MAJOR REASONS FOR CLIMATE CHANGE:

TRANSPORTATION

Presented By:

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• MAJOR REASONS …

The major reasons for climate change include a mix of natural and, overwhelmingly, human-made (anthropogenic) factors:

1. Burning of Fossil Fuels;
2. Deforestation;
3. Industrial Activity;
4. Agriculture & Livestock;
5. Transportation;
6. Waste and Garbage;
7. Plastics;
8. Urbanization and Energy Consumption; and
9. Industrial Chemicals.

POLICY AND GLOBAL ACTION …

- Transportation plays a significant role in climate change due to its heavy reliance on fossil fuels;
- Transportation is a major contributor to climate change, but also a sector with clear paths for decarbonization; and
- Transitioning to clean energy, improving infrastructure, and changing travel behaviors are essential to reducing its climate impact.

• GREENHOUSE GAS EMISSIONS …

- **Carbon Dioxide (CO_2):** The main greenhouse gas emitted by the transportation sector; and
- It results from burning gasoline and diesel.
- **Methane (CH_4) and Nitrous Oxide (N_2O):** Also emitted, especially from air and maritime transport; and
- **Contribution to Global Emissions:** Transportation accounts for around 15-20 percent of global greenhouse gas emissions, depending on the country.

- **MODES OF TRANSPORTATION AND THEIR IMPACT …**
  - **Road transport (Cars, Trucks, Buses):** Largest contributor within the sector—responsible for nearly **75 percent** of transport-related emissions;
  - **Aviation:** Rapidly growing sector; emits not just CO_2 but also condensation trails and Nox (Nitrogen Oxides), which have complex climate effects;
  - **Shipping:** A major emitter, especially from heavy fuel oil use; and
  - **Rail:** Among the least polluting, especially when electrified.

URBANIZATION AND VEHICLE USE …

- Increased urban sprawl leads to more vehicle use;
- Dependence on personal vehicles increases per capita emissions; and
- In contrast, cities with strong public transportation infrastructure show lower emissions.

INDIRECT IMPACT …

- Infrastructure development (Roads, Airports) contributes to land use change, deforestation, and ecosystem disruption; and
- Air pollution from transport also impacts human health, indirectly linking to climate stress via health system burdens.

MAJOR REASONS …

- **Electrification:** Shifting to electric vehicles (EVs), especially when powered by clean energy, can cut emissions drastically;
- **Public Transport:** Investment in efficient and clean public transit reduces dependence on private cars;
- **Active Transport:** Promoting walking and cycling lowers emissions and improves health;
- **Biofuels and Hydrogen:** Potential alternatives, especially for aviation and shipping; and
- **Urban Planning:** Designing compact, transit-oriented cities can reduce travel demand and emissions.

• POLICY AND GLOBAL ACTION …

- Carbon pricing, fuel efficiency standards, and zero-emission vehicle mandates are key policy tools;
- International agreements, like the Paris Agreement, aim to reduce emissions from all sectors, including transport; and
- The International Maritime Organization (IMO) and International Civil Aviation Organization (ICAO) are working on sector-specific climate goals.

CANADA

TRANSPORTATION IN CANADA …

The transportation sector is one of the largest contributors to climate change in Canada, both in terms of greenhouse gas (GHG) emissions and fossil fuel consumption; and

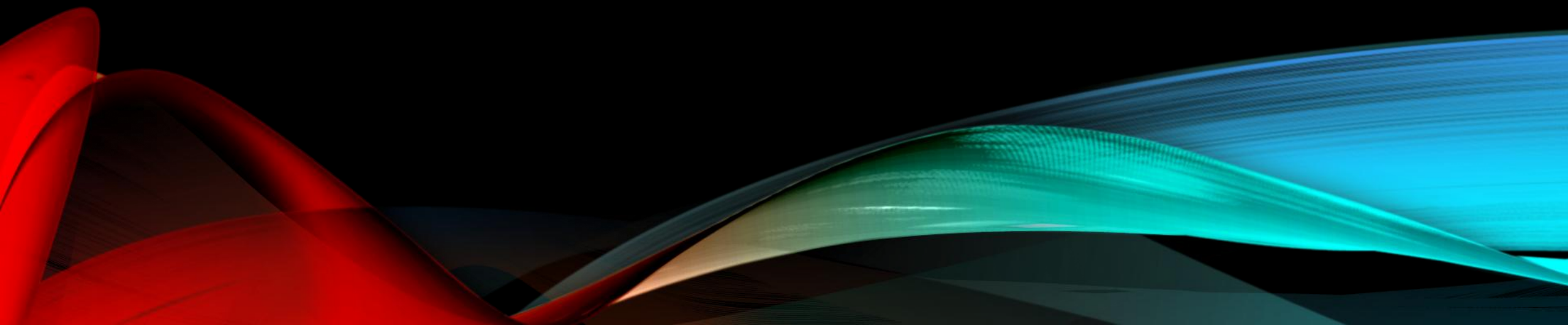
Due to Canada's vast geography, heavy reliance on personal vehicles, and resource-based economy, transportation has a disproportionate environmental impact compared to other developed nations.

- **TRANSPORTATION AND CLIMATE CHANGE …**
  - **GHG Contribution:**
    - Transportation accounts for about 25 percent of Canada's total GHG emissions (as of 2023); and
    - It is the second-largest source of emissions after the oil and gas sector.
  - **Main Emission Sources:**
    - Passenger vehicles (Cars, SUVs, Light Trucks);
    - Freight transportation (Trucks, Trains, Ships, Airplanes);
    - Aviation and marine transport; and
    - Public transit systems (though generally more efficient, still emit CO_2 if fossil-fueled).

1. WESTERN CANADA …

- **ALBERTA & SASKACHEWAN:**
- Heavy reliance on trucks due to long distances between cities and rural infrastructure;
- Industrial freight movement (Oil, Grain, Mining equipment) contributes heavily to diesel emissions; and
- Cities like Calgary and Edmonton have limited public transit usage compared to car dependency.

REGION-SPECIFIC IMPACTS



1. WESTERN CANADA …

- **BRITISH COLUMBIA (BC):**
- Congested urban corridors (e.g., Metro Vancouver) lead to idling and high per capita transport emissions;
- **Port of Vancouver:** Significant emissions from marine shipping and container trucking; and
- BC has higher uptake of electric vehicles (EVs) due to government incentives and hydroelectric power.

1. WESTERN CANADA …

- **MANITOBA:**
- Fewer emissions compared to Alberta/BC, but increasing due to rising vehicle use in Winnipeg and rural areas.

2. CENTRAL CANADA …

- ONTARIO:
- Largest number of vehicles in Canada;
- Toronto and the GTA suffer from severe traffic congestion and associated emissions;
- Freight hubs (e.g., Windsor–Detroit border, 401 Highway corridor) move massive amounts of goods by truck; and
- Significant air travel emissions via Pearson International Airport.

2. CENTRAL CANADA …

- QUEBEC:
- Lower emissions than Ontario due to better public transit in Montreal and Quebec City;
- The use of bikes for recreational purposes;
- Greater investment in EVs and use of clean hydroelectricity; and
- Trucking and aviation still contribute substantial GHGs.

3. NORTHERN CANADA …

- **YUKON, NORTHWEST TERRITORIES & NUNAVUT:**
- Remote communities depend on diesel-powered vehicles, ATVs, snowmobiles, and air transport;
- Roads are limited; air transport is the main mode for goods and people—high GHG intensity per trip; and
- Warming permafrost is damaging transportation infrastructure (e.g., winter roads, runways).

4. ATLANTIC CANADA …

- **NEWFOUNDLAND & LABRADOR, NOVA SCOTIA & NEW BRUNSWICK, and PRINCE EDWARD ISLAND:**
- Smaller populations, but high car dependency due to fewer transit options;
- Newfoundland & Labrador and Nova Scotia have marine shipping emissions (ferries, fishing vessels);
- Extreme weather events, worsened by climate change, are damaging road and bridge infrastructure (e.g., Hurricane Fiona); and
- Limited EV infrastructure in rural areas.

MITIGATION AND POLICY RESPONSES …

- Provincial and Federal Actions:
- Zero-Emission Vehicle Mandate:
  - All new light-duty cars and passenger trucks must be zero-emission by 2035;
- Carbon Pricing:
  - Carbon tax on gasoline and diesel aims to reduce fossil fuel use;
- Public Transit Investments:
  - Expansion of subways, light rail, and electric buses in major cities; and
- EV Incentives:
  - Rebates for purchasing electric or plug-in hybrid vehicles (Federal and Provincial).