



UNB Data Visualization

Climate Action

Shivam Goyal



AGENDA

- 1 What is happening ?
- 2 Drivers of Climate Change
- 3 Steps taken to combat Climate Change

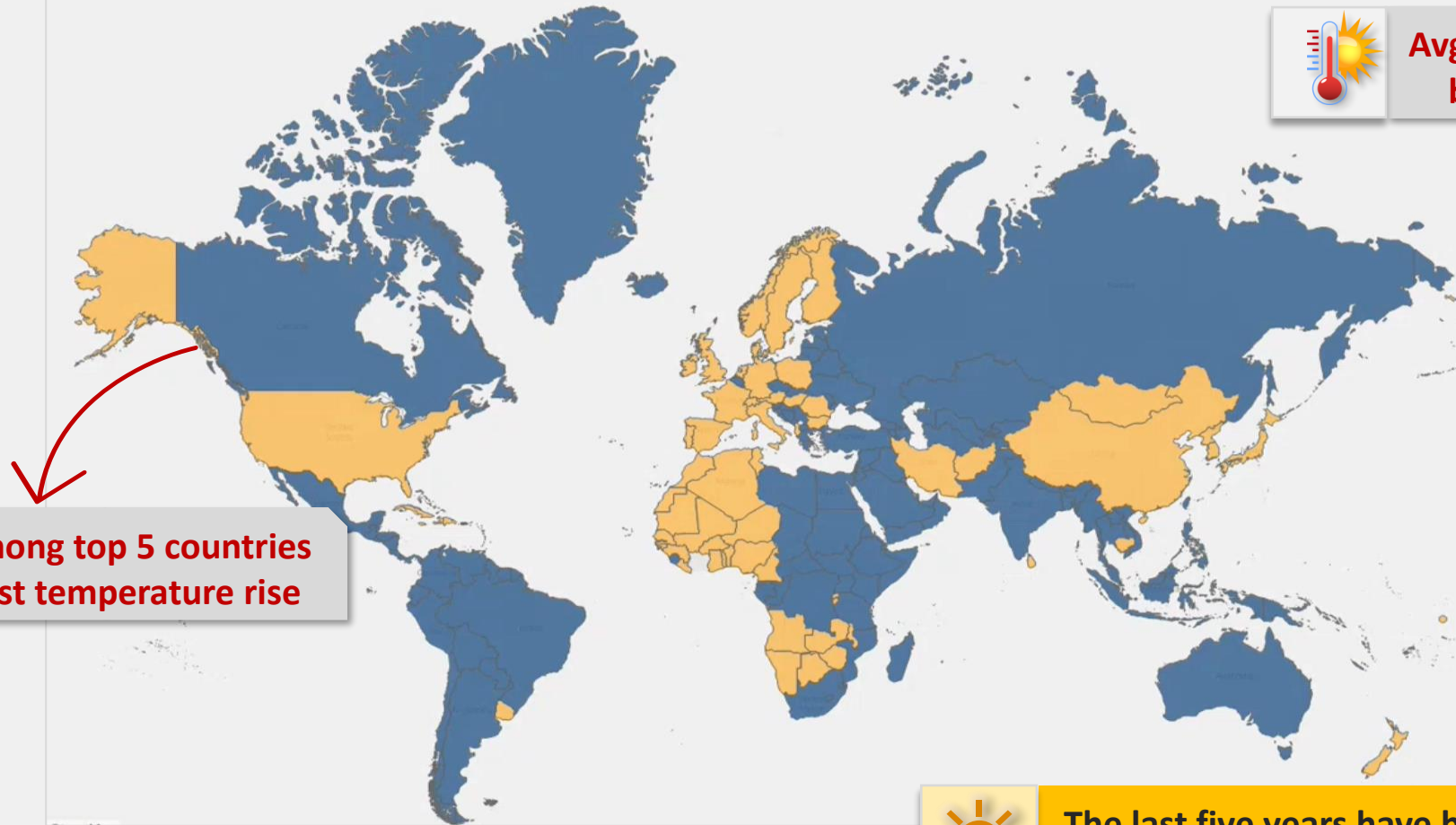
13 CLIMATE ACTION



Climate Action – Need of the hour

Mother Earth is **BURNING**

Mean Surface Temperature Change - 1990



Avg. Surface Temperature rose by 1.5°C since last 5 years



Canada, among top 5 countries with highest temperature rise



The last five years have been the warmest across the entirety of recorded human history worldwide

Climate Action – Need of the hour

Oceans are bearing the heat

Greenland Ice is melting

200

ZJ Change in ocean heat
from 1992 to 2020

263

billion metric tons per
year since 2015

Antarctic Ice is melting

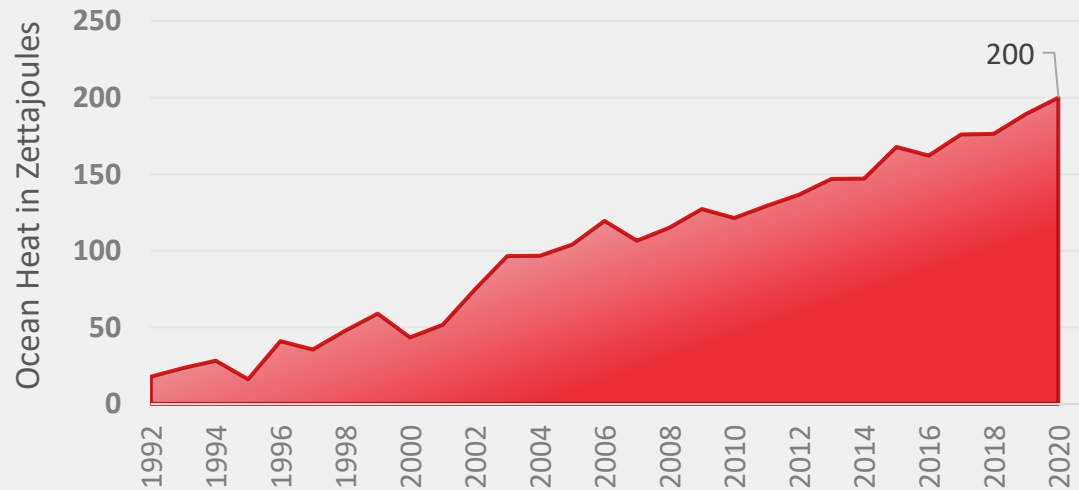
151

billion metric tons per
year since 2015

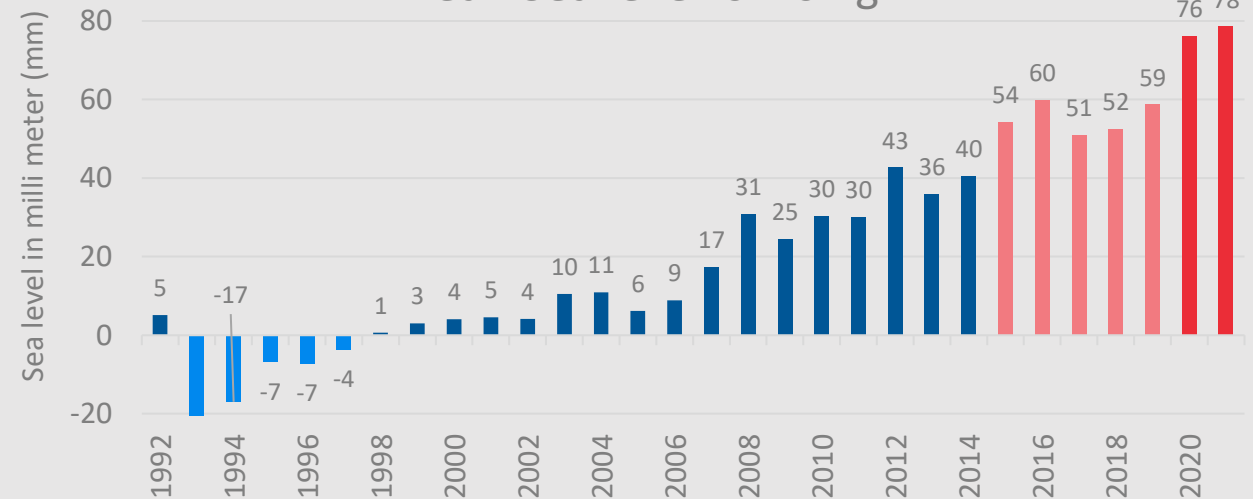
45%

Increase in the sea level
since 2015

Ocean Heat is Increasing

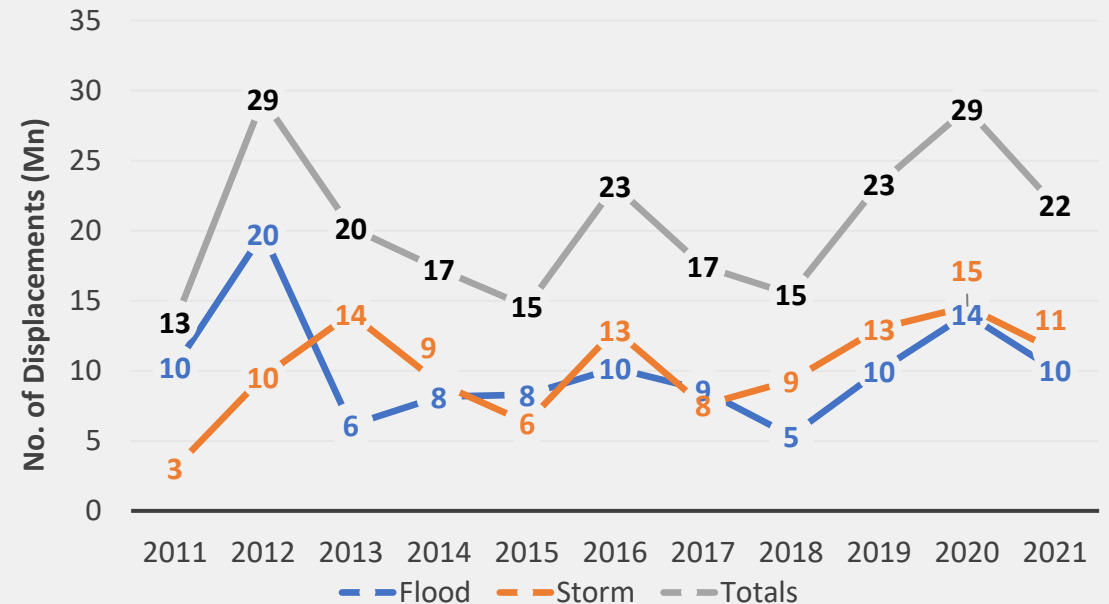
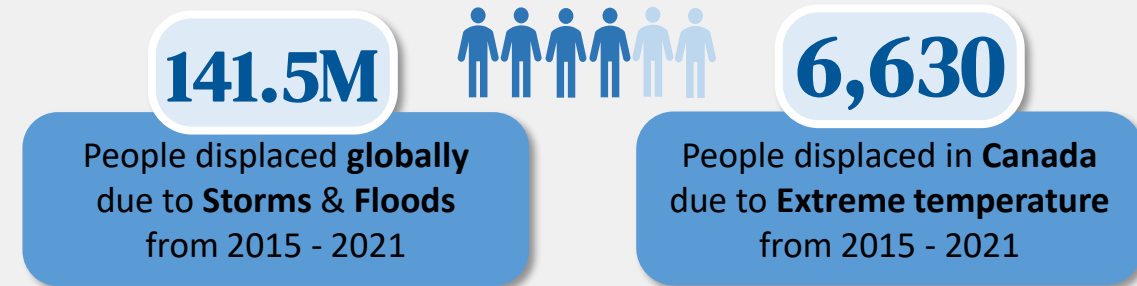
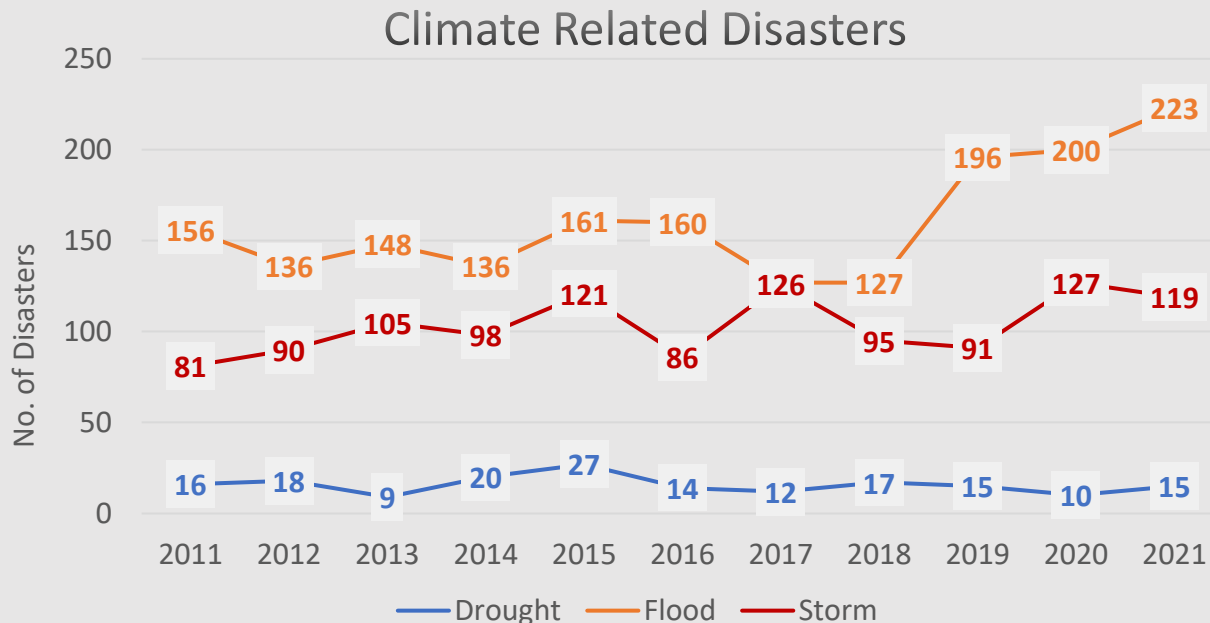
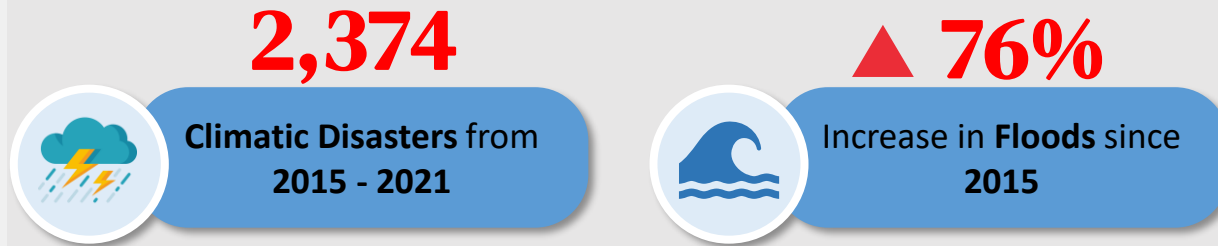


Mean Sea level is Rising



Climate Action – Need of the hour

Temperature Rise causing Extreme Weather



Climate Action – Need of the hour

What's really Warming the Earth?



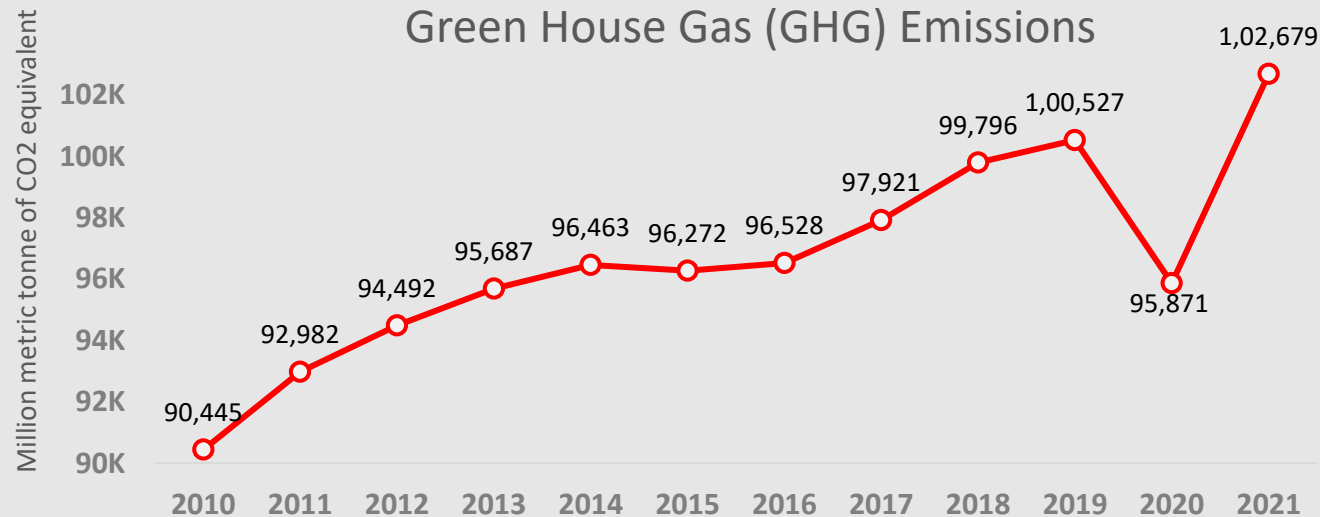
▲ **6.8%**

Increase in GHG Emissions
from 2020 to 2021

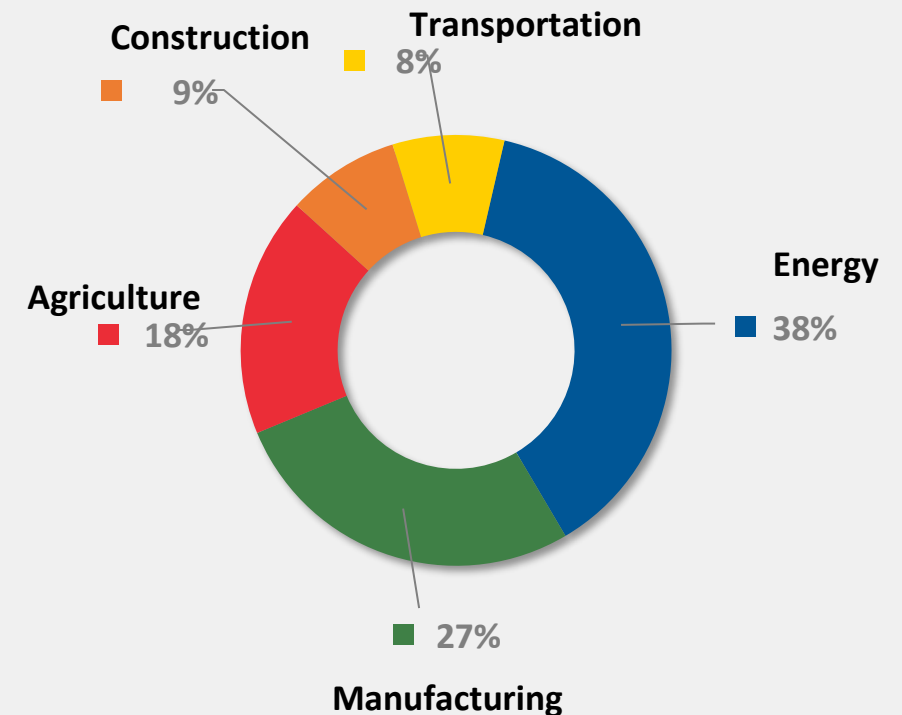


64%

World's electricity was generated
from fossil fuels from 2015 - 2021



Average Annual Emissions across sectors (2010 - 2020)



Climate Action – Need of the hour

Global Measures to combat climate change

46

National jurisdictions are covered by the initiatives selected



11.83

GtCO₂e, representing 23.11% of global GHG emissions covered these initiatives in 2022



29-32

GT CO₂e reduction across six-sectors

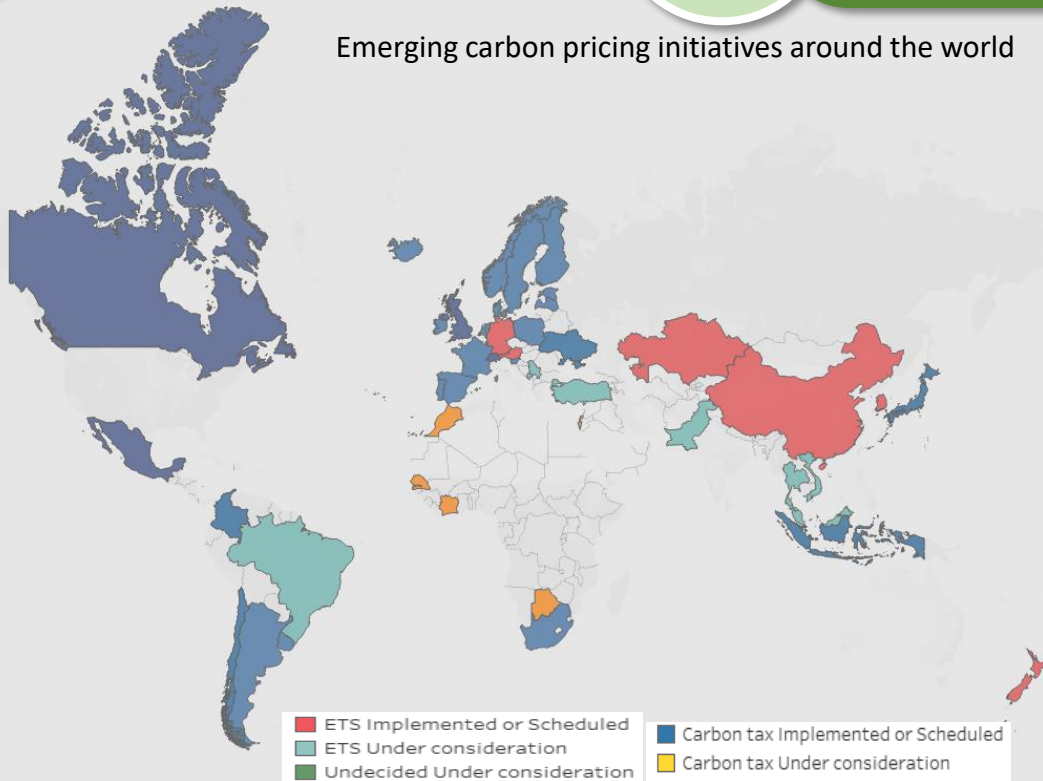


1.5°C

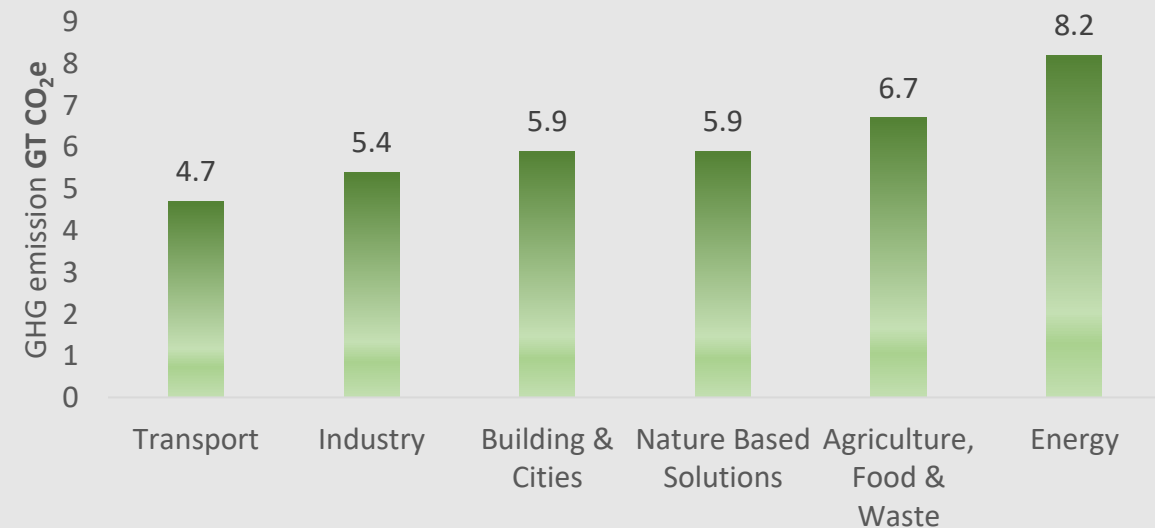
limit temperature rise



Emerging carbon pricing initiatives around the world



Sector emission reduction (2030) GT CO₂e



Climate Action – Need of the hour

How has Canada progressed ?

66 Mt



Reduction in total GHG emission
from 2019 - 2020

>10 %



Reduction in total GHG emission in
5 provinces from 2019 - 2020

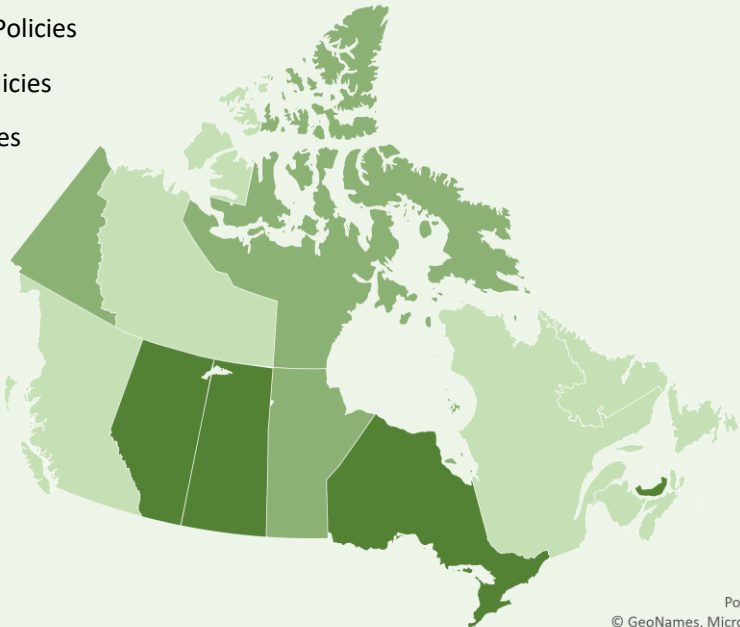
16 %



Reduction in total GHG emission in
Transport sector 2019 - 2020

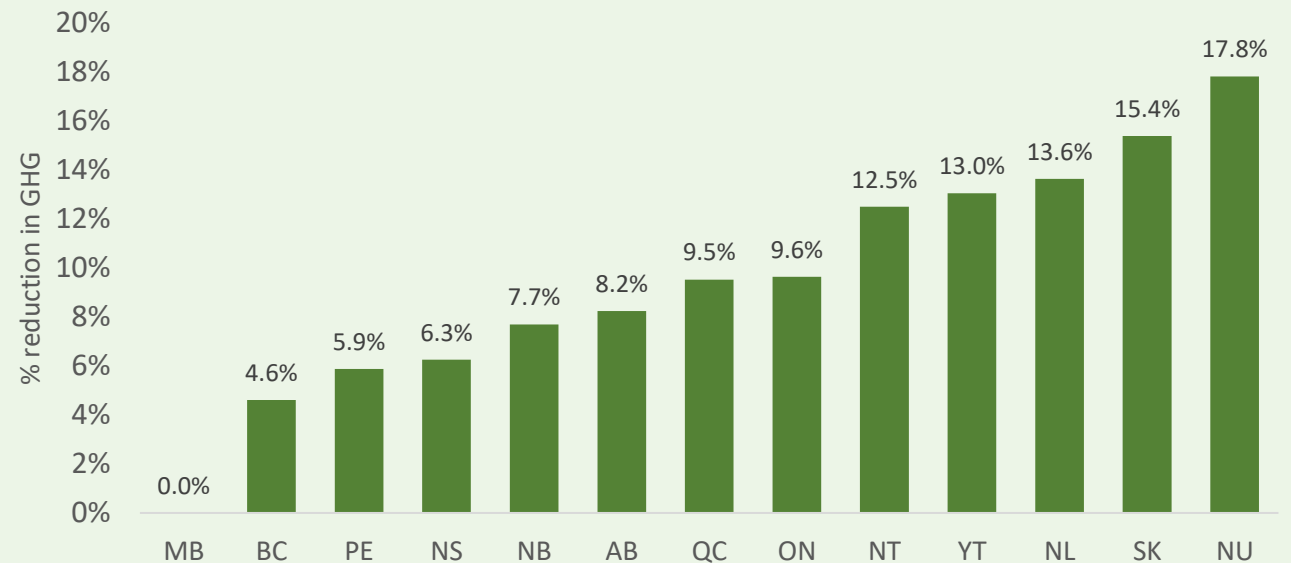
Fuel Charge & Output-Based Carbon Pricing System Policies

- Provincial Policies
- Federal Policies
- Both Policies



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YoY reduction in GHG emission 2019-2020



Can we make a difference ?

Yes we can!!!



**This can play a huge role
in limiting the Earth's
Temperature rise to 1.5°C**



Questions

13 CLIMATE
ACTION



Climate Action: Why it Matters?



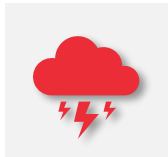
**SUSTAINABLE
DEVELOPMENT GOALS**

Urgent actions are required to combat climate changes and its impacts

Climate Action is the need of the hour



2019 was the second warmest year on record



Weather patterns are changing across the world



**One Planet, One
Chance, Let's save it!**



What is the Goal for Climate Action?

1

Resilience to climate related hazards

2

Integrate Climate Change measures - Policy

3

Mitigation – Education & Awareness

4

Operationalize Green Climate commitment

5

Promote mechanisms - Effective Planning

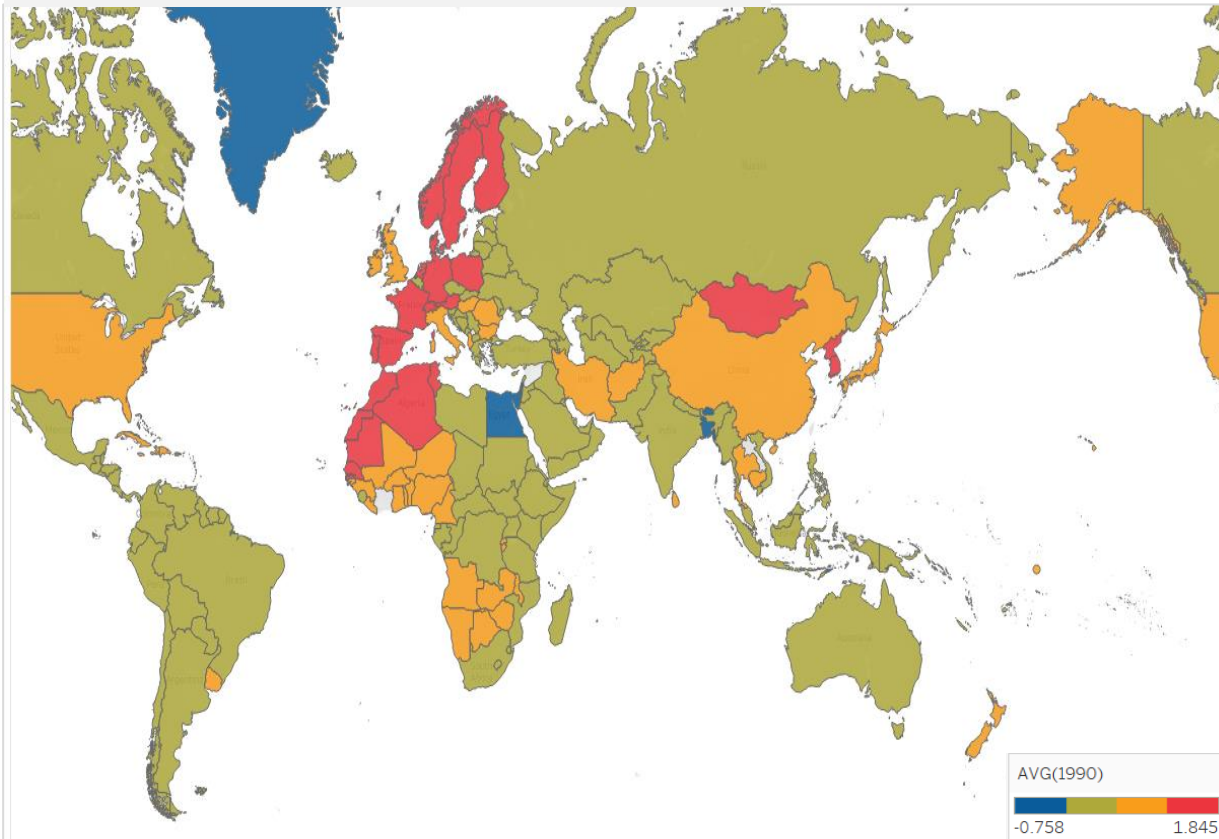
Mother Earth is Burning

Annual Surface Temperature for 70% of the world has risen by 1.3 degree C on average over the past 30 years

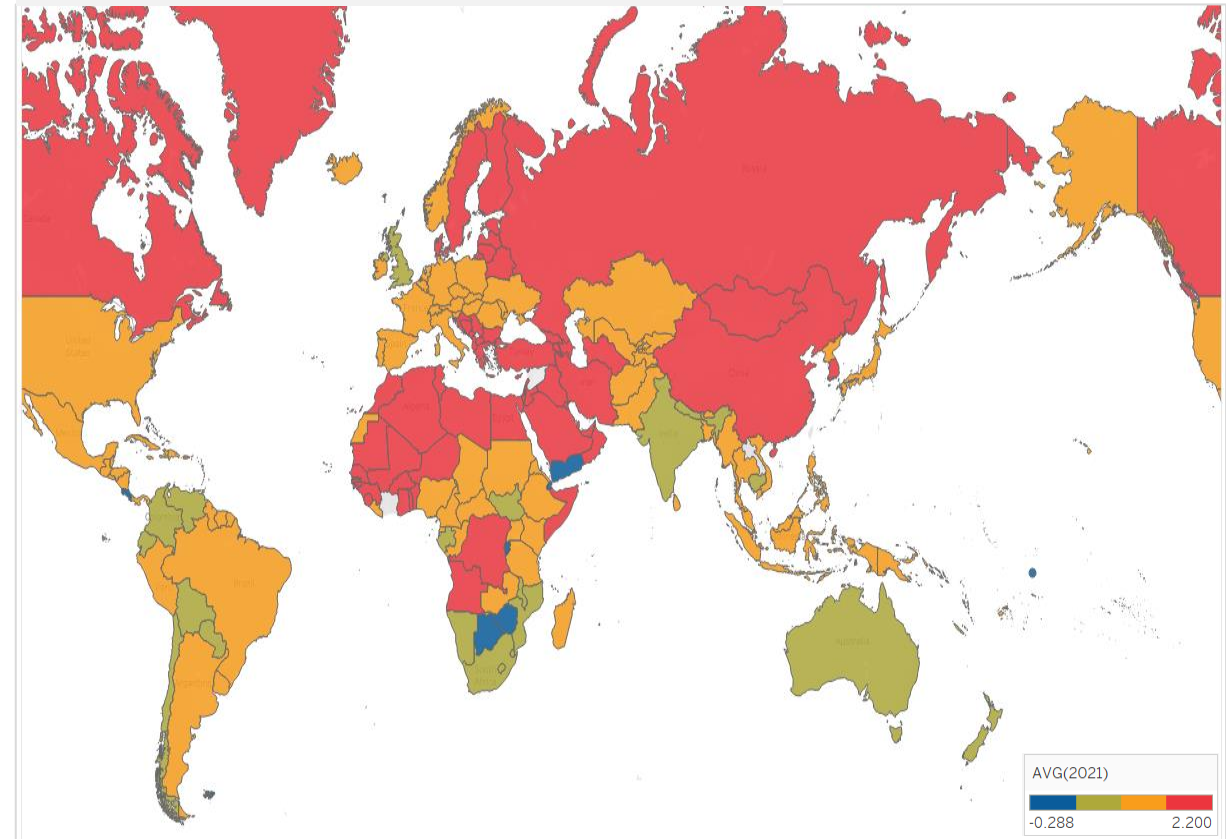
Kuwait 53.2 C Iraq 51.6 C Canada 49.6 C

Denmark -69.6 C Russia -67.8 C Canada -63 C

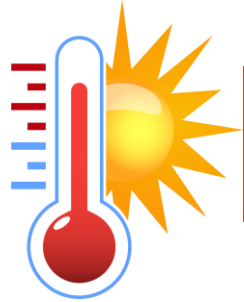
Mean Annual Surface Temperature Variation of World - 1990



Mean Annual Surface Temperature Variation of World - 2021

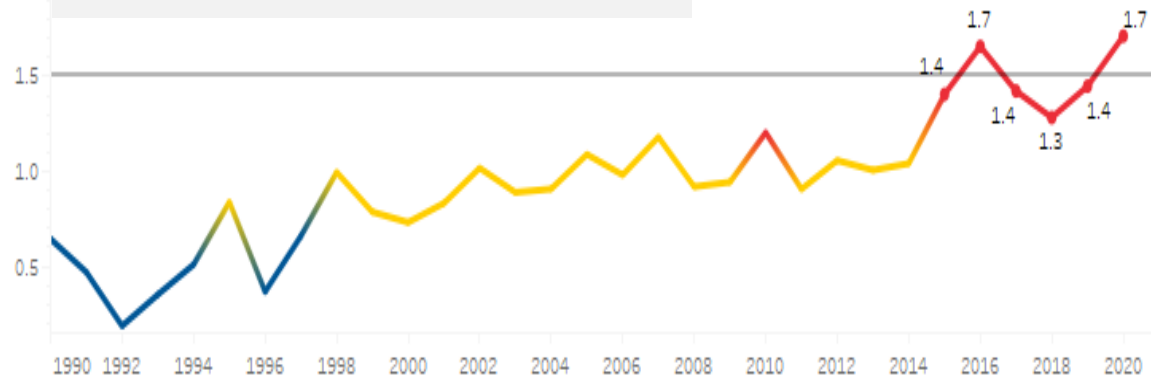


Canada is Burning even more

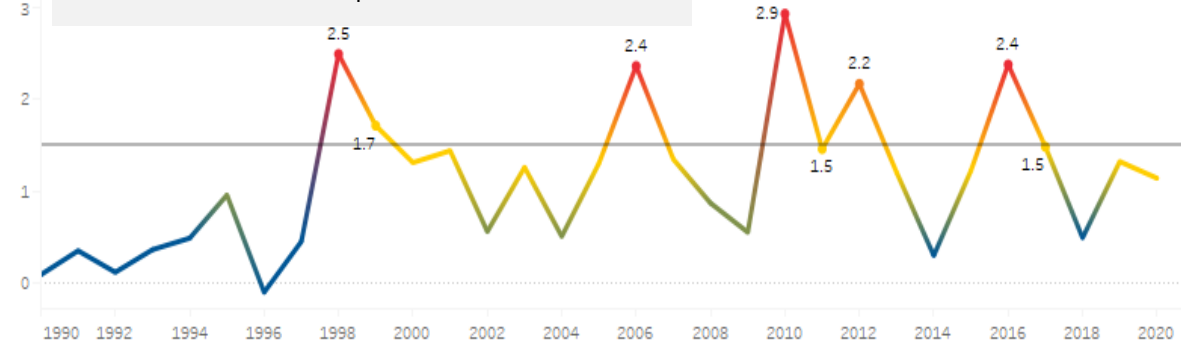


Earth's Annual Surface Temperature has risen by 1.5 degree C on average since last 5 years

Mean Annual Surface Temperature Variation of World

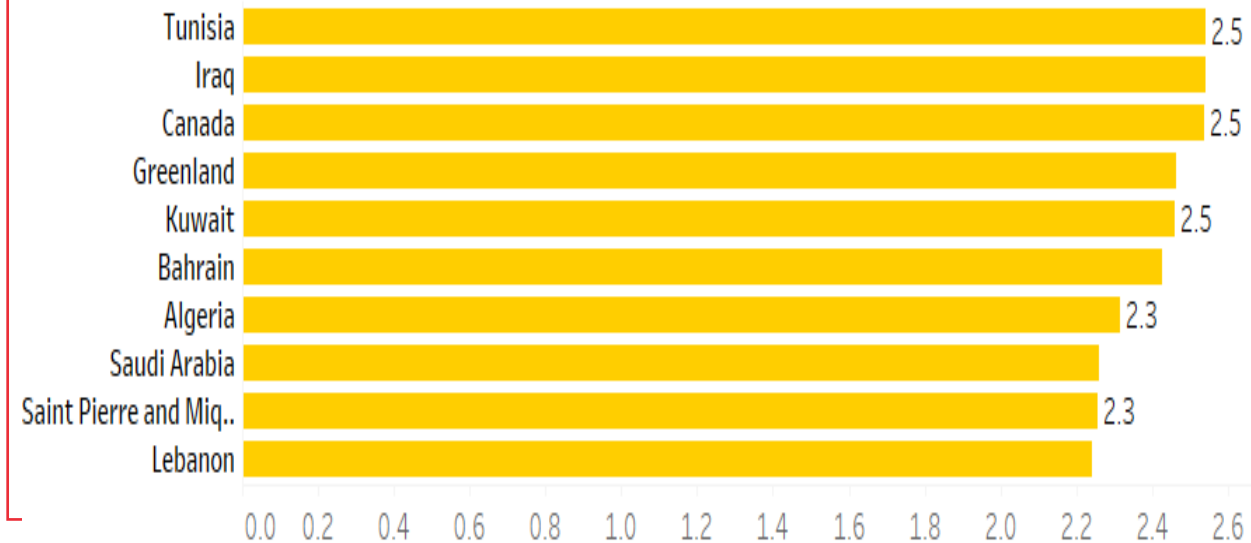


Mean Annual Surface Temperature Variation of Canada



Canada is among the top 3 countries with highest temperature rise

Top 10 Countries with maximum Annual Surface Temperature change in 2021



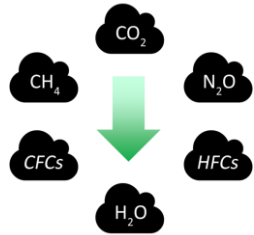
The last five years have been the warmest across the entirety of recorded human history worldwide

What's really warming the earth?

GHG emissions are rising

Sharp increase in the emissions of GHGs and their concentration in the earth's atmosphere since the onset of industrialization

Components of GHGs



Major sources of GHG Emissions



1. The largest source of GHG emissions is from burning **fossil fuels** for **electricity**
2. More than 60% annual **electricity** production was from **fossil fuels** in last 5 years

▲ 10 %

Increase in the GHG emission from 2010 to 2021



5802.9

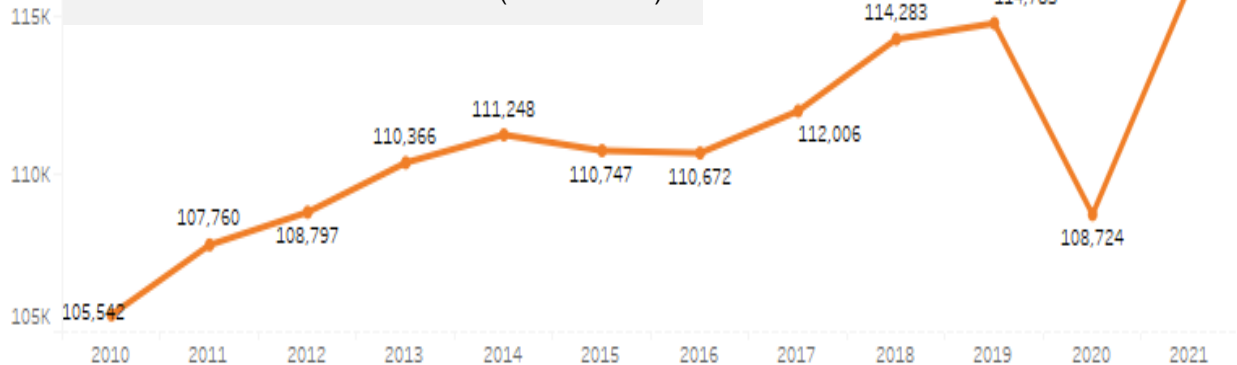
MMTCO2e GHG emitted into the atmosphere in 2021



15%

Increase in electricity generation from fossil fuels from 2010 -2020

Annual GHG Emissions MMTCO2e(2010 – 2021)



27%

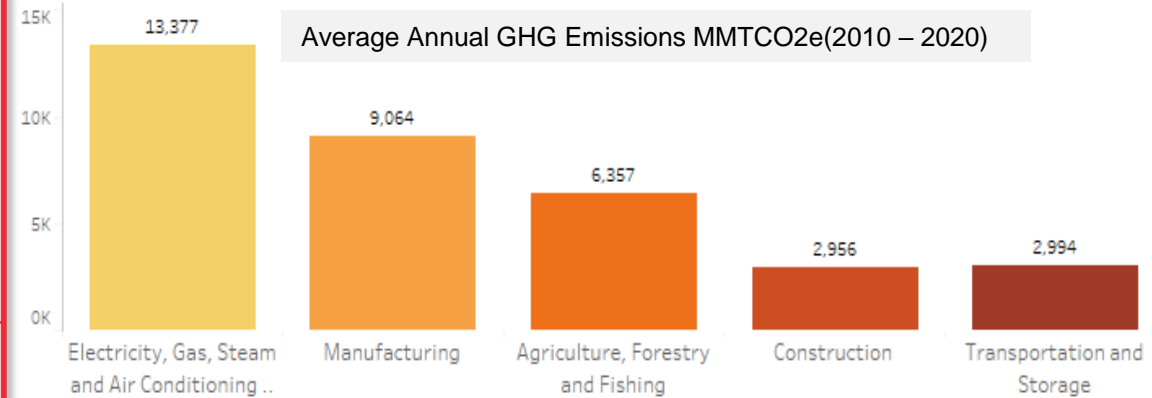
Increase in hydro-power for electricity generation

3.4

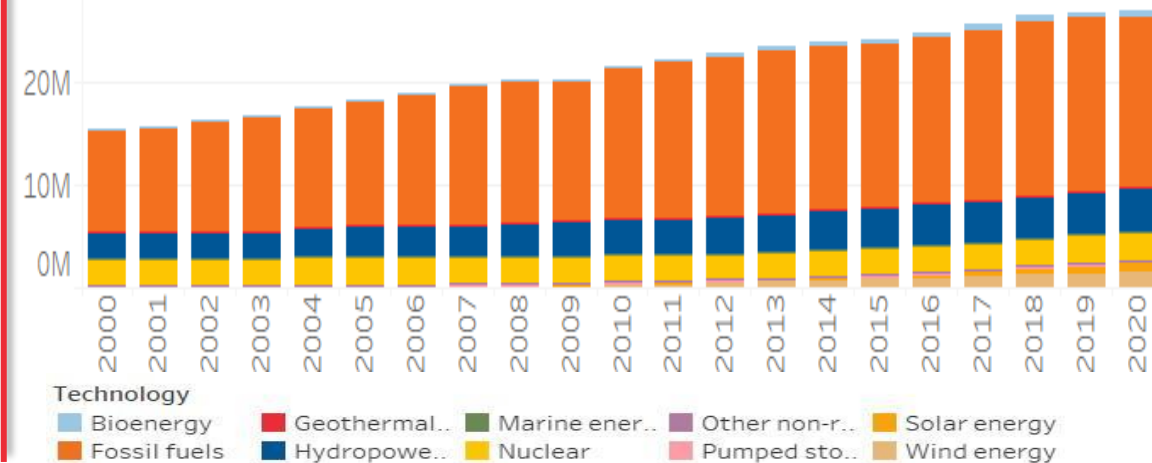
times increase in Solar power generation in last 5 years

4.6

times increase in Wind power generation in last decade



Electricity generation by fuel type across World GWs

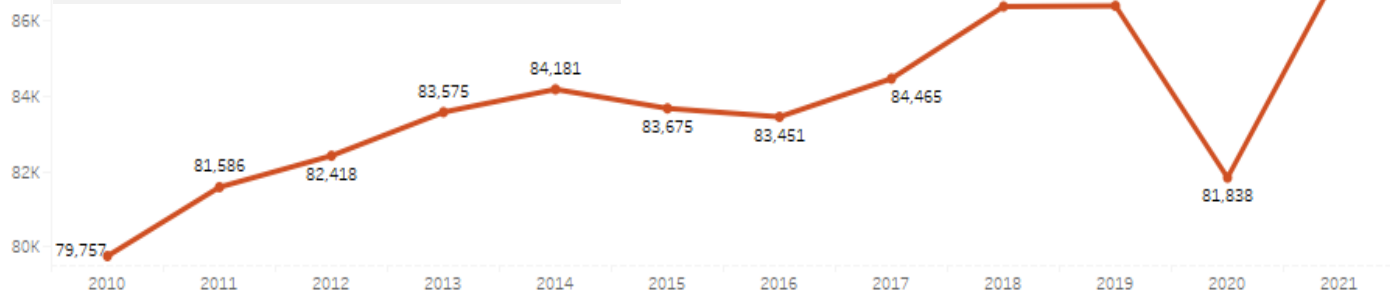


CO2– Devil behind temp change

CO2 emissions are rising

CO2 is a key greenhouse gas that traps heat in our planet and accelerates climate change. CO2 is emitted by us when we burn fossil fuels

Annual CO2 Emissions MMT(2010 – 2020)



87,370 MMT CO2 in 2021

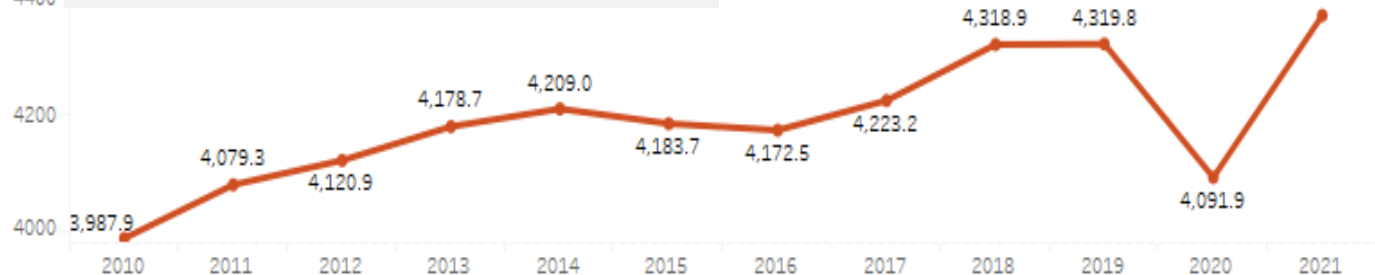
▲ **9.5%** increase in total annual CO2 emission in last 10 years



4368.5 MMT CO2 in 2021

▲ **9.6%** increase in average annual CO2 emission in last 10 years

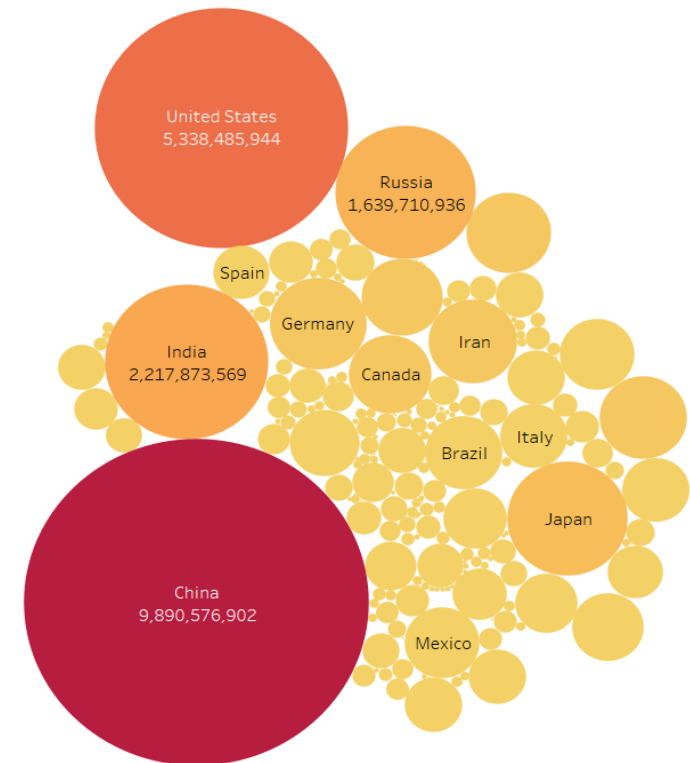
Average Annual CO2 Emissions MMT(2010 – 2020)



CO2 is getting trapped in the atmosphere

- We are adding CO2 to our planet faster than any point in history.
- US and China contributing almost 42% which is 15.1 Billion Tonnes of the Global CO2 Emissions from fossil fuels.
- Canada contributes 573M Tonnes (1.6%) Global Emissions.

Average Annual CO2 Emissions from fossil fuels (2010 – 2020)



Oceans are bearing the heat

Due to Ocean Warming, Sea Levels are rising

The year 2021 was the ocean's warmest recorded year and saw the highest global sea level

▲ **188.1**

Zettajoules monthly change in ocean heat from 1992 to 2019

▲ **2.15**

mm mean annual increase in sea level

▲ **163%**

Increase in the sea level in the last decade



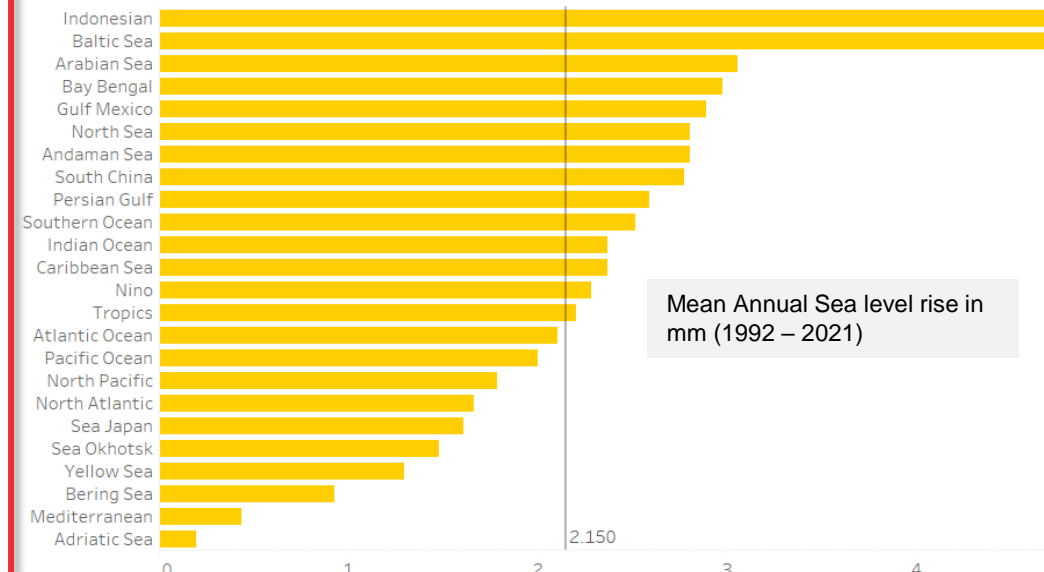
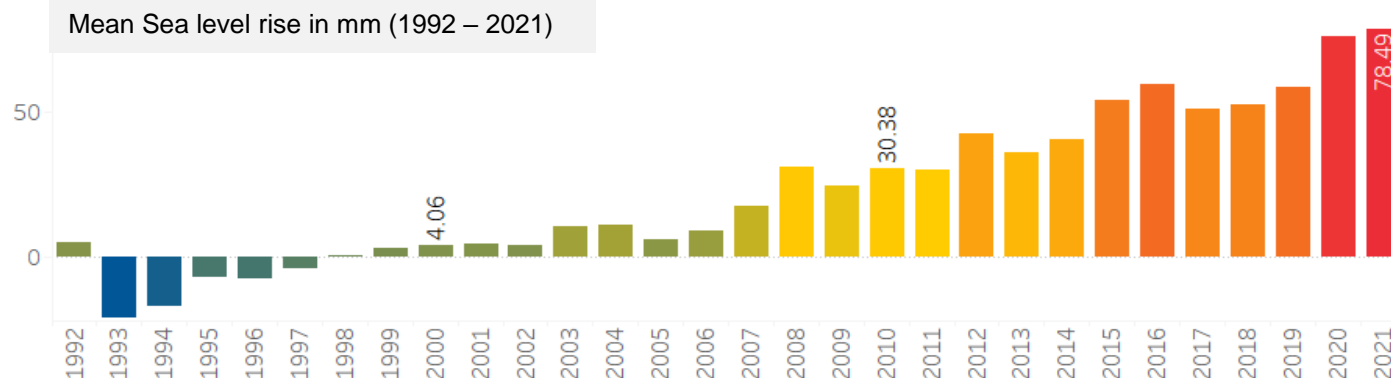
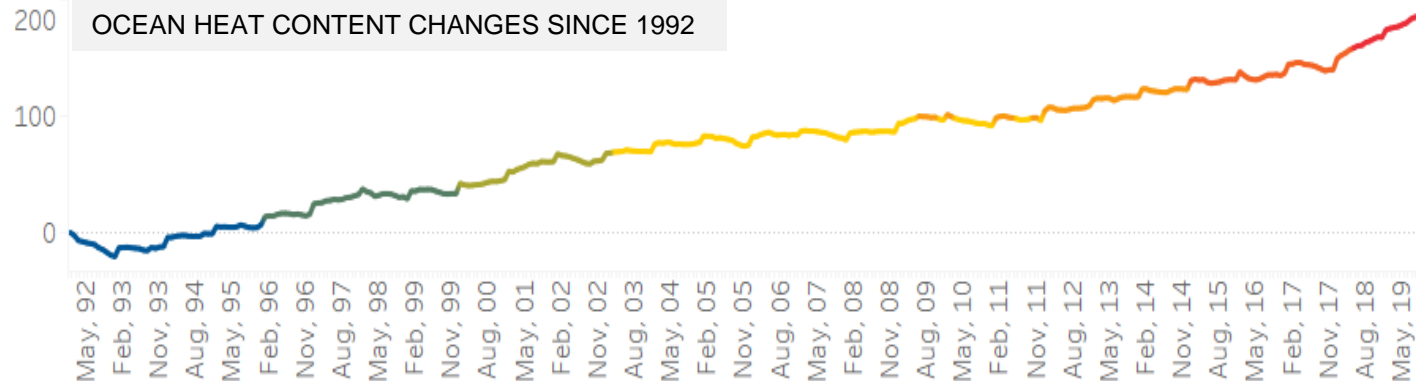
ANTARCTICA MASS VARIATION SINCE 2002

↓ **151.0** billion metric tons per year since 2002

GREENLAND MASS VARIATION SINCE 2002

↓ **273.0** billion metric tons per year since 2002

↻ **83%** of the global carbon cycle is circulated through the oceans



Disasters due to Climate change

Disasters due to Climate Change is affecting humans



6,630

People displaced in Canada due to Extreme temperature from 2017 - 2021



75%

Increase in # floods from 2017 - 2021



6,946

Reported Disasters from 2017 - 2021

113.3M

Internal displacements from 2017 - 2021

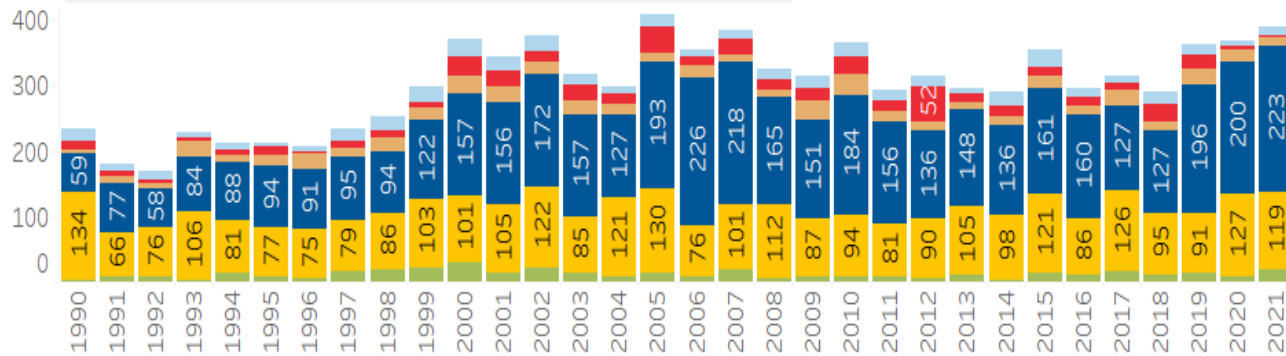
56M

People displaced due to Storms from 2017 - 2021

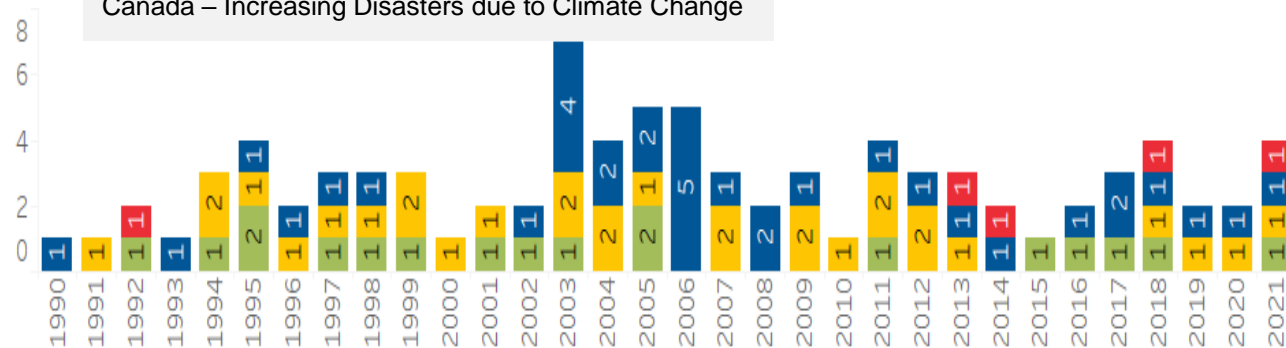
48M

People displaced due to Floods from 2017 - 2021

World – Increasing Disasters due to Climate Change



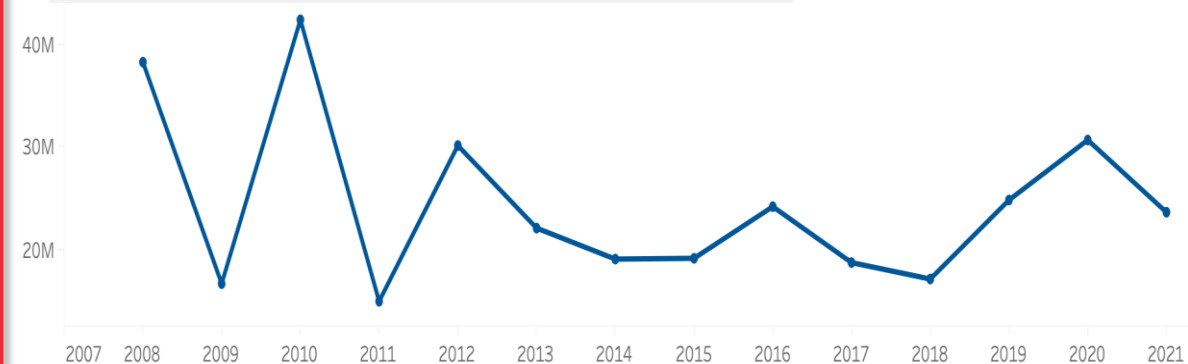
Canada – Increasing Disasters due to Climate Change



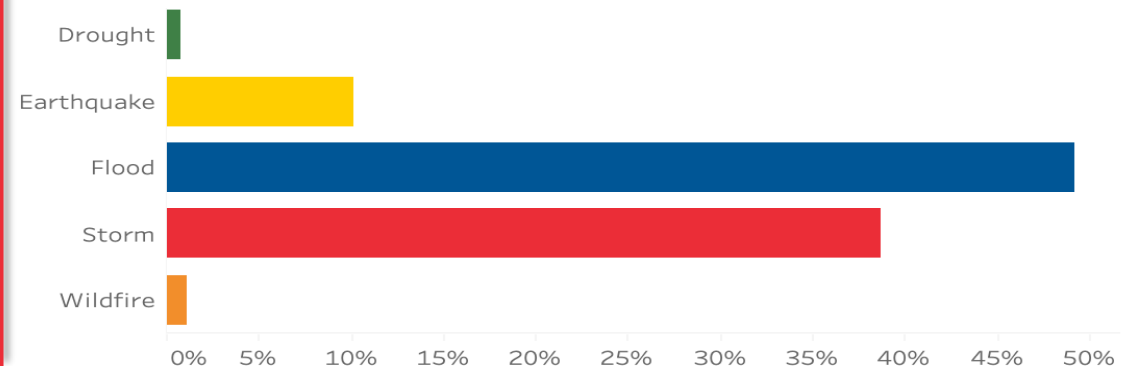
Indicator Climate related disasters

Drought Extreme temperature Landslide Flood Storm Wildfire

World – Internal Displacements due to Disasters



World – Total % Internal Displacements due to Disaster Types

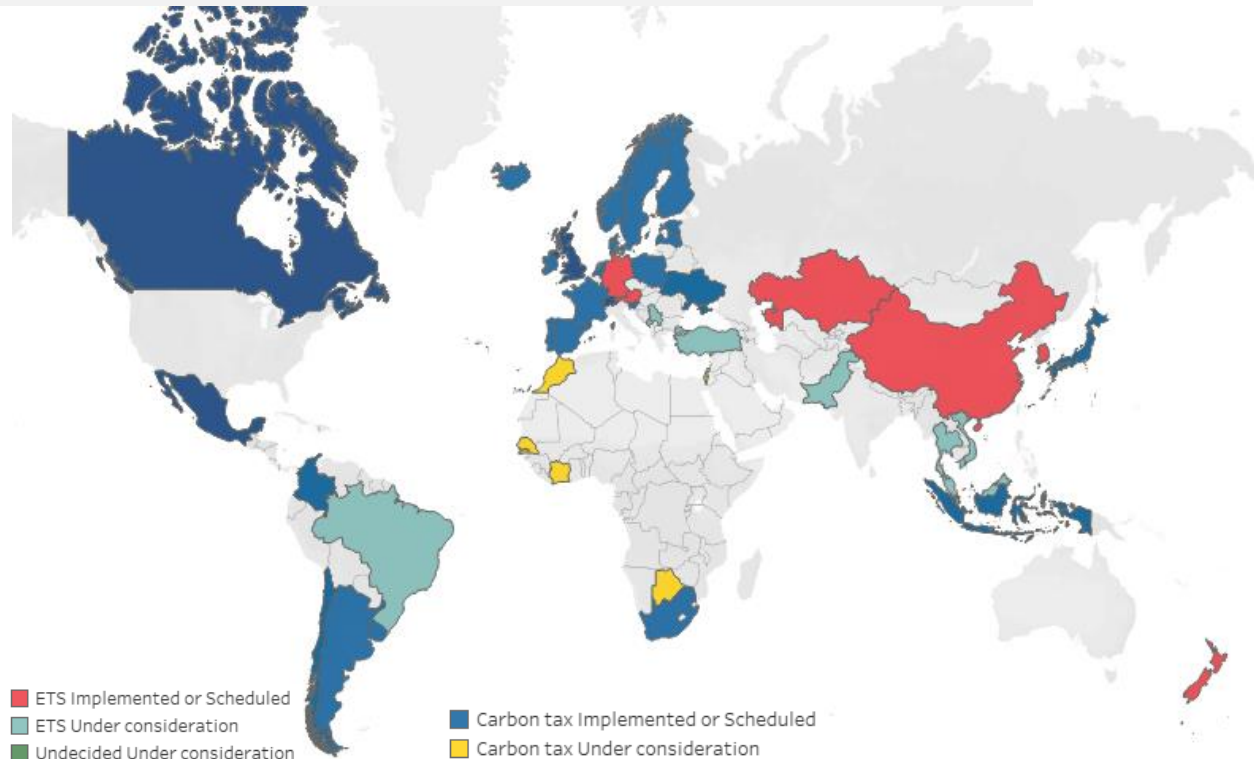


How to combat Global Warming – Steps

Emerging carbon pricing initiatives around the world



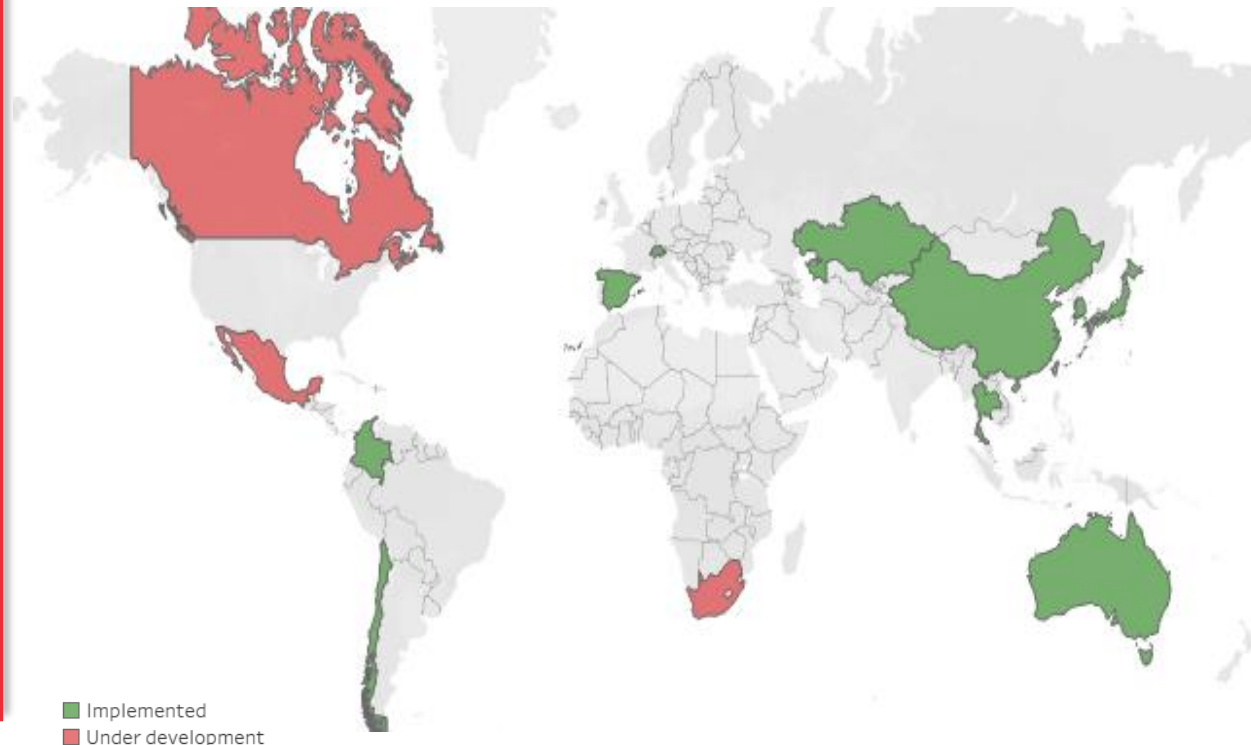
Summary map of regional, national and subnational carbon pricing initiatives



Carbon pricing is an instrument that captures the external costs of greenhouse gas (GHG) emissions



Summary map of regional, national and subnational carbon crediting mechanisms



Policies of the Canadian Government



30 Mt

of annual GHG emissions reductions by 2030



290

climate related policies implemented by Government of Canada over the past 50 years

2030 GHG reduction commitment

- Climate Summit – Trudeau's GHG reduction commitments
- 40 to 45% below 2005 levels by 2030

ETS Policy – Clean Fuel Standard

- Reduce CO2 intensity of fuels and energy
- Implemented for liquid energy (2022) & planned for solid/gas (2023)
- Intended to stimulate cost-effective investments in low-carbon fuels

Carbon Tax - Greenhouse Pollution Pricing Act

- Various fuel types and combustible waste are subject to fuel charge
- Carbon pollution price of \$20 per tonne (2019)
- Increment by \$10 annually to \$50 per tonne (2022)



34%

GHG emissions reductions in Oil & Gas sector by 2030

71%

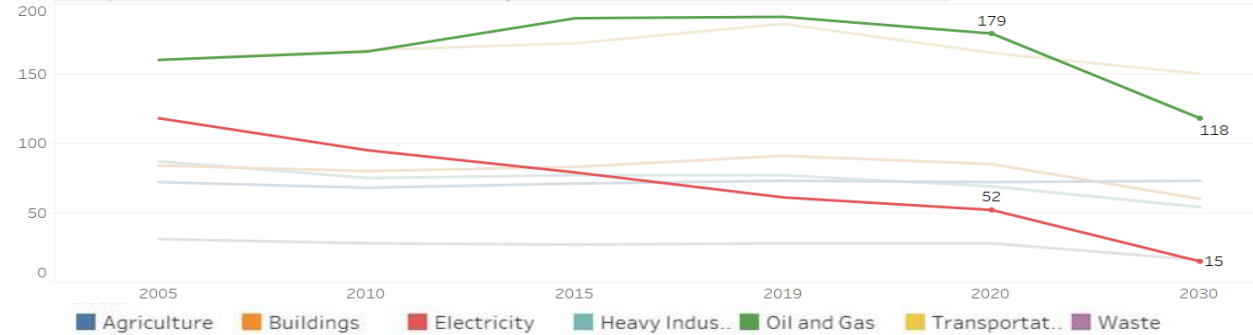
GHG emissions reductions in Electricity sector by 2030



24 M

Planned investment for EV charger installation in Canada for 2022

Expected Emissions reductions by Sector in 2030 for Canada



Investment in the installation of Electric vehicle chargers(USD) for 2022



Climate needs Funding

1. Canada along with other countries has been the biggest contributors in giving climate fund as pledged to developing nations
2. Canada stepped up and announced a doubling of its international climate finance, from \$2.65 billion (2015–2021) to \$5.3 billion (2021–2026)

Contribution by funds across countries for developing countries to combat climate change



Climate Fund Canada Climate Action Fund

\$5.3 Mn

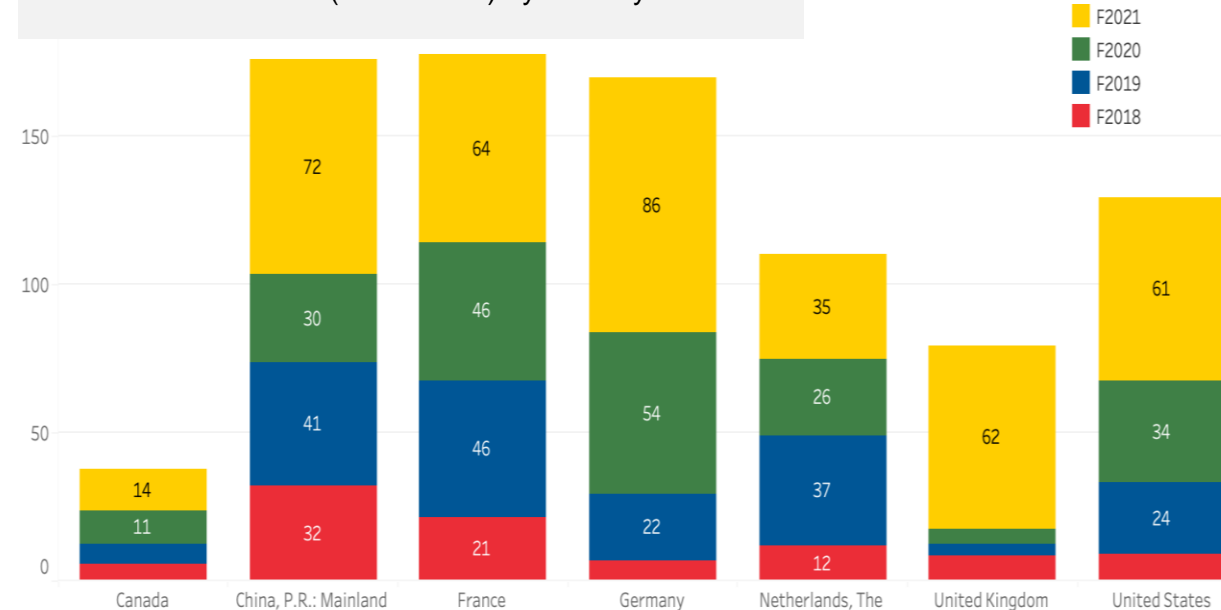
funding to support 44 climate action projects

\$4.2 Bn

to be disbursed over next coming years to tackle climate Change

Canada along with other countries issued Green Bonds worth in billions from the Year 2016-2021 and has been increasing every year

Green Bond Issuance (Billion USD) by Country



Climate Action: Recommendations

We can target 4 Levers that can combat Climate Change

Our Health is non negotiable

Policy

1

Government to fund R&D in Innovation to boost green technology

2

Regulate to control emissions and ban polluting activities and chemicals.

3

Tax & Subsidise – Apply more carbon tax and cut support for fossil fuels

4

Inform & Educate: Educational programmes and campaigns to raise awareness, and inspire businesses and consumers to act.

Sectors

1

Research & Innovation, recycling and Improvement in manufacturing efficiency needs to be scaled up.

2

Integrate Strategy to emphasize decarbonizing the electricity sector while providing affordable and renewable electricity for all.

3

Decarbonizing transport relies on innovative technologies and a shift towards cleaner alternatives.

4

Buildings: Policies to improve building qualities. Encourage to renovate, retrofit existing building to make it more energy efficient.

Climate Action – Need of the hour

How has Canada progressed ?



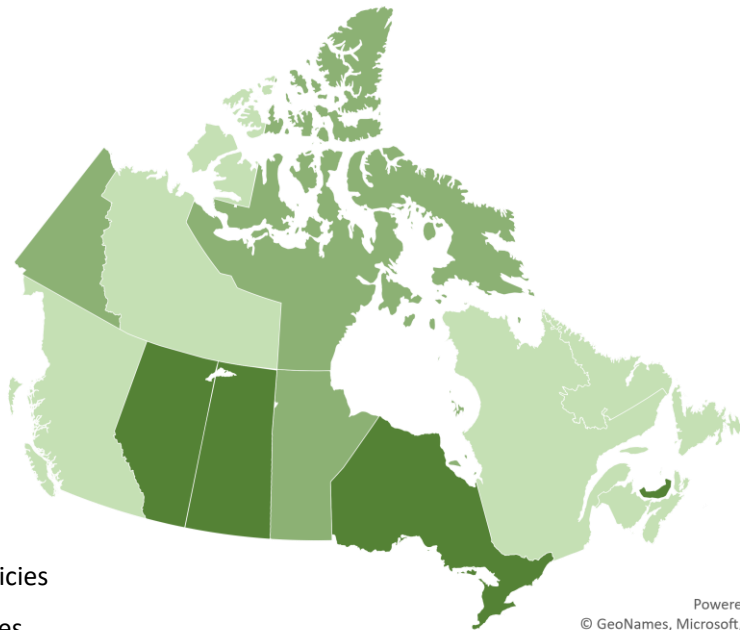
10 %

Reduction in total GHG emission
from 2019 - 2020

16 %

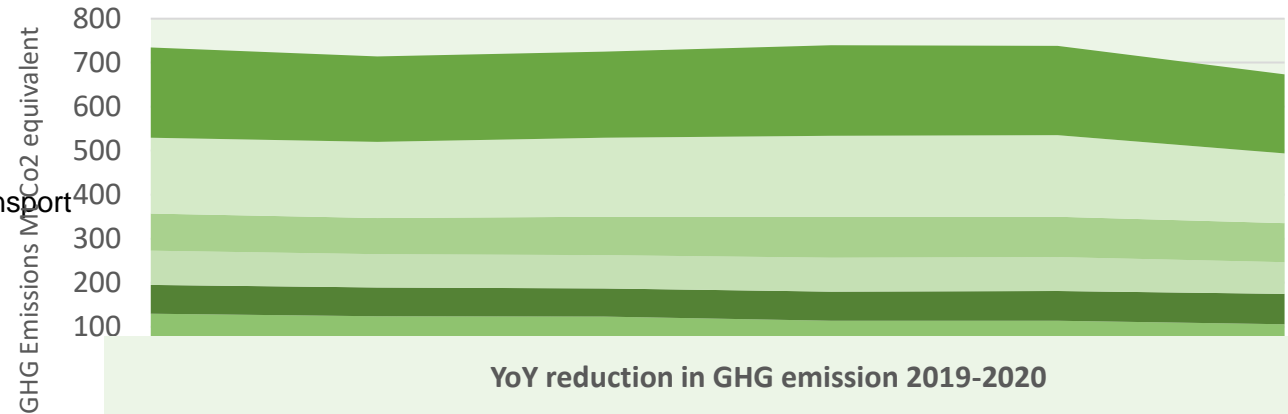
Reduction in GHG emission in Transport
sector 2019-2020

Fuel Charge & Output-Based Carbon Pricing System Policies



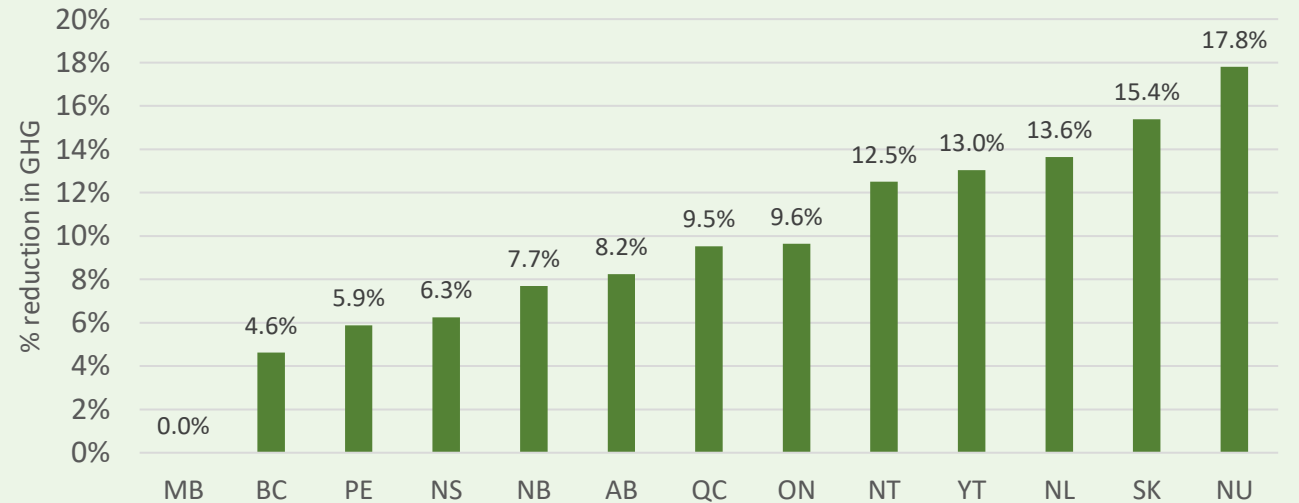
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Canada's GHG Emissions by Economic Sector Mt Co2 equivalent



■ V

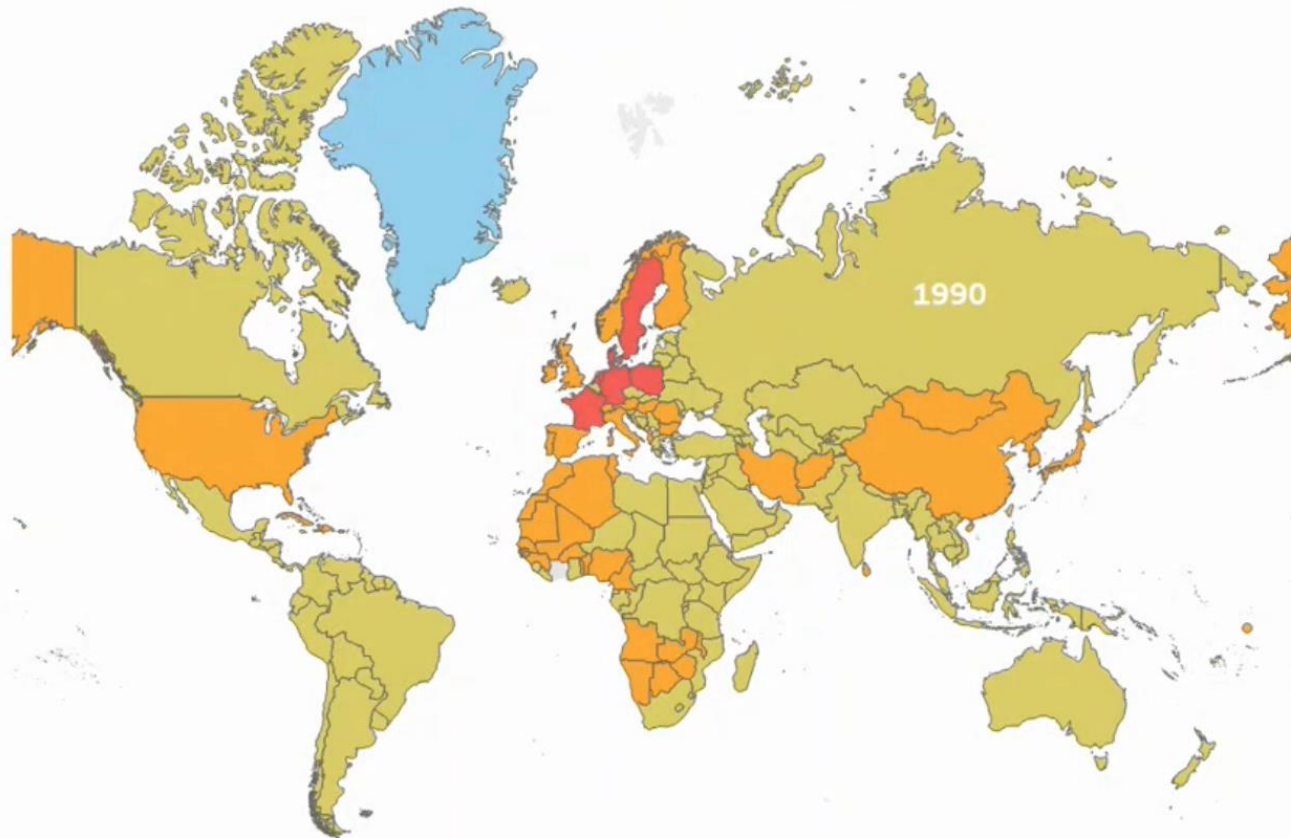
YoY reduction in GHG emission 2019-2020



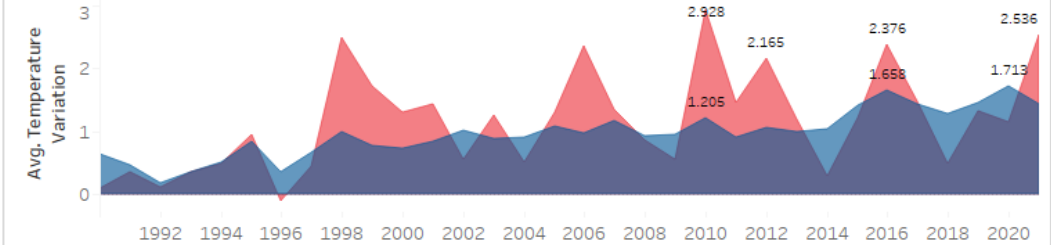
Mother Earth is Burning

Annual Surface Temperature for 70% of the world has risen by 1.3 degree C on average over the past 30 years

Surface Temperature Change 1990 -2021



Surface Temperature variation – World vs Canada



Earth's Annual Surface Temperature has risen by 1.5 degree C on average since last 5 years



Canada is among the top 3 countries with highest temperature rise