

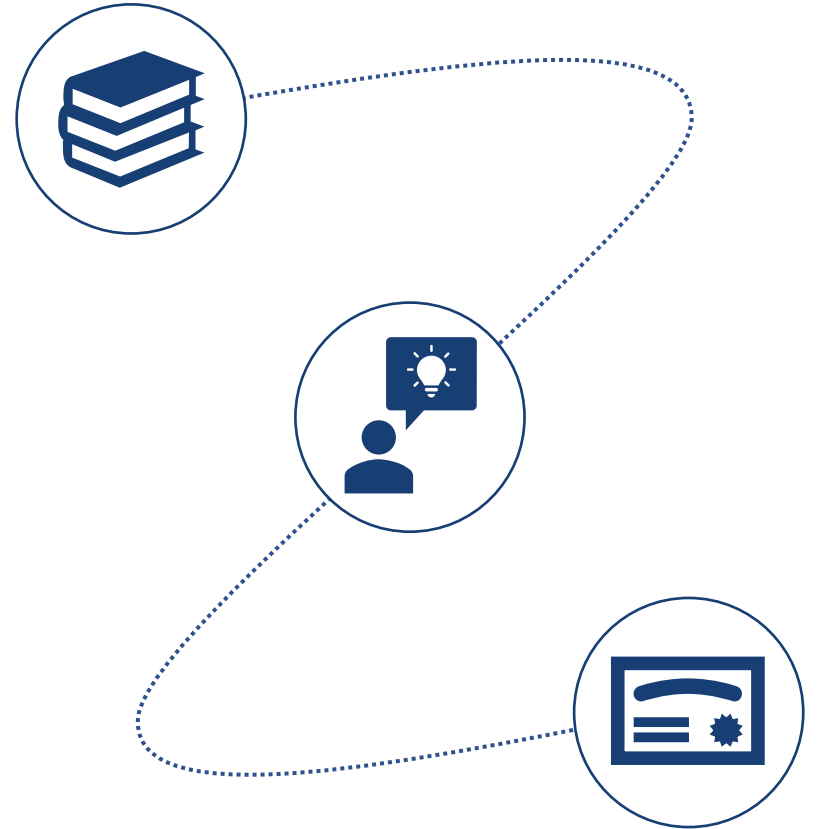


Frankfurt School

Introduction to Carbon Accounting (Part I)

LEARNING OBJECTIVES

- Understanding of carbon accounting definition
- Sources of greenhouse gases
- Impact of carbon accounting on businesses
- Key concepts of carbon accounting



OVERVIEW OF CARBON ACCOUNTING

OVERVIEW

What is carbon accounting?

Carbon accounting, or **greenhouse gas accounting**, is the process of quantifying the number of greenhouse gases (GHGs) produced directly and indirectly from a business's or organization's activities within a set of boundaries.

Allows to understand how the organisation impacts the climate change

Defines the main sources of GHG emissions

Defines some of the climate-related risks and opportunities

Ensures access to regulated markets

OVERVIEW

Why do we have to do carbon accounting?

Regulatory
compliance

Risk
management

Investor and
stakeholder
expectations

Cost reduction
and efficiency

Competitive
advantage

Supply chain
management

Long term
resilience

Reporting and
transparency

Innovation and
investment
opportunities

Overview

Three pillars

Measurement

- The first pillar involves the systematic collection of data regarding various emission sources, including energy consumption, transportation, production processes, and waste management.

Reporting

- Once the data is collected, it's organized into comprehensive reports that outline the emissions generated by different activities. Transparent reporting allows stakeholders to comprehend the environmental impact accurately.

Verification

- The credibility of GHG accounting is bolstered through independent verification. A third-party assessment ensures accuracy, completeness, and consistency in the calculations and reports.

Key steps

Data collection

- Gather data on energy consumption, transportation, waste, and other relevant activities within your organization.

Emission factors

- Use standardized emission factors to convert activity data into greenhouse gas emissions.

Calculation

- Calculate emissions from different sources, aggregating the results to determine your organization's total carbon footprint.

Reporting

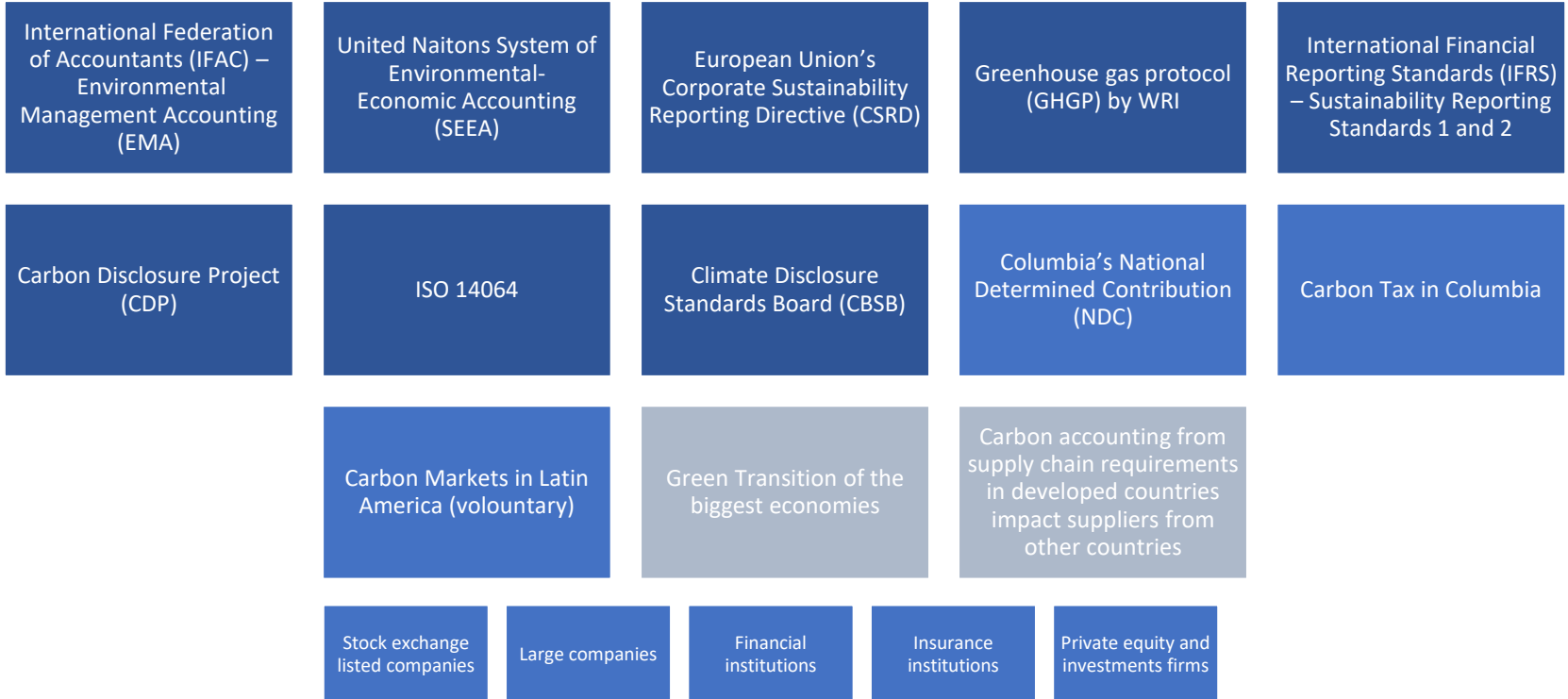
- Develop comprehensive reports that present the data in a clear, understandable manner.

Verification

- Engage a third-party verifier to ensure the accuracy and credibility of your emission data.

OVERVIEW

Who should do carbon accounting?



OVERVIEW

What is the impact of carbon accounting on economy?

- ✓ Strategic decision making
- ✓ Transition to low-carbon economy
- ✓ Risk management and resilience
- ✓ Investor confidence and attractiveness
- ✓ Regulatory compliance
- ✓ Innovation and market opportunities
- ✓ Cost reduction and efficiency
- ✓ Consumer references and brand value



OVERVIEW

What is the impact of carbon accounting on Financial Institutions?

Internal impact

- ✓ Risk management and compliance
- ✓ Portfolio optimization and efficiency
- ✓ Stakeholders trust and reputation
- ✓ Innovation and product development

External impact

- ✓ Investor expectations and reporting
- ✓ Climate risk disclosure and alignment to standards
- ✓ Net-zero commitments and science-based targets

Risks

- ✓ Data quality and accuracy
- ✓ Reputation risks

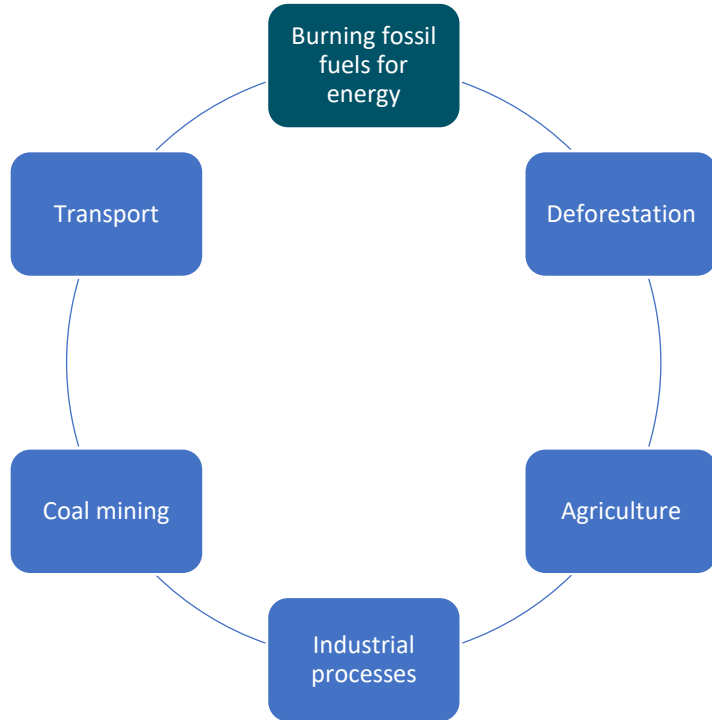
Opportunities

- ✓ Competitive advantage
- ✓ Innovation and new revenue streams

BASICS OF GREENHOUSE GAS EMISSIONS

BASICS OF GREENHOUSE GAS EMISSIONS

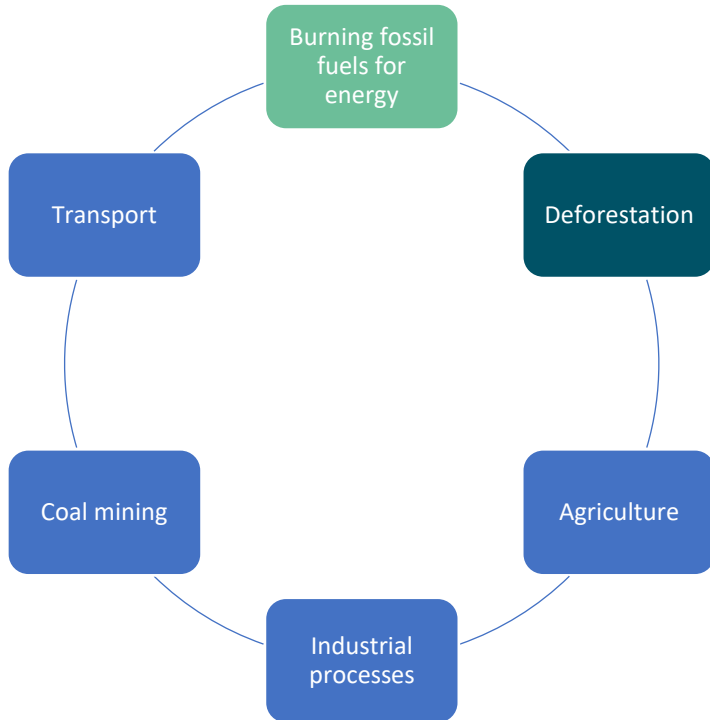
Sources of greenhouse gases



- ✓ Coal
- ✓ Lignite
- ✓ Natural gas
- ✓ Diesel
- ✓ Petrol
- ✓ Heavy oil

BASICS OF GREENHOUSE GAS EMISSIONS

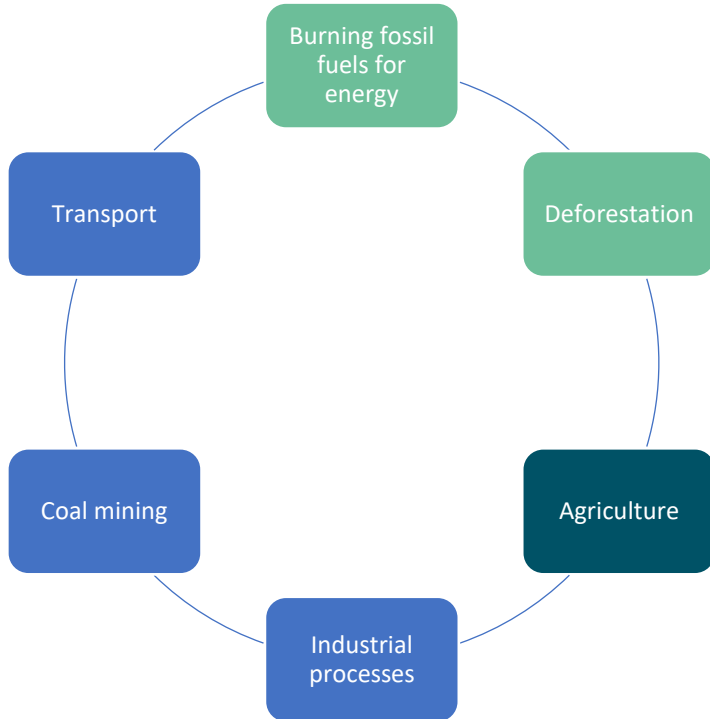
Sources of greenhouse gases



- ✓ Photosynthesis process / Absorption
 - ✓ Plant respiration
 - ✓ Photolysis
 - ✓ Decomposition

BASICS OF GREENHOUSE GAS EMISSIONS

Sources of greenhouse gases



Land use:

- ✓ Land use for livestock
- ✓ Land use for human food

Crop production:

- ✓ Crops for human food
- ✓ Crops for animal feed

Livestock and fisheries:

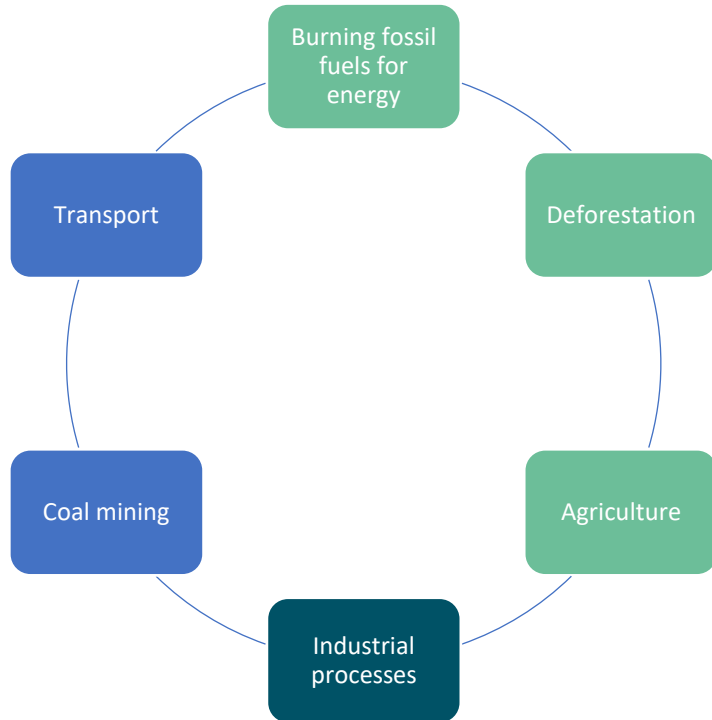
- ✓ Livestock and fish farms
- ✓ Wild fisheries

Supply chain:

- ✓ Retail
- ✓ Packaging
- ✓ Transport
- ✓ Food processing

BASICS OF GREENHOUSE GAS EMISSIONS

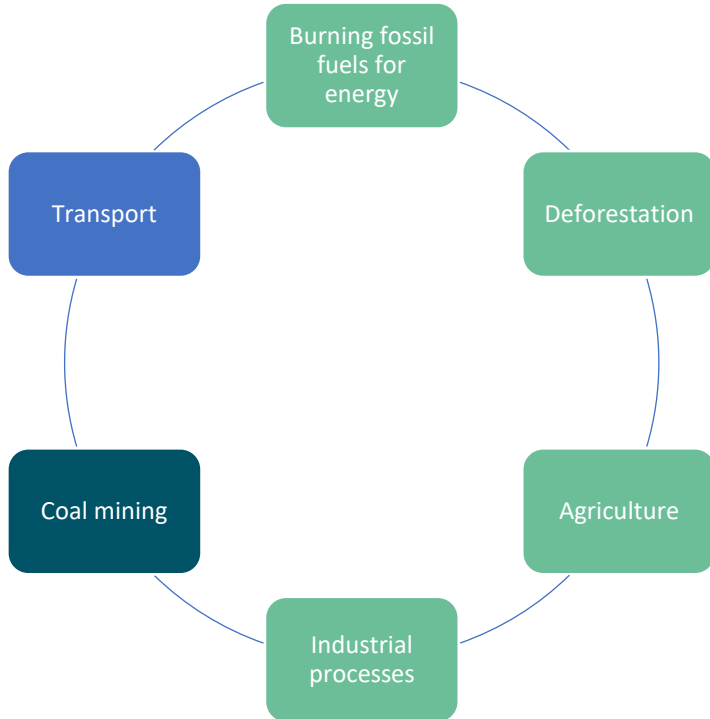
Sources of greenhouse gases



- ✓ Energy production
- ✓ Chemical reactions
- ✓ Product manufacturing
 - ✓ Fugitive emissions
 - ✓ Waste
- ✓ Construction
- ✓ Transport

BASICS OF GREENHOUSE GAS EMISSIONS

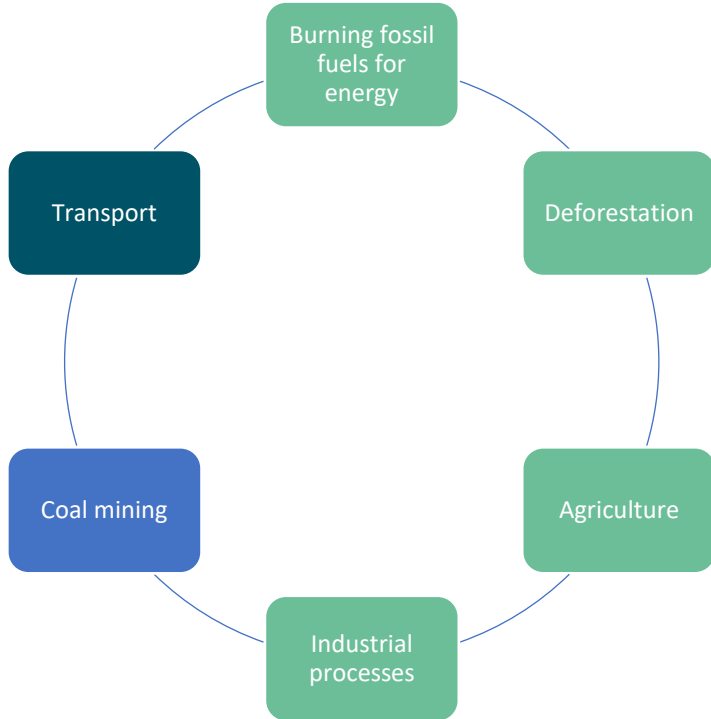
Sources of greenhouse gases



- ✓ Methane release
- ✓ Processing
- ✓ Storage
- ✓ Transportation
- ✓ Fires

BASICS OF GREENHOUSE GAS EMISSIONS

Sources of greenhouse gases



✓ Fossil fuel burning petrol, diesel, natural gas

✓ Tires

✓ Brake pads

Road transport
(private and
public)

Aviation

Shipping

Rail

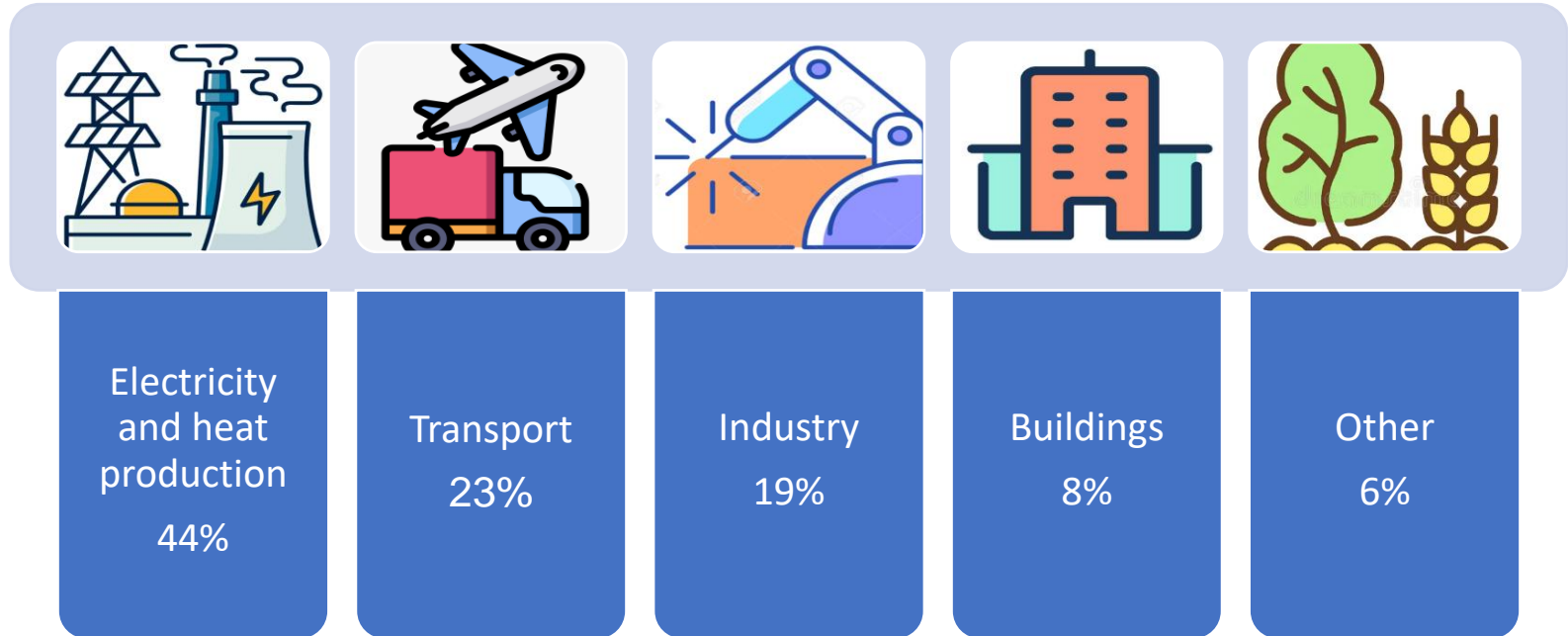
Freight

Non-road
vehicles

Urban mobility
and traffic
congestion

BASICS OF GREENHOUSE GAS EMISSIONS

Sources of greenhouse gases



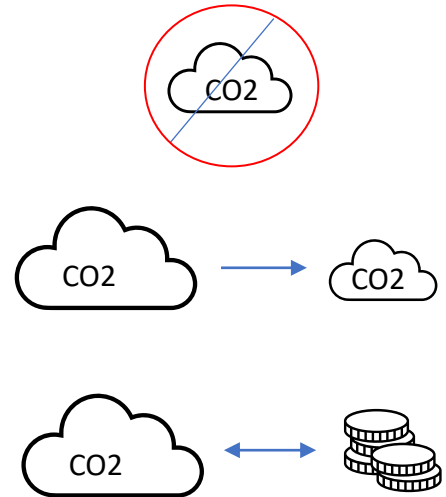
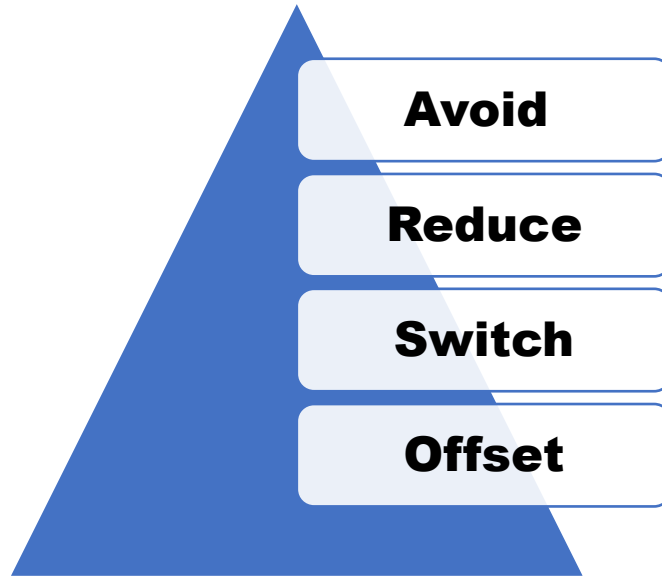
BASICS OF GREENHOUSE GAS EMISSIONS

Alternatives / Mitigation

- ✓ Carbon mitigation is an effort to minimize or diminish and stabilize levels of greenhouse gases in the atmosphere to stop the climate change – increase of global temperatures.
- ✓ The mitigation should start with understanding of the carbon sources of the entity.
- ✓ Minimize carbon emissions by increasing efficiencies.
- ✓ Investing in alternative technologies e.g. renewable energy sources.
- ✓ Carbon credits.

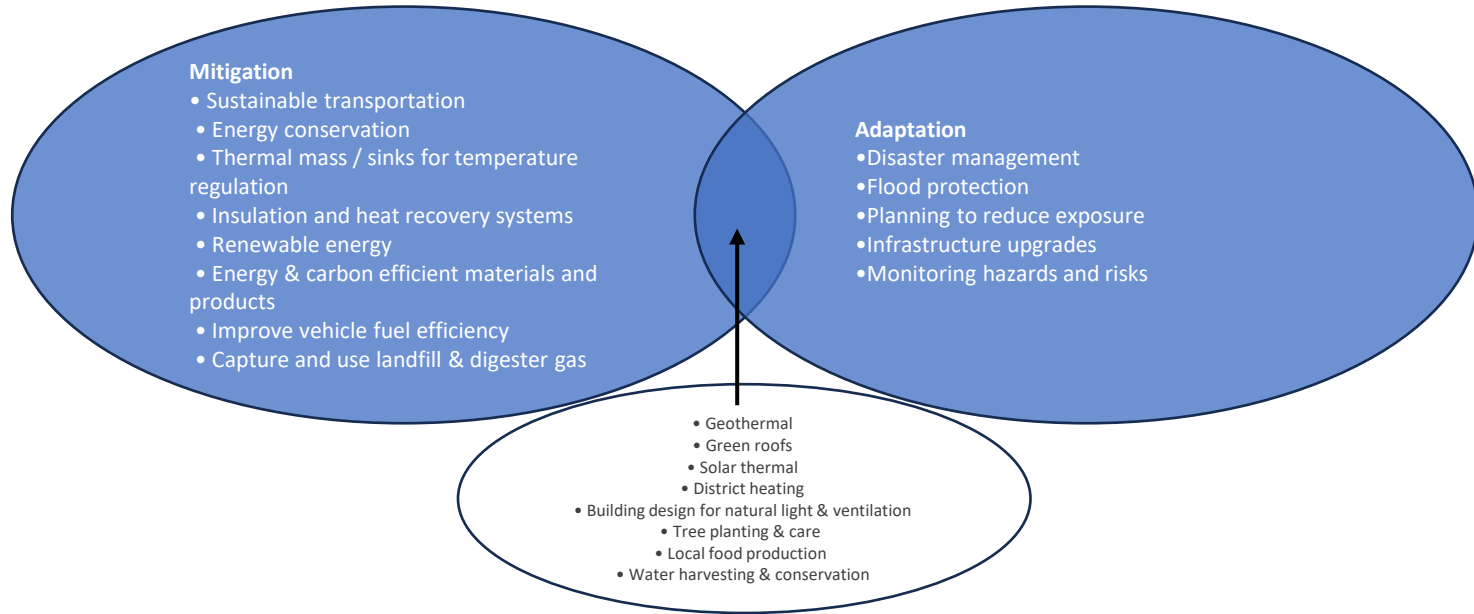
BASICS OF GREENHOUSE GAS EMISSIONS

Alternatives / Mitigation



BASICS OF GREENHOUSE GAS EMISSIONS

Alternatives / Mitigation



KEY CONCEPTS

KEY CONCEPTS

Global Warming Potential

Scope 1 emissions

Scope 2 emissions

Scope 3 emissions

Carbon sinks

- ✓ Global Warming Potential (GWP) is an index to measure of how much infrared thermal radiation a greenhouse gas would absorb over a given time frame after it has been added to the atmosphere (or emitted to the atmosphere).
- ✓ The GWP makes different greenhouse gases comparable with regards to their "effectiveness in causing radiative forcing".
 - ✓ CO₂ – is a reference gas
 - ✓ GWP of CO₂ is 1
 - ✓ Other gases are compared to CO₂
 - ✓ Allows to provide the total GHG in one number

KEY CONCEPTS

Global Warming Potential

Scope 1 emissions

Scope 2 emissions

Scope 3 emissions

Carbon sinks

Name	Chemical formula	Global Warming Potential (100 years)
Carbon dioxide	CO ₂	1
Methane	CH ₄	21
Nitrous-oxide	N ₂ O	310
HFC-23	CHF ₃	11 700
Sulphur hexafluoride	SF ₆	23 900
Perfluoro methane	CF ₄	6 500

Note: There are many more Greenhouse gases listed by IPCC

KEY CONCEPTS

Global Warming Potential

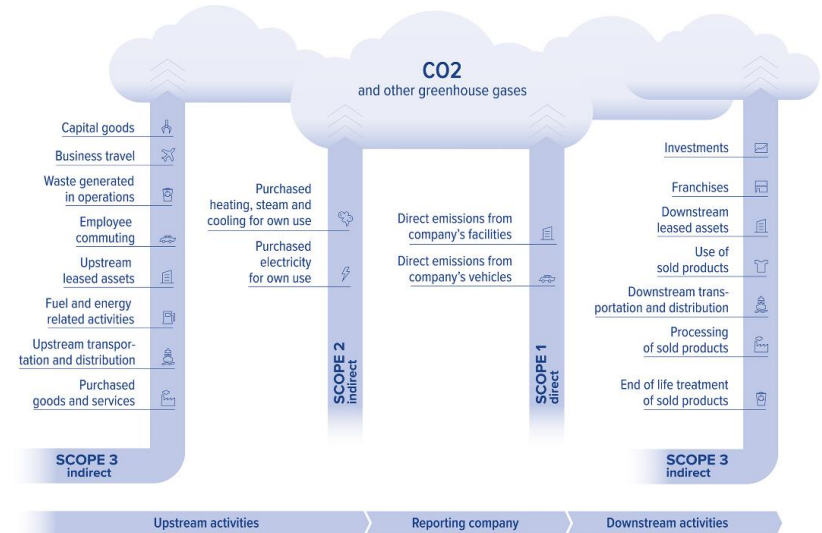
Scope 1 emissions

Scope 2 emissions

Scope 3 emissions

Carbon sinks

Scope 1 + Scope 2 + Scope 3 = Total GHG emissions



KEY CONCEPTS

Carbon pool, flux and sequestration

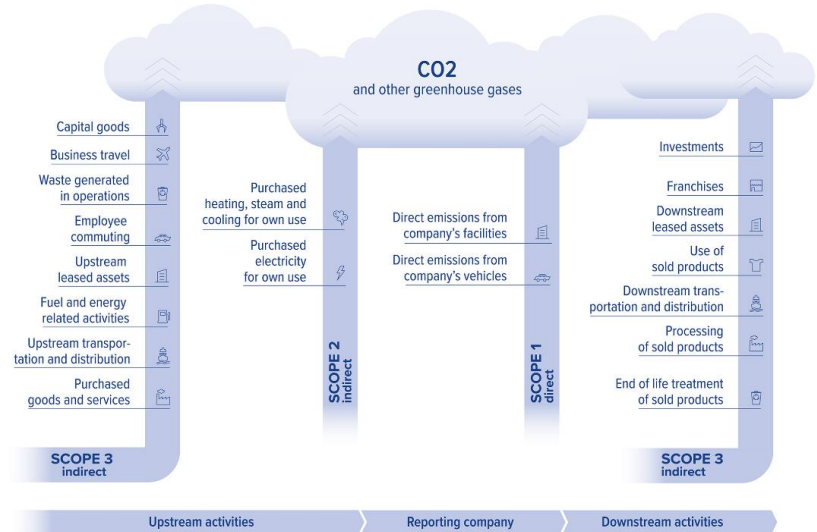
Global Warming Potential

Scope 1 emissions

Scope 2 emissions

Scope 3 emissions

Carbon sinks



KEY CONCEPTS

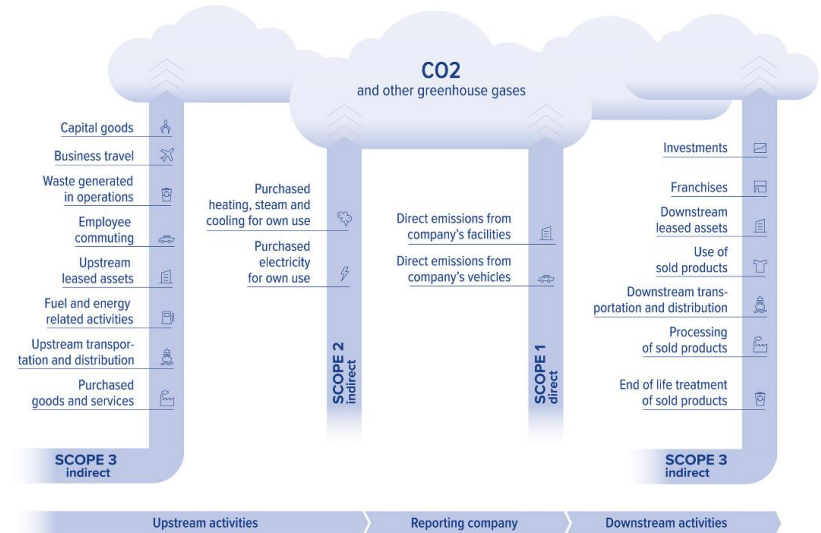
Global Warming Potential

Scope 1 emissions

Scope 2 emissions

Scope 3 emissions

Carbon sinks



KEY CONCEPTS

Global Warming Potential

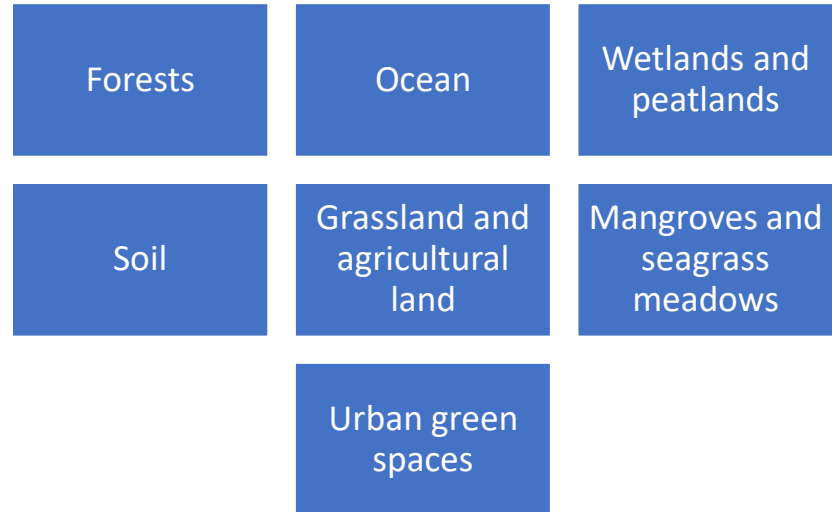
Scope 1 emissions

Scope 2 emissions

Scope 3 emissions

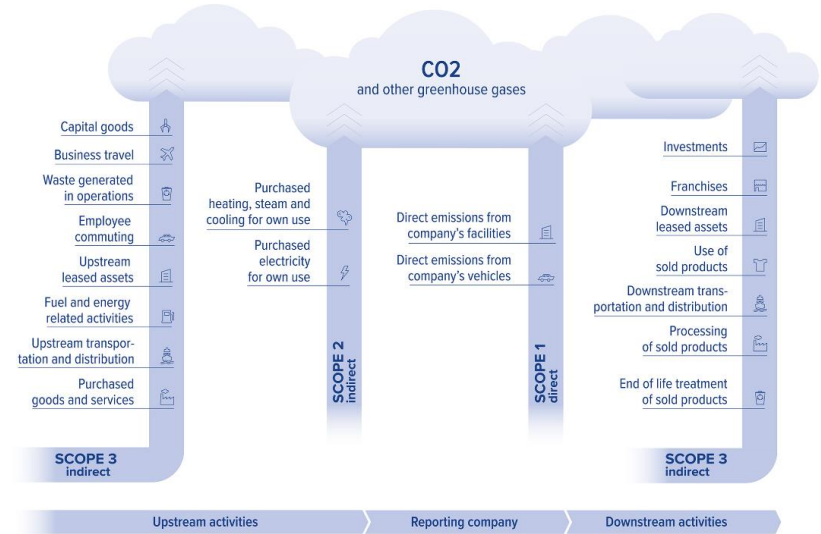
Carbon sinks

Carbon sink is a natural or human-made system that absorbs more carbon dioxide (CO₂) from the atmosphere than it releases. Essentially, it acts as a reservoir that stores carbon, helping to mitigate the impact of greenhouse gas emissions.



KEY TAKEAWAYS

- ✓ Carbon accounting definition
- ✓ Who, what, why?
- ✓ Key concepts:
 - ✓ Carbon pool, flux, sequestration
 - ✓ Global warming potential
 - ✓ Scope 1
 - ✓ Scope 2
 - ✓ Scope 3
 - ✓ Carbon sinks



INTRODUCTION TO GLOBAL STANDARDS

INTRODUCTION TO GLOBAL STANDARDS

Review



ISO: 14064

ISO is for International Organization for Standardization.

Non-Governmental Organization that coordinates 140 members countries' national standard bodies in development of standards for technical or management issues

ISO 9000 (quality) & ISO 14000 (environmental management).



The ISO 14064 standard (initially published in 2006 and updated in 2018) is part of the ISO 14000 series of International Standards for environmental management.

The ISO 14064 standard provides governments, businesses, regions and other organizations with a complementary set of tools for programs to quantify, monitor, report and verify greenhouse gas emissions.

The ISO 14064 standard supports organizations to participate in both regulated and voluntary programs such as emissions trading schemes and public reporting using a globally recognized standard.

ISO: 14064

Structure and benefits

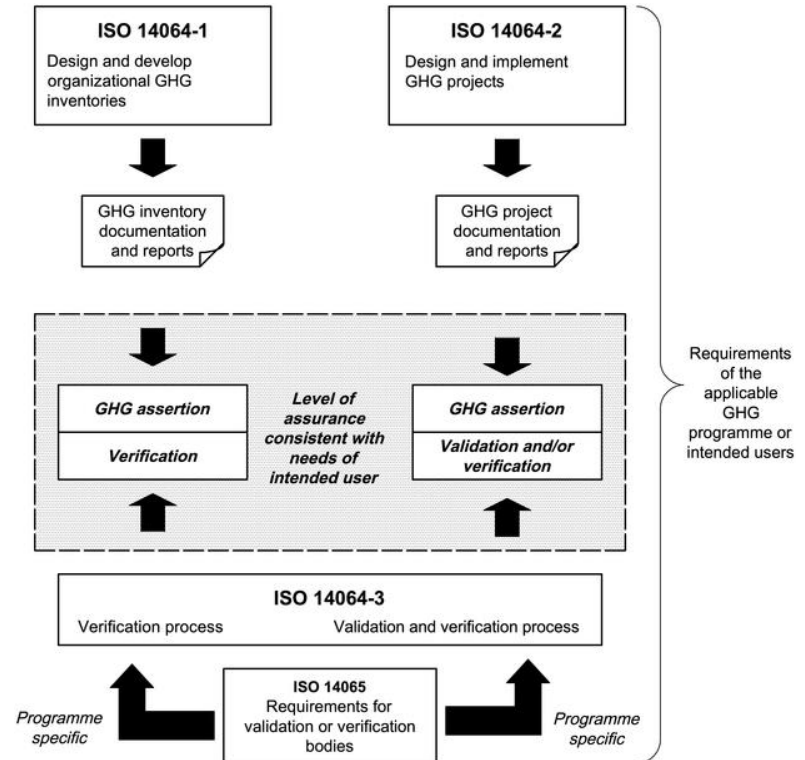
Part 1: GHG Inventories Specifications for the quantification, monitoring and reporting of entity emissions and removals

Part 2: GHG Projects Specifications for the quantification, monitoring and reporting of project emissions and removals

Part 3: Verification, Specifications and guidance for validation, verification and certification

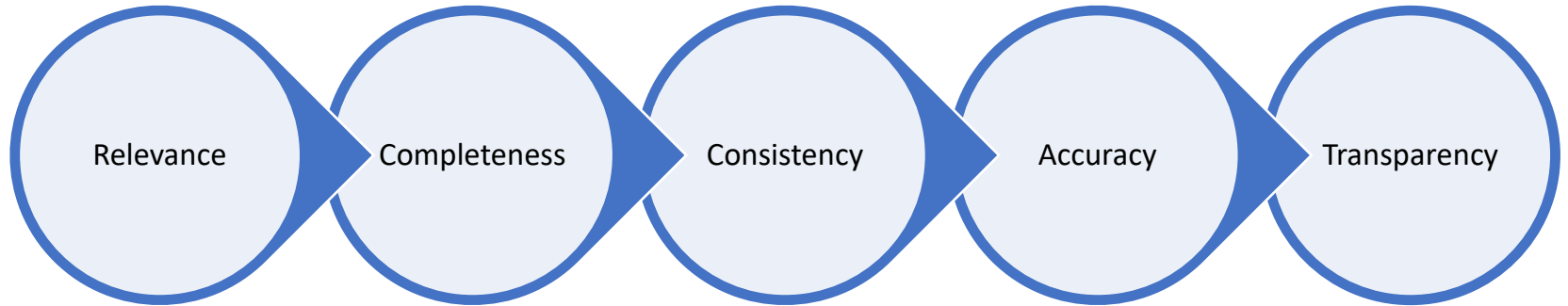
Benefits:

- ✓ Transparent and comparable GHG reporting
- ✓ Simplification of the GHG inventory and its verification
- ✓ Reduced effort and costs
- ✓ Greater confidence in GHG inventory
- ✓ Improved credibility with stakeholders



ISO: 14064

Principles



ISO: 14064

Boundaries

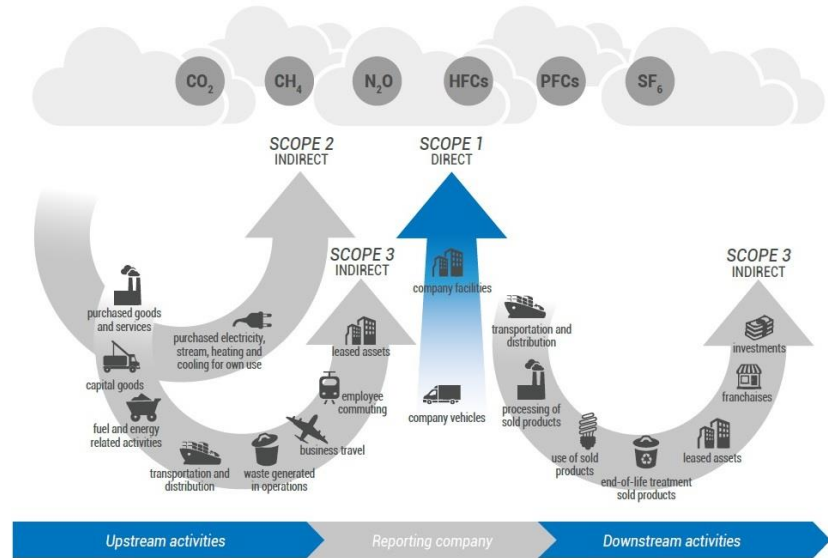
Organizational boundaries

Reporting boundaries

Direct GHG emissions and removals

Indirect GHG emissions

GHG inventory categories



Quelle: Deutsches Global Compact Netzwerk

ISO: 14064

Selection, calculation, base-year

Selection of quantification approach

- ✓ How the model accurately represents the emissions and removals
- ✓ Its limits of application
- ✓ Its uncertainty and rigour
- ✓ The reproducibility of results
- ✓ The acceptability of the model
- ✓ The origin and level of recognition of the model
- ✓ The consistency with the indented use

Calculation of GHG emissions and removals

- ✓ Calculations done according to quantification approach selected
- ✓ Report the period of emissions
- ✓ Provide CO₂ equivalent using appropriate GWPs (using the latest GWP from IPCC)
- ✓ Quantify biogenic emissions or removals in accordance with Annex D to the standards
- ✓ Quantify emissions or removals from imported/exported electricity consumed/produced by organization (Annex E to the standard)
- ✓ Follow Annex G for guidance concerning emissions or removals from agriculture

Base-year GHG inventory

- ✓ The organization shall establish a historical base year for GHG emissions and removals for comparative purposes
- ✓ Whole year or representative part of the year (note seasonality etc.)
- ✓ Follow the reporting boundary
- ✓ Provide reasoning of choice

ISO: 14064

Reporting

Planning the GHG report

- ✓ Purpose and objectives
- ✓ Overall and specific responsibilities for preparing the report
- ✓ Frequency
- ✓ Structure
- ✓ Data included
- ✓ Policy of dissemination

GHG report content

- ✓ Description of the organisation
- ✓ Responsible entity
- ✓ Period
- ✓ Boundaries and criteria
- ✓ Direct GHG emissions
- ✓ Biogenic emissions
- ✓ Exclusions
- ✓ Quantification approaches
- ✓ Factors (removal, GWP etc.)
- ✓ Uncertainty level
- ✓ Statement – follow ISO
- ✓ Verification disclosure

ISO: 14064

Verification

Verification needs to be:

- ✓ Impartial
- ✓ Objective
- ✓ Critical

Principles of verification described in ISO 14064-3

The objectives of the verification are:

- ✓ Error checking
- ✓ Confirmation of results
- ✓ Needed for external stakeholders (investors, stock exchanges, governmental entities etc.)

- ✓ Internal verification
- ✓ External verification – third party verification

GHG PROTOCOL

Introduction

Launched in 1998 by World Resources Institute and World Business Council for Sustainable Development

The Greenhouse Gas Protocol provides the foundation for more sustainable climate strategies and more efficient, resilient and profitable organizations.

GHG Protocol standards are the most widely used accounting tools to measure, manage and report on greenhouse gas emissions.

Main goals

- ✓ Reduce burden of measurement and reporting
- ✓ Illuminate opportunities and enable market based options
- ✓ Support management action and stakeholder reporting
- ✓ Enable credible, transparent and consistent information flow across multiple borders/jurisdictions



WORLD
RESOURCES
INSTITUTE

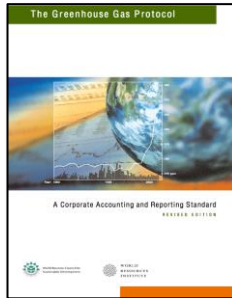


World Business Council for
Sustainable Development

GHG PROTOCOL

Major publications

Entity



Corporate
Standard



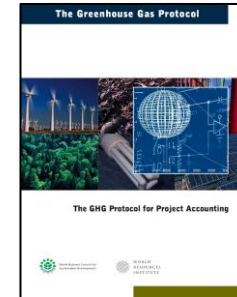
Value Chain
(scope 3)
Standard

Product



Product

Project



Project
Protocol

GHG PROTOCOL

Three types of accounting

Entity accounting

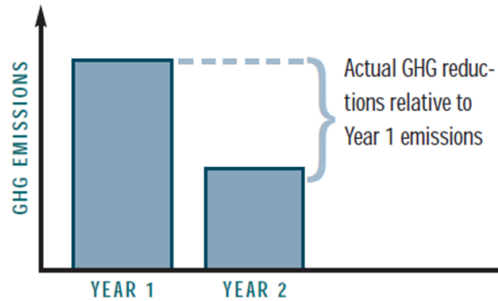


FIGURE 2.1a: Comparison against a base year for corporate/entity accounting

- Corporate or entity-level inventories aggregate emissions data from all of an organization's operations.
- These inventories compare emissions with those from a prior base year.

Project accounting

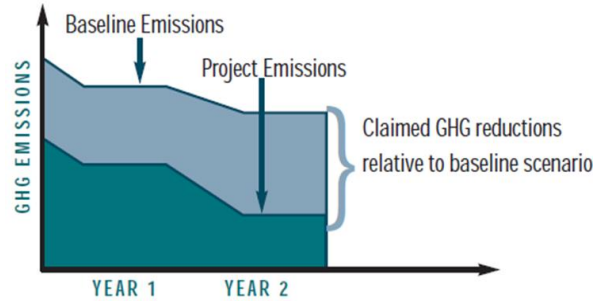
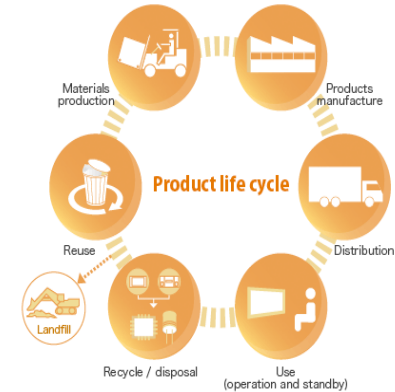


FIGURE 2.1b: Comparison against a baseline scenario for project accounting

- Project-level accounting quantifies future emissions that a specific project will avoid.
- This impact is estimated by comparing it with a baseline or "what if?" scenario.

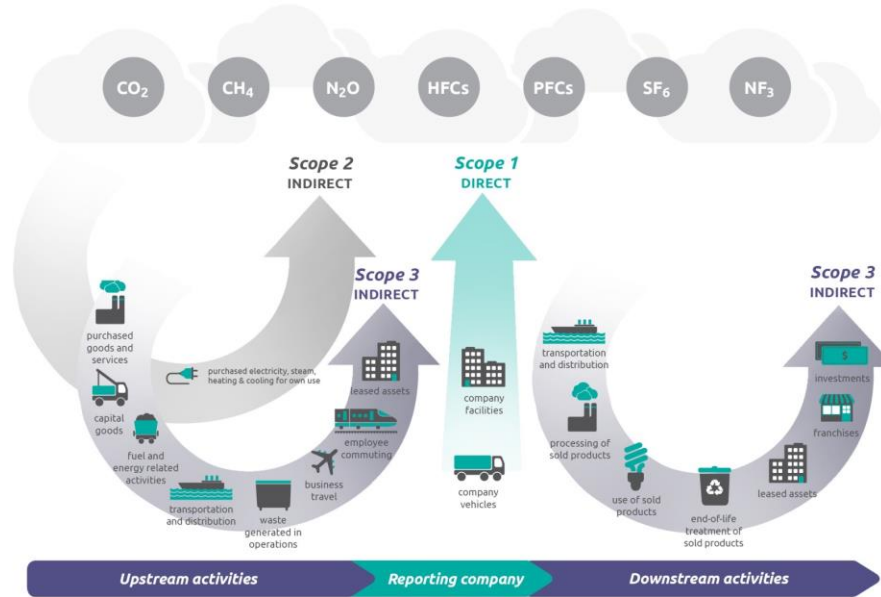
Product accounting



- Combines emissions data (past and future) from all phases of an individual product or service
- Emissions data compared with those of a prior base year

GHG PROTOCOL

Scopes in corporate reporting



GHG PROTOCOL

Objectives

1. Provides standards and guidance for companies and other organizations to prepare GHG emissions inventories
2. Widespread adoption of standard:
 - ✓ Several year, multi-stakeholder development process
 - ✓ Robust, practical and built on practitioner expertise
3. Covers accounting and reporting of 7 GHGs:
 - ✓ Carbon dioxide (CO₂)
 - ✓ Methane (CH₄)
 - ✓ Nitrous oxide (N₂O)
 - ✓ Sulphur hexafluoride (SF₆)
 - ✓ Nitrogen trifluoride (NF₃)
 - ✓ Hydrofluorocarbons (HFCs)
 - ✓ Perfluorocarbons (PFCs)

GHG PROTOCOL

Objectives and who should use the standard

Objectives

- ✓ To help companies prepare a true, fair account of emissions
- ✓ To simplify and reduce the costs of compiling an inventory
- ✓ To assist businesses in managing and reducing emissions
- ✓ To facilitate participation in GHG programs
- ✓ To increase consistency and transparency in GHG accounting and reporting

Who should use the standard

- ✓ Businesses developing GHG inventories (primary users)
- ✓ Other organizations developing inventories
 - Non-governmental organizations (NGOs)
 - Government agencies (consult Public Sector Protocol)
 - Universities
- ✓ Organizations designing voluntary GHG accounting and reporting programs
- ✓ Policymakers or regulators designing GHG reporting rules

GHG PROTOCOL

Who follows the standard?

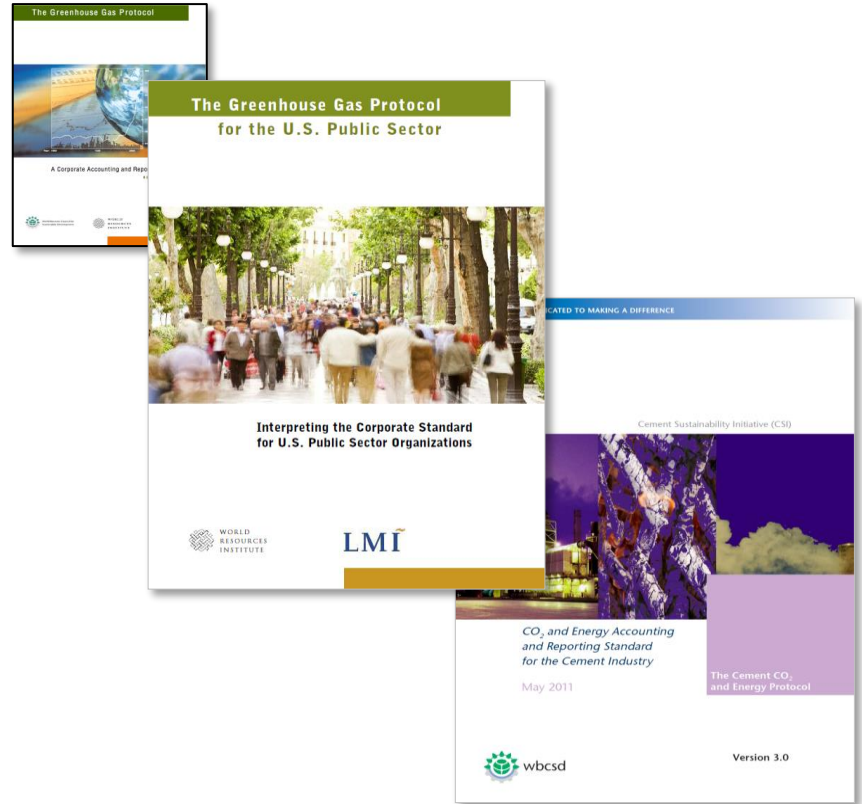


GHG PROTOCOL

Sector guidelines

Focus on sectors that:

- ✓ Present unique GHG accounting issues that are not adequately addressed in the parent Standard
- ✓ Contribute significantly to global emissions
- ✓ Offer significant potential for emissions reductions
- ✓ Demonstrate strong demand for new guidance



GHG PROTOCOL

Business goals for developing inventories

Understand
operational risks and
opportunities

- Exposure to GHG regulations
- Enhanced market opportunities (e.g., access niche markets)
- Guide investment and procurement decisions

Track and reduce
emissions

- Identify emissions hot spots and reduction opportunities
- Set GHG reduction targets
- Measure and report GHG performance over time
- Develop performance benchmarks and assess performance peers

Report to
stakeholders

- Meet information needs of stakeholders
- Participate in voluntary reporting programs
- Report to government reporting programs
- Improve corporate reputation and accountability

GHG PROTOCOL

Standard is not for

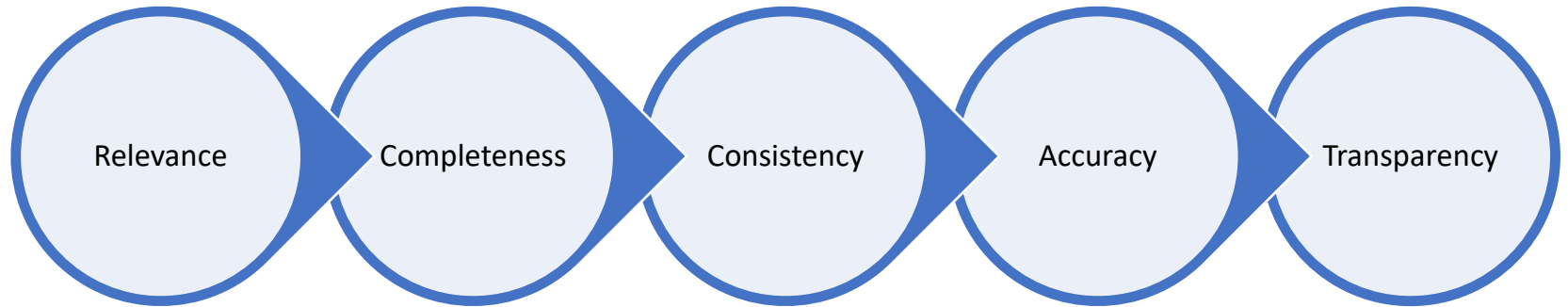
- ✓ Quantifying reductions from GHG mitigation projects (offsets)
- ✓ Consult the GHG Protocol guidance for Project Accounting
- ✓ Accounting for life-cycle emissions from products
- ✓ Consult GHG Protocol Product Life Cycle Standard

GHG Protocol's Relationship to other GHG Programs

- ✓ Not a reporting program (does not collect inventories)
- ✓ Does not require verification
- ✓ Not designed for a particular program or policy
- ✓ Foundation for, and compatible with, most programs
- ✓ If participating in a GHG program, check its requirements

GHG PROTOCOL

Principles



GHG PROTOCOL

Activity / discussion

1. Has your organization implemented any measures to ensure the above principles in its financial accounting or other record keeping/reporting?
2. Can you think of a possible scenario in which there may be a tradeoff between two principles?
 - ✓ Relevance
 - ✓ Completeness
 - ✓ Consistency
 - ✓ Transparency
 - ✓ Accuracy

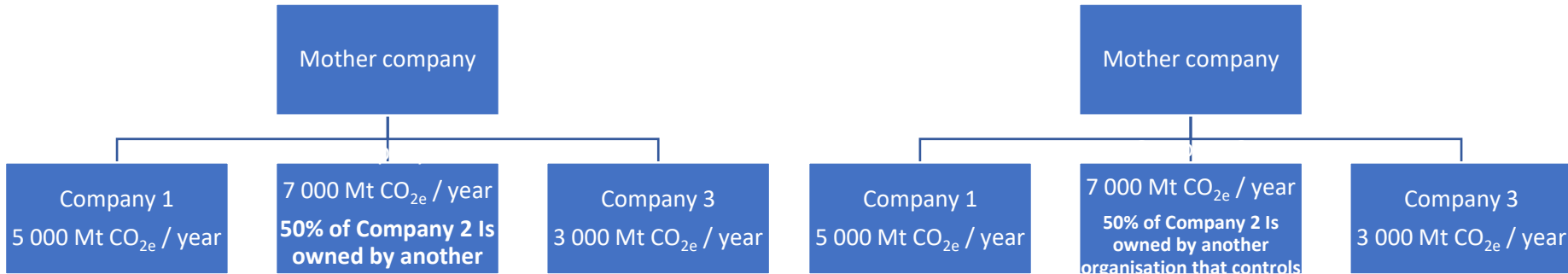
GHG PROTOCOL

Boundaries

- ✓ Boundaries: Imaginary lines encompassing the emissions to include in a company's GHG inventory
- ✓ Organizational boundaries - Determine which company operations to include
- ✓ Operational boundaries - Determine which emissions sources to include, Determine how to categorize emissions

Why are organizational boundaries important?

- ✓ Complex business structures
- ✓ Subsidiaries
- ✓ Joint ventures
- ✓ Franchises
- ✓ To measure emissions consistently throughout company



GHG PROTOCOL

Boundaries - Consolidation

Combining emissions data from separate operations

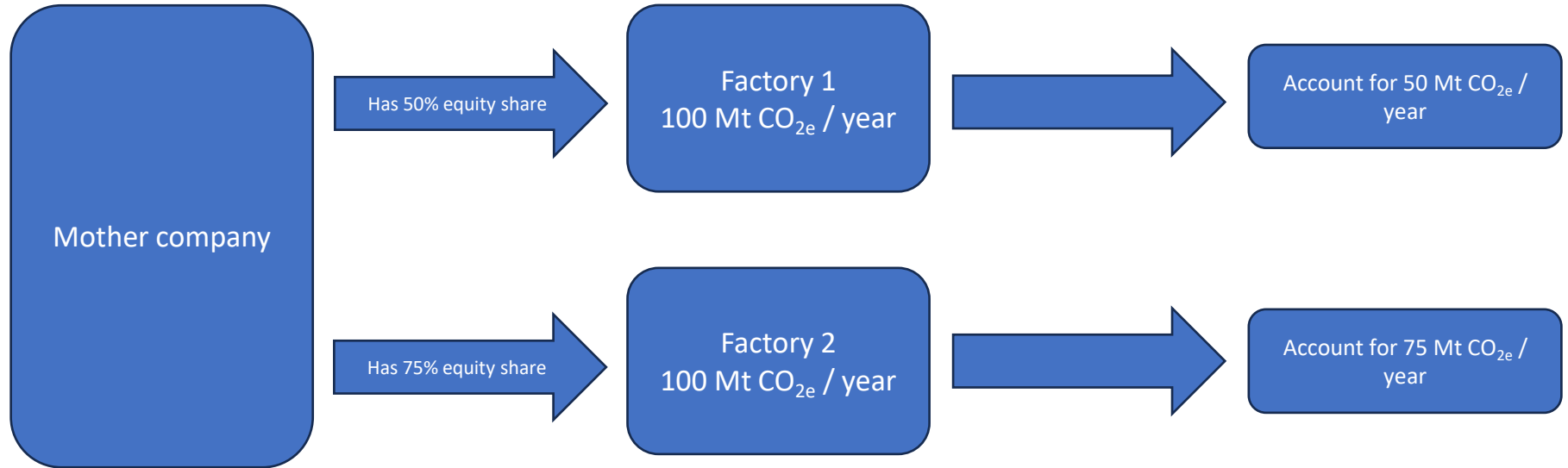
2 consolidation approaches

1. Equity Share
2. Control
 - a) Financial Control
 - b) Operational Control

Apply selected approach across entire organization

GHG PROTOCOL

Boundaries – Equity share approach



GHG PROTOCOL

Boundaries – Control approach

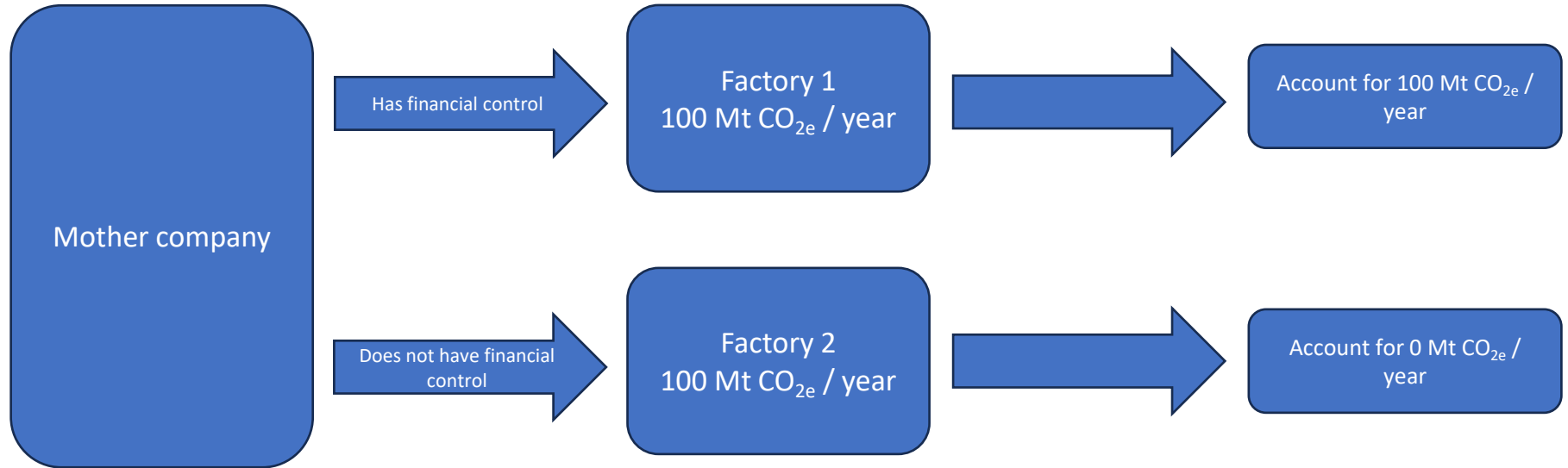
Definition: can be defined as

- a) financial control
- b) operational control

Account for 100% of emissions from operations under the company's "control"
Independent of equity share

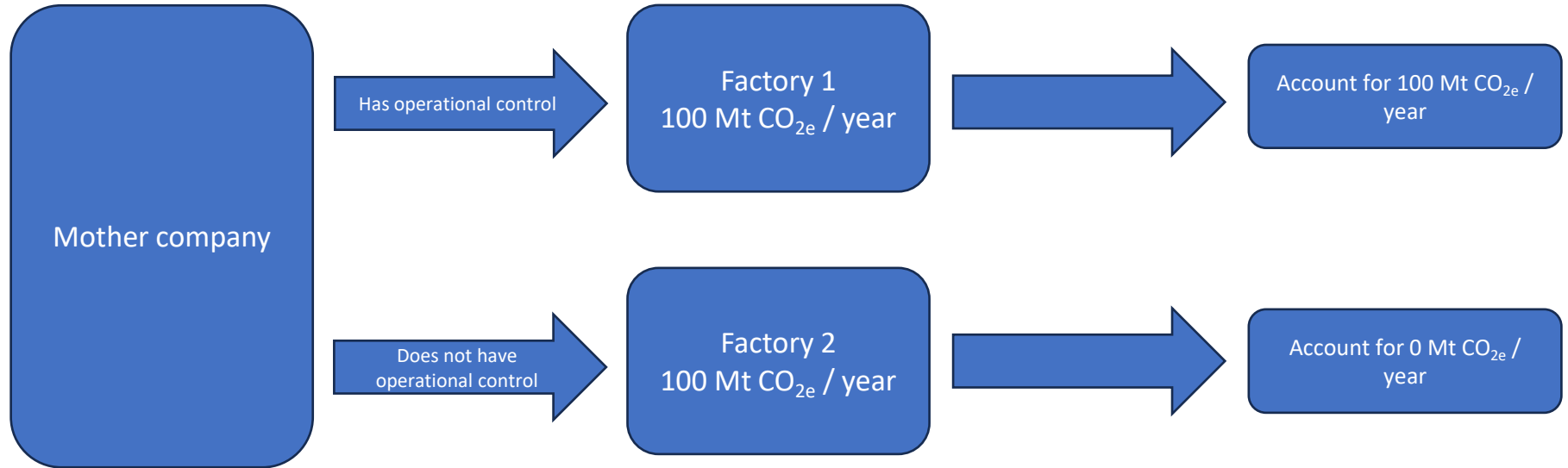
GHG PROTOCOL

Boundaries – Control approach – Financial control



GHG PROTOCOL

Boundaries – Control approach – Operational control



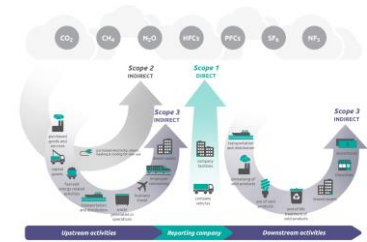
GHG PROTOCOL

Scope 1

Direct GHG emissions from sources a company owns or controls

Examples:

- ✓ Generation of electricity, heat, or steam
- ✓ Physical or chemical processing
- ✓ Transportation of materials, products, waste, and employees
- ✓ Fugitive emissions
- ✓ Inclusion in GHG inventory: required



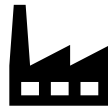
Indirect emissions



Service (owned by another company)

Scope 1

Direct emissions



Your factory

Indirect emissions



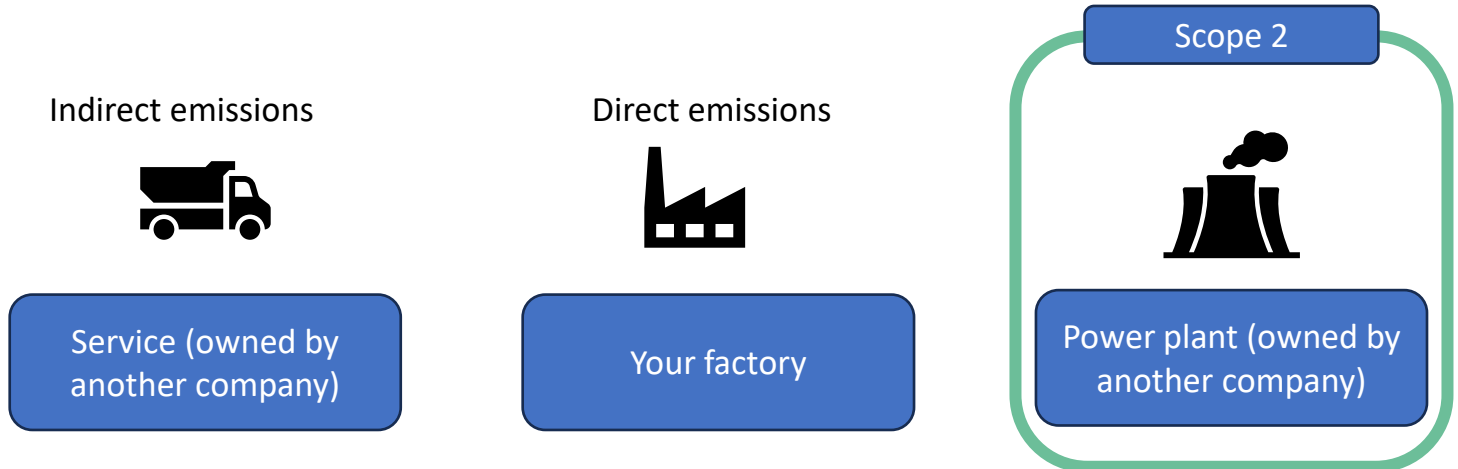
Power plant (owned by another company)

GHG PROTOCOL

Scope 2

Indirect emissions from purchased electricity, steam, heating and cooling

- ✓ For office-based businesses Scope 2 usually most significant
- ✓ Can be reduced through energy efficiency and conservation
- ✓ Inclusion in GHG inventory: required



GHG PROTOCOL

Scope 3

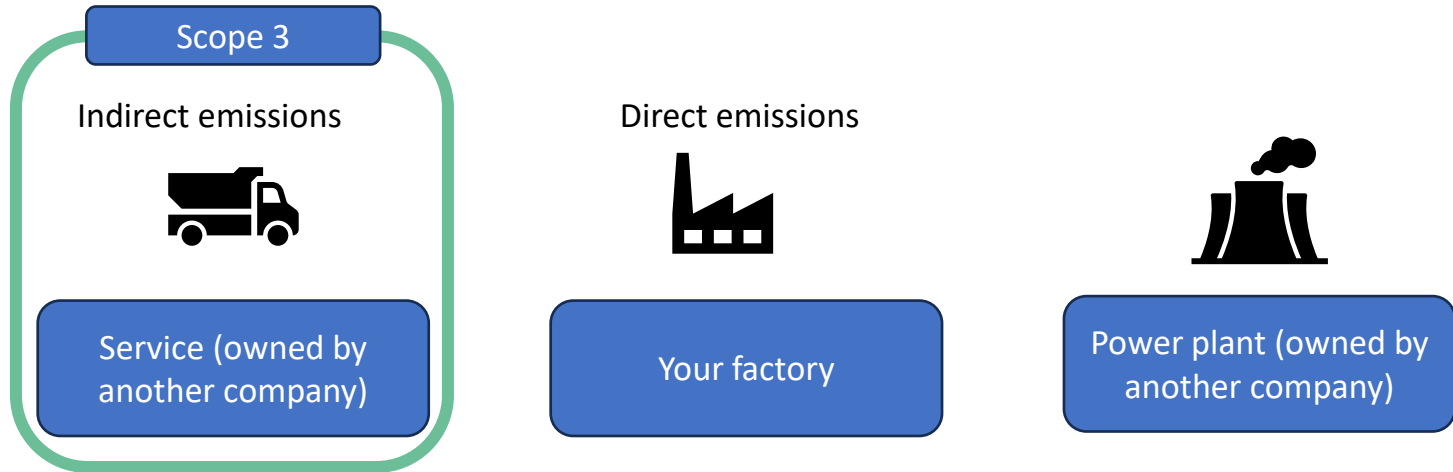
All other indirect emissions

Examples:

- ✓ Transport in vehicles not owned/controlled by the company
- ✓ Energy consumed during customer use of company products

Inclusion in GHG inventory: optional under Corporate Standard

- ✓ Although may be required by some programs
- ✓ Required by GHG Protocol Scope 3 Standard



GHG PROTOCOL

Scopes - Biomass

Emissions from the combustion of biomass (wood, ethanol, other biofuels, etc.)

CO₂ emissions:

- ✓ Report separately from Scopes
- ✓ Because CO₂ is sequestered during growing

N₂O and CH₄

- ✓ Report as normal within Scopes
- ✓ Because N₂O and CH₄ not sequestered during growing

GHG PROTOCOL

Scopes - Double counting

- ✓ Occurs when different companies claim ownership of same emissions or reductions
- ✓ Scopes allow companies to account for emissions along value chain while preventing double-counting
- ✓ The same emissions will never be reported twice under the same scope (except Scope 3)

NO DOUBLE COUNTING!

GHG PROTOCOL

Scopes - Summary

Operational boundaries determine which emissions are included and how they are classified

SCOPE	TYPE OF EMISSIONS	REPORTING
Scope 1	direct	mandatory
Scope 2	purchase energy	mandatory
Scope 3	all other indirect	optional

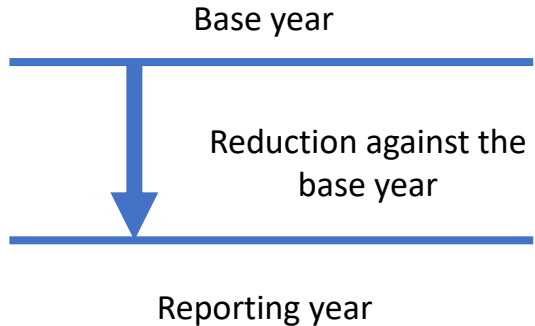
GHG PROTOCOL

Tracking over time – Base year

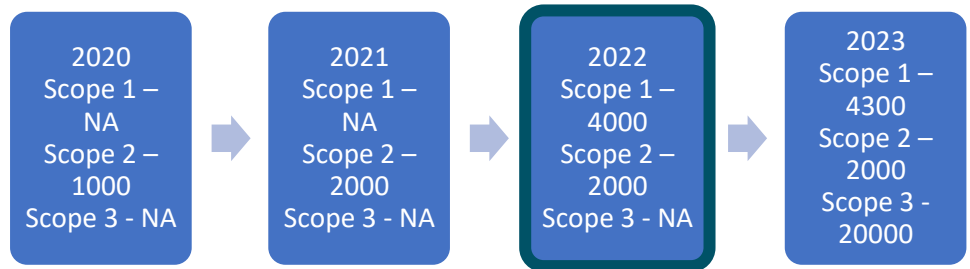
Base year= the period in history against which an organization's emissions are tracked over time

Advantages

- Track progress towards reduction targets
- Put effects of inventory changes into context



Select the earliest year with verifiable emissions data for required Scopes



- Specify why you chose that particular year

- If emissions fluctuate dramatically annually, consider averaging emissions over a series of consecutive years as your base year

GHG PROTOCOL

Threshold and structural changes

- ✓ Significance threshold: a criterion used to determine whether a change is significant enough to warrant recalculation
- ✓ The GHG Protocol does not specify a significance threshold
- ✓ Each organization must define what significance threshold will trigger base year recalculations

Structural change: transfer of ownership or control of emitting activities from one company to another

- ✓ Mergers, acquisitions, and divestments
- ✓ Outsourcing or in-sourcing of emitting activities
 - ✓ Don't recalculate if out- or in-sourced activities were previously included in a different Scope

Recalculate base year emissions for structural changes

GHG PROTOCOL

Tracking over time - summary

Base year: the year in history against which an organization's emissions are tracked over time

1. Define your organization's recalculation policy
2. Define significance threshold to trigger base year recalculation
3. Recalculate for
 - ✓ structural changes
 - ✓ changes in calculation methodology
 - ✓ discovery of significant errors
4. Don't recalculate for
 - ✓ organic growth or decline
 - ✓ Changes involving facilities that didn't exist in base year
 - ✓ Out-/in-sourcing of activities previously accounted for in different Scope

CASE STUDY

Alignment strategy

Santander

Assess emissions/baseline



Set targets and pathways



Engagement with customers



Steer portfolio



Sector	Scenario	Emissions	Metric	2019 baseline	2030 targets
Power generation	IEA Net Zero 2050	Scope 1	tCO ₂ e/MWh	0.21*	0.11 (-46%)
Energy	IEA Net Zero 2050	Scope 1 + 2 + 3**	mtCO ₂ e	23.84	16.98 (-29%)
Aviation	IEA Net Zero 2050	Scope 1 + 2	grCO ₂ e/RPK	92.47	61.71 (-33%)
Steel	IEA Net Zero 2050	Scope 1 + 2	tCO ₂ e/tonne steel	1.58	1.07 (-32%)
Thermal coal	Phase-out targets to eliminate exposure by 2030 to: <ul style="list-style-type: none"> • Power generation customers with a revenue dependency on coal of over 10% • coal mining 				

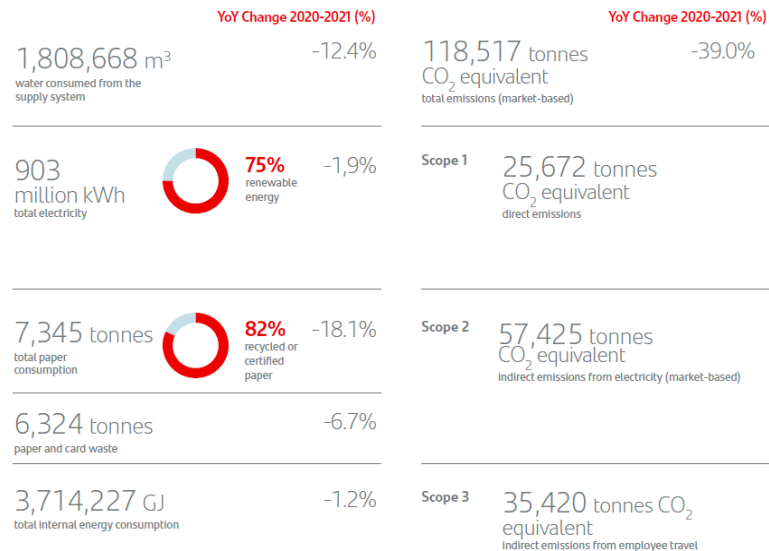
Developing a green value proposition for our customers



1. All segments, minus SCIB and WM&I

2. Includes retail, Commercial Banking, Sustainability Linked Loans and Collaboration Revenues

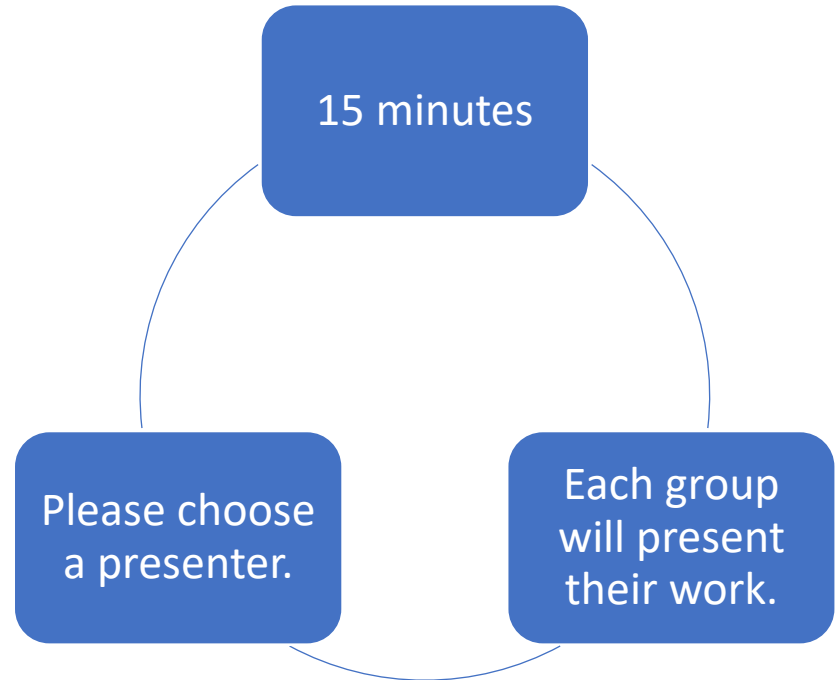
2021 Environmental Footprint



GROUP WORK

Interactive Activity: Mapping Organization Emissions

1. List emission sources of your organisation.
2. Divide the emission sources into Scope 1,2 and 3.
3. List activities that can be done to avoid or reduce the emissions



**THANKS FOR
YOUR ATTENTION**





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