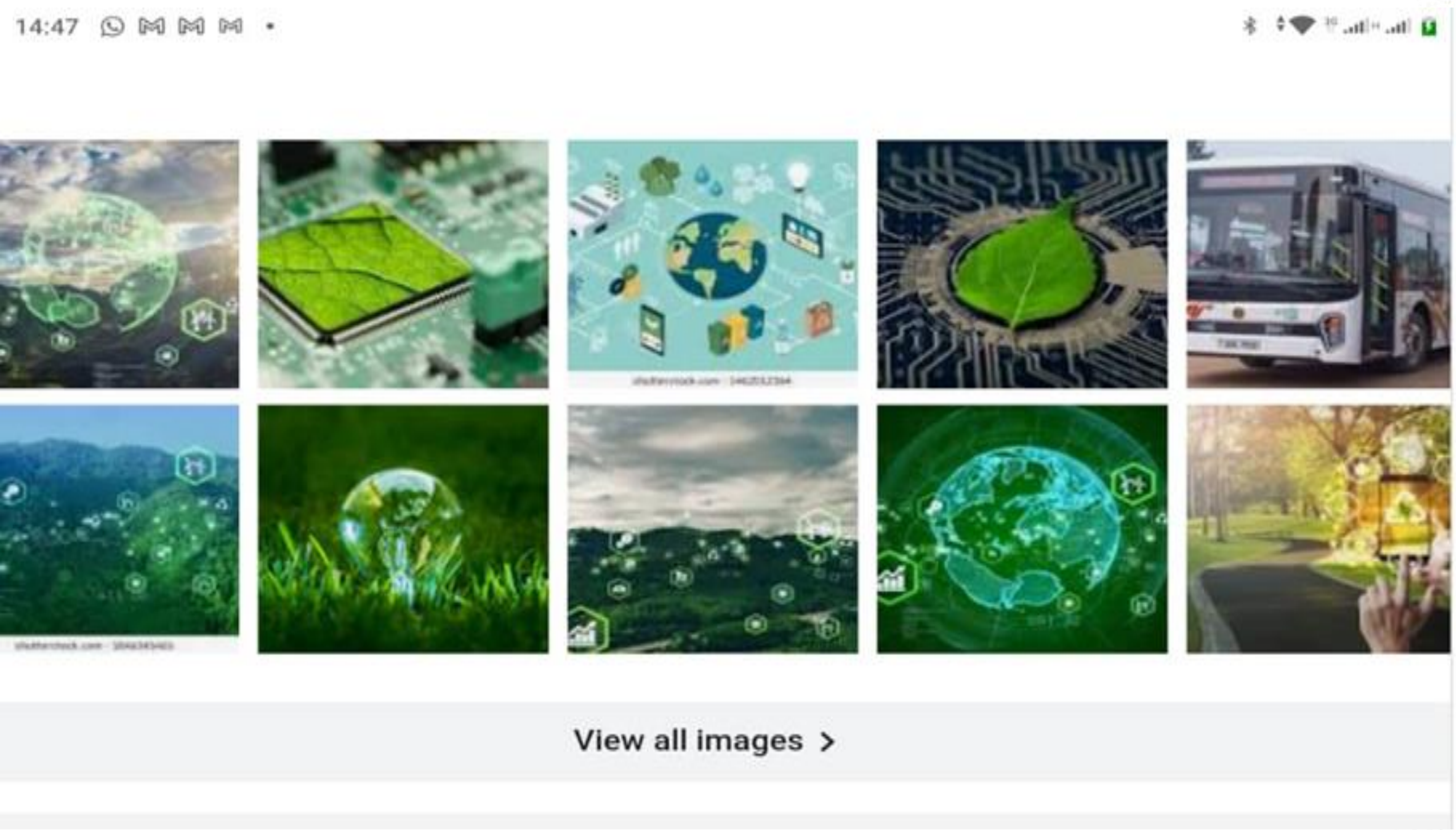
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DEMONSTRATE MITIGATION OPTIONS WITH SYSTEMIC IMPACTS

Conduct holistic and integrated migration effort through its Impact Programs on Sustainable Cities, Food Systems, Land, and Restoration, and Sustainable Forest Management. The Sustainable Cities Impact Program, for example, targets urban interventions with significant climate change mitigation potential to help cities shift towards low-emission and resilient urban development in an integrated manner

FOSTER ENABLING CONDITIONS FOR MAINSTREAMING MITIGATION CONCERNS INTO SUSTAINABLE DEVELOPMENT STRATEGIES

Address the need for enabling conditions to mainstream climate change concerns into the national planning and development agenda through its support for enabling activities, including Convention obligations and the Capacity-building Initiative for Transparency through sound data, analysis, and policy frameworks.

Current trends

Chowdhury Mowtushi Motin

GHG emissions have continued to increase over 1970 to 2010 but due to the COVID-19 pandemic led to an unprecedented 5.4 per cent drop in CO_2 emissions

- Increase of 1.3% per year from 1970 to 2000
- Increase of 2.2% per year from 2000 to 2010
- Increase of 1.3% per year from 2010 to 2019

Figure 2.1. Global greenhouse gas emissions from all sources, 1970–2020

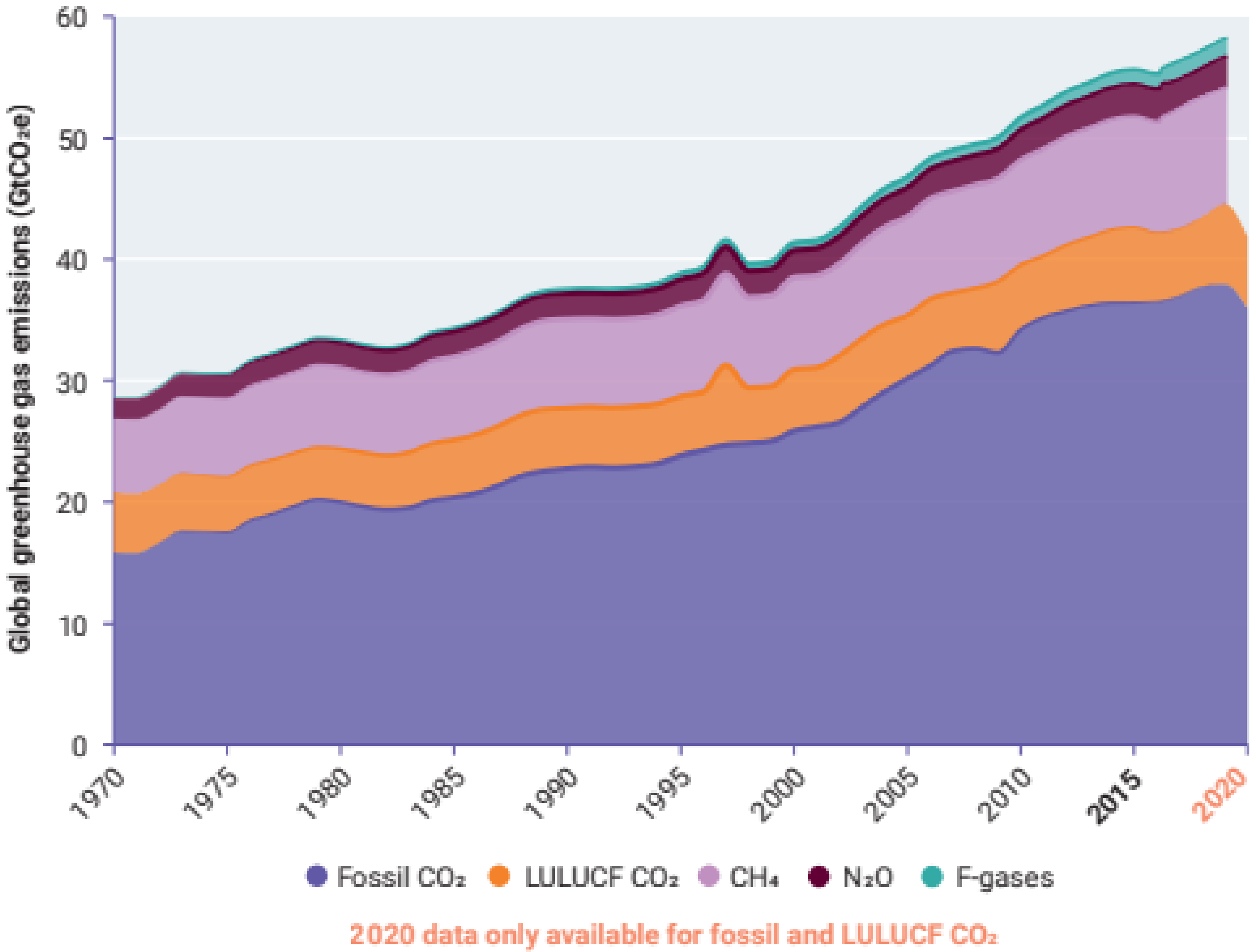
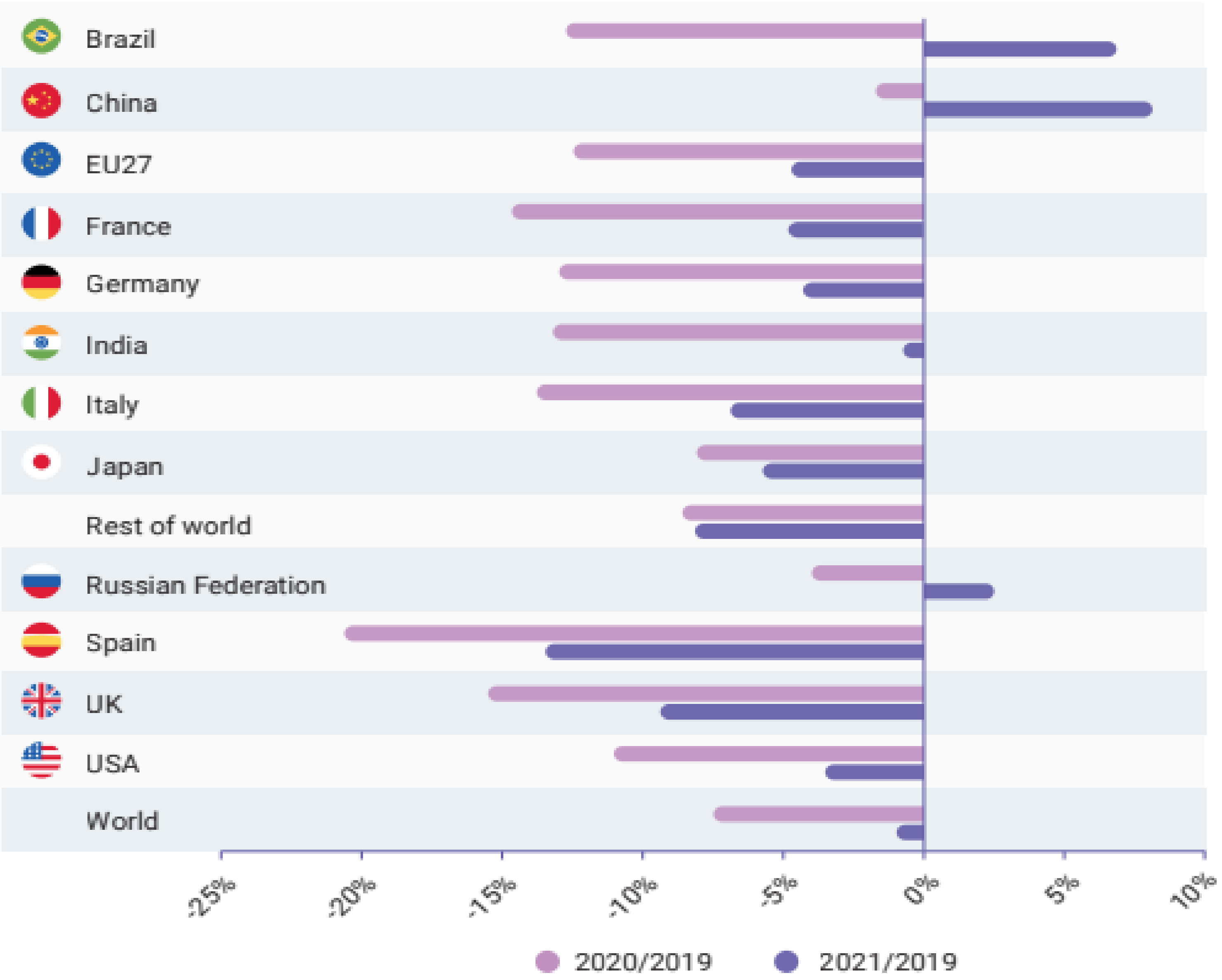


Figure 2.2. Change in emissions in 2020 and 2021, both relative to 2019 levels due to COVID-19 lockdowns



Despite the large decline in CO_2 emissions in 2020, the concentration of CO_2 in the atmosphere grew by around 2.3 parts per million, in line with recent trends. It is unlikely that the reductions in emissions in 2020 will be detectible in the atmospheric growth rate for three reasons:

- Although emission levels declined, they were still high and around the same levels as those seen in the early 2010s, meaning the amount of CO_2 remaining in the atmosphere is expected to be only marginally less than if emissions grew.

- CO_2 is a cumulative pollutant with a long lifetime, so sustained emission reductions are needed to see a change in the atmospheric signal.

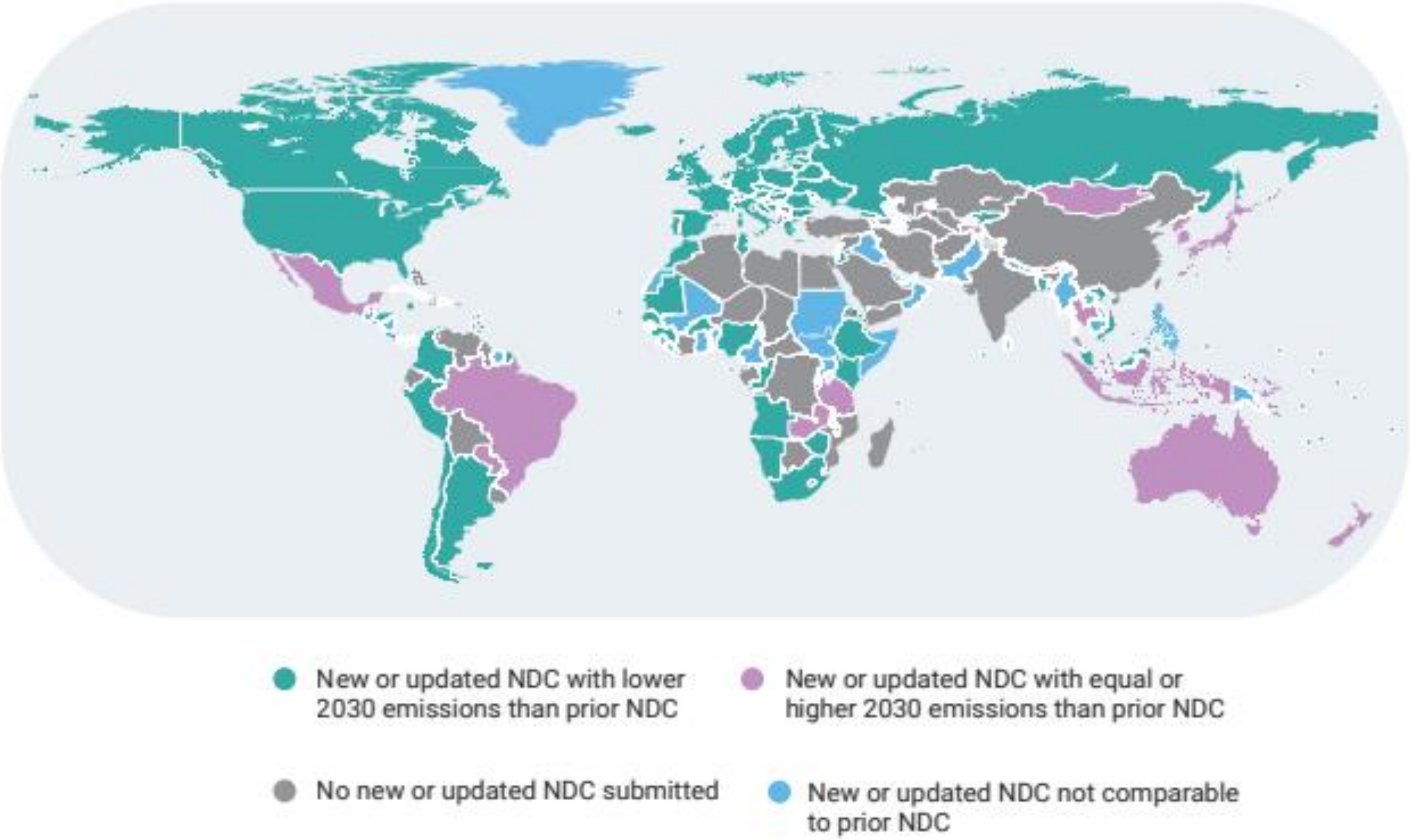
- The natural variability of around one part per million is far greater than the effect of a 5.4 per cent reduction in emissions

Trends and implications of the new updated NDCs mitigation pledges for 2030

Typically due to insufficient information in the previous NDCs, as transparency has improved in the current NDCs.

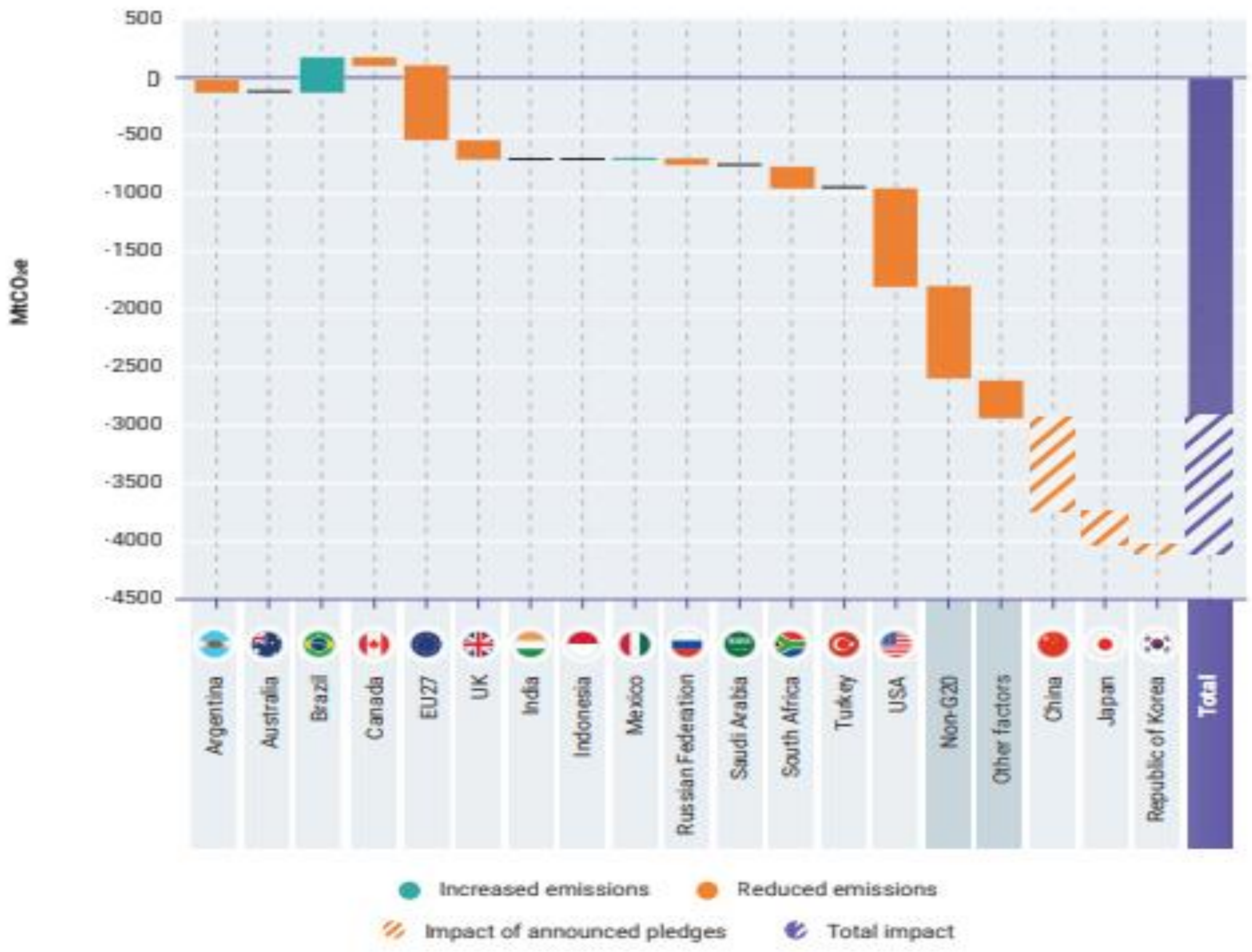
- GHG targets can be formulated to cover a country's entire economy or only a subset of it.
- Targets with full coverage include the energy, industrial process and product use, waste and land sectors, as well as CO2, methane, nitrous oxide, hydrofluorocarbons (HFCs), perfluorochemicals (PFCs), sulfur hexafluoride and nitrogen trifluoride.
- The GHG targets in the current round of NDCs are only marginally more comprehensive in terms of sector and gas coverage than in the previous round.
- 19 per cent had full sector and gas coverage, up from 14 per cent in those countries' first NDCs.
- seven countries improved their NDCs from partial coverage to full or nearly full coverage.
- three countries downgraded their NDCs from nearly full coverage to partial coverage.

Figure 2.3. Effect of new or updated nationally determined contributions on 2030 greenhouse gas emissions relative to previous nationally determined contributions



Source: Climate Watch (2021)

Figure 2.4. Impact of 2030 pledges (nationally determined contributions and other announced pledges as at 30 September 2021) on 2030 global emissions compared with previous nationally determined contribution submissions



The analysis shows that the aggregate impact of the new or updated unconditional NDCs is estimated to lead to a reduction in 2030 global GHG emissions of about 2.9 GtCO2e, compared with the previous NDCs

G20 members that have submitted new or updated NDCs

G20 members	Change in 2030 emissions relative to original NDC Based on modelling studies (median and range)	G20 members	Change in 2030 emissions relative to original NDC Based on modelling studies (median and range)
1.Argentina	-0.12 GtCO2e (range: -0.11 – -0.13	7.Mexico	Marginal increase due to change in BAU scenario
2.Australia	No change	8.Russian Federation	Reduced, but the target still results in higher emissions than the current policy projection
3.Brazil	0.3 GtCO2e (range: 0.15–0.4)	9.South Africa	Reduced
4.Canada	-0.09 GtCO2e (range: -0.08 – -0.1)	10.United Kingdom	-0.17 GtCO2e (range: -0.1 – -0.2)
5.EU27	-0.6 GtCO2e (range: -0.5 – -0.7)	11.United States of America	-0.85 GtCO2e (range: -0.8 – -0.9)11
6.Indonesia	No change		

G20 members that have announced mitigation pledges for 2030

G20 member	Change in 2030 emissions relative to original NDC Based on modelling studies (median and range)
1.China	-0.8 $GtCO_2e$ (range: -0.5 – -1.2)
2.Japan	-0.27 $GtCO_2e$ (range: -0.17 – -0.32)
3.Republic of Korea	Reduced**

G20 members that have not yet submitted new or updated NDCs or announced pledges

G20 members	Change in 2030 emissions relative to original NDC Based on modelling studies (median and range)
1.India	N/A
2.Saudi Arabia	N/A
3.Turkey	N/A

Table 2.2. Assessment of progress towards achieving the previous unconditional nationally determined contribution targets for G20 members under current policies based on independent studies mainly published after the COVID-19 outbreak

		Projected progress towards the previous NDC target [*x* studies meet the target/out of *y* studies]		
		Achieve previous target (indicated by +, if overachieved by more than 15 per cent)	Miss previous target	Uncertain
Status of NDC or announced target	Submitted stronger target	Argentina [3/3], EU27 [in Emissions Gap Report 2020 for EU27+UK; 1/3, one within reach],[1,2] Russian Federation+ [4/5],[1] South Africa [3/3], UK (formerly part of the EU)	USA [0/5], Canada [1/3]	
	Announced stronger target	China [4/6], Japan [3/3]	Republic of Korea [0/3][3]	
	No new target submitted	India+ [4/6], Saudi Arabia [2/2], Turkey+ [3/3]		
	Submitted equivalent or weaker target		Australia [1/4], Brazil [1/4, one within reach], Mexico [0/3]	Indonesia [0/3, two within reach]

Table 2.2 shows the progress of G20 members towards their previous NDC targets as of November 2020, organized by the status and assessment of their new or updated NDC targets and other announced 2030 targets submitted or announced thereafter.

Greenhouse gas emissions (all gases and sectors, including land use, land-use change and forestry) of the G20 and its individual members by 2030 under the current policies scenario, previous nationally determined contributions and new, updated or announced pledges compared with historical emissions

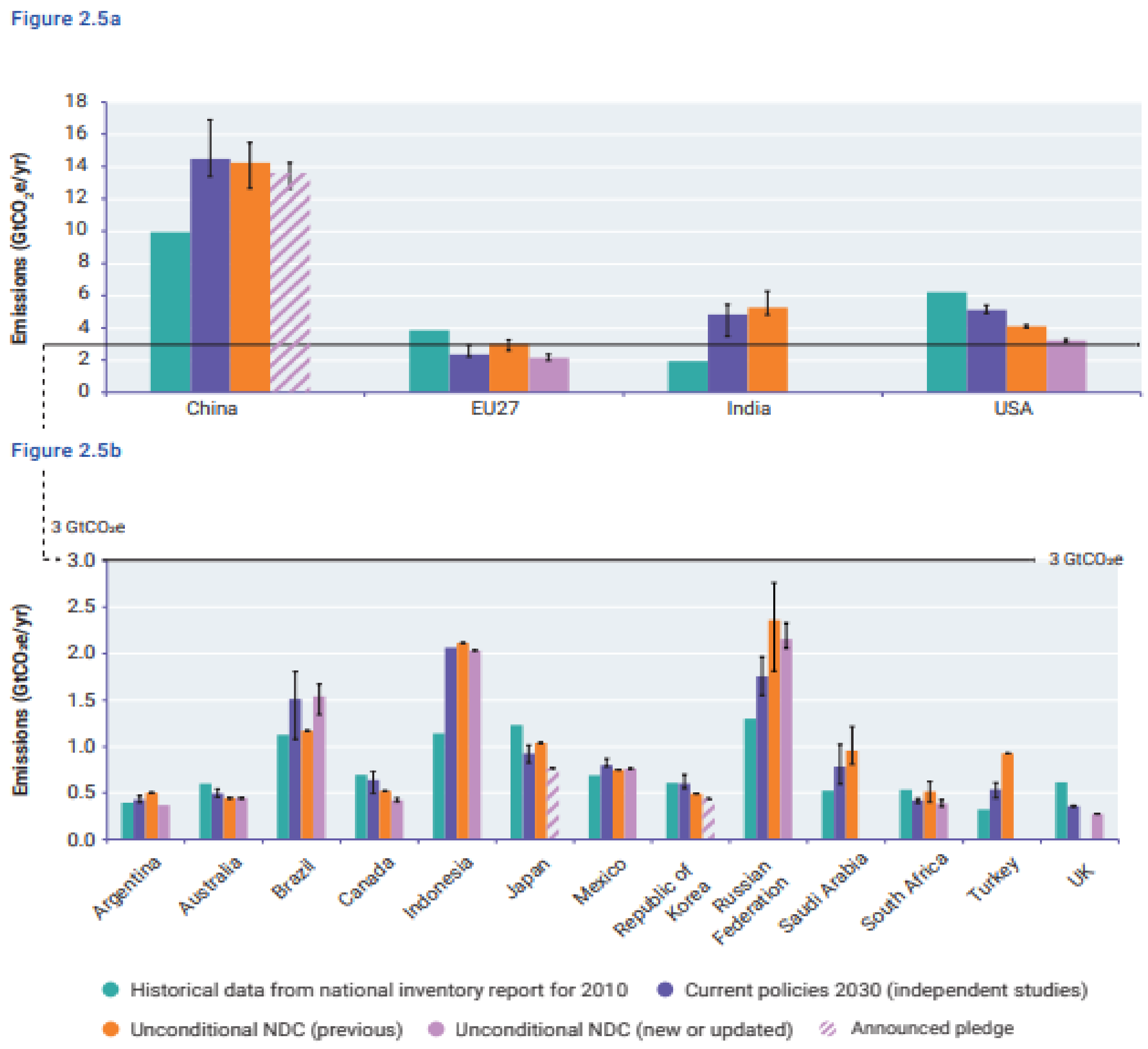
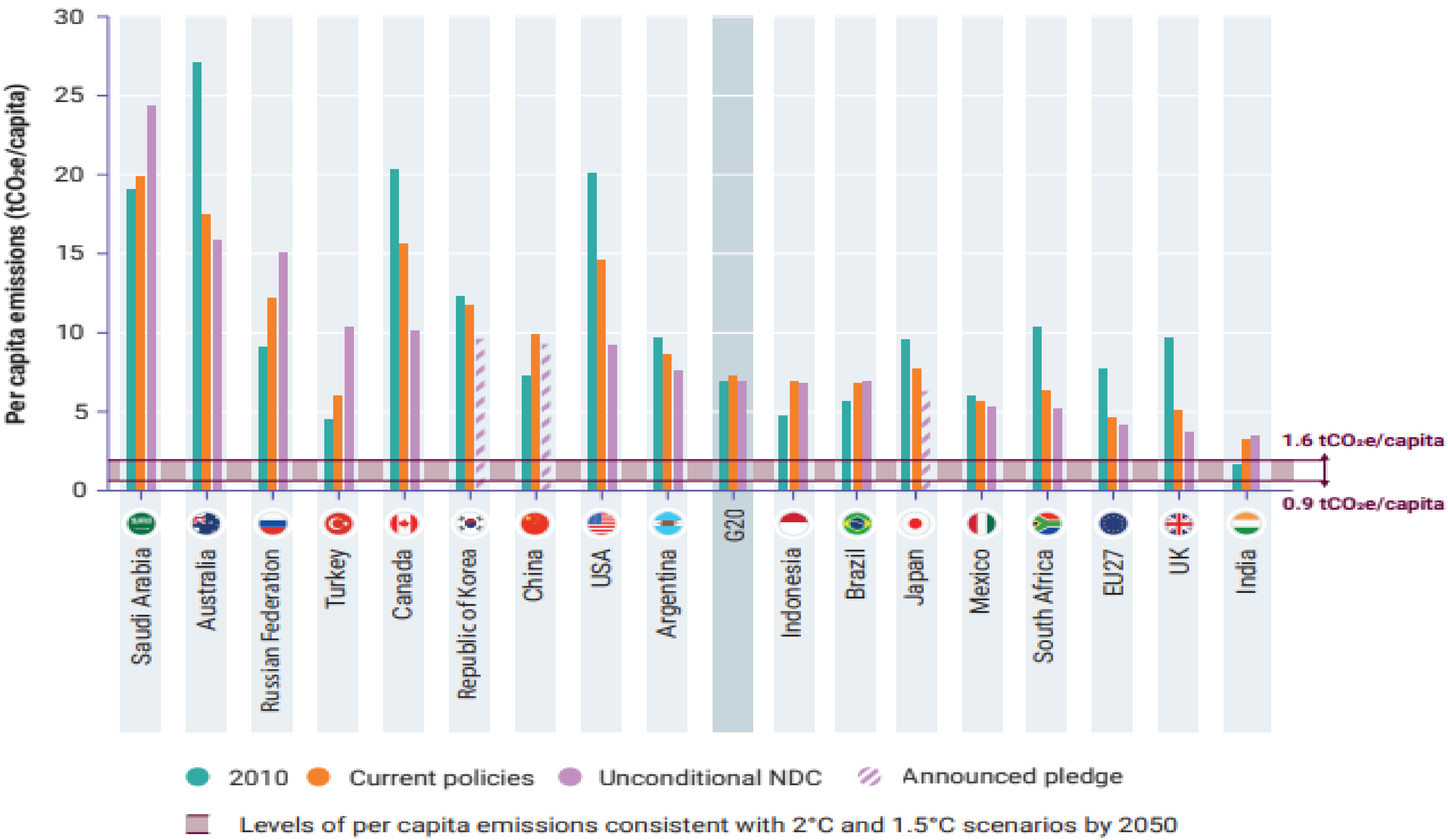
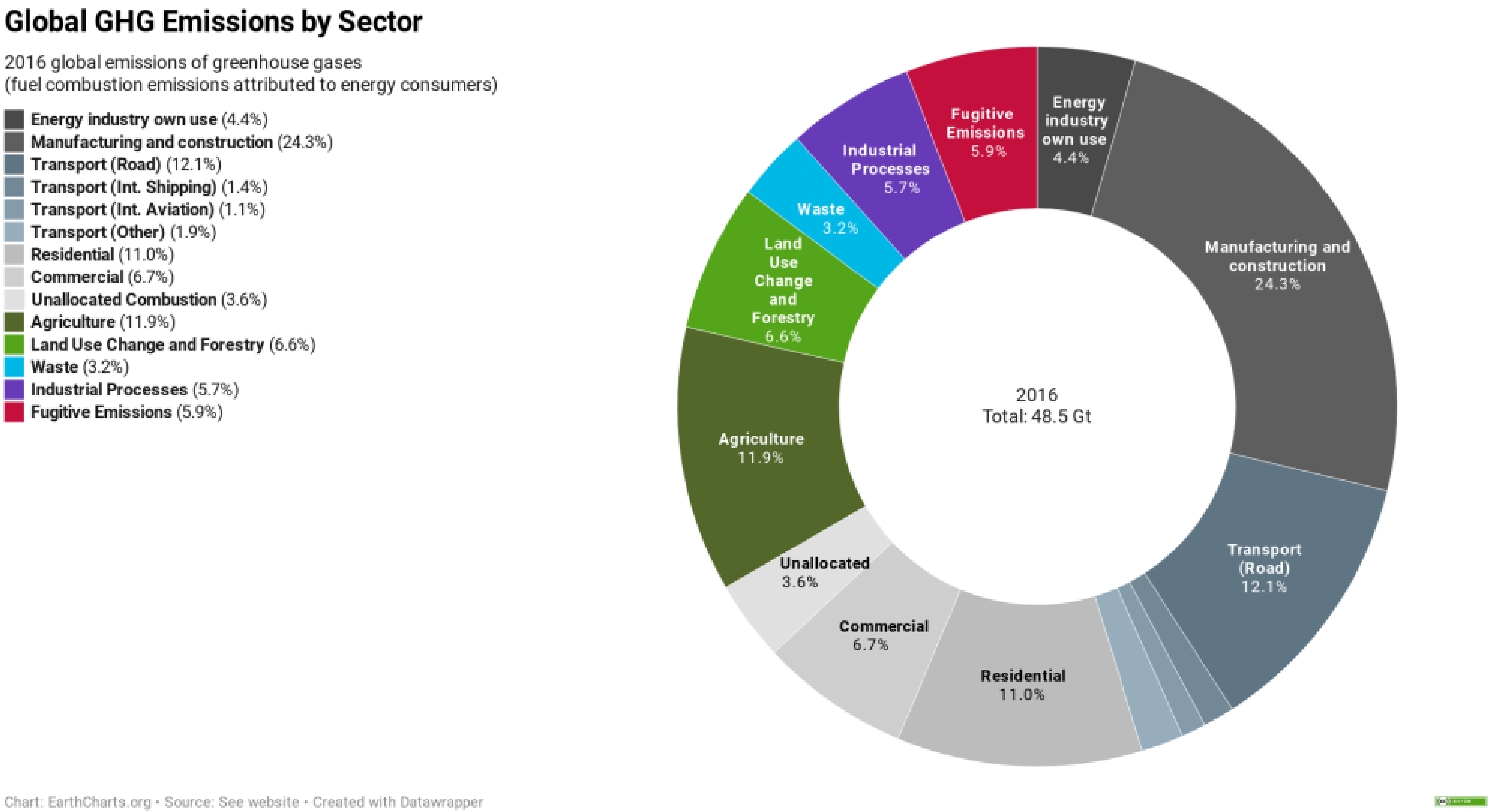
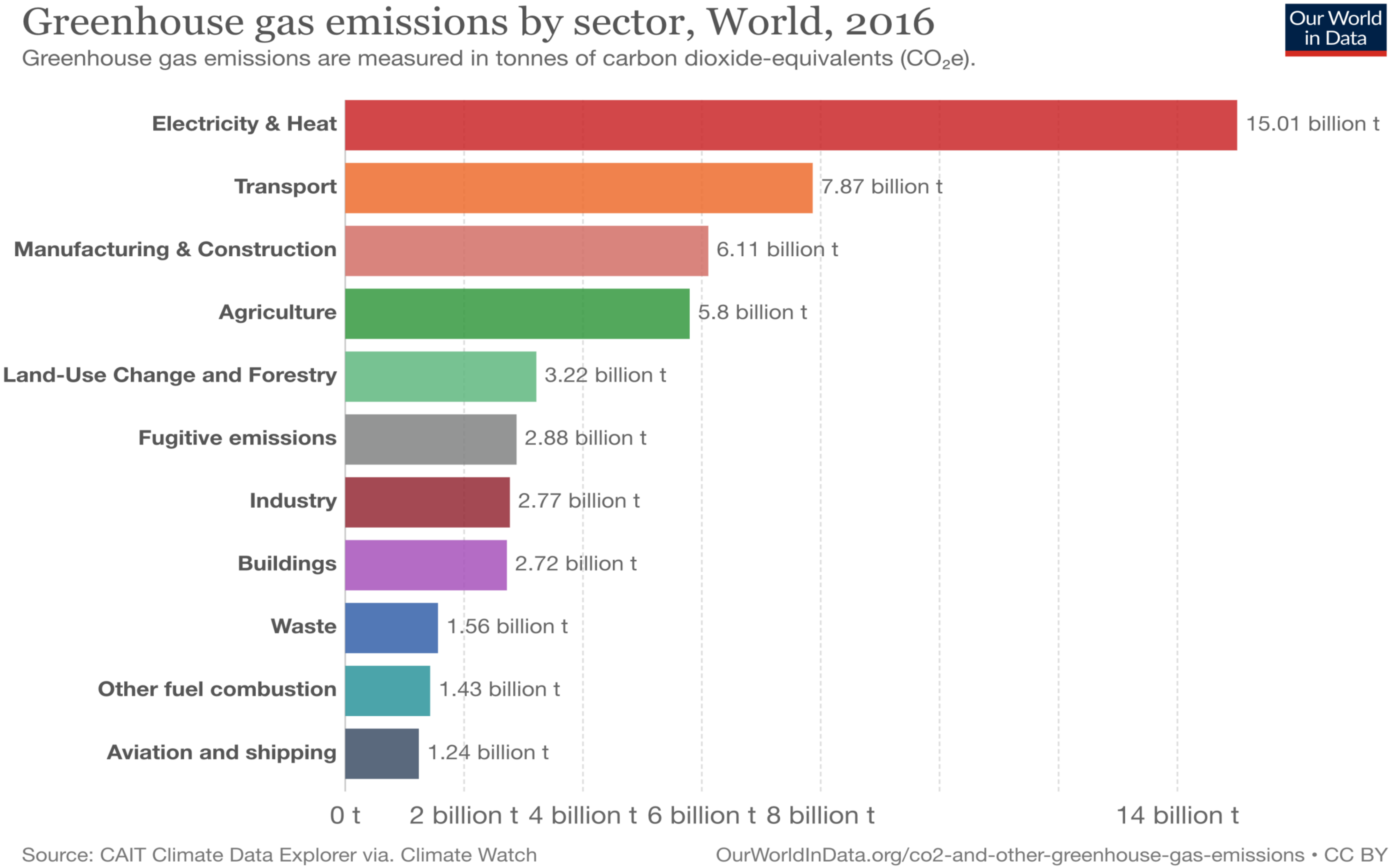


Figure 2.6. Per capita greenhouse gas emissions of the G20 and its individual members by 2030 under nationally determined contributions and other announced 2030 pledges as at 30 September 2021, current policies scenario projections from independent studies mainly published after the COVID-19 outbreak, and 2010 historical levels



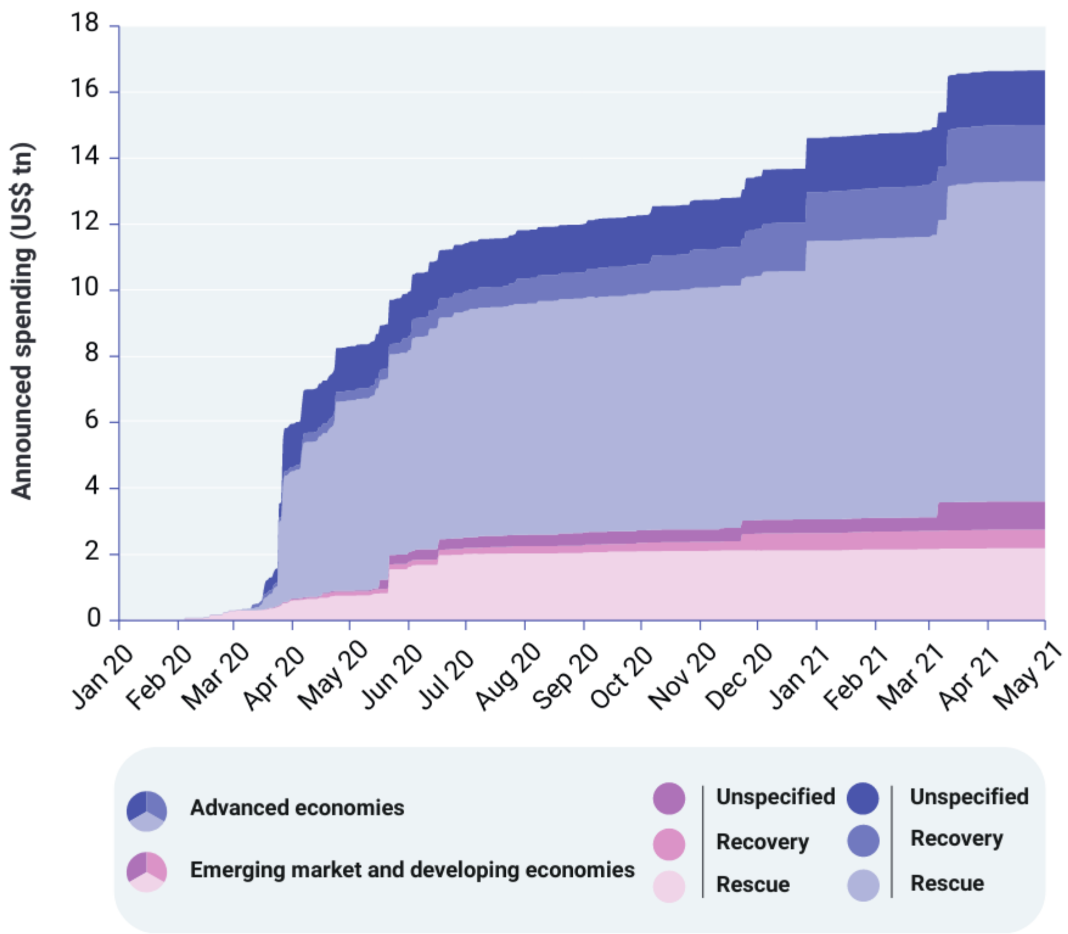

Global GHG Emissions by Sector
2016 global emissions of greenhouse gases
(fuel combustion emissions attributed to energy consumers)
Energy industry own use (4.4%)
Manufacturing and construction (24.3%)
Transport (Road) (12.1%)
Transport (Int. Shipping) (1.4%)
Transport (Int. Aviation) (1.1%)
Transport (Other) (1.9%)
Residential (11.0%)
Commercial (6.7%)
Unallocated Combustion (3.6%)
Agriculture (11.9%)
Land Use Change and Forestry (6.6%)
Waste (3.2%)
Industrial Processes (5.7%)
Fugitive Emissions (5.9%)
Energy industry own use 4.4%
Manufacturing and construction 24.3%
Transport (Road) 12.1%
Residential 11.0%
Commercial 6.7%
Unallocated 3.6%
Agriculture 11.9%
Land Use Change and Forestry 6.6%
Waste 3.2%
Industrial Processes 5.7%
Fugitive Emissions 5.9%
2016
Total: 48.5 Gt
Chart: EarthCharts.org • Source: See website • Created with Datawrapper


Greenhouse gas emissions by sector, World, 2016
Greenhouse gas emissions are measured in tonnes of carbon dioxide-equivalents (CO_2e).
Our World in Data
Electricity & Heat
15.01 billion t
Transport
7.87 billion t
Manufacturing & Construction
6.11 billion t
Agriculture
5.8 billion t
Land-Use Change and Forestry
3.22 billion t
Fugitive emissions
2.88 billion t
Industry
2.77 billion t
Buildings
2.72 billion t
Waste
1.56 billion t
Other fuel combustion
1.43 billion t
Aviation and shipping
1.24 billion t
0 t
2 billion t
4 billion t
6 billion t
8 billion t
14 billion t
Source: CAIT Climate Data Explorer via. Climate Watch
OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

Are COVID-19 fiscal measures helping or stunting the emission gap?

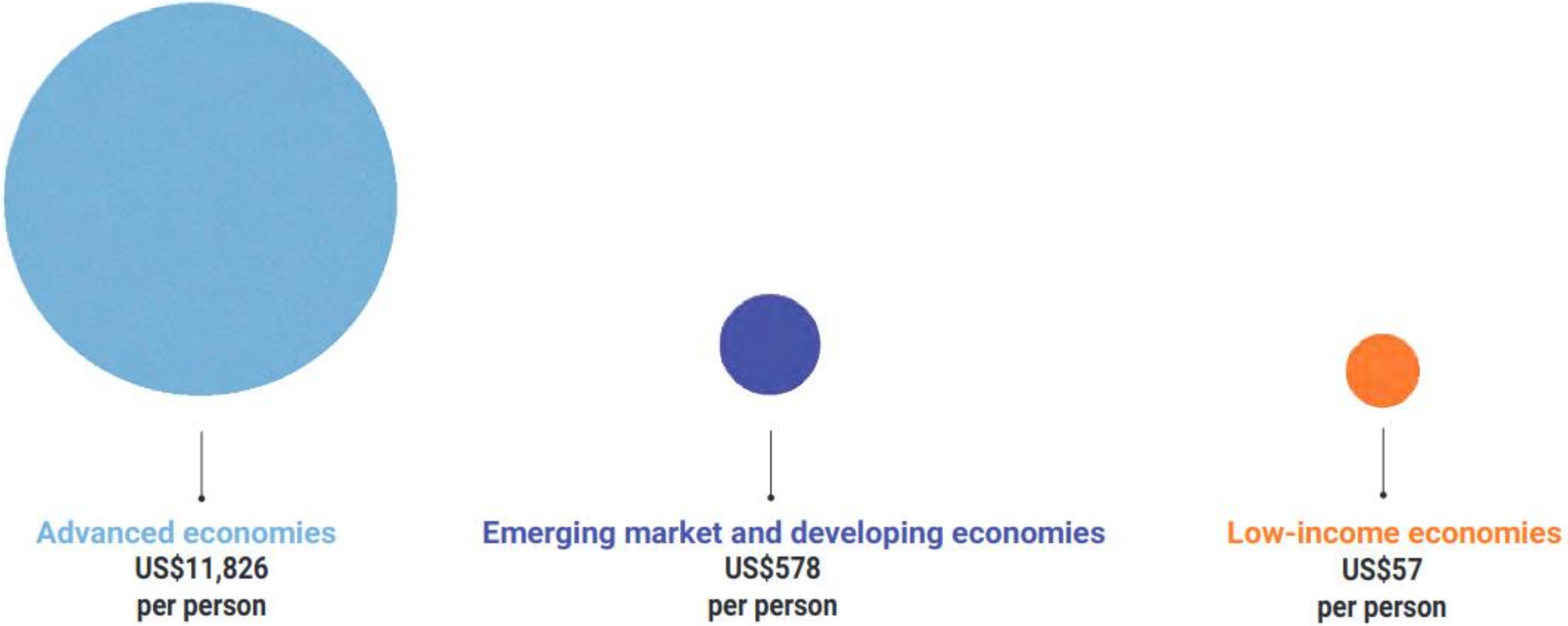
Francesco Pizzolo

COVID-19-related fiscal packages



Source: O'Callaghan *et al.* (2021)

COVID-19-related fiscal packages per individual



Source: O'Callaghan *et al.* (2021)

Data as of May 2021

Low-carbon opportunities — Rescue spendings

Target hard-to-abate industrial sectors

Green incentives in:

- Liquidity support
- Reduced taxation

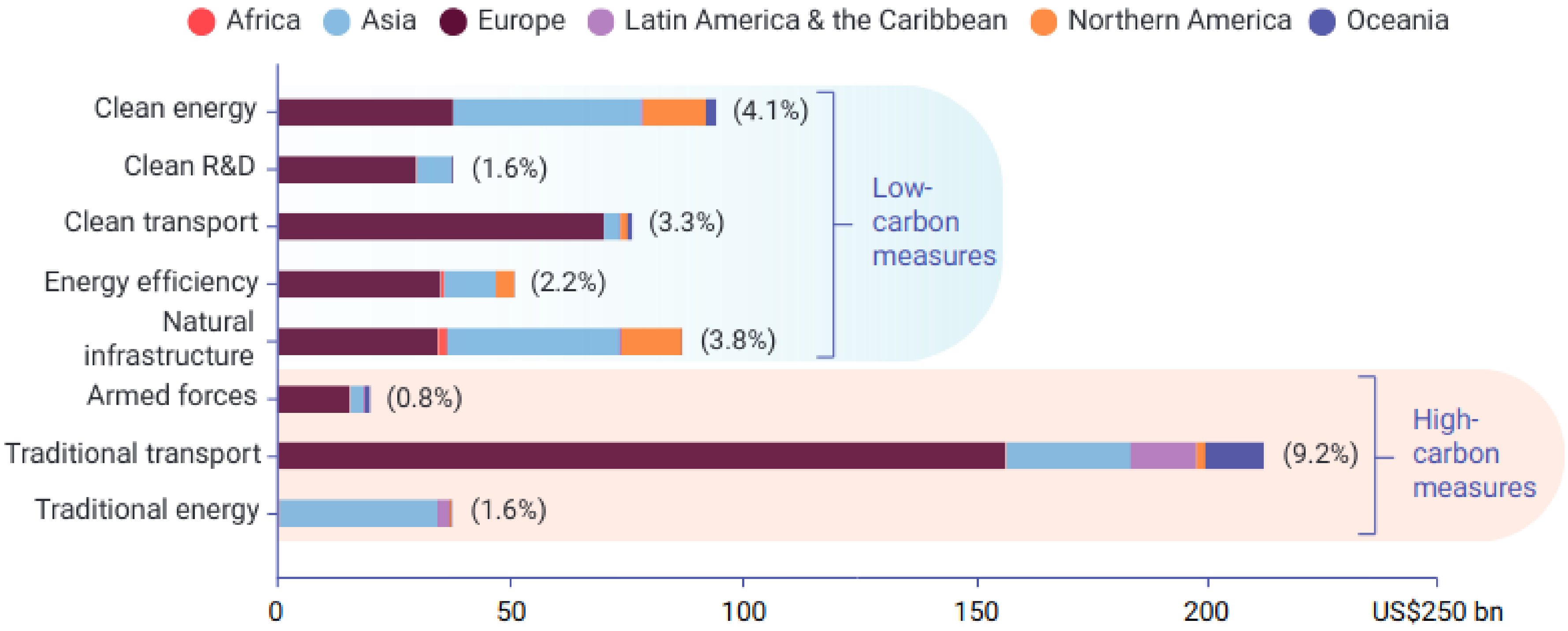
Can allow a shift towards carbon neutrality without compromising jobs and livelihood

Low-carbon opportunities — Recovery spendings pt1

Can be more efficient than conventional stimulus in delivering stronger economic returns

Supporting the fossil fuel industry without conditions for a sustainable transition endanger economic returns as fossil fuel assets become devalued with reduced demand for their outputs (Mercure et al. 2018; Ansari and Holz 2020; van der Ploeg and Rezai 2020).

Figure 5.4. Global recovery spending as of May 2021 across sectors by region (US$ billions)

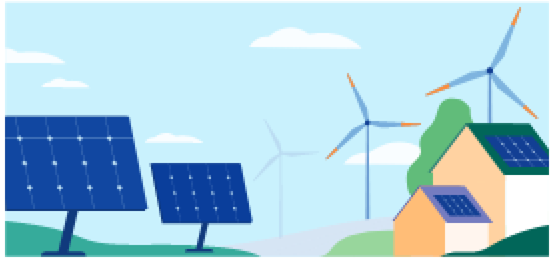


Note: Low-carbon initiatives (top) and high-carbon initiatives (bottom).

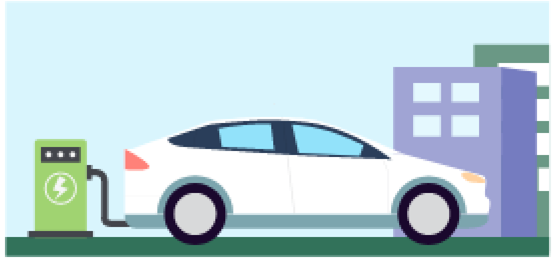
Source: O'Callaghan *et al.* (2021)

Low-carbon opportunities — Recovery spendings pt2

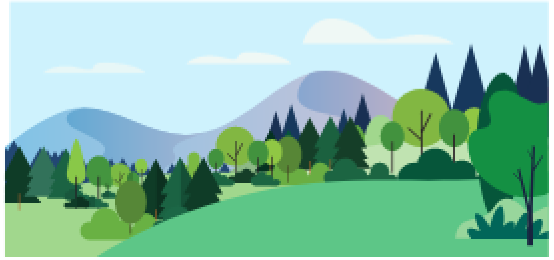
Sustainable public transport



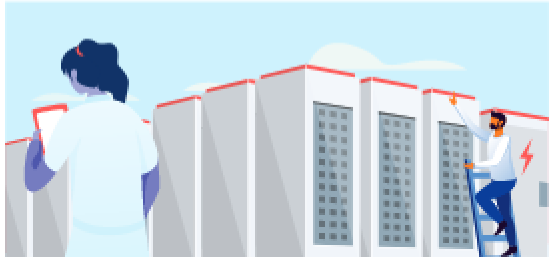
Clean energy infrastructure



Energy efficiency upgrades



Natural capital



Clean research and development

Green skills retraining initiatives

Regardless of the development status of a country, low-carbon options can generate more jobs and economic value than traditional "dirty" and "neutral" alternatives.

Principles for a green recovery

Upholding commitments

Need to uphold 2030 SDGs and the Paris Agreement

Fiscal spending as an indicator of progress against NDCs

Building resilience

Mitigating climate risk by emphasizing nature-based solutions

Investment in effective disaster management

Centring participation

Protecting the most vulnerable and synthesizing the diverse priorities of different socioeco-nomic groups, genders, ethnicities and age groups

Supporting the private sector

Small and medium-sized enterprises and informal enterprises are vulnerable, account for most of global employment and can rapidly take up green innovations

Creating alliances

Building trade and innovation networks can support recovery

Shared governance approaches can create fiscal space for recovery in developing countries

Accelerating the transition

Stimulating markets where the transition is well under way (e.g. renewable energy)

Limiting fossil fuel subsidies and making dirty energy bailouts conditional on green transformations

Prioritizing transparency

Transparent and inclusive policy consultation is essential

Spending should not undermine environmental protections or generate unsustainable deficits

Sources: Synthesized from Butterworth (2020); C40 (2020); Corkal *et al.* (2020); Green Growth Knowledge Platform (2020); Partners for Inclusive Green Economies (2020); United Kingdom, Climate Change Committee (2020); Ocean Conservancy (2021); The Lancet COVID-19 Commission Task Force on Green Recovery (2021)

Key themes of current low-carbon spendings

Just 2.5% of COVID-19 fiscal spendings has been low carbon; a further <20% is likely to reduce emissions

Nearly 90% comes from just 7 countries:

- China,
- France,
- Germany,
- Japan,
- South Korea,
- Spain, and
- the United Kingdom

Low-carbon fiscal investments cover nearly all low-carbon industries

Insufficient focus on long-term human capital development

There are significant disparities in total and low-carbon spendings between countries, even among developed nations

Higher spendings does not equate more money spent on green priorities

Nations with low-carbon recoveries >39% of the total:

- Canada
- Denmark
- Finland
- France
- Germany
- Norway

Overview of G20 members

Figure 5.3. Non-exhaustive overview of total fiscal rescue and recovery measures of G20 members with high-carbon, neutral and low-carbon impacts as a share of 2020 gross domestic product[12]

Notes: GRO – Global Recovery Observatory of the University of Oxford, UNEP, Green Fiscal Policy Network and United Nations Development Programme (UNDP); OECD – OECD Green Recovery Database; E3G – Green Recovery Tracker of Third Generation Environmentalism (E3G) and Wuppertal Institute.

The disproportionately negative impacts of COVID-19 on vulnerable nations

- According to the World Bank, since the beginning of the pandemic 120M more people are now living in poverty
- Foreign investments in developing countries shrank in 2020 compared to 2019, especially in Africa (-15.6%) and Latin America and the Caribbean (-45.4%)
- Risk for economically poorer nations to become the world's top greenhouse gases emitters *and* the most affected by climate change

How wealthier economies could support vulnerable nations

Key measures to unlock finance for lower-income nations to recover green include:

- Debt forgiveness
- Direct grants and concessional finance
- Concessional finance for green and blue bonds
- Guaranteeing private sector debt
- Redistributing multilateral finance

Market mechanisms in bridging the emission gap

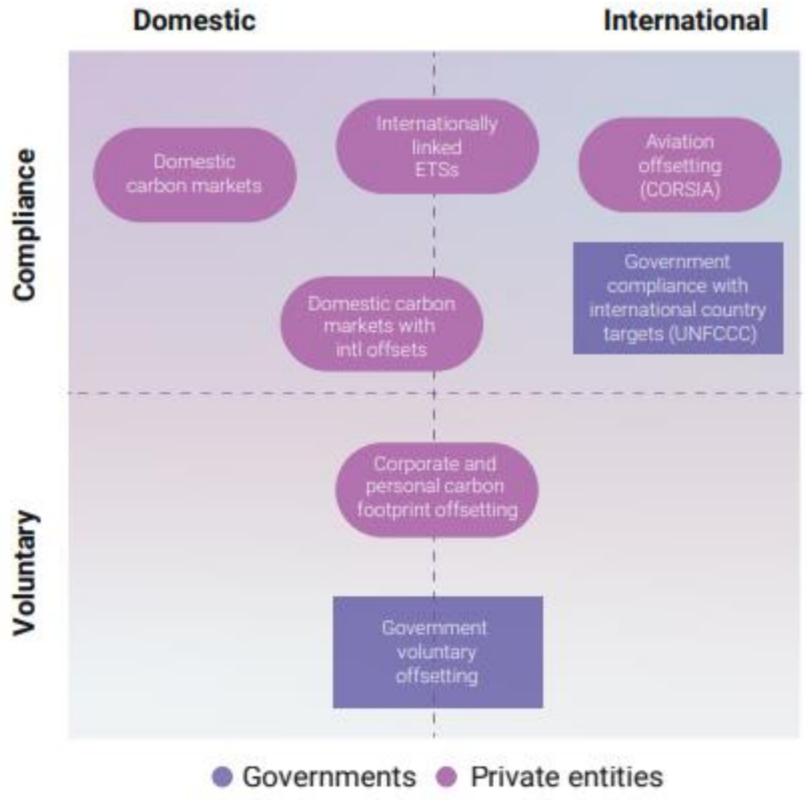
Julia Tonkowicz

Under article 6, the Paris Agreement provides for an international framework for market mechanisms to enable greater ambition in both mitigation and adaptation actions

There are various market mechanism to mitigate climate change. In the Paris Agreement, cooperation among countries is considered a way to both implement nationally determined contributions (NDCs) and promote greater ambition, while also fostering sustainable development and encouraging broad participation from the private and public sectors. Market mechanisms are therefore seen as an important component in collective action to achieve the long-term goals of the Paris Agreement.

In principle, the role of markets within the context of the agreement is to enable all parties engaged in mitigation actions to implement these in a cost-effective manner, while simultaneously providing an opportunity to enhance their ambition.

Figure 7.1a Market typology



Source: Adapted from La Hoz Theuer (2021)

Carbon markets and carbon prices

To reach global net-zero emissions, countries with emissions greater than zero may need to be balanced by countries with negative emissions. This can be done by buying carbon emissions and offsetting.

Market size, for example, reaches **US$300–400 billion in 2030** and around **US$1 trillion in 2050** in scenarios with different net-zero timings.

Removal credits by technology-based CO2 removal approaches could play an increasingly important role to achieve net-zero emissions but will be limited by the global removal capacity of these technologies.

Carbon markets: A term for a carbon trading system through which countries may buy or sell units of greenhouse gas emissions in an effort to meet their national limits on emissions, either under the Kyoto Protocol or other agreements, such as that among member states of the European Union. The term comes from the fact that CO2 is the predominant greenhouse gas, and other gases are measured in units called carbon dioxide equivalent.

Carbon price: The price for avoided or released CO2 or CO2e emissions. This may refer to the rate of a carbon tax or the price of emission permits. In many models that are used to assess the economic costs of mitigation, carbon prices are used as a proxy to represent the level of effort in mitigation policies.

Figure 2.26 | Global price of carbon emissions consistent with mitigation pathways.

Panels show

(a) **undiscounted price of carbon** (2030–2100)

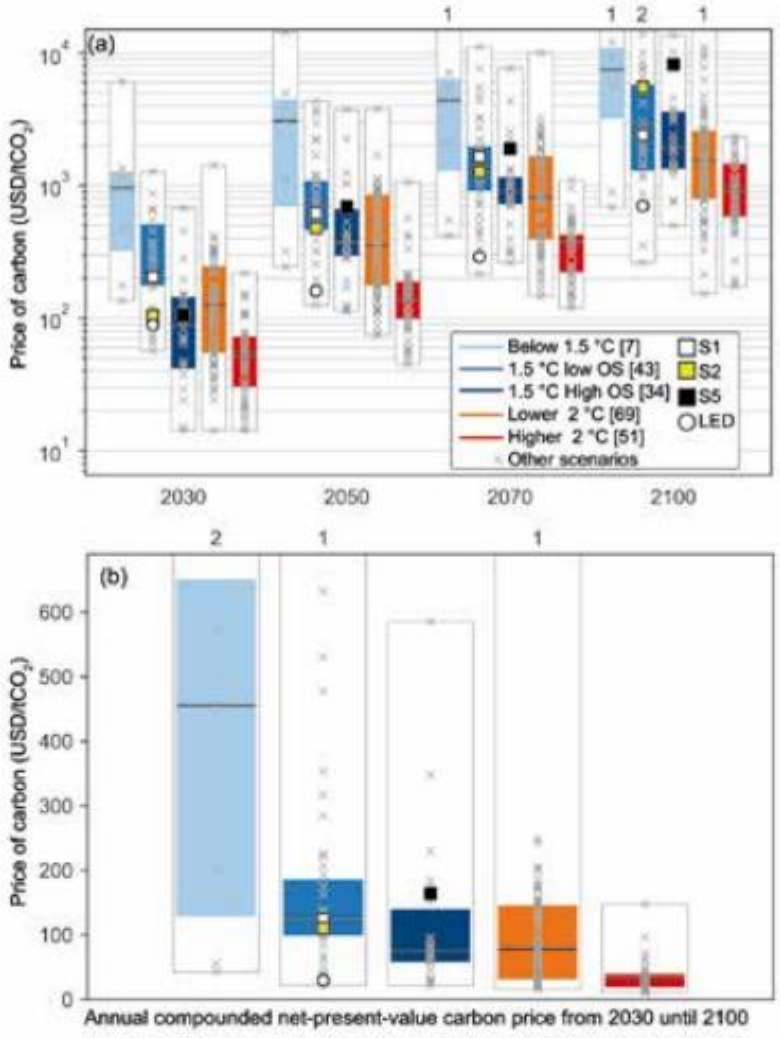
(b) **average price of carbon** (2030–2100) **discounted at a 5% discount rate to 2020 in USD2010**.

AC: Annually compounded.

NPV: Net present value.

Median values in floating black line. The number of pathways included in box plots is indicated in the legend.

Number of pathways outside the figure range is noted at the top.



Investments

Realizing the transformations towards a 1.5°C world would require a major shift in investment patterns

Although there is potential for international carbon markets to reduce costs to achieve NDC goals and increase ambition, such potential will remain unknown until important details are determined under article 6. These include establishing robust rules to ensure environmental integrity, including the avoidance of double counting, capacity-building and the management of potential carbon leakages. That also includes investments.

Global energy-system investments in the year 2016 are estimated at approximately 1.7 trillion USD2010 (approximately 2.2% of global GDP and 10% of gross capital formation), of which 0.23 trillion USD2010 was for incremental end-use energy efficiency and the remainder for supply-side capacity installations

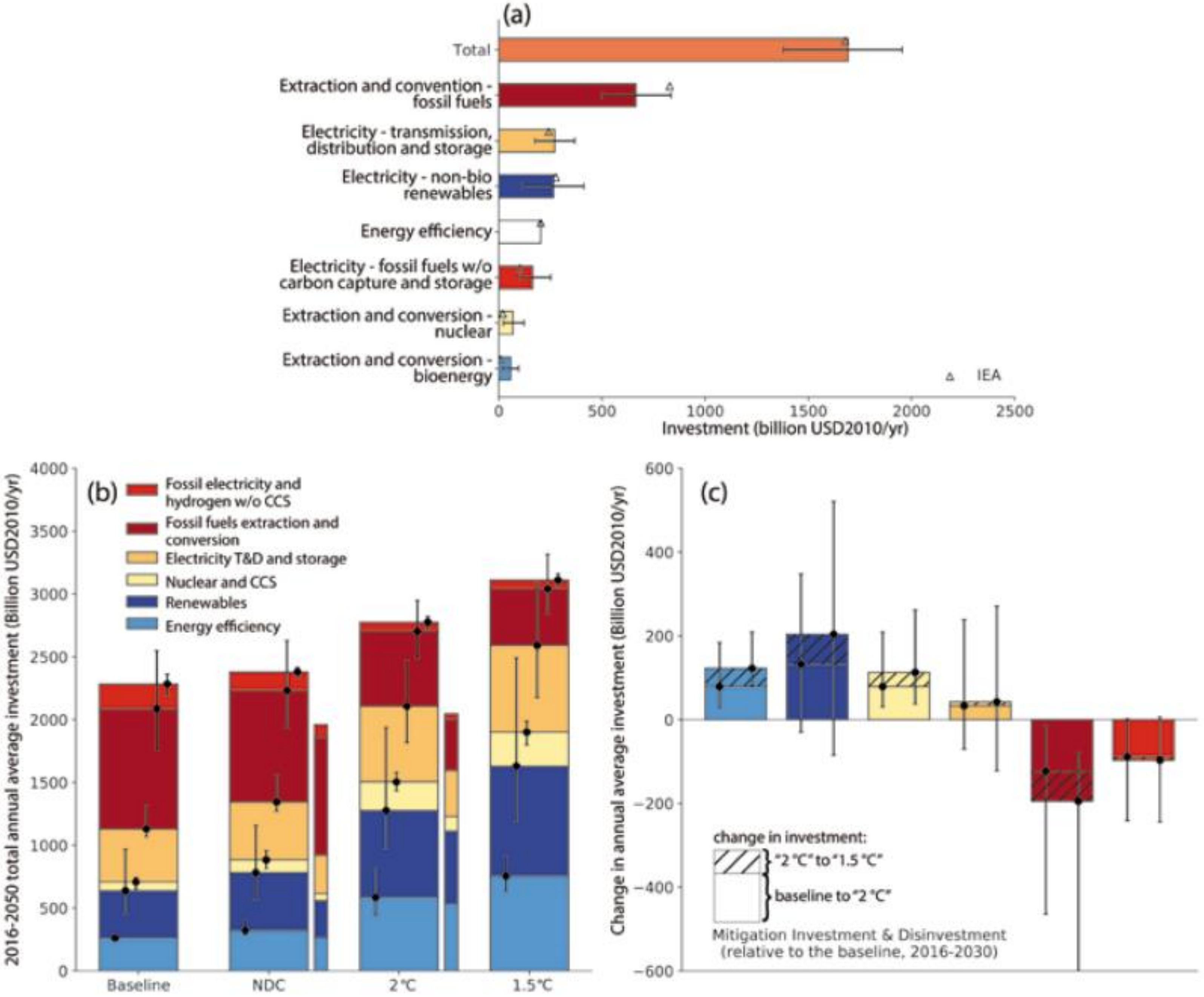
Research carried out by six global IAM teams found that 1.5°C-consistent climate policies would require a marked upscaling of energy system supply-side investments (resource extraction, power generation, fuel conversion, pipelines/transmission, and energy storage) between now and mid-century, reaching levels of between 1.6–3.8 trillion USD2010 yr−1 globally on average over the 2016–2050 timeframe

Figure 2.27 | Historical and projected global energy investments.

(a) **Historical investment estimates across six global models** from (McCollum et al., 2018) (bars = model means, whiskers full model range) compared to historical estimates from IEA (International Energy Agency (IEA) 2016) (triangles).

(b) **Average annual investments over the 2016–2050 period in the "baselines"** (i.e., pathways without new climate policies beyond those in place today), scenarios which implement the NDCs ('NDC', including conditional NDCs), scenarios consistent with the Lower-2°C pathway class ('2°C'), and scenarios in line with the 1.5°C-low-OS pathway class ('1.5°C'). Whiskers show the range of models; wide bars show the multimodel means; narrow bars represent analogous values from individual IEA scenarios (OECD/IEA and IRENA, 2017).

(c) **Average annual mitigation investments and disinvestments for the 2016–2030 periods relative to the baseline**. The solid bars show the values for '2°C' pathways, while the hatched areas show the additional investments for the pathways labelled with '1.5°C'. Whiskers show the full range around the multimodel means. T&D stands for transmission and distribution, and CCS stands for carbon capture and storage. Global cumulative carbon dioxide emissions, from fossil fuels and industrial processes (FF&I) but excluding land use, over the 2016-2100 timeframe range from 880 to 1074 GtCO2 (multimodel mean: 952 GtCO2) in the '2°C' pathway and from 206 to 525 GtCO2 (mean: 390 GtCO2) in the '1.5°C' pathway.



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