

THE CLIMATE CONVOCATION

For CSE-GSP's climate change course participants

September 28-30, 2022

Anil Agarwal Environment Training Institute (AAETI), Nimli, Rajasthan



The Climate Crisis: Science, Impacts, Politics

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We are in a climate crisis



How did we get here?



What needs to be done?



How do we get there?

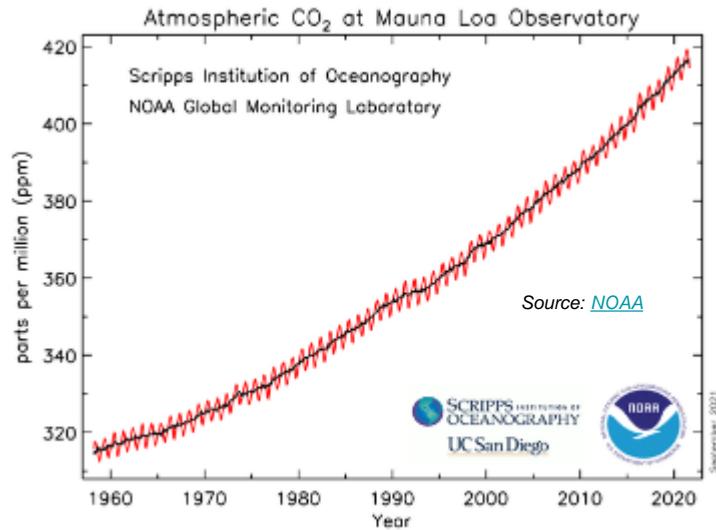


What has been done so far?



The World's Leading Climate Scientists Have Repeatedly Warned Us About Climate Change

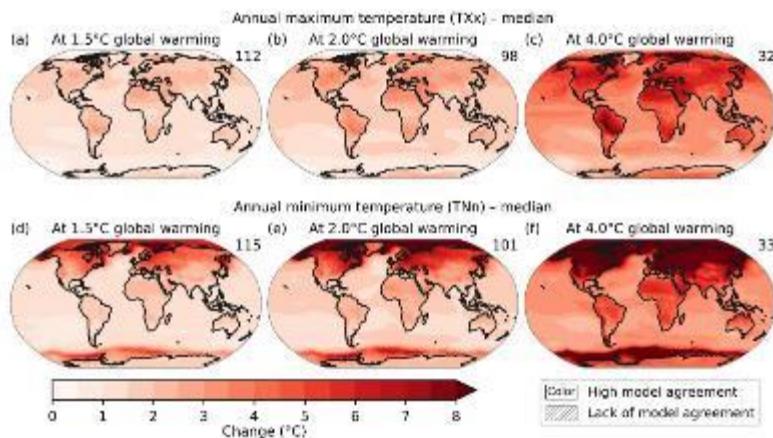
- ❖ The current concentration of carbon dioxide is 419 parts per million (ppm), the level deemed 'safe' was 350 ppm
- ❖ Almost 100% of this has been caused by human-driven burning of fossil fuels and deforestation
- ❖ This has caused the Earth to heat up by 1.09 degrees Celsius since pre-industrial times (1850); the last decade was hotter than any period in the past 1,25,000 years
- ❖ There will be further warming in the coming decades unless there are immediate, strong, and rapid reductions to global emissions
- ❖ Every additional 0.5 degree of warming will increase hot extremes, extreme precipitation, and drought
- ❖ Some changes are irreversible – such as the retreat of glaciers and thawing of Arctic permafrost



"It is indisputable that human activities are causing climate change, making extreme climate events including heat waves, heavy rainfall, and droughts, more frequent and severe." – IPCC AR6, August 2021

The IPCC's Sixth Assessment Report (AR6)

Working Group I Report, published August 2021

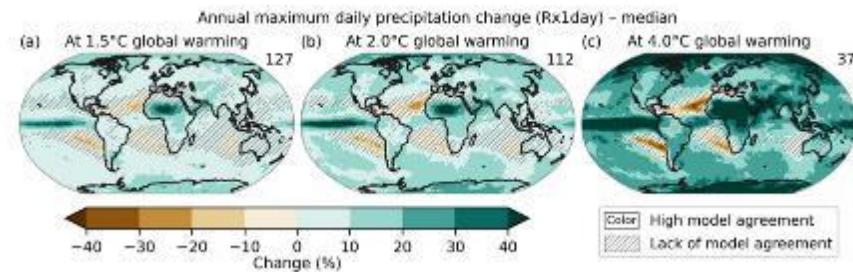


IPCC's projections for annual maximum temperature (top) and annual minimum temperature (bottom) under 1.5C (left), 2C (middle) and 4C (right) of warming

Rising temperatures will mean “the land area affected by increasing drought frequency and severity” will expand

Heavy rainfall will “generally become more frequent and more intense with additional global warming”

For India, heat extremes, extreme rainfall, droughts and flooding will become the new normal



Future projections of annual maximum daily precipitation under 1.5C (left), 2C (middle) and 4C (right) of warming

The Impacts of Climate Change Span Several Sectors

"Taken as a whole, the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time." – IPCC, 2018

Economic losses	A disaster related to a weather, climate or water hazard occurred every day on average over the past 50 years – killing 115 people and causing US\$ 202 million in losses daily (WMO)
	From 1970 to 2019, weather, climate and water hazards accounted for 50% of all disasters, 45% of all reported deaths and 74% of all reported economic losses (WMO)
Public health	Between 2000 and 2019, 4,75,000 deaths occurred directly due to more than 11,000 extreme weather events (Global Climate Risk Index)
	Between 2030 and 2050, climate change is expected to cause approximately 2,50,000 additional deaths per year , from malnutrition, malaria, diarrhoea and heat stress. (WHO)
Biodiversity	Up to 14% of species face a very high risk of extinction at global warming of 1.5C (IPCC AR6 WG2)
	Wildfires around the world emitted more CO2 in July and August 2021 than India does in one year (Copernicus)
Displacement and migration	In 2020, extreme weather events displaced 55 million people worldwide , 929,000 in India alone (IDMC)

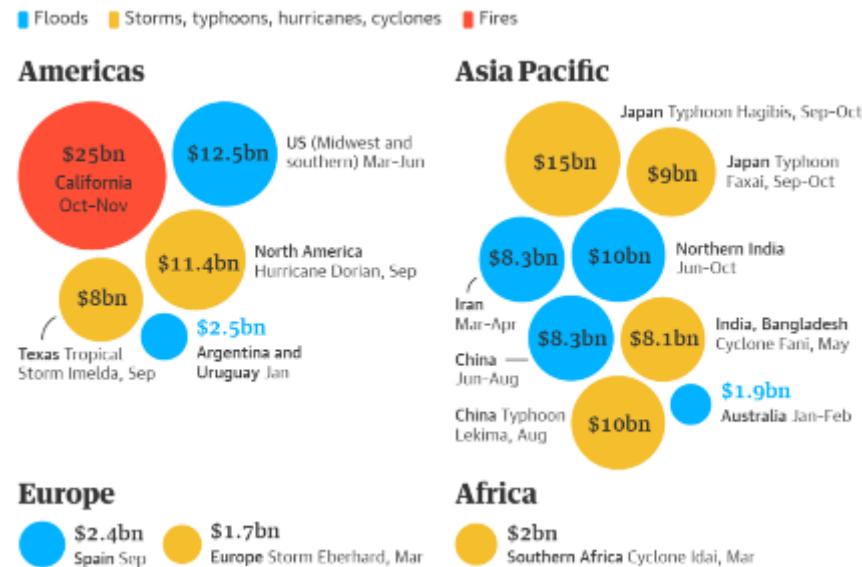
The Impacts of Climate Change Are Costing Us Now

India ranked 7th among top 10 countries affected in 2019

Ranking 2019 (2018)	Country	CRI score	Fatalities	Fatalities per 100 000 inhabitants	Absolute losses (in million US\$ PPP)	Losses per unit GDP in %	Human Development Index 2020 Ranking ¹⁴
1 (54)	Mozambique	2.67	700	2.25	4 930.08	12.16	181
2 (132)	Zimbabwe	6.17	347	2.33	1 836.82	4.26	150
3 (135)	The Bahamas	6.50	56	14.70	4 758.21	31.59	58
4 (1)	Japan	14.50	290	0.23	28 899.73	0.53	19
5 (93)	Malawi	15.17	95	0.47	452.14	2.22	174
6 (24)	Islamic Republic of Afghanistan	16.00	191	0.51	548.73	0.67	169
7 (5)	India	16.67	2 267	0.17	68 812.35	0.72	131
8 (133)	South Sudan	17.33	185	1.38	85.86	0.74	185
9 (27)	Niger	18.17	117	0.50	219.58	0.74	189
10 (59)	Bolivia	19.67	33	0.29	798.91	0.76	107

PPP = Purchasing Power Parities, GDP = Gross Domestic Product.

Economic cost of extreme weather events in 2019
The world suffered over US \$100 billion worth of damage



Guardian graphic. Source: Christian Aid

Which human activities release GHGs?



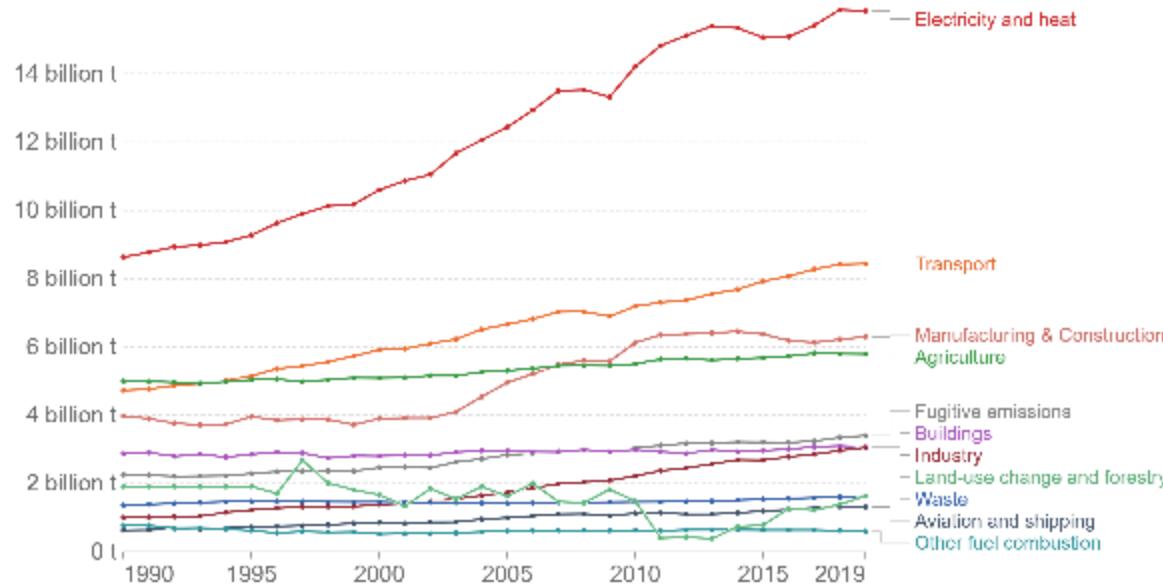
Cutting down trees in forests



Food production like growing rice, or raising cattle for dairy and meat



Which sectors are emitting the most?



Source: Our World in Data based on Climate Analysis Indicators Tool (CAIT).

Note: Greenhouse gases are weighted by their global warming potential value (GWP100). GWP100 measures the relative warming impact of one molecule of a greenhouse gas, relative to carbon dioxide, over 100 years.

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

The largest contributor to human caused emissions is **electricity generation**, which has been (until recently) almost exclusively dependent on burning coal. It accounted for 15.83 gigatonnes of carbon dioxide equivalent in 2019

Transport is the second largest contributor, with approximately 15 percent (around 8.43 gigatonnes) of global emissions in 2019. It is also currently the most aggressively rising component of global emissions

Who is emitting the most today?

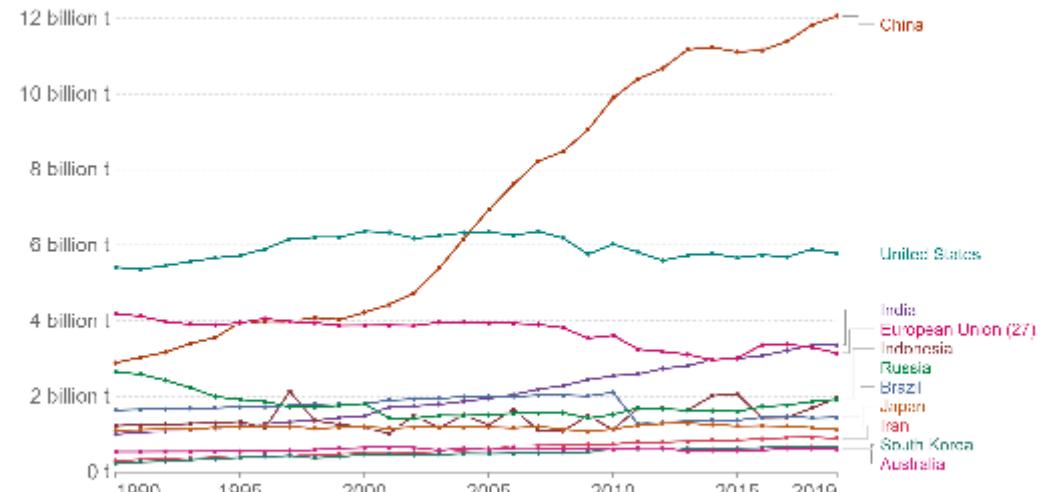
2019	CO ₂ e
China	12.06Gt
United States	5.77Gt
India	3.36Gt
European Union (27)	3.15Gt
Indonesia	1.96Gt
Russia	1.92Gt
Brazil	1.45Gt
Japan	1.13Gt
Iran	893.78Mt
South Korea	652.66Mt

In 2005, China overtook the United States as the world's largest GHG emitter

China currently emits more than thrice as much as India

Total greenhouse gas emissions

Emissions are measured in carbon dioxide equivalents (CO₂eq). This means non-CO₂ gases are weighted by the amount of warming they cause over a 100-year timescale. Emissions from land use change – which can be positive or negative – are taken into account.

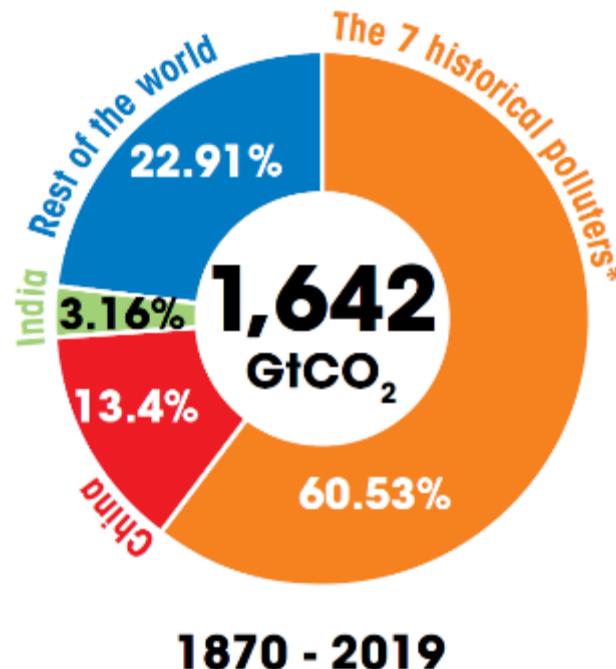


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[OurWorldInData.org/co2-and-other-greenhouse-gas-emissions](https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions) • CC BY

Historically, the scenario is slightly different



Only 7 countries have emitted most of the CO₂ since 1870!

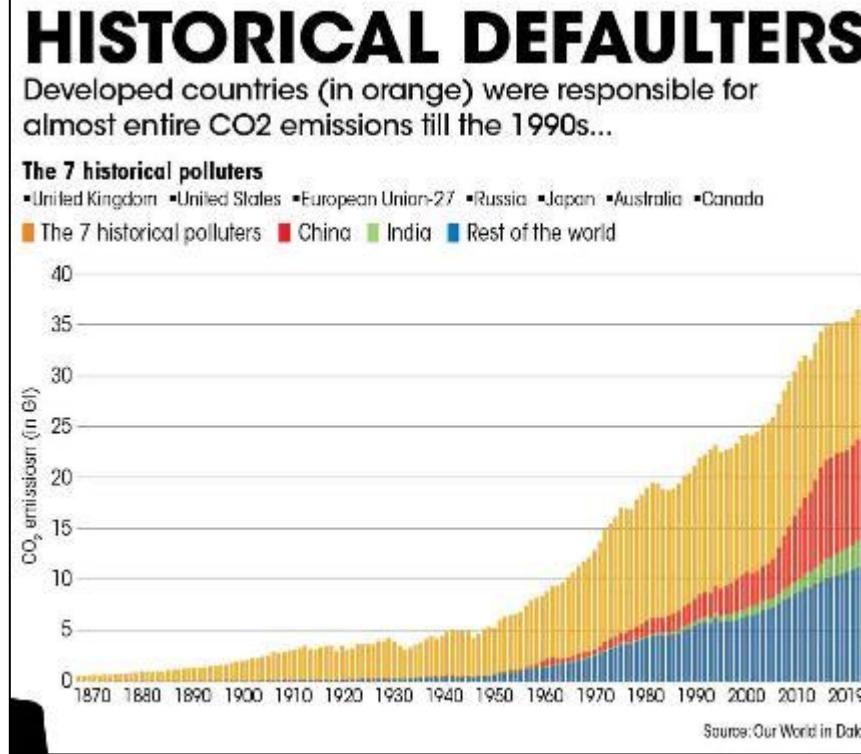
CO₂ once emitted stays in the atmosphere for 150-200 years

So, if we look at the CO₂ pie that has been emitted from 1870 onwards, only 7 countries have emitted most of the CO₂

USA, UK, Russia, European Union, Japan, Australia, Canada

India has emitted only 3.15% of all CO₂ since 1870

Hence, we need equity in climate action



The **US** is responsible for 25% and EU for 22% CO₂ emissions cumulatively since 1870

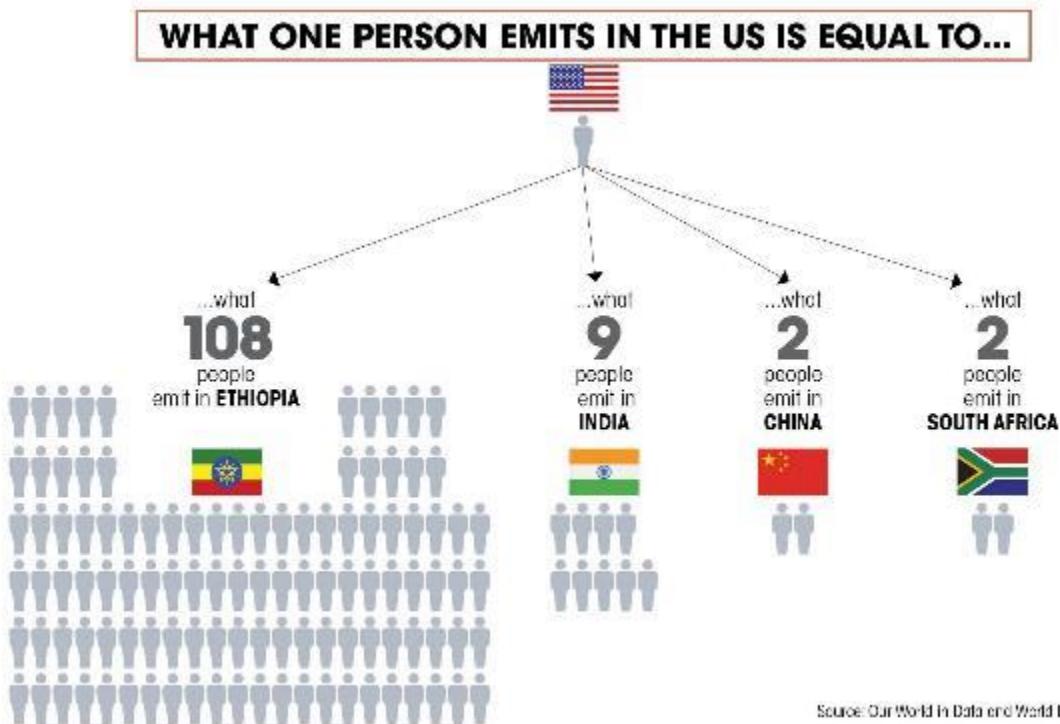
China has rapidly caught up – it can now be considered a developed nation

Climate change is a global challenge, but with differentiated responsibility and differentiated impacts

The consumption of the ‘carbon pie’ has been extremely inequitable



Even today, rich countries emit far more per person than poor countries



Hence, we need 'equity' – where the rich make more effort to reduce their GHG emissions, than the poor.

But climate negotiations have seen developed countries attempt to place equal burden on developing countries for emissions reduction

"Remember, climate change is a great equaliser; rich and poor, all will be affected"

- Sunita Narain, Centre for Science and Environment

We need to halve emissions in 8 years, says the IPCC

An average increase of 1.5 C above pre-industrial temperatures is considered the "safe" limit of climate change by scientists

Global GHG emissions must fall by 43 per cent by 2030 compared to 2019 levels, amounting to 31 GtCO₂e in 2030 (vs. 59 GtCO₂e in 2019)

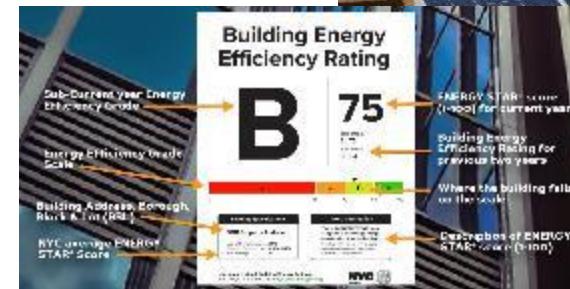
Global use of coal, oil and gas must decline by 95%, 60%, and 45% in 2050 compared to 2019

We can mitigate the worst of the coming impacts...

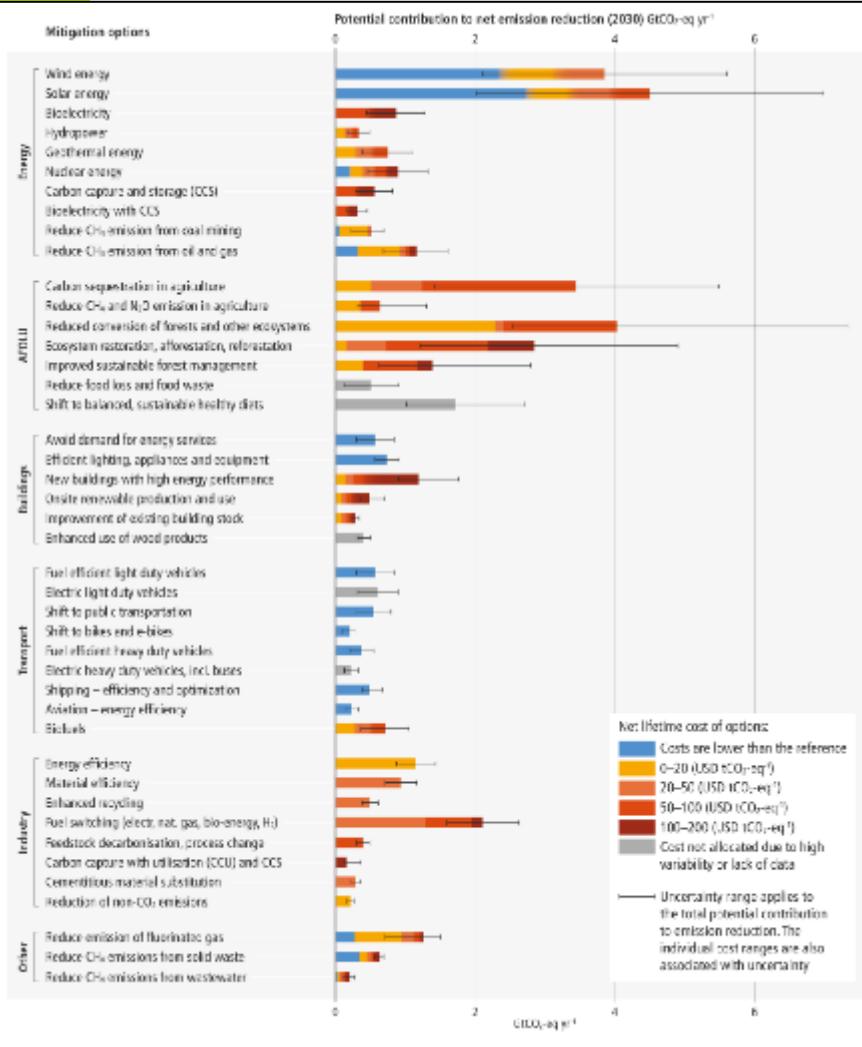


Mitigation is “a human intervention to reduce emissions or enhance the sinks of greenhouse gases”

In climate policy, mitigation measures are technologies, processes or practices that contribute to mitigation, for example, renewable energy technologies, waste minimization processes and public transport commuting practices.



Solutions are numerous and cheap!

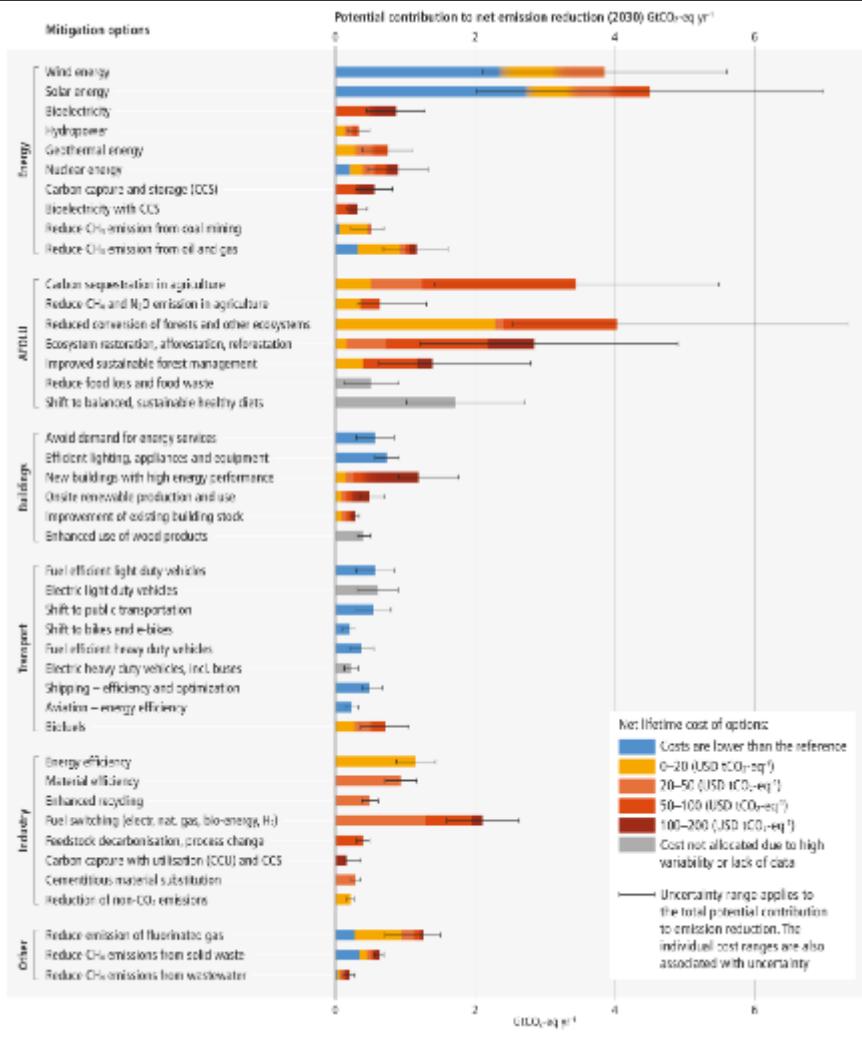


According to the IPCC, widespread ‘system transformations’ are required across the energy, buildings, transport, land and other sectors, to achieve the 1.5°C target

But solutions are available at affordable costs.

Several mitigation options, notably solar energy, wind energy, electrification of urban systems, urban green infrastructure, energy efficiency, demand side management, improved forest- and crop/grassland management, and reduced food waste and loss, are **technically viable**, are becoming increasingly **cost effective**, and are generally **supported by the public**. This **enables deployment in many regions**.

Solutions are numerous and cheap!



On a unit costs basis, solar energy has dropped 85 per cent, wind by 55 per cent, and lithium-ion batteries by 85 per cent.

Behavioural changes such as adopting plant-based diets, or shifting to walking and cycling “can reduce global GHG emissions in end use sectors by 40-70 per cent by 2050”, mainly in developed countries



We also need to adapt to the known incoming impacts

- Given the frequency and severity of extreme weather events, the world needs to adapt to climate change
- 1970-2019 saw 11,000 climate-related disasters, with 2 million deaths and losses worth \$3.6 trillion
- In 2020, the world suffered economic losses of \$268 billion from weather-related disasters, most of it uninsured and unprotected
- Adaption = preparedness and building resilience
- It must be integrated with development to result in climate-resilient development



Examples of adaptation

- Adaptation activities vary across sectors and regions depending on need, geography, and context
- They can range from developing crop varieties that are resistant to extreme weather, building elevated homes and other climate-resilient infrastructure in cities, or develop Heat Action Plans
- Building of social resilience by enabling members of local communities to proactively work on rainwater storage, crop diversification, and better farming methods also strengthens their capacity to respond to climate change

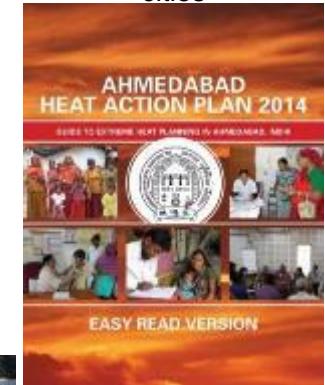
Developing drought resistant crop varieties



Building green infrastructure in cities



Heat action plans for cities



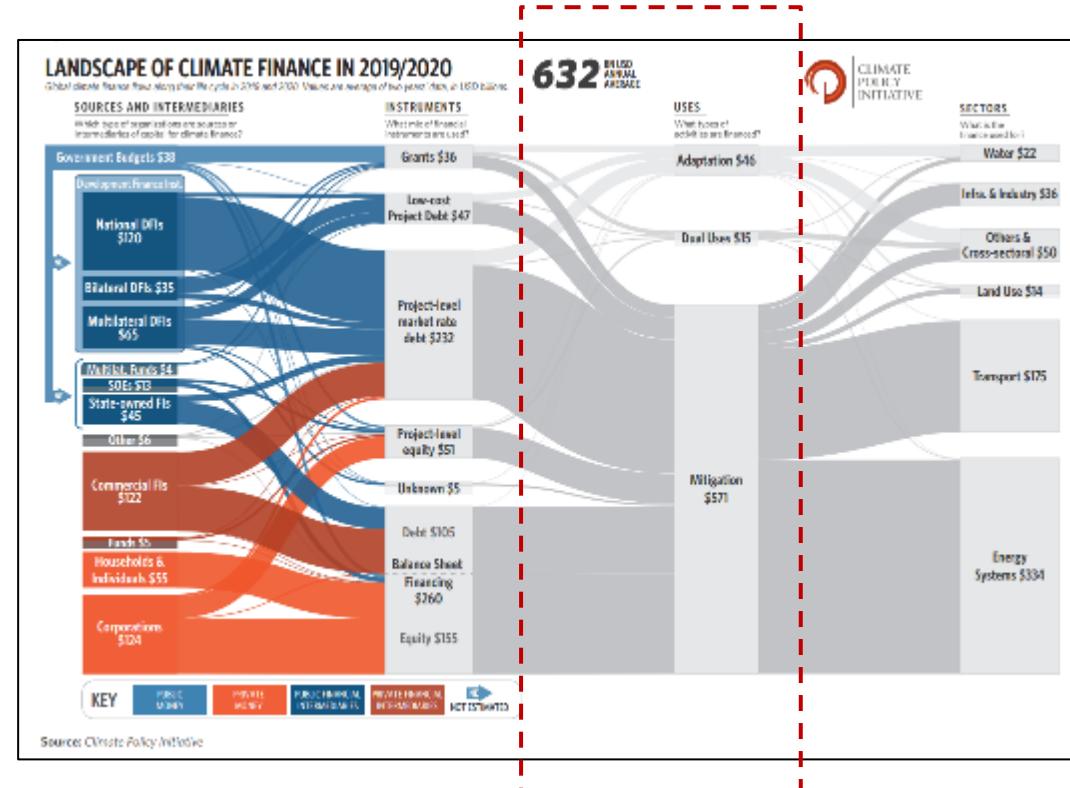
Sea walls, mangroves, and “oyster shorelines” to combat sea level rise



More financing is needed for adaptation

In 2019 and 2020, \$571b went to mitigation, ONLY \$46b to adaptation, and \$15b to both

- Ever-increasing adaptation costs have outpaced the flow of funds to developing countries
- Annual adaptation costs in developing economies will be in the range of USD 155 to USD 330 billion by 2030 (UNEP, 2021)
- In 2020, the world suffered economic losses of \$268 billion from weather-related disasters, most of it uninsured and unprotected.
- Current global financial flows for climate adaptation are insufficient
- India's National Adaptation Fund for Climate Change was established in 2015, but funds have been declining



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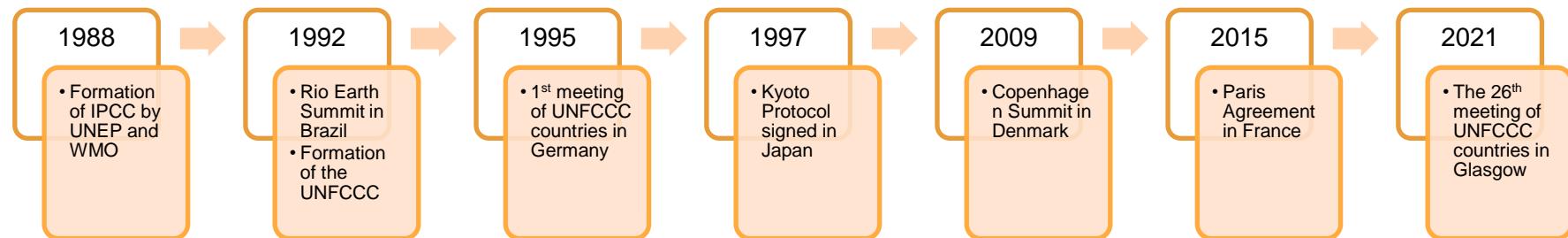
What has been done so far?



What are countries doing?

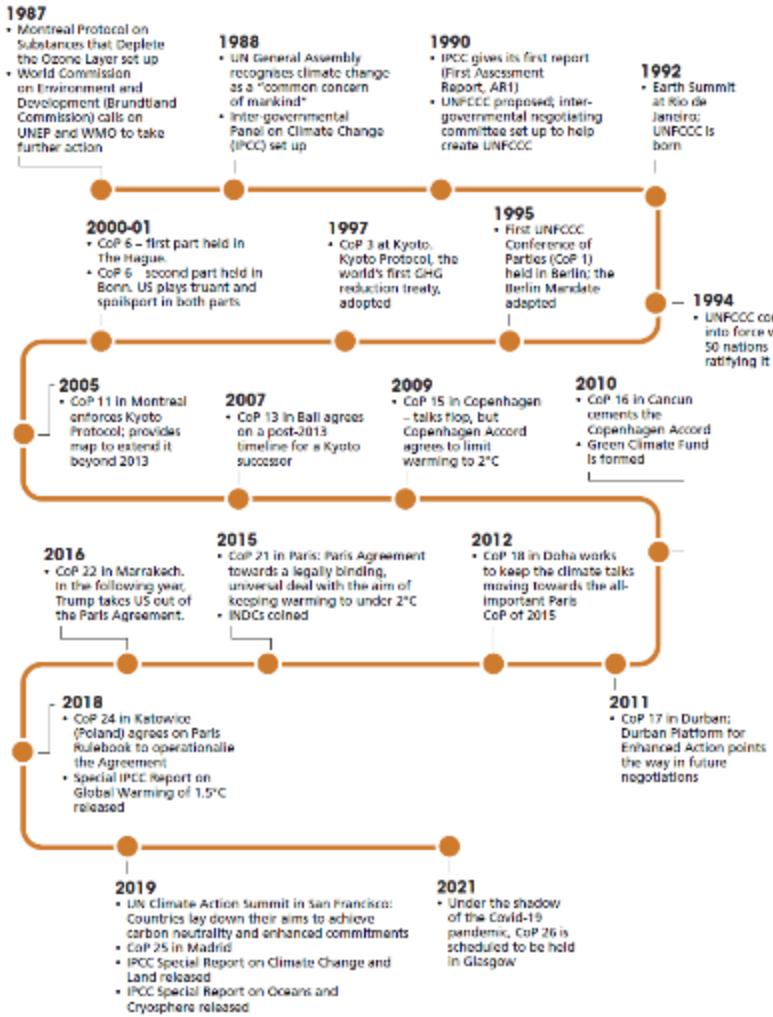


We have been trying to stop climate change since the late 1980s!



The Paris Agreement in 2015 was too little, too late

What has been done so far?



The United Nation Framework Convention on Climate Change (UNFCCC) was adopted at the Earth Summit (Rio) - it was the first step in addressing one of the most urgent environmental problems facing humankind.

The principle of **Common but Differentiated Responsibility (CBDR)** was formalised in Rio de Janeiro in 1992. Among other things it states that "*the developed country Parties should take the lead in combating climate change and the adverse effects thereof*"

The **Kyoto Protocol** was the world's first major GHG reduction agreement was signed in 1997. It had legally binding targets.

Over the next decade, developed countries pushed a system of voluntary pledges instead of legally binding commitments.

At COP 21, the **Paris Agreement** was adopted - its core achievement was to commit all countries – from the largest polluters to the non-polluters – to regular climate planning and target-setting, but on a voluntary basis

The Paris Agreement



196 countries adopted the Paris Agreement in 2015 - these are a mix of rich and poor countries, and everyone must cut their emissions, even if they emit very little. It is a non-binding treaty

TEMPERATURE TARGET

To limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels

FINANCE

Rich countries must provide \$100 billion in climate finance from 2020 to developing countries

REVIEW MECHANISM

Pledges will be revised upward every 5 years, an assessment will be conducted

What do country pledges or NDCs look like?				
India	China	US	EU-27	UK
Reduce emissions intensity by 33%–35% below 2005 levels	Lower carbon dioxide emissions per unit of GDP by “over 65%” in 2030 compared to 2005 levels	Reduce emissions by 50%–52% below 2005 levels by 2030	Reduce emissions by “at least 55%” below 1990 levels by 2030	68% reduction in GHG emissions by 2030 compared to 1990 levels



The Paris Agreement and the future

What was the overall goal?

To limit the average temperature of the planet to rising no more than 1.5C or 2C above pre-industrial levels or the temperature in the late 1800s

Are we on track to do this?

No!

As of now the world will warm by 2.4C by 2100 even after implementing the NDCs announced at Glasgow, Nov 2021

Following an unprecedented drop of 5.4 % in 2020, **global CO2 emissions are bouncing back** to pre-COVID levels

RECAP:

Global GHG emissions must fall by 43 per cent by 2030 compared to 2019 levels, amounting to 31 GtCO2e in 2030 (vs. 59 GtCO2e in 2019)

Global use of coal, oil and gas must decline by 95%, 60%, and 45% in 2050 compared to 2019 (IPCC)

But almost all major coal, oil and gas producing countries are planning to increase their production till at least 2030 or beyond – current plans would result in **240% more coal, 57% more oil, and 71% more gas in 2030** than levels allowed if we want to limit global warming to 1.5°C (UNEP)

COP 26 was held in Glasgow from Nov 1-12, 2021...



Issue	Expectation	What happened at COP 26
Enhanced climate ambition	Countries are expected to submit progressively more ambitious NDCs every 5 years	152 countries submitted new NDCs, must be revised again in 2022
Net zero	Clear plans to achieve net zero emissions were expected, with adequate short-term ambition	Most major economies, including India, have announced net zero targets, either in law, in a policy document, or via a statement
Phasing out coal	Coal was expected to be in focus, due to pressure from natural-gas dependent countries like US and UK	Some countries committed to phase out coal power, but the common COP 26 document noted only a "phase down"
Climate finance	The promise of \$100 billion in climate finance was expected to be fulfilled	Noted with "deep regret" failure to meet goal; climate finance goal will not be met till 2023; a new goal not agreed upon
Climate adaptation funding	Increased finance for climate adaptation in developing countries was expected	Developed countries also agreed to at least double funding for adaptation by 2025, which would amount to at least \$40 billion
Loss and damage	Financing for current victims of climate impacts is urgently needed from developed countries	New dialogue to be held after COP 26 to determine how finance for loss and damage can be provided
Nature	Role of forests in mitigation needs to be clarified so that land rights and livelihoods are not harmed	141 countries signed a voluntary pledge to halt deforestation
Carbon markets (Article 6)	Rules for carbon markets were expected to be finalized	Rules finalized, but many uncertainties remain
Methane emissions	A growing concern that needs to be addressed	111 countries signed a voluntary pledge to reduce their methane emissions

What about India?

India is already one of the most vulnerable countries to climate change

Surface air temperature over India has increased by 0.7 °C between 1901 and 2018 (MOES 2020)

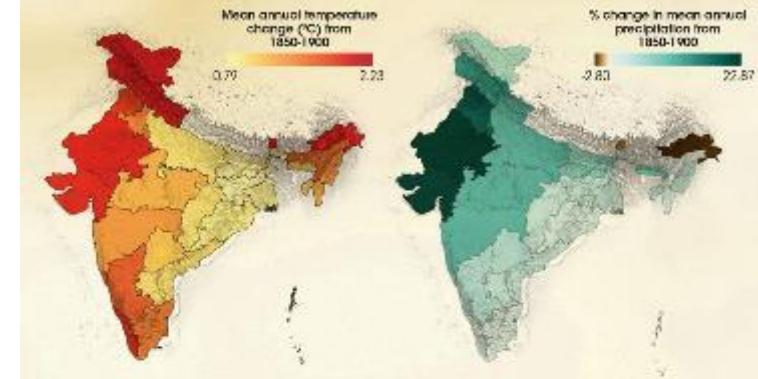
Climate change is causing losses of 1.5% of GDP annually

The risk of exacerbation of extreme poverty in India is significant under a 1.5°C warming scenario and is worse under current trends, as it is expected to drive 42 million Indians into poverty by 2030

Down to Earth analysis also showed that the northern and western parts of India will likely be more vulnerable than the eastern part, in terms of temperature rise

India in a 1.5°C warmer world

Northern and western parts of the country are likely to see a drastic increase in annual average temperature and precipitation; a moderate rise in eastern parts



	Mean annual temperature change (°C)	Annual precipitation change (%)		Mean annual temperature change (°C)	Annual precipitation change (%)
Andaman & Nicobar	1.14	-0.19	Lakshadweep	1.23	7.84
Andhra Pradesh	1	4.19	Madhya Pradesh	1.07	11
Arunchal Pradesh	1.47	-2.8	Maharashtra	1.16	10.84
Assam	1.21	1.45	Manipur	1.16	4.98
Bihar	0.81	8.04	Meghalaya	1.04	8.81
Chandigarh	1.26	18.17	Mizoram	1.12	2.65
Chhattisgarh	1	3.99	Nagaland	1.16	5.29
Dadra & Nagar Haveli	1.2	19.77	Odisha	0.9	2.5
Delhi	1.1	16.26	Puducherry	1.06	3.19
Goa	1.25	8.83	Punjab	1.27	20.54
Gujarat	1.33	22.16	Rajasthan	1.43	22.07
Haryana	1.17	19.41	Sikkim	1.55	-1.76
Himachal Pradesh	1.73	13.92	Tamil Nadu	1.18	1.68
Jammu & Kashmir	1.76	13.61	Telangana	1.05	6.41
Jharkhand	0.79	4.56	Tripura	1.03	4.87
Karnataka	1.21	5.32	Uttar Pradesh	0.98	11.18
Kerala	1.31	2.01	Uttarakhand	1.62	11.72
Ladakh	2.23	6.23	West Bengal	0.81	4.11

Note: Standard temperature and rainfall deviation calculated for a period where the global temperature increases by 1.5°C from 1850-1900 onwards.
Source: From 5 Tech briefs of the IPCC Working Group I Technical Summary, the results are based on CMIP5 modelling for 1.5°C warming
from 1850-1900 or the SRES A1B pathway

What about India?

India's pledge to the Paris Agreement has 3 parts:

First NDC 2015	Updated in 2021-2022	Progress
to reduce emissions intensity of the economy by 33–35% below 2005 levels	to reduce emissions intensity of its GDP by 45% by 2030 from its 2005 levels	25% of emission intensity reduction of GDP achieved between 2005 -2016, on track to achieve more than 40% by 2030
to have 40 per cent of installed electric power from non-fossil-based energy resources by 2030	to have 50 per cent of cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030	39.7% achieved as of June 2022
to create an additional (cumulative) carbon sink of 2.5-3 gigatonnes of carbon dioxide equivalent (GtCO ₂ e) by 2030 through additional forest and tree cover	-	Limited information available
-	Net Zero by 2070	-

- Historically contributed only 3% to global CO₂ emissions – it is a climate victim itself!
- Advocates for CBDR and equity and COP negotiations
- Supported coal “phase down” not “phase out” at COP 26, backed by US and China
- Calls for a balance between ‘mitigation’ and ‘adaptation’ – latter needed by developing world
- Will not commit to binding targets on any sector, fuel, or gas

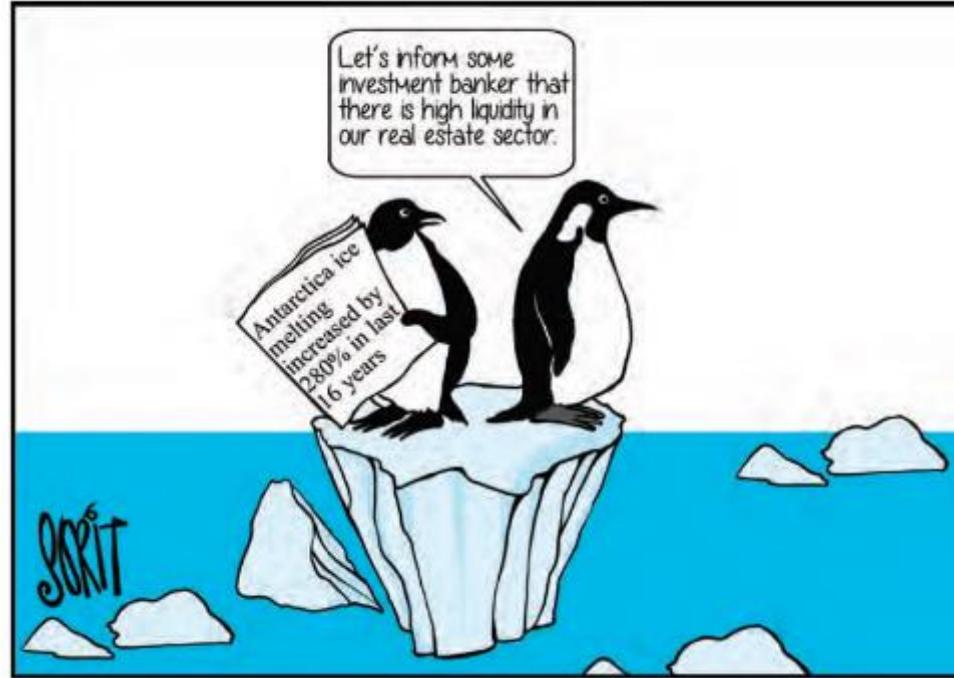
What's Next? - COP 27

- IPCC Sixth Assessment Report findings published – reinforce the urgency for climate ambition and finance
- Heightening extreme weather events – early heat wave in India, record high temperatures in Europe, flooding in Pakistan
- First COP in the developing world since COP 22 in Marrakech in 2016
- Impact of Russian war on climate pledges especially oil and gas, and coal dependence – push towards 'energy security'
- According to the Egypt COP 27 Presidency, this will be an "implementation COP"

Major agenda items

- Climate finance
- Loss and damage
- Climate adaptation
- Mitigation ambition
- Global Stocktake





Thank you!

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