Funded in part by:
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Canada

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TRAINING ON GHG MANAGEMENT

PROJECT IGNITE: INNOVATING GHG EMISSION REDUCTION, NURTURING INSTITUTIONS & TRAINING ENTERPRISES FOR LOW CARBON ECONOMY

PRESENTED BY: HAKIM HABANI

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Traditional Land Acknowledgement

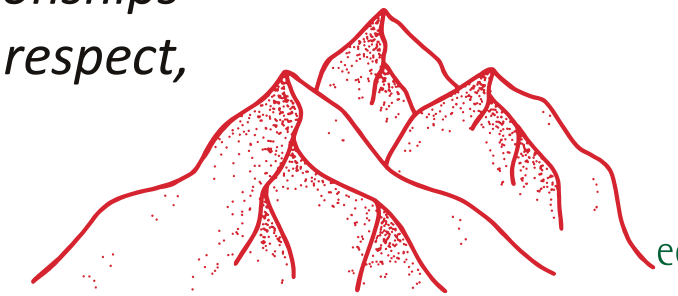
First Nation

Métis

Inuit

ECO Canada respectfully acknowledges that Saskatchewan is situated on Treaty 2, 4, 5, 6, 8 and 10 territories—the traditional lands of diverse First Nations—and within the Homeland of the Métis.

We honour the First Nations and Métis peoples who have cared for these lands for generations. We recognize their enduring relationships with the land and commit to advancing reconciliation through respect, learning and meaningful action.



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CLIMATE CHANGE

IPCC - (INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE)

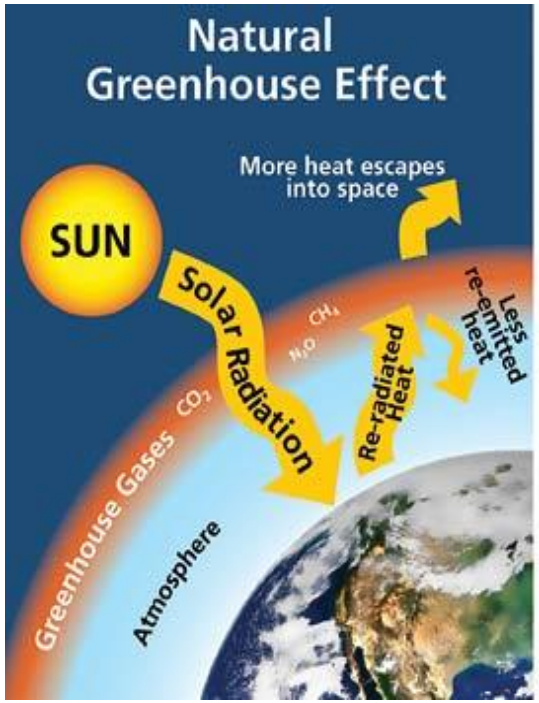
"Any change in climate over time, whether due to natural variability or as a result of human activity"

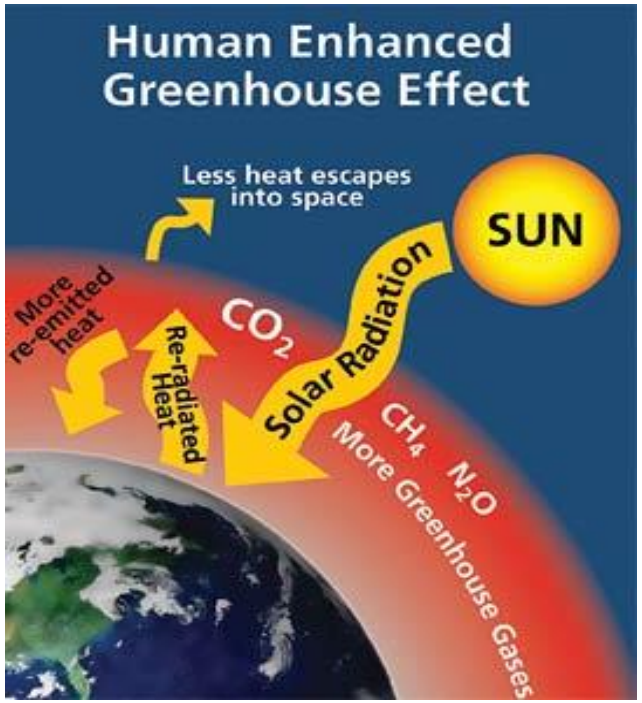
UNFCCC - UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

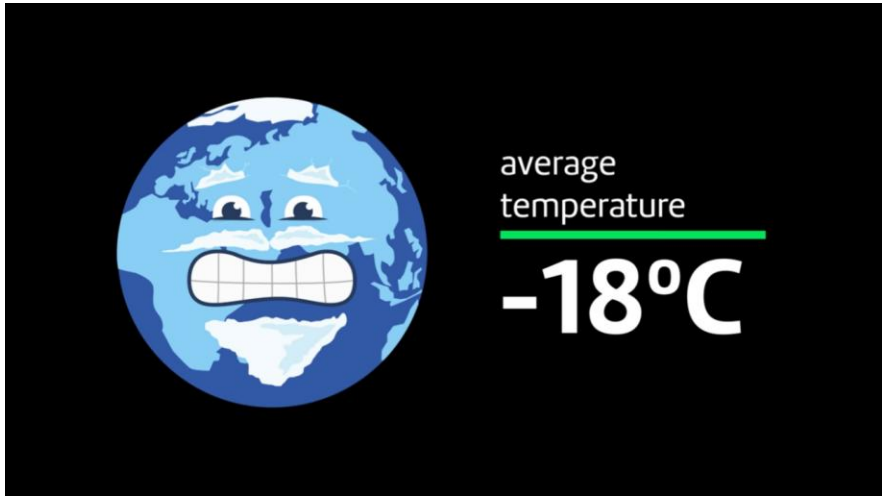
"A change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods"

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IS IT GOOD OR BAD..??



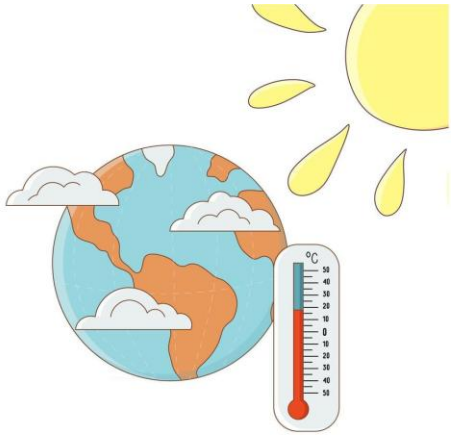




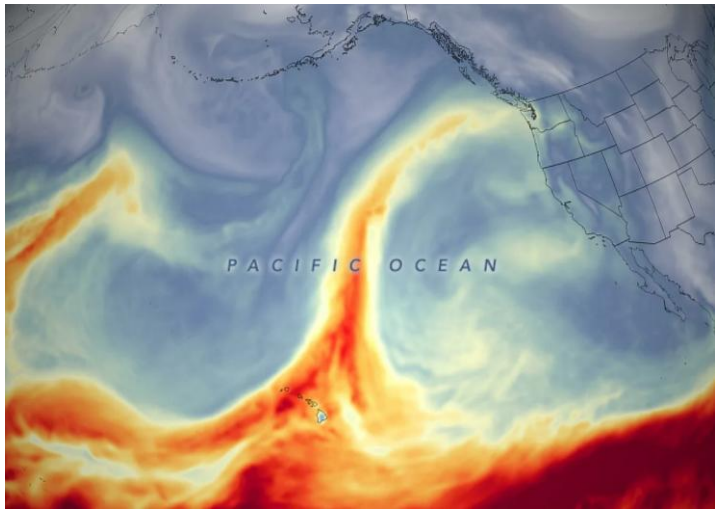
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CURRENT EFFECTS OF

CLIMATE CHANGE



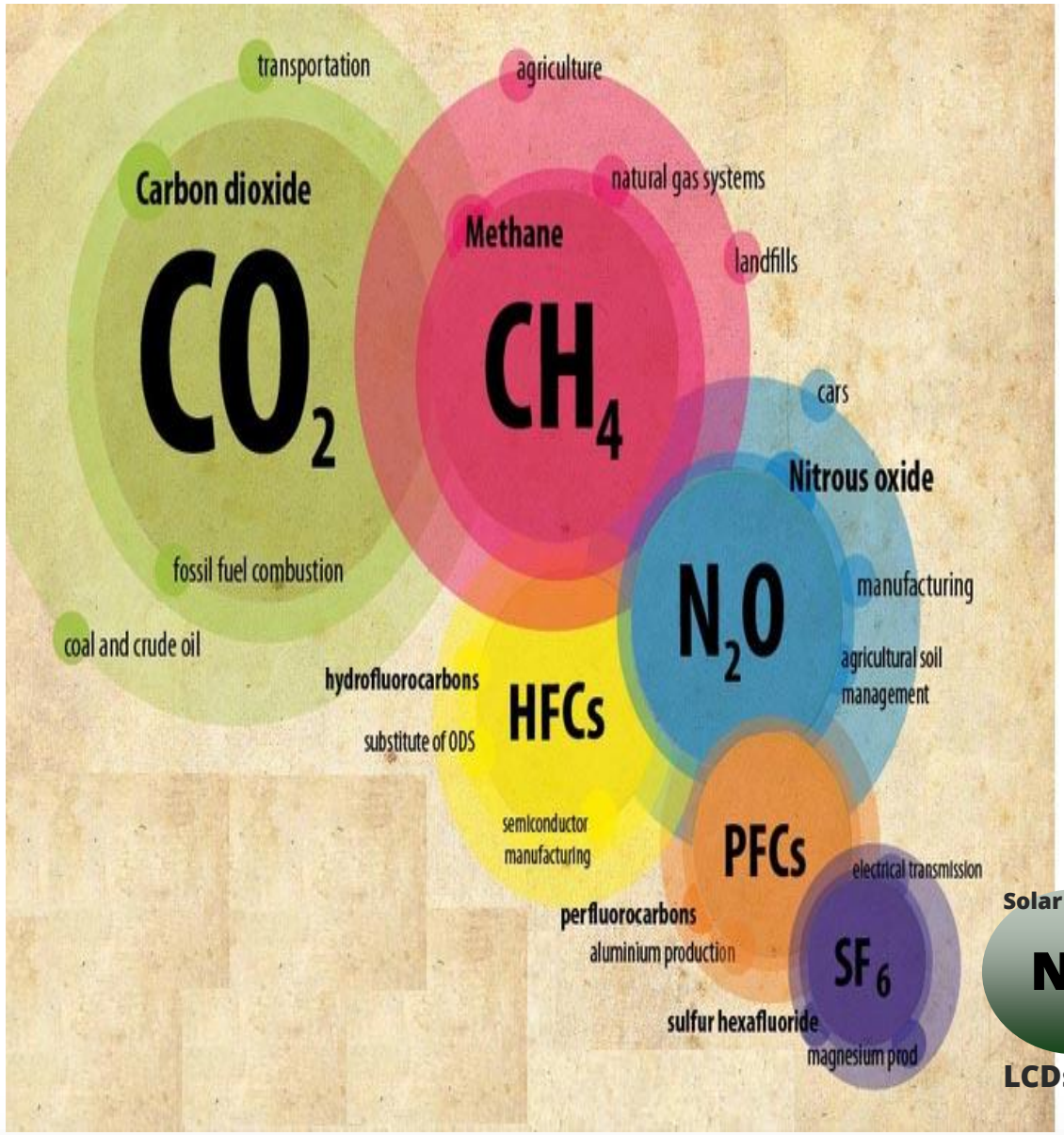








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GREENHOUSE GASES

Global Warming Potential (GWP)

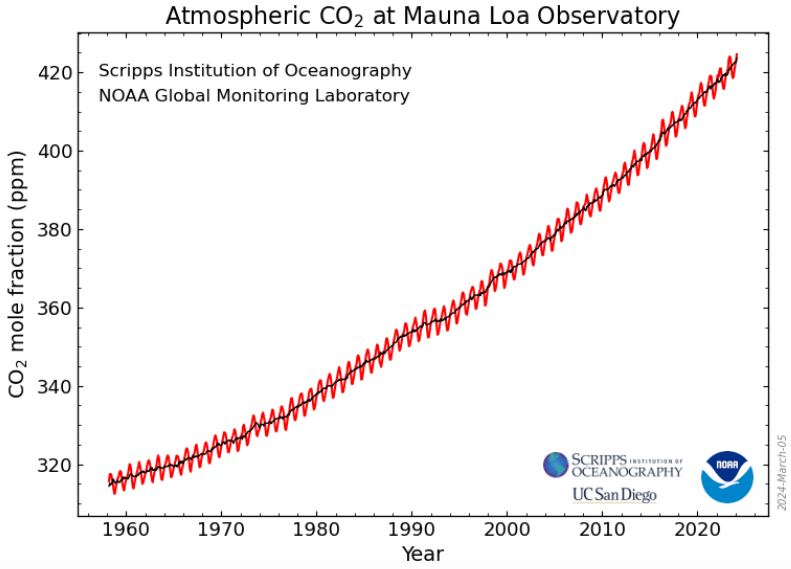
1. Integrated climate effect relative to CO_2
2. Defined time horizon (here: 100 years)

GREENHOUSE GAS / EXAMPLE	LIFETIME (YEARS)	GWP_{100} (100 YEARS)
CARBON DIOXIDE (CO_2)	VARIABLE	1
METHANE (CH_4)	11.8	27.2–29.8*
NITROUS OXIDE (N_2O)	109	273
HFC-134A	14.0	1,530
CF_4 (PFC-14)	50,000	7,380
SULPHUR HEXAFLUORIDE (SF_6)	3,200	25,200
NITROGEN TRIFLUORIDE (NF_3)	569	17,400

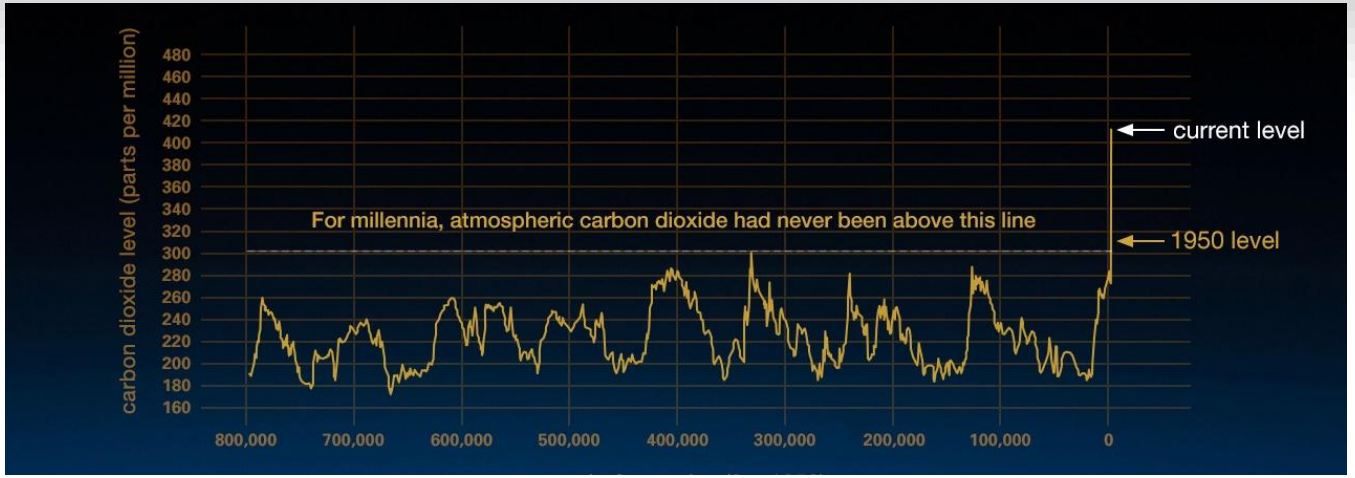
Source: IPCC AR6 WGI, Ch. 7 SM, Table 7.SM.7. *CH_4: non-fossil–fossil.

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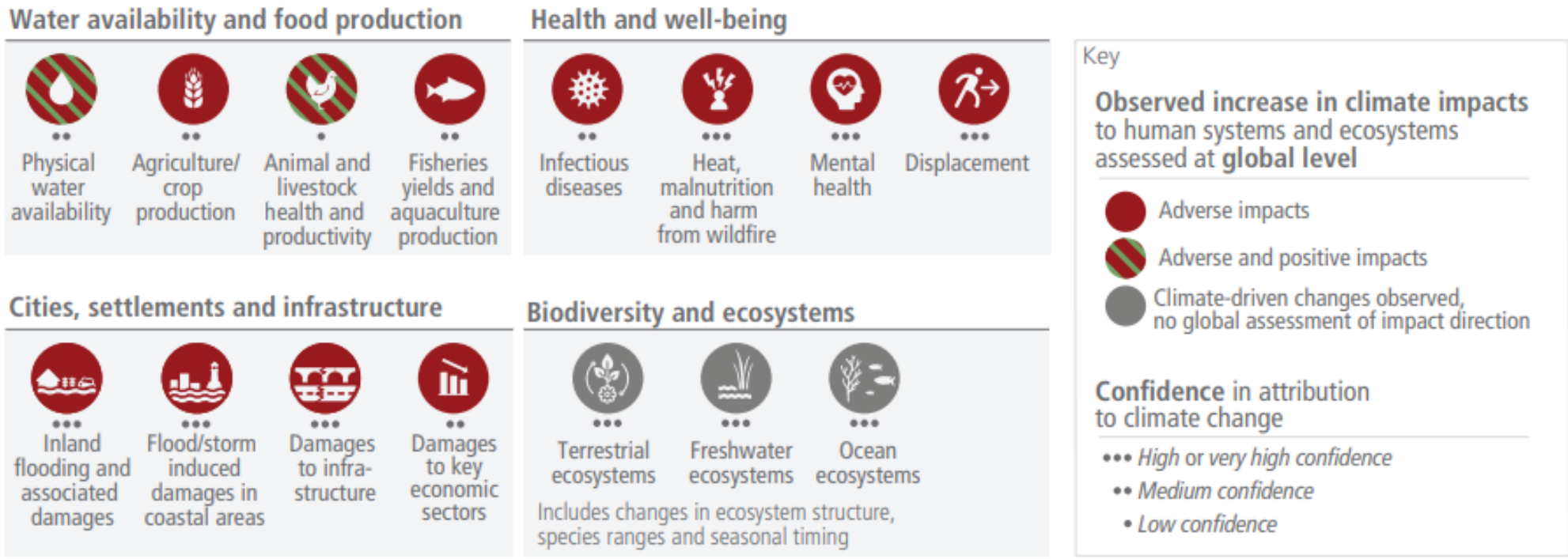
THE RISE OF EMISSIONS



In 2024, atmospheric CO_2 at Mauna Loa averaged 424.6 ppm, compared with about 280 ppm before industrialization.



Source: NOAA Global Monitoring Laboratory, Mauna Loa annual mean CO_2 data (2024)



Approx.

3.6 Billion

People

reside in areas highly vulnerable to climate change

Source: Climate Change 2023 Synthesis Report Summary for Policymakers

THE ROAD

FROM KYOTO TO PARIS

1997

- Kyoto is adopted to limit the emissions from 6 main sources of GHG.
- Target was to reduce emissions by 5.2% below 1990 levels.
- It established Emissions Trading and the Clean Development Mechanism

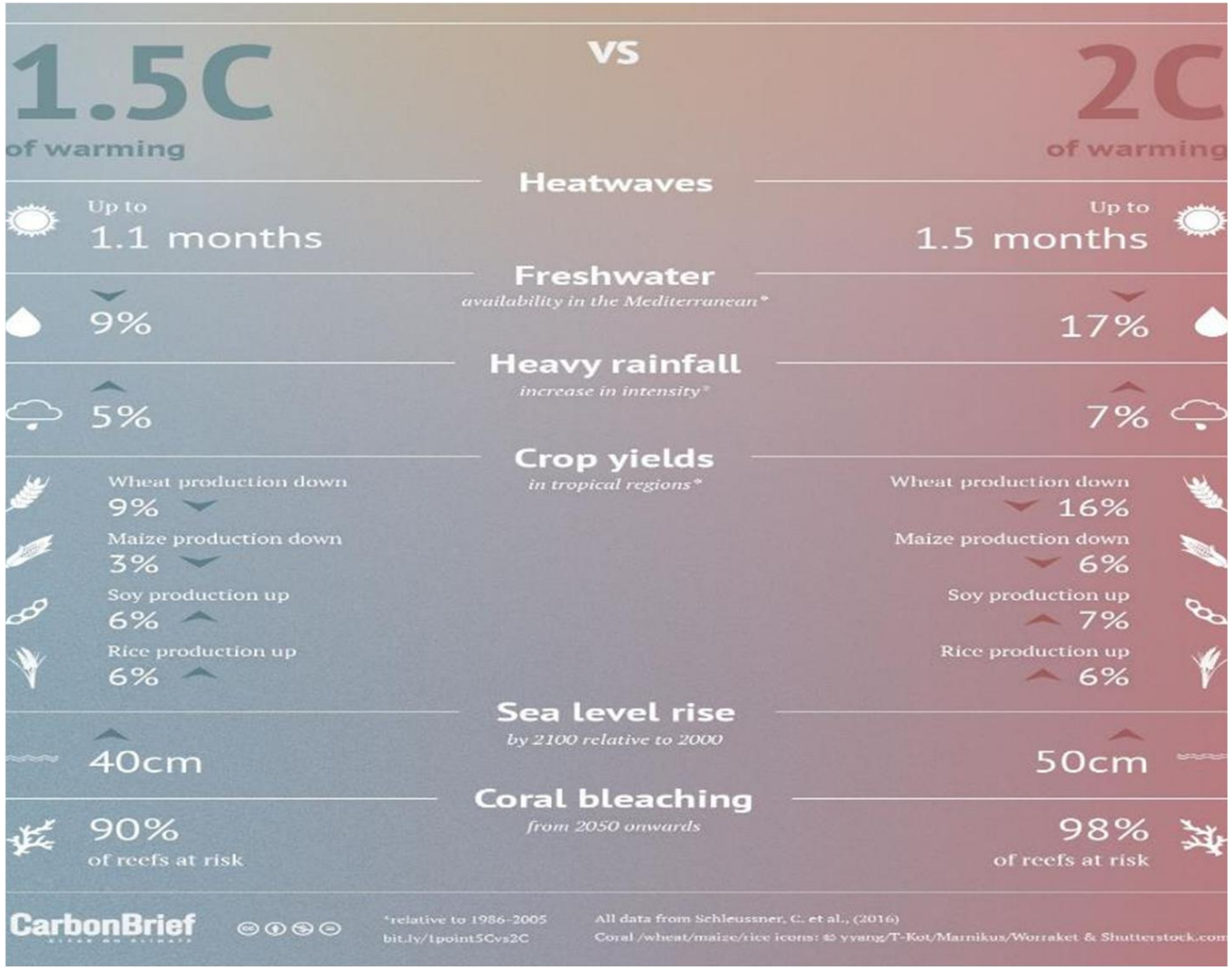
2005

- The EU launches the Emissions Trading System, worlds first company-level carbon trading system.
- Setup as a cap-and-trade system and covered large industrial emitters that accounted for 45% of total GHG emissions.

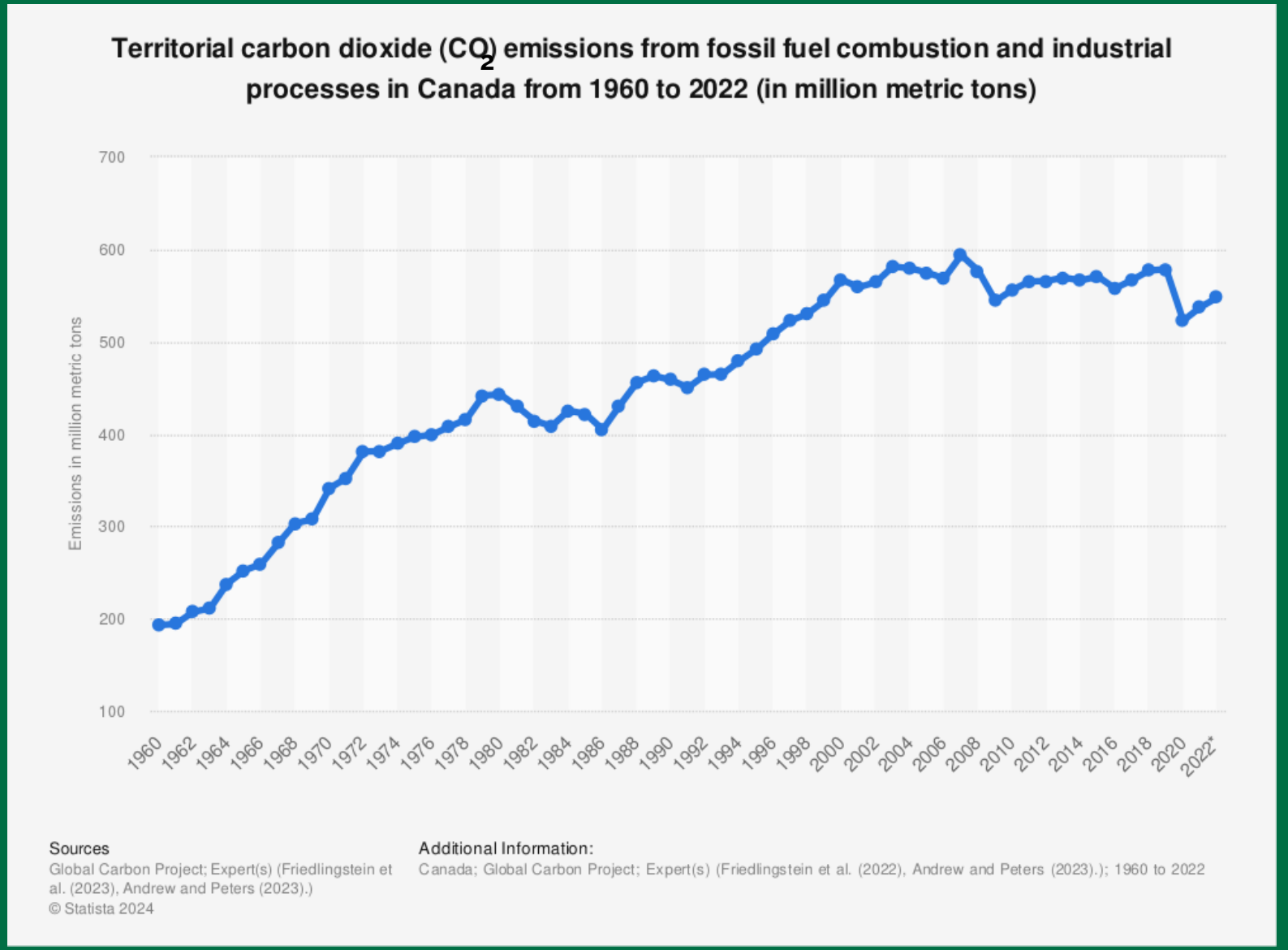
2015

- Paris agreement is signed at COP21 with the goal of limiting global warming to 2 degrees
- It is the first agreement that was universal where each country would set voluntary emission reduction targets.

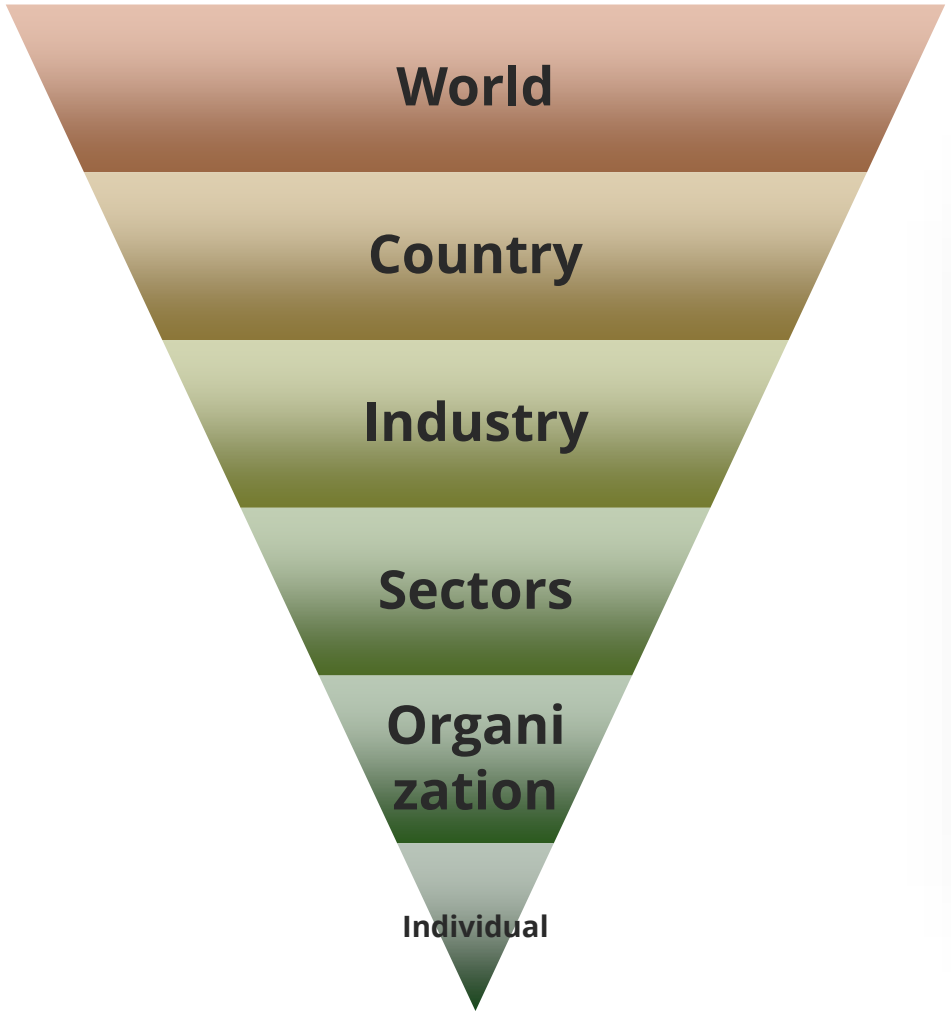
DOES IT MATTER ?



EMISSIONS IN CANADA OVER THE YEARS



WHERE DOES CANADA STAND?



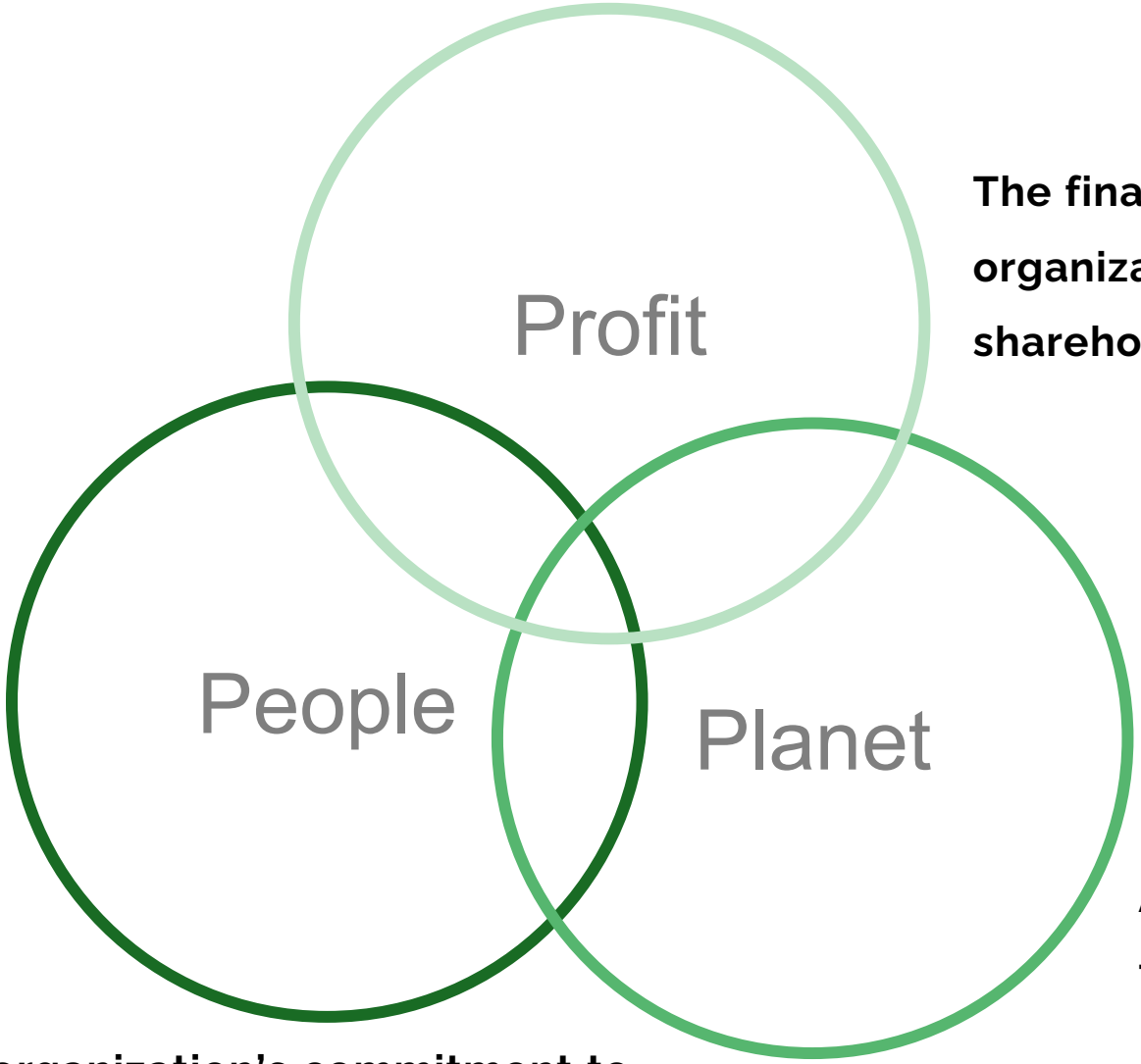
CANADA'S COMMITMENT

REDUCE EMISSIONS BY 40-45% FROM 2005 LEVELS BY 2030

NET ZERO BY 2050

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THE TRIPLE BOTTOM LINE



The financial return an organization generates for shareholders

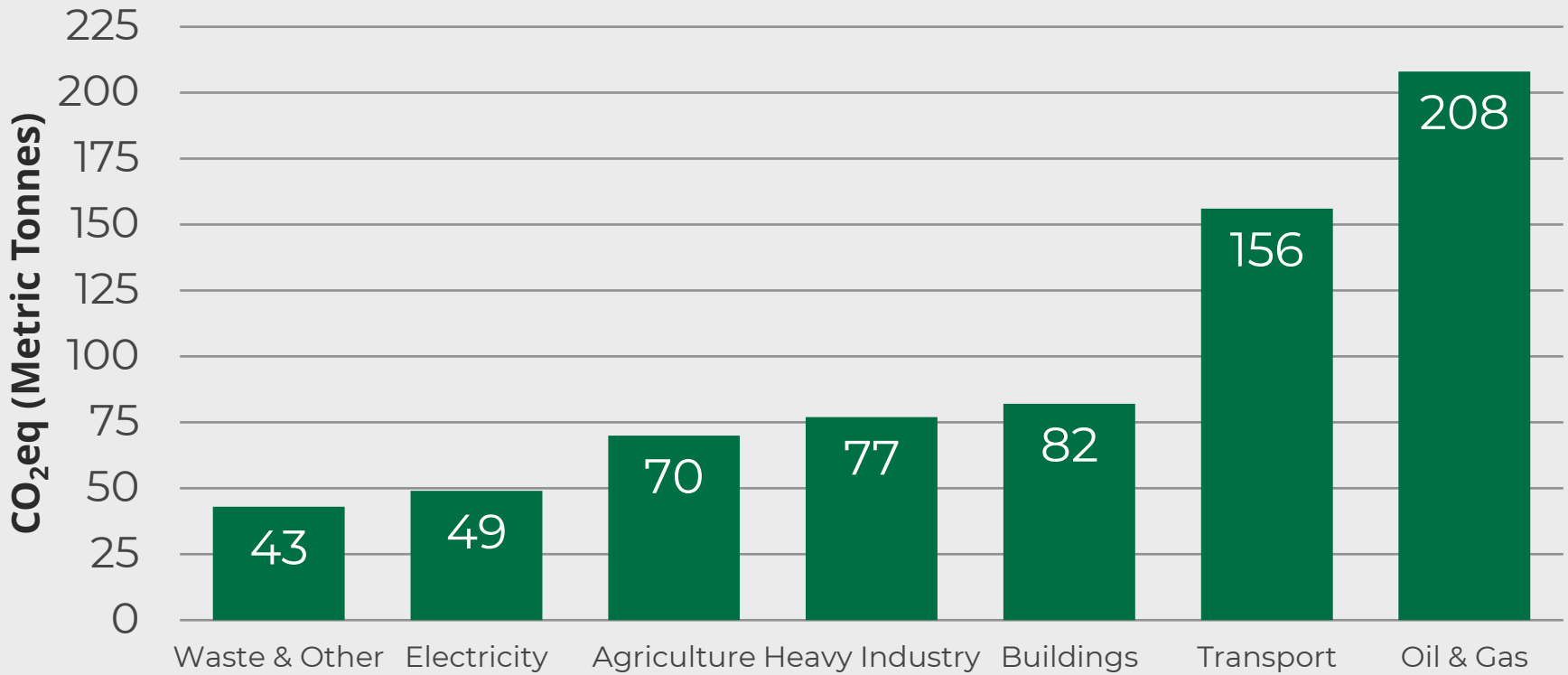
An organization's effect on the environment

An organization's commitment to positively impact the community

Source: championsoftheplanet.org

BREAKDOWN OF CANADA'S GHG EMISSIONS BY ECONOMIC SECTOR

2024



Source: National Inventory Report 1990–2024 (2026) | Government of Canada

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LAWS & REGULATIONS

CANADIAN GHG CLIMATE RELATED REGULATIONS

GHG REGULATIONS & PROGRAMS

GHGRP

GHG REPORTING PROGRAM

- **Reporting for facilities emitting over 10,000 tonnes of GHG emissions annually**

CFR

CLEAN FUEL REGULATIONS

- **Requires gasoline and diesel suppliers to lower lifecycle carbon intensity**

OFFSET

CANADIAN GREENHOUSE GAS OFFSET CREDIT SYSTEM

- **Program created to generate offset credits from GHG emission reductions or removals**

LMR

LANDFILL METHANE REGULATIONS

- **Requires covered municipal solid-waste landfills to monitor methane and detect equipment leaks**

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EMISSION QUANTIFICATION

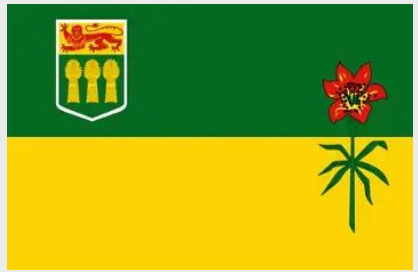
RIGHT FRAMEWORK. CREDIBLE INVENTORY.

GREENHOUSE GAS PROTOCOL

- Corporate GHG accounting framework developed by WRI and WBCSD
- Defines organizational boundaries, emissions scopes and inventory principles
- Supports consistent calculation and transparent disclosure

ISO 14064

- ISO 14064-1: organization-level GHG inventories and reporting
- ISO 14064-2: project reductions/removals
- ISO 14064-3: validation and verification



- OBPS calculations use verified emissions and production data
- Annual returns, records and applicable third-party verification support compliance
- Provincial reporting and federal GHGRP obligations remain separate

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SASKATCHEWAN

OBPS: COVERAGE, MRV & COMPLIANCE

PROGRAM SCOPE

- In force since 2019
- Generally mandatory at ≥ 25,000 t CO_2e/year; eligible facilities may opt in
- Reporting begins above 10,000 t CO_2e/year; reporting ≠ OBPS registration
- Current rules: 2023 regulations, amended in 2026

ANNUAL MRV & COMPLIANCE

MONITOR & CALCULATE

- Measure regulated emissions and production under the applicable facility standard
- Permitted emissions = baseline intensity × production × performance-standard allocation

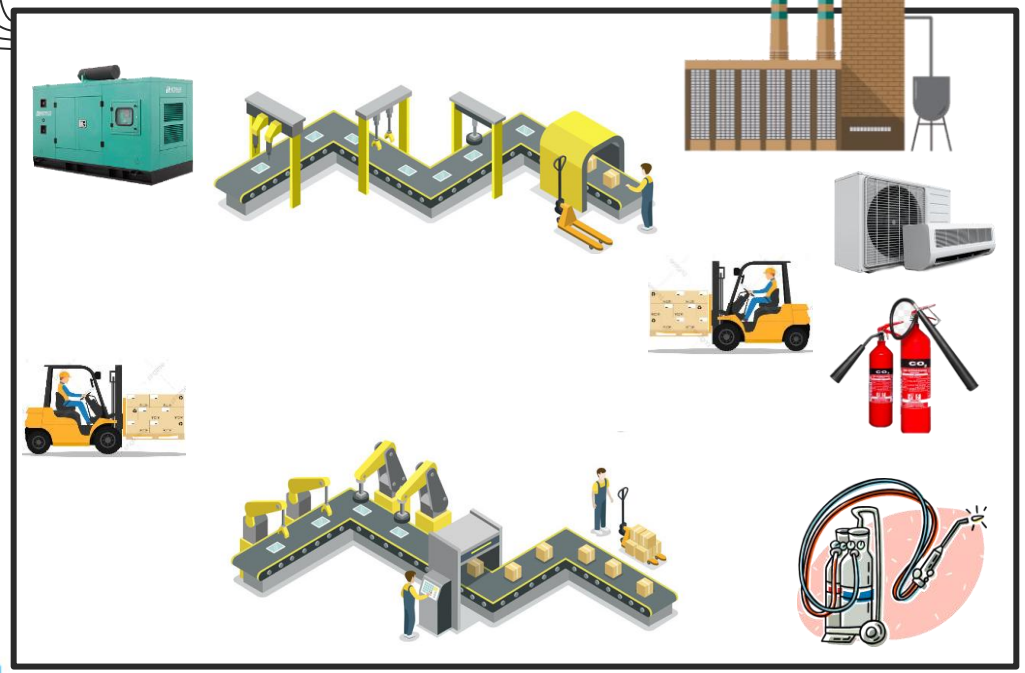
VERIFY & RECONCILE

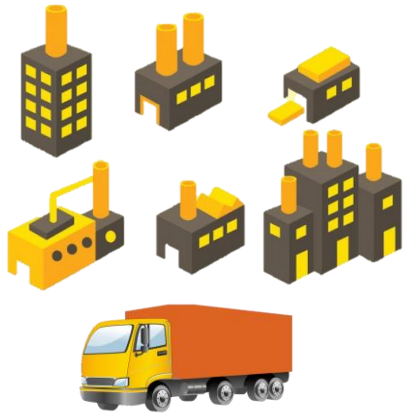
- Annual return independently verified: ISO 14064-3; verifier accredited to ISO 14065
- Below limit: earn tradable performance credits
- Above limit: use eligible credits and/or pay the Technology Fund
- Materiality: 5% GHG | 0.1% production

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WHAT IS REQUIRED TO START A BUSINESS?















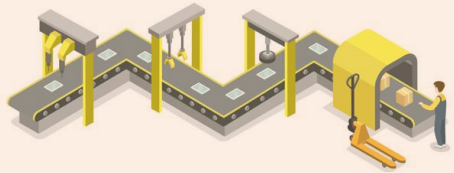
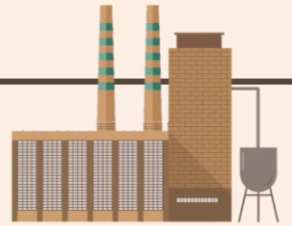


Indirect GHG Emission : Scope 3 Emission

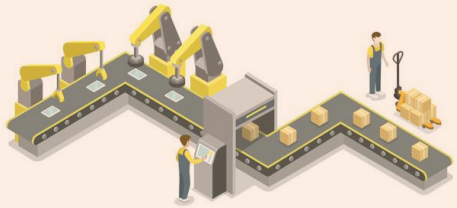


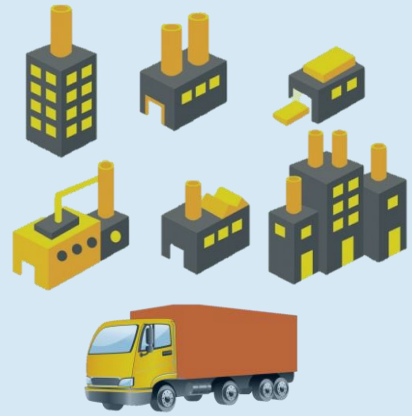
Indirect GHG Emission : Scope 2

Direct GHG Emission : Scope 1 Emission





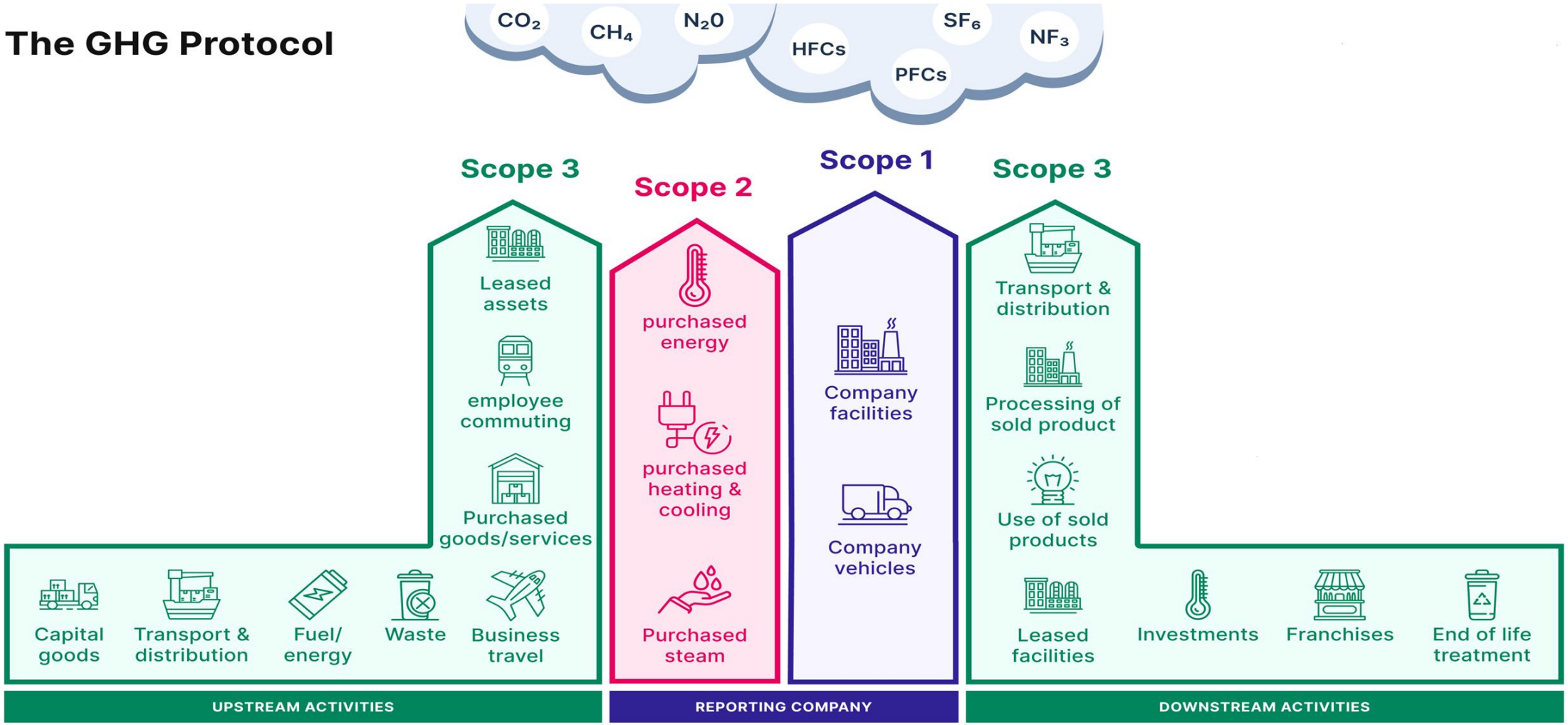









EMISSION SOURCES

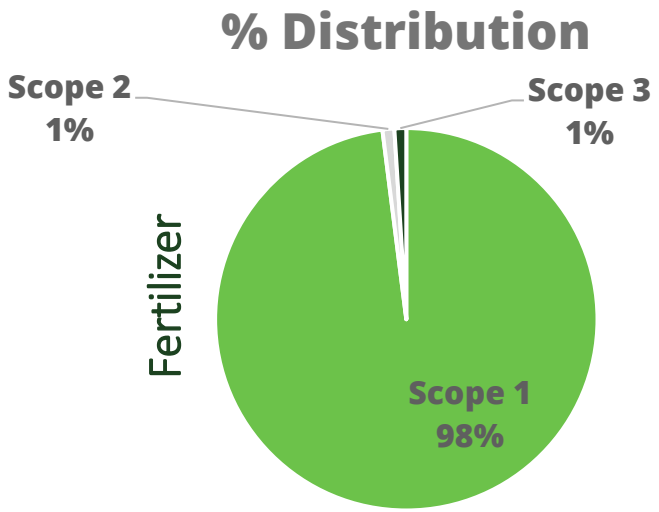


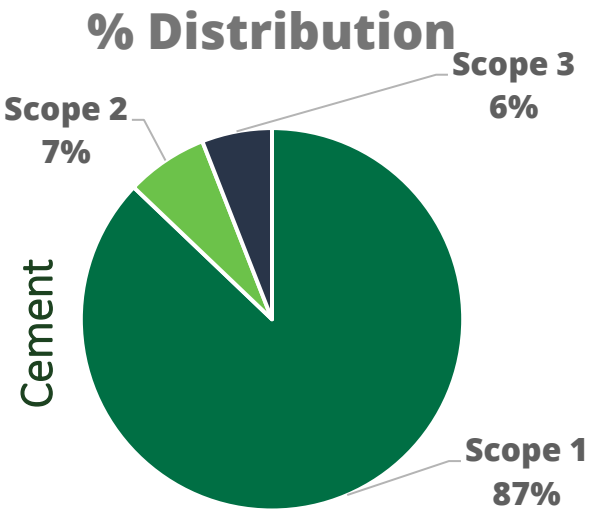
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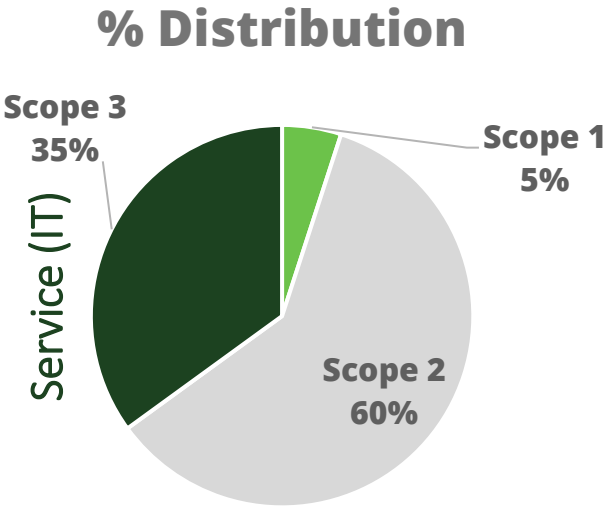
CALCULATING GHG EMISSIONS

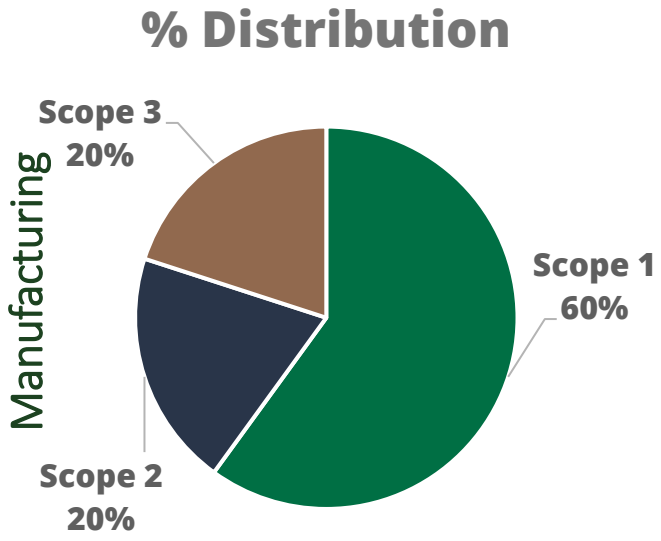


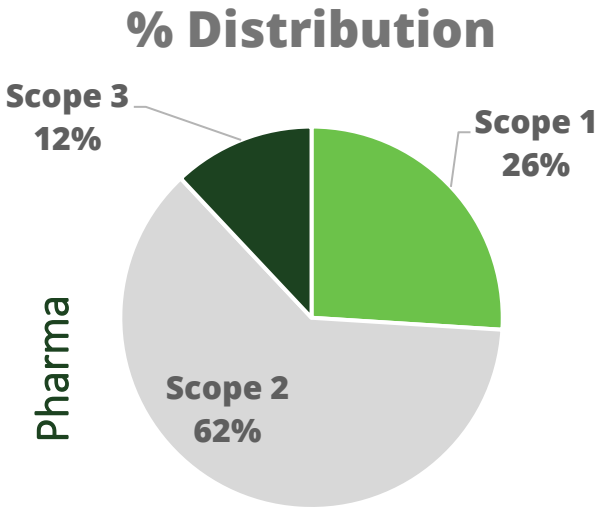
EMISSIONS – PROFILE

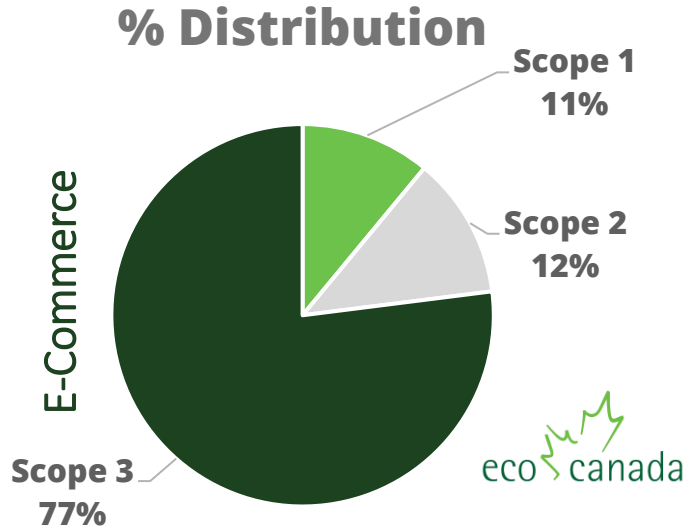












SCOPE 1 EMISSIONS

Scope 1: Direct GHG Emissions

Emissions from sources owned or controlled by the company

- ❑ **Stationary / Mobile Combustion**
- ❑ **Generation Of Electricity, Heat Or Steam**
- ❑ **Process Emissions**









SCOPE 2 EMISSIONS

Scope 2: Indirect GHG Emissions

➢ **Purchased Electricity / Heat / Steam**





SCOPE 3 EMISSIONS

Scope 3: Other Indirect GHG Emissions

- All Other Indirect Emissions
- A consequence of the activities of the company, but occur from sources not owned or controlled by the company







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SCOPE 1 - DATA SOURCES









- Purchase Receipts
- ERP Records/Entries
- Fuel Log Books
- Ledger/Journal Entries
- Safety records
- Meters

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SCOPE 2 - DATA SOURCES







- **Electricity Bills**
- **Online Metering**
- **Meters**
- **Log Books**

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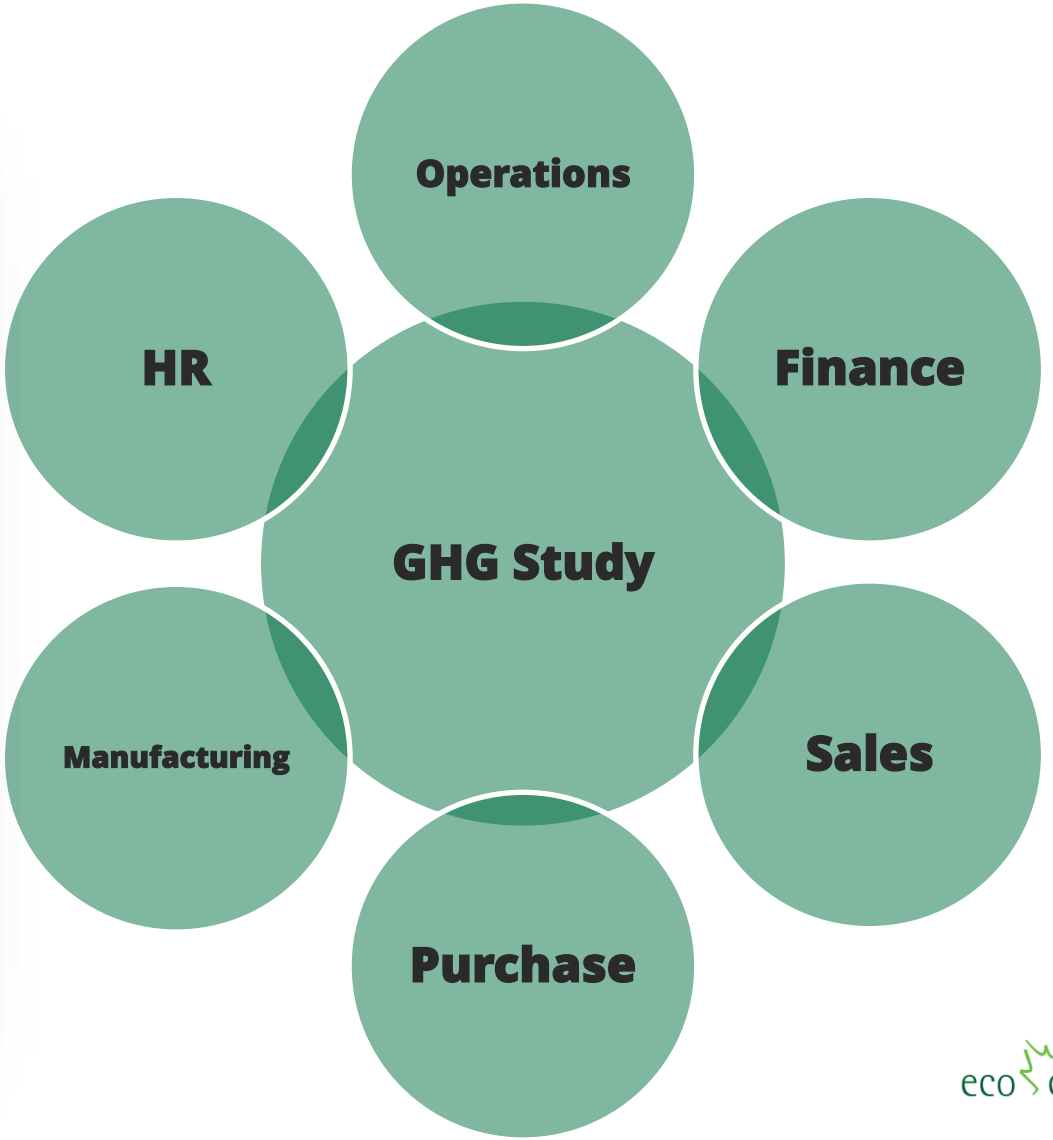
SCOPE 3 – DATA SOURCES

- **Suppliers**
- **Material receipts**
- **Product dispatch**
- **Transporter**
- **Customers**

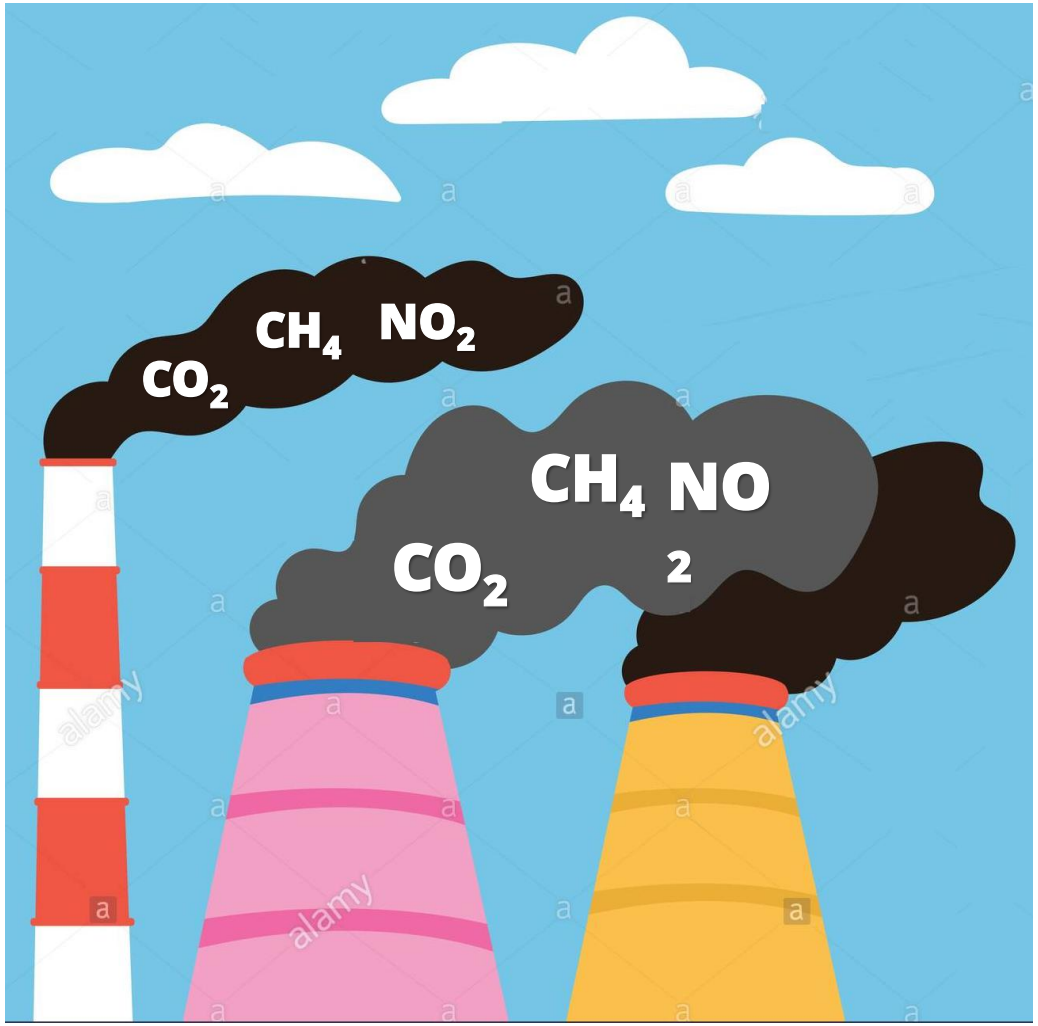


DATA COLLECTION

- Data collection should be well coordinated activity
- What, where and why ?
- A data collection system should be established
- Since GHG study is not one time activity



EMISSION FACTORS



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EMISSION FACTORS

Based on choice of emission factor, methodology employed to calculate emissions is categorized into:

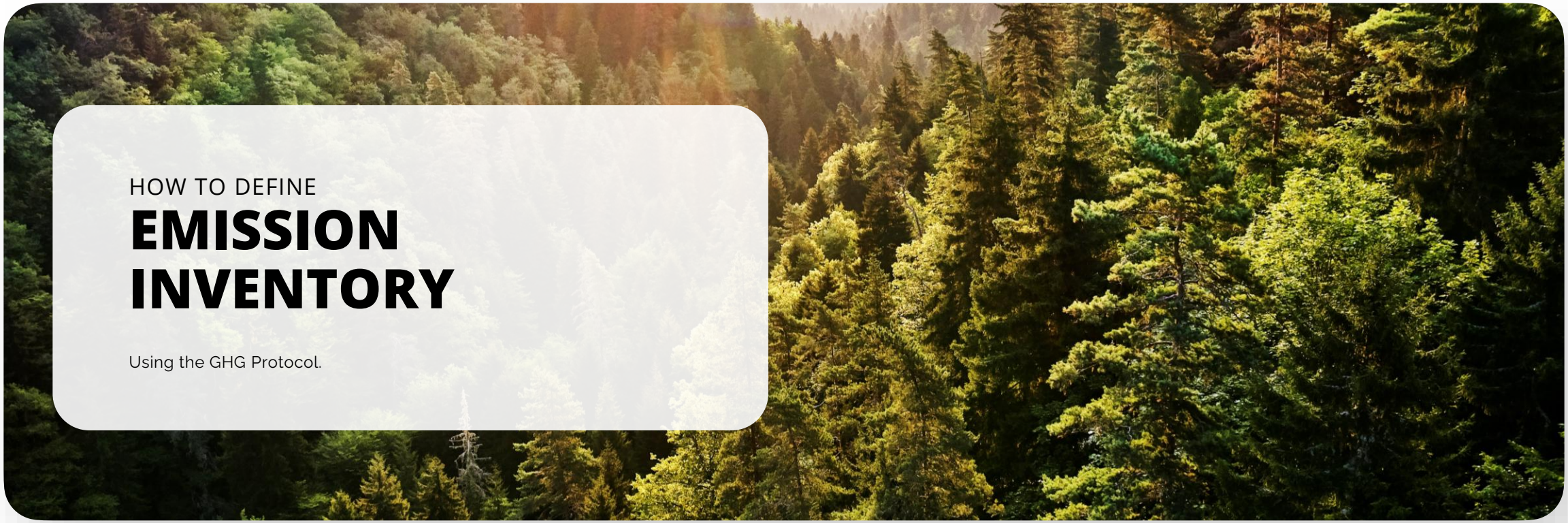
- **TIER1 - GLOBAL LEVEL**
- **TIER 2 – REGIONAL/NATIONAL LEVEL**
- **TIER 3 – LOCAL LEVEL**

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SIGNIFICANCE OF EMISSIONS QUANTIFICATION



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HOW TO DEFINE

EMISSION INVENTORY

Using the GHG Protocol.

1. Determine the inventory and organizational boundaries

2. Gather relevant data on activities across all sources of emissions

3. Confirm appropriate EFs and GWPs to calculate the emissions for each GHG source

4. Document all steps, assumptions, and data sources to ensure transparency.

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CORPORATE GHG ACCOUNTING

Estimation of GHG emissions from a company's operations and activities



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DEFINING ORGANIZATIONAL BOUNDARIES

Equity Share

This approach accounts for emissions according to the percentage of equity the business has in the operation

Control Approach

This approach allocates all emissions produced from operations to the business that has control, defined in either financial or operational terms

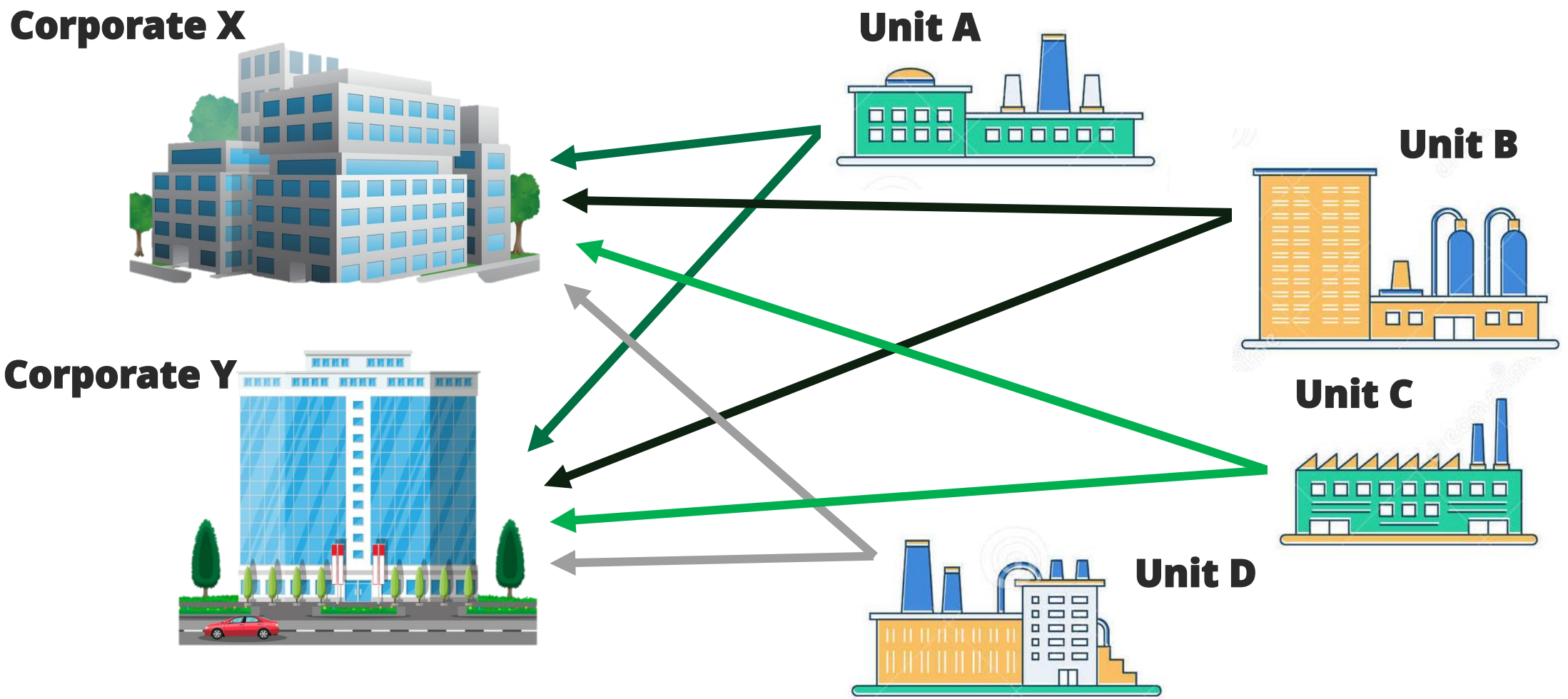
Financial Control

When a business has control of the financial and operational direction of activities

Operational Control

When a business has the agency to implement operating policies that govern operations

HOW TO GO AHEAD WITH GHG ACCOUNTING?

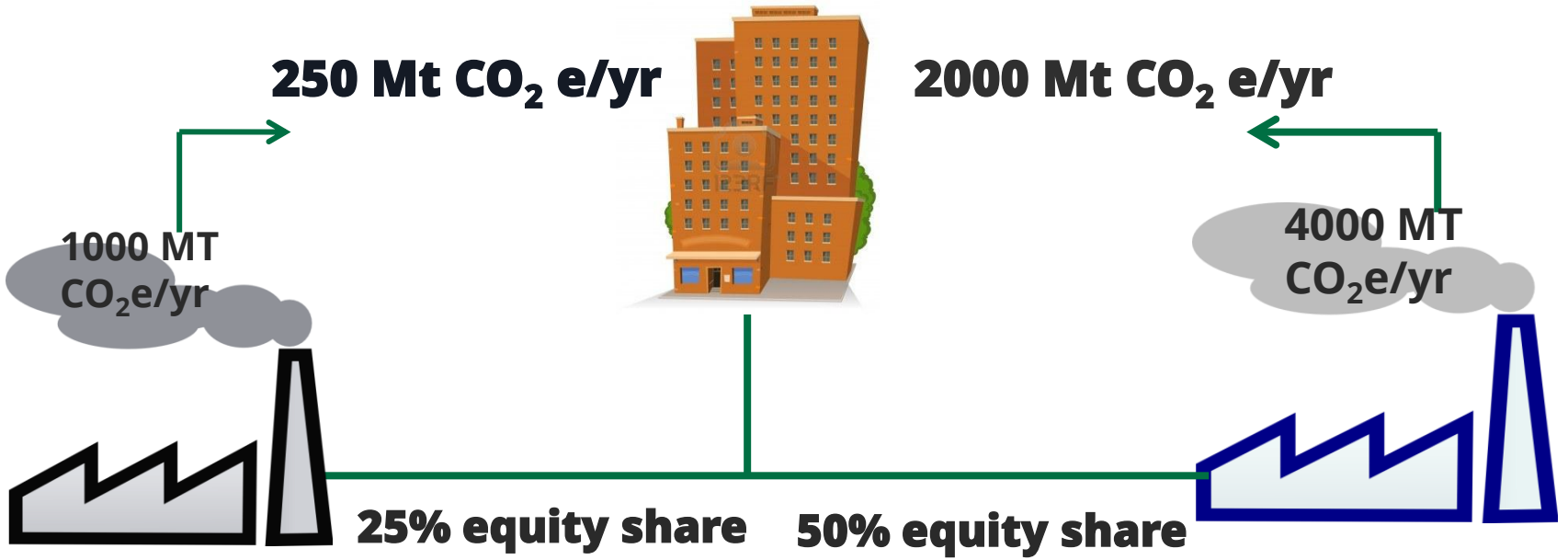


By setting organizational boundaries

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1. EQUITY SHARE APPROACH

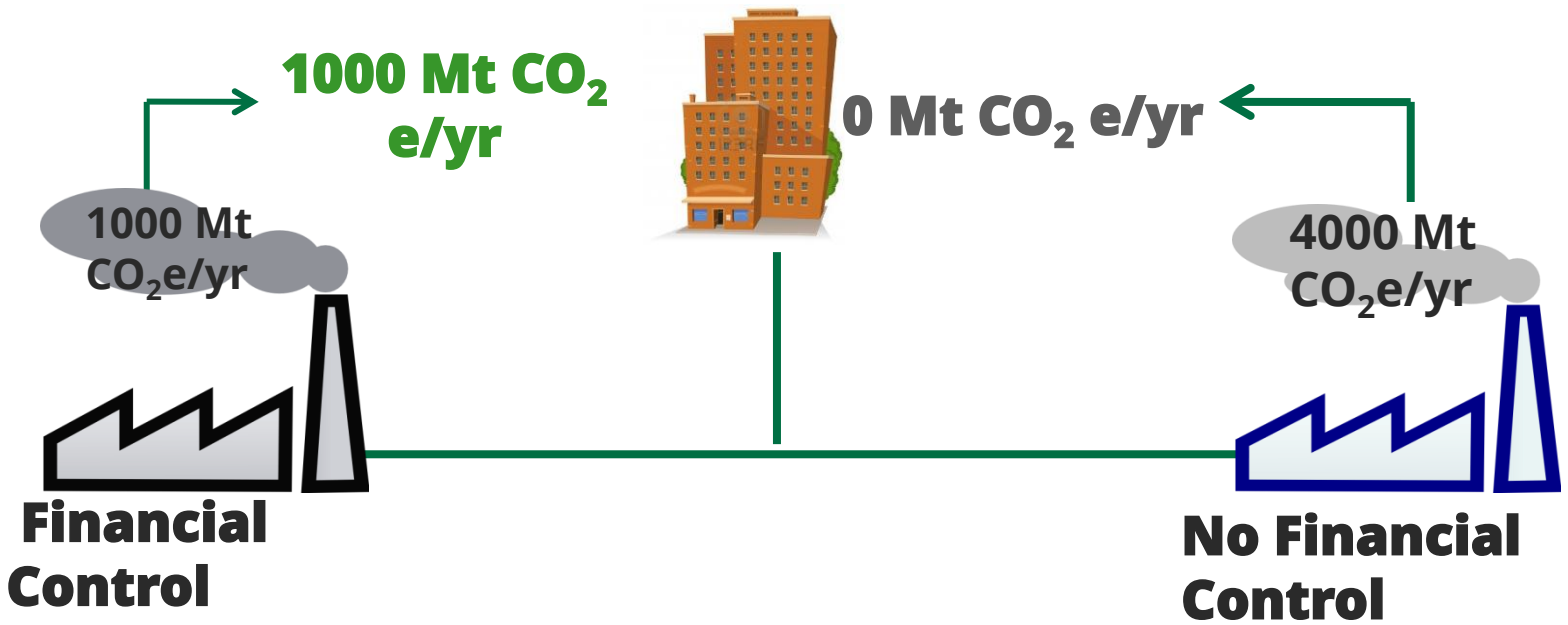
- ❑ Account for emissions according to the corporate's equity share in the operation
- ❑ Independent of financial or operational control
- ❑ Basis is % of ownership; economic interest



2.A FINANCIAL CONTROL

Financial control :

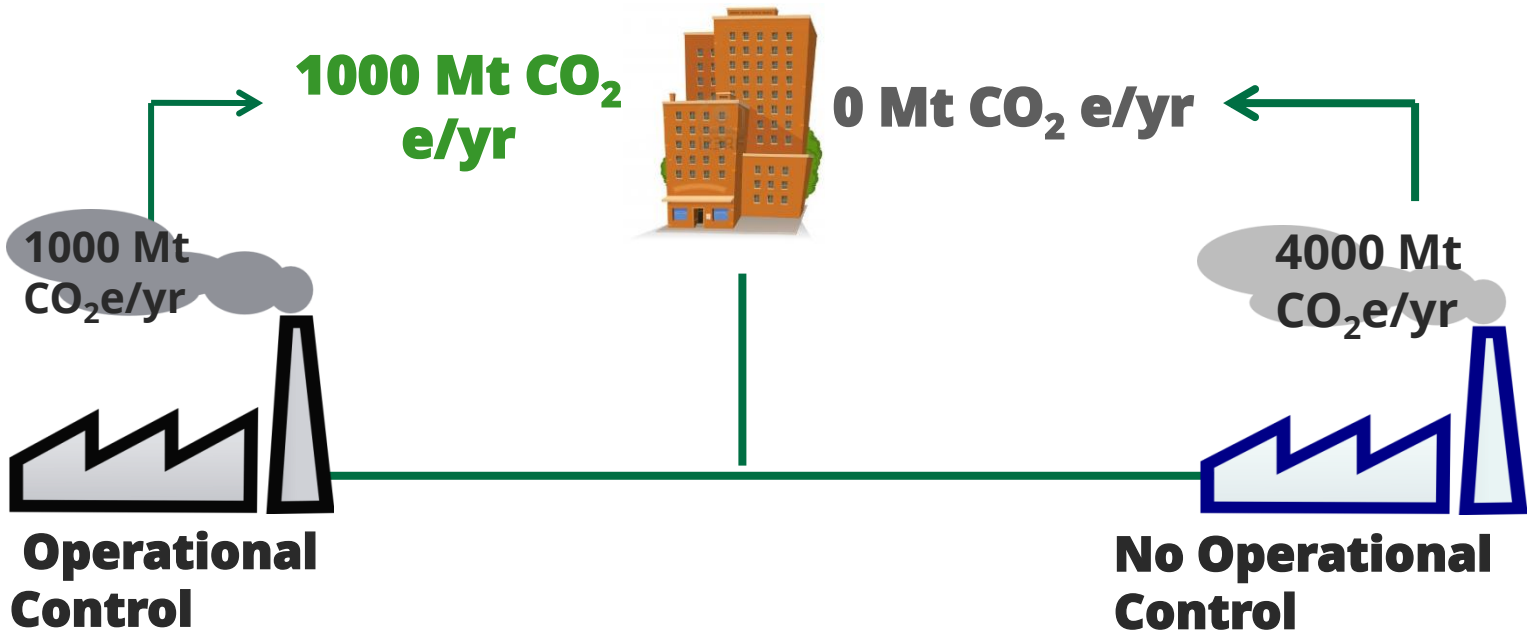
- ❑ **Ability to direct an operation's financial and operational policies**
- ❑ **To determine, consider financial accounting status**
- ❑ **Account for 100% of emissions from each operation under financial control**



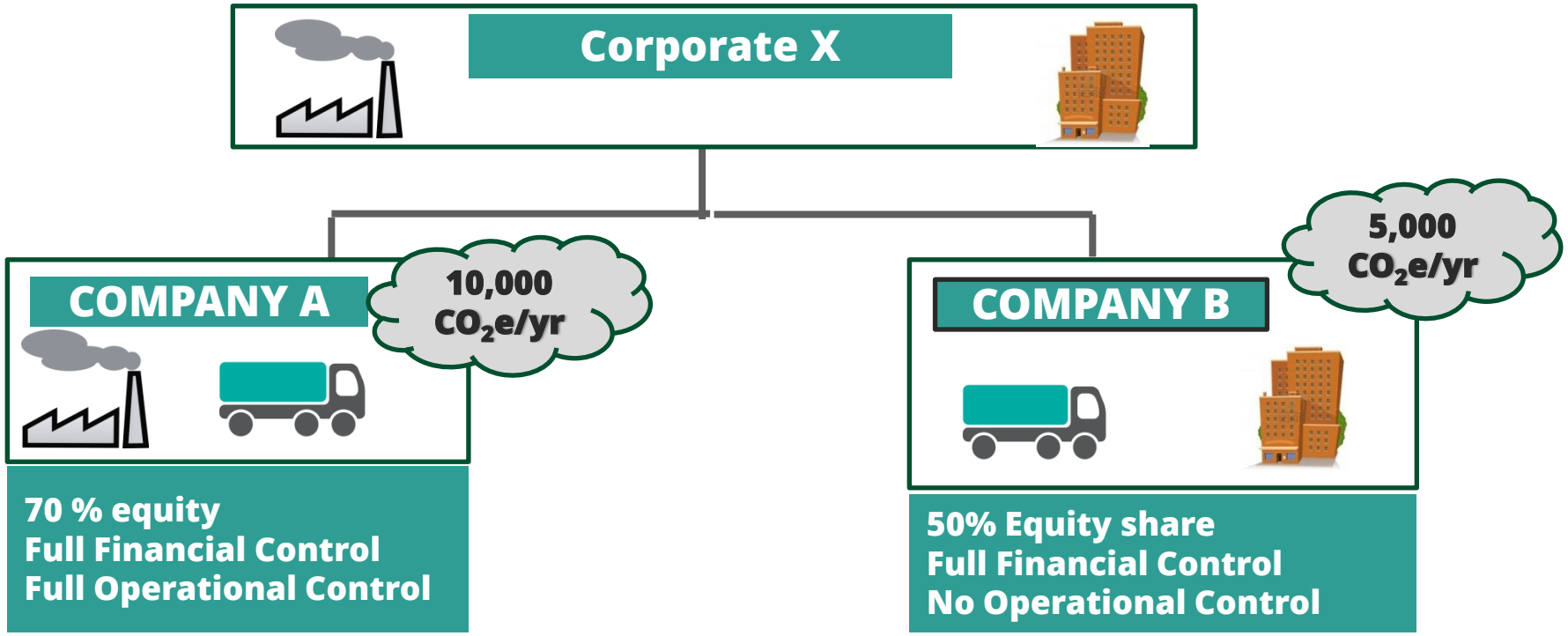
2.B OPERATIONAL CONTROL

Operational control:

- ❑ **Full authority to introduce and implement operating policies at the operation**
- ❑ **To determine, consider ownership of operating permit**
- ❑ **Account for 100% of the emissions from each operation under operational control**



EXAMPLE



Consolidation Approach	Emissions (metric tons CO_2/yr)
Equity share	
Financial control	
Operational control	

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IN SUMMARY

Consolidation Approaches		
1. Equity Share Approach	**2. Control Approach**	
	2.a) Financial Control	**2. b) Operational Control**
Percent ownership	Directs financial and operating policies to gain economic benefits	Authority to introduce and implement operating policies
% owned	**If yes: 100% If no: 0%**	**If yes: 100% If no: 0%**

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SOURCES OF ACTIVITY DATA

PRIMARY SOURCES

- Directly measured or monitored activities that produce GHG emissions
- Derived from specific activities

SECONDARY SOURCES

- Estimated based on industry benchmarks or statistical models
- Derived from estimations

EFFECTIVE DATA MANAGEMENT SYSTEM

- Set Clear Objectives
- Establish a governance structure

- Standardize data collection protocols
- Select appropriate tools

- Establish data management procedures
- Ensure data accuracy and integrity by conducting audits

- Monitor and track progress
- Regularly review and update the system

SELECTING

EMISSION FACTORS AND GLOBAL WARMING POTENTIAL

Selection Criteria :

- **Credibility of sources**
- **Applicability to specific activities**
- **Data quality and relevance**

EF

COEFFICIENT THAT DESCRIBES THE RATE AT WHICH AN ACTIVITY RELEASES GHG EMISSIONS INTO THE ATMOSPHERE.

CRUCIAL FOR ESTIMATING AND COMPARING EMISSIONS FROM VARIOUS SOURCES

SIMILARLY, EMISSION FACTORS EXIST FOR METHANE AND NITROUS OXIDE AND EXPRESSED IN CO_2 EQUIVALENT PER UNIT OF ACTIVITY

GWP

USED TO COMPARE DIFFERENT GREENHOUSE GASSES OVER A SET 100-YEAR HORIZON

A WAY TO STANDARDIZE THE EFFECTS OF DIFFERENT GASSES

BOTH METHANE AND NITROUS OXIDE HAVE HIGHER GWP

FUNDAMENTAL FOR QUANTIFICATIONS AS THEY PERMIT THE CALCULATION OF CO_2 EQUIVALENT

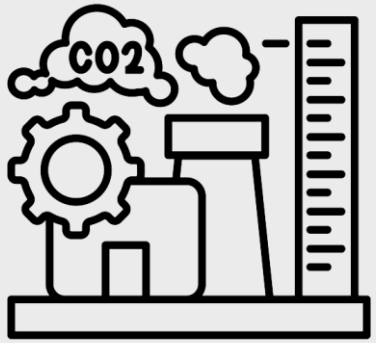
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EMISSIONS CALCULATION



Activity Data

x



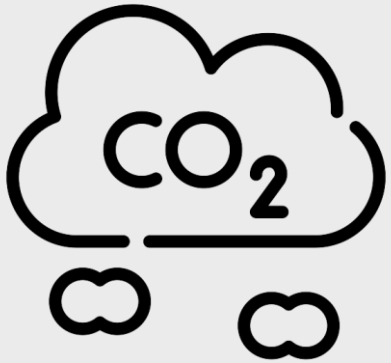
Emission Factor

x



Global Warming Potential

=



Tonnes of Carbon Dioxide Equivalent

SOURCE IDENTIFICATION

Scope 1 – Direct Emissions

- Gas/Coal Consumption in Boiler
- Gas consumption in paint shop
- Gas Consumption in heat treatment furnace
- LPG consumption in canteen
- Emission from company owned vehicles
- Acetylene in cutting/welding
- Refill of Refrigerant (HFC type)
- Refill of Fire Extinguisher ($C0_2$)

Scope 2 – Electricity consumption Grid

IDENTIFICATION FOR SOURCES



Car Manufacturing Company

Scope 3 – Indirect Emissions

1. Raw Material Receipt
2. Car Dispatch to dealers
3. Employee commute
4. Business commute
5. Raw material emissions(steel, aluminum, etc.)
6. Supplier Emissions

And many more...

1	Fuel Combustion
2	Wherever there is GHG Usage
3	Process Emissions

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WASTE BECOMES SCOPE 3 WHEN A THIRD-PARTY TREATS IT

THE ACCOUNTING BOUNDARY

1 OPERATIONS

Waste generated in owned or controlled facilities

2 WASTE STREAMS

Solid waste, wastewater and discarded equipment

3 THIRD-PARTY TREATMENT

Landfill, recycling, composting, incineration or wastewater treatment

REPORTING RULE

Third-party waste treatment is upstream Scope 3, Category 5. Treatment in facilities owned or controlled by the reporting company belongs in Scope 1 and Scope 2.

WHAT CREATES THE EMISSIONS

CH_4 Decomposition of biogenic material in landfill or waste-to-energy systems

CO_2 Treatment of fossil and biogenic carbon contained in waste

HFCs Disposal of refrigeration and air-conditioning equipment

Source: GHG Protocol — Technical Guidance for Calculating Scope 3 Emissions, Category 5

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EMISSION QUANTIFICATION

CALCULATE WITH THE BEST DATA YOU CAN OBTAIN

Three methods trade data effort for specificity

01	**SUPPLIER-SPECIFIC**	Use allocated Scope 1 and Scope 2 emissions supplied by the waste-treatment provider.	**Most specific**
02	**WASTE-TYPE-SPECIFIC**	Multiply each waste quantity by an emission factor matched to both material and treatment.	**Preferred when streams are known**
03	**AVERAGE-DATA**	Apply treatment shares and average emission factors to the total mass of waste.	**Higher uncertainty**

CORE CALCULATION

Waste quantity × treatment-specific emission factor = kg CO_2e

MINIMUM DATA

- Mass or volume of waste
- Waste type and final treatment
- Matching factor and source year

Do not deduct "avoided emissions" from recycling from the Scope 3 inventory; disclose them separately with methods and assumptions.

Source: GHG Protocol — Technical Guidance for Calculating Scope 3 Emissions, Category 5

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REDUCE WASTE EMISSIONS: LESS WASTE, BETTER TREATMENT

Act in order: prevent waste first, then improve the treatment pathway and the quality of the data.

1 PREVENT

Design out waste; buy only what is needed

2 REUSE

Extend product, packaging and material life

3 RECYCLE / COMPOST

Separate clean streams and divert organics

4 RECOVER

Capture landfill gas or recover energy where appropriate

5 DISPOSE

Use as the last option; track final treatment

DESIGN & PROCUREMENT

Set waste-prevention targets; specify reusable or recyclable materials; reduce single-use inputs.

OPERATIONS

Measure each stream; segregate organics and recyclables; prevent contamination; recover refrigerants.

SUPPLIERS & CONTRACTS

Require final-treatment data; select providers with verified performance; track landfill-gas capture.

Source: GHG Protocol — Technical Guidance for Calculating Scope 3 Emissions, Category 5

GHG STATEMENT

VERIFICATION

PRE-ENGAGEMENT

Preliminary assessment confirming details of the engagement

PLANNING

Preliminary review of information including strategic and risk assessment

EXECUTION

Assessment of GHG statement as defined in the plan which may include desktop review and interviews of key staff

COMPLETION

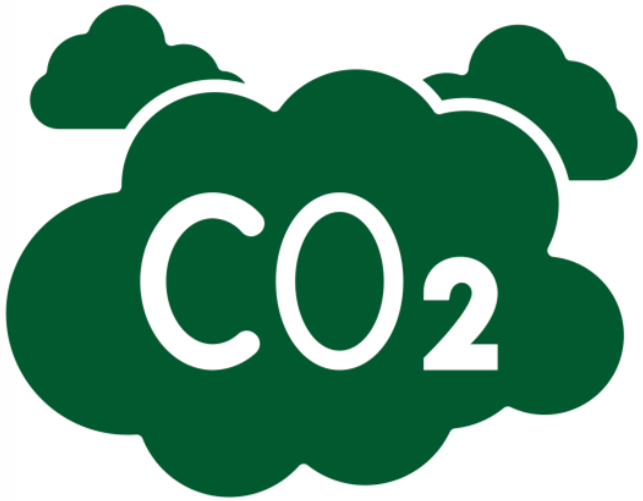
Verification report that reviews key outcomes, future obligations and issues an opinion of the GHG statement

GHG TARGET SETTING

EMISSION REDUCTION

1. Establish Baseline & Base Year
2. Analyze Gaps
3. Set Targets
4. Find Opportunities
5. Plan Implementation
6. Monitor Progress
7. Review and Reflect

EMISSION REDUCTION GOAL IN PROGRESS 80%



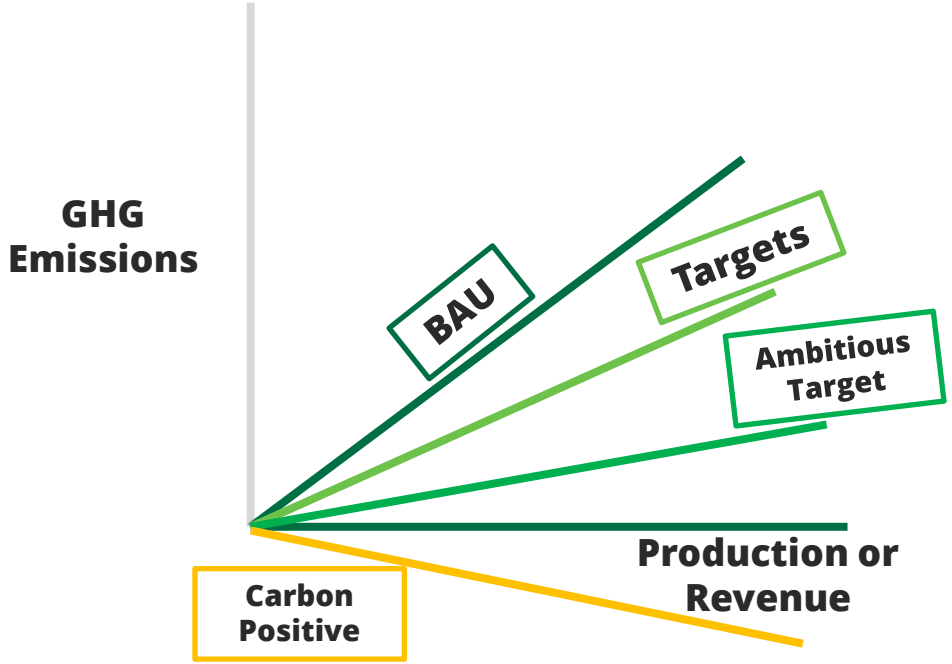
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TARGETS FOR GHG REDUCTION

- LOGICAL FOLLOW UP ON COMPLETION GHG INVENTORY
- FACTORED INTO RELEVANT DECISIONS

1. INVESTMENT
2. PRODUCTION
3. MATERIALS AND TECHNOLOGIES TO USE

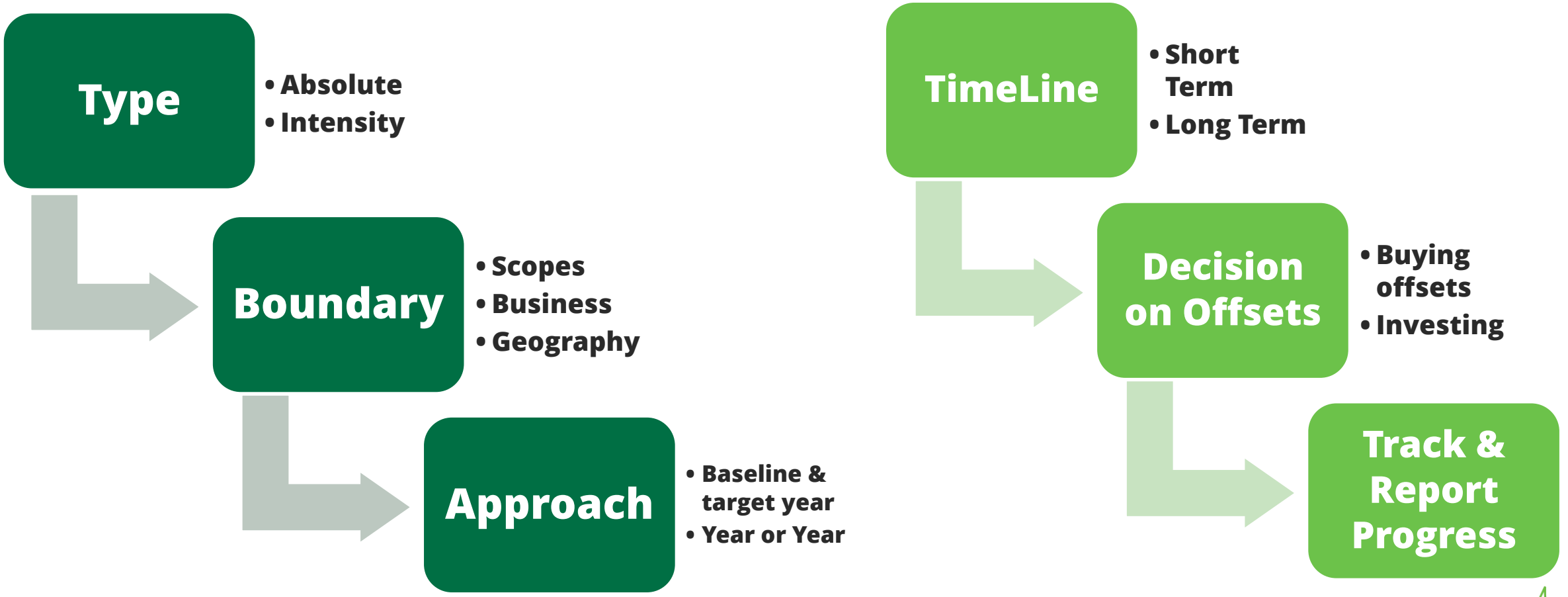




- **Why GHG Targets**
  - **Managing & Minimizing Risks**
  - **Achieving Cost Savings**
  - **Stimulating Innovation**
  - **Leadership**
  - **Participating in Voluntary Programs**

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TARGET SETTING PROCESS



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TARGET TYPES

Absolute target

- Reduce absolute emissions over time
- Example: reduce CO_2 by 25% below 2010 levels by 2020



- Environmentally Robust
- GHG Reduction in specified quantity
- Addressed concerns to manage absolute emissions

- Does not allow comparison
- Recalculation required for significant changes
- Differentiation – Organic decline?
- Difficult to achieve if company grows unexpectedly



Intensity target

- The ratio of emissions relative to a business metric over time
- Example: reduce CO_2 by 12% per tonnes of clinker between 2000 and 2008

- Reflects GHG performance improvements independent of organic growth or decline
- Base year recalculation not required
- Facilitates benchmarking/comparison





- Absolute emissions may rise even if intensity goes down
- Diverse Operation – Single Metric a challenge
- If revenue/money is a metric, changes in inflation, currency value to be incorporated

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TO SUMMARIZE...

Target setting is an important element of GHG management



TARGET SETTING IMPORTANT ELEMENTS

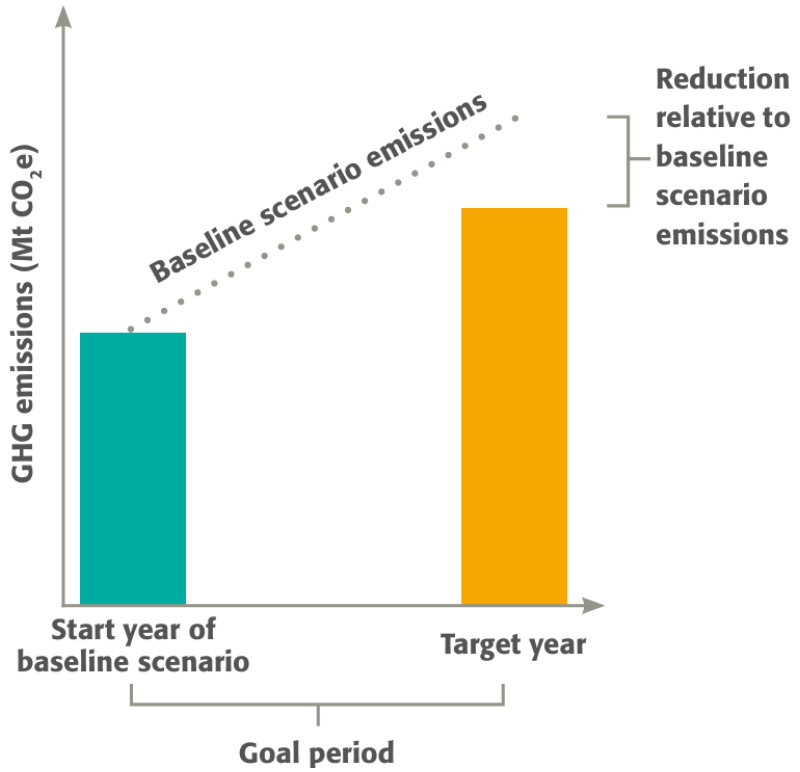
- **Baseline**
- **Type**
- **Boundary**
- **Horizon**

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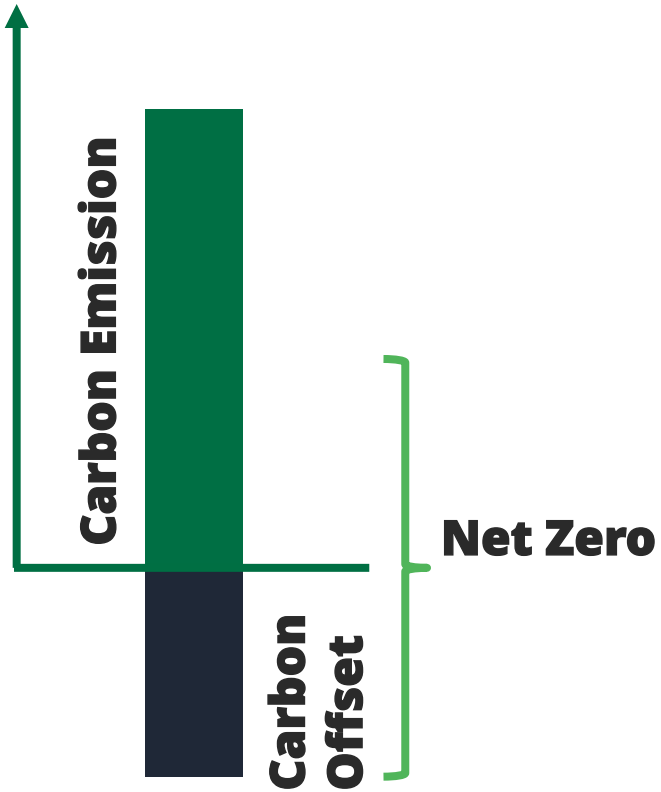
SELECT BASELINE

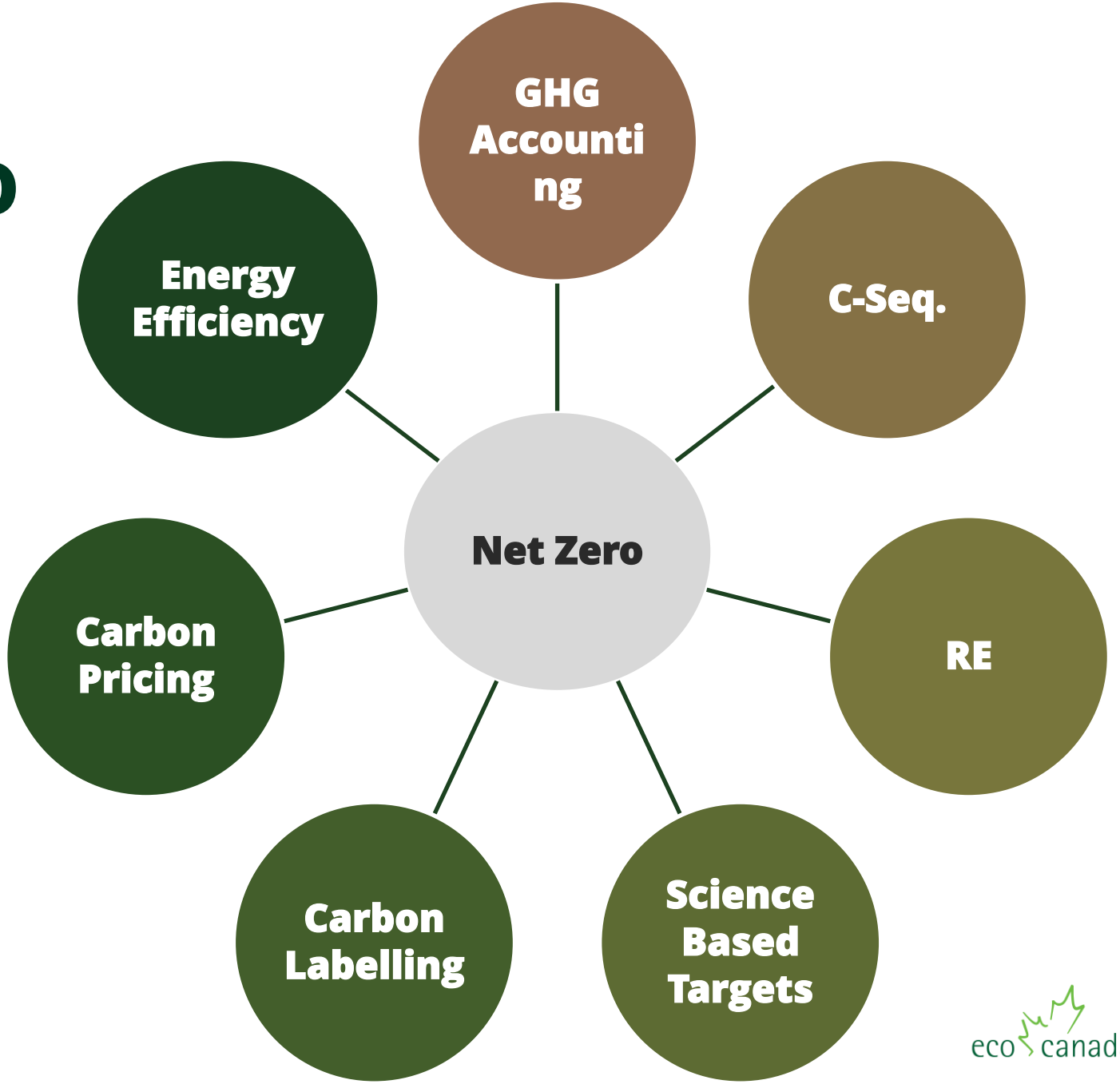
When companies choose to track performance or set a reduction target, companies shall:

- Choose a **base year & specify their reasons** for choosing that particular year
- Develop a base year emissions **recalculation policy** that articulates the basis for any recalculations
- Recalculate base year emissions when **significant changes in the company structure or inventory methodology occur**



Approaches towards Net Zero





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CARBON CREDITS

A carbon credit is a tradable unit representing one metric tonne of CO_2e reduced or removed and independently verified.

From carbon credit to offset:

- Measured against a credible baseline
- Independently validated and verified
- Serialized and issued on a registry
- Retired before an offset claim is made

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CARBON OFFSETS

A carbon offset is a real and verified reduction of GHG emissions that can be purchased by individuals, and organizations

Factors to consider before purchasing/developing carbon offset projects :

- Additionality
- Permanence
- Transparency and Verifiability
- Local or Global Impact

VOLUNTARY CARBON OFFSET PROGRAMS

Verra

- The Verified Carbon Standard program focuses on a wide range of project types, including renewable energy, forestry, and agriculture.

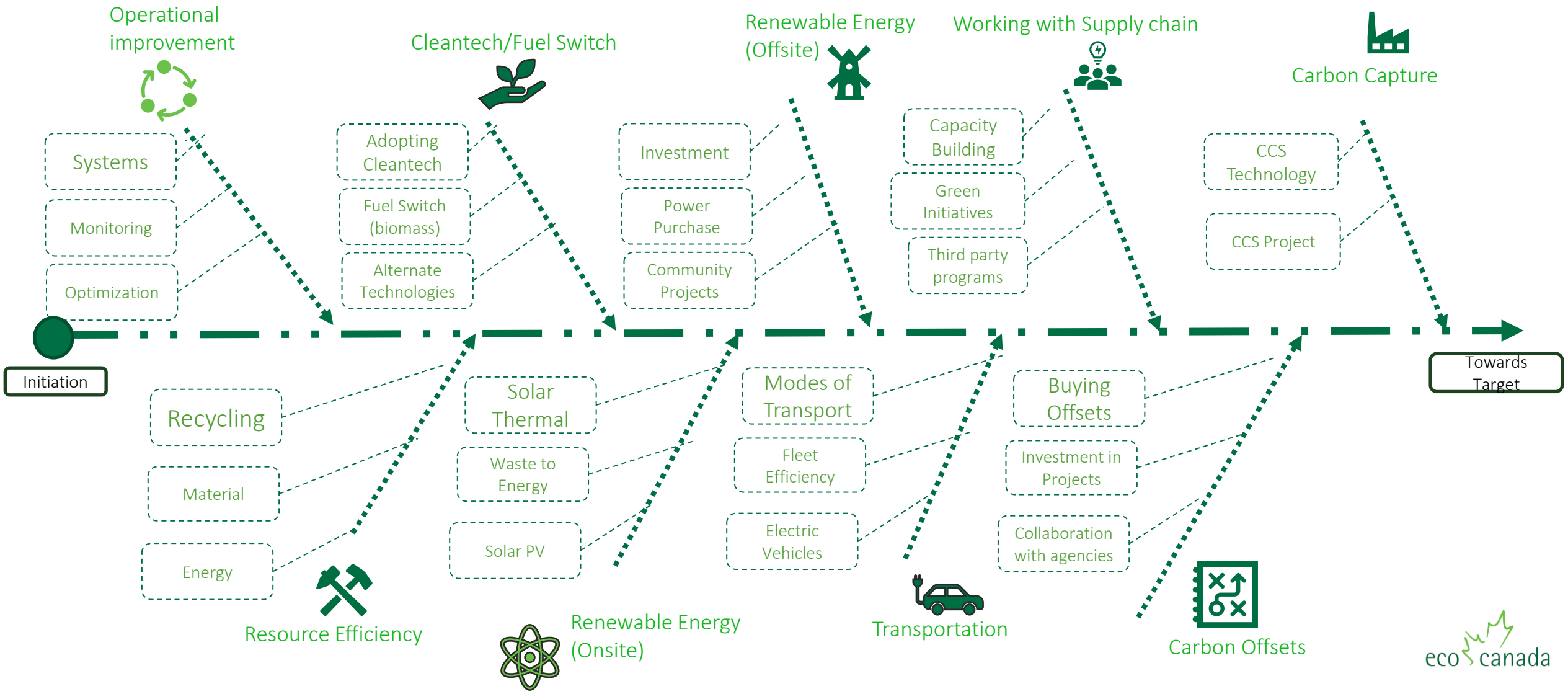
Gold Standard

- Places a strong emphasis on projects that contribute to sustainable development and have social impact.
- The focus is primarily on renewable energy and energy efficiency projects.

CSA Group

- The GHG CleanProjects® Registry is one of their most widely known platforms for reporting and showcasing emission reduction or removal projects.
- The projects span across various sectors like renewable energy, waste diversion, forestry etc.

GHG MITIGATION – APPROACH





GHG Training Program: Feedback Survey

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