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# Greenhouse Gas Protocol Product/Supply Chain Initiative

## Stakeholder Advisory Group Workshop November 2009

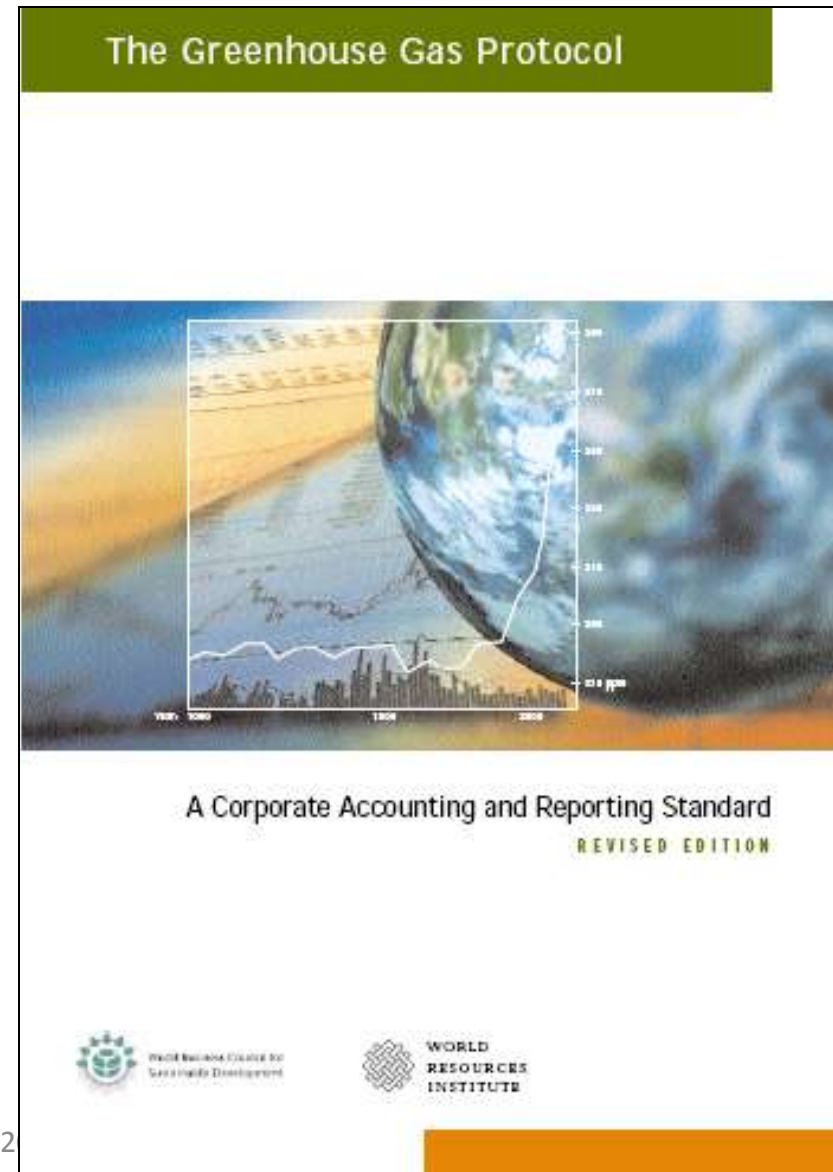


# Workshop Objectives

- Update stakeholders on standard development process
- Explain requirements and guidance in draft standards
- Seek feedback on key decisions

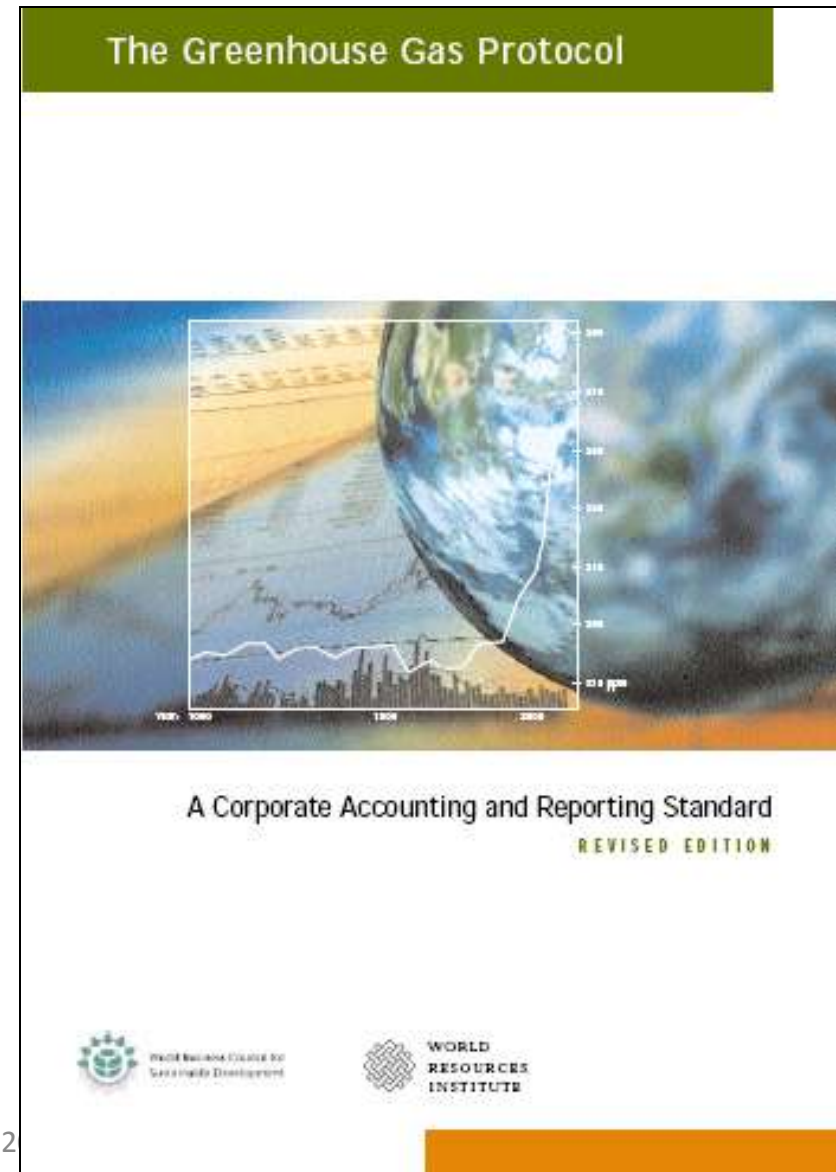
# Greenhouse Gas Protocol Initiative

- Convened in 1998 by WRI and WBCSD
- A multi-stakeholder partnership of businesses, NGOs, governments and others convened by WRI and WBCSD
- Mission: Develop internationally accepted GHG accounting and reporting standards and to promote their use worldwide



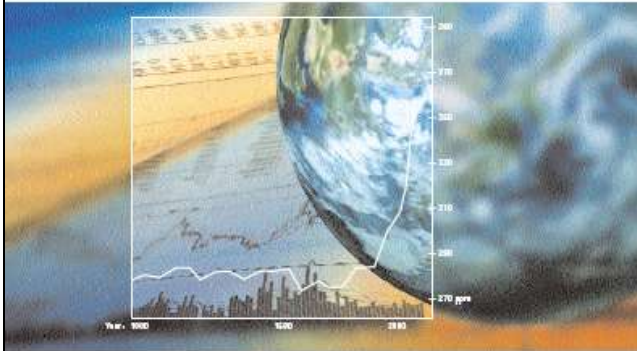
# Greenhouse Gas Protocol Initiative

- The most widely used international accounting tool for businesses to understand, quantify, and manage greenhouse gases
- Free standards and tools available at [www.GHGProtocol.org](http://www.GHGProtocol.org)



# GHG Protocol Publications

## The Greenhouse Gas Protocol



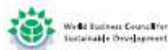
A Corporate Accounting and Reporting Standard  
REVISED EDITION



## The Greenhouse Gas Protocol



The GHG Protocol for Project Accounting

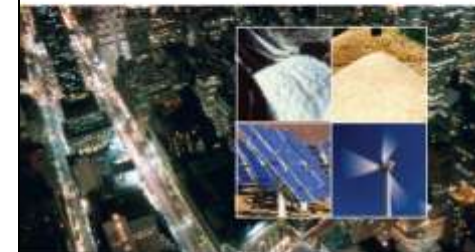


## The Greenhouse Gas Protocol



The Land Use, Land-Use Change, and Forestry  
Guidance for GHG Project Accounting

## The Greenhouse Gas Protocol



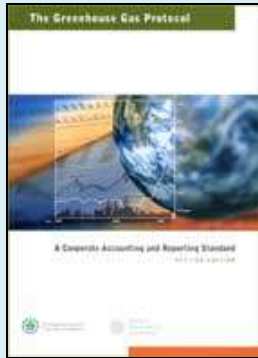
Guidelines for Quantifying GHG Reductions from  
Grid-Connected Electricity Projects



# GHG Protocol: Ten Year Overview



2001: First edition of GHG Protocol Corporate Standard published



2004: Revised edition of Corporate Standard

2003: CDP adopts GHG Protocol

**CARBON DISCLOSURE PROJECT**

2005: ISO adopts GHG Protocol



2008: Launch of India & China Programs



1998: WRI/WBCSD create GHG Protocol



2002: CCAR/EPA adopt GHG Protocol



2004: Launch of Mexico Program



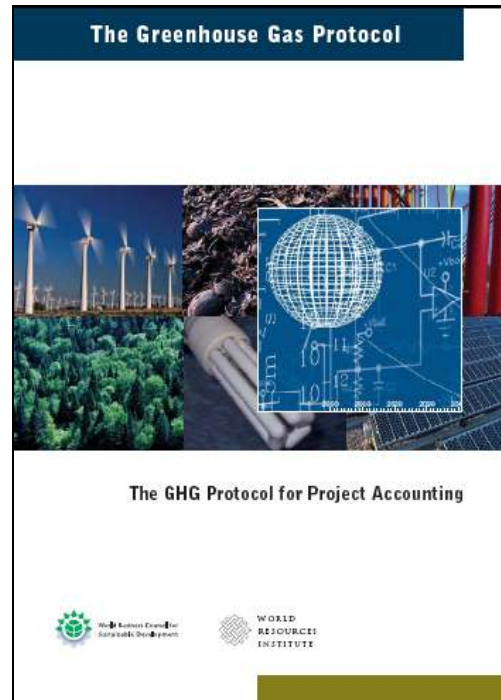
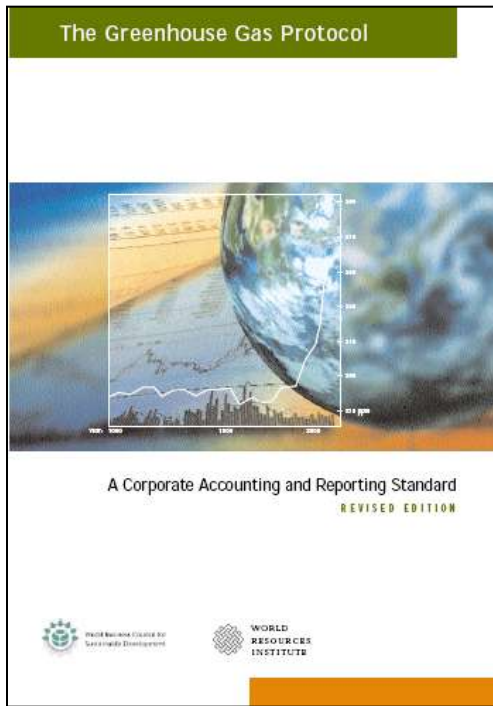
2007: TCR & Brazil Program



2008: Launch of Product & Supply Chain Initiative



# New GHG Protocol Standards



Scope 3  
(Corporate Value Chain)  
Standard

Product Life Cycle  
Standard

*Under development*

# Mission of Product/Supply Chain Initiative

- Develop internationally accepted product and Scope 3 accounting and reporting standards through a broad, multi-stakeholder, inclusive process
- Develop relevant, credible, and user-friendly standards to ensure their broad adoption for managing and mitigating emissions



# New Standards in Development

## Scope 3 (Corporate Value Chain) Accounting & Reporting Standard

- Quantify and report major GHG emissions in the value chain at the company/organization level (scope 3)
- To understand, manage, and report GHG emissions across the entire value chain
- Build on GHG Protocol Corporate Standard

## Product Life Cycle Accounting & Reporting Standard

- Quantify and report product-level emissions
- To understand, manage, and report the life cycle GHG emissions associated with individual products
- Build on existing life cycle assessment standards

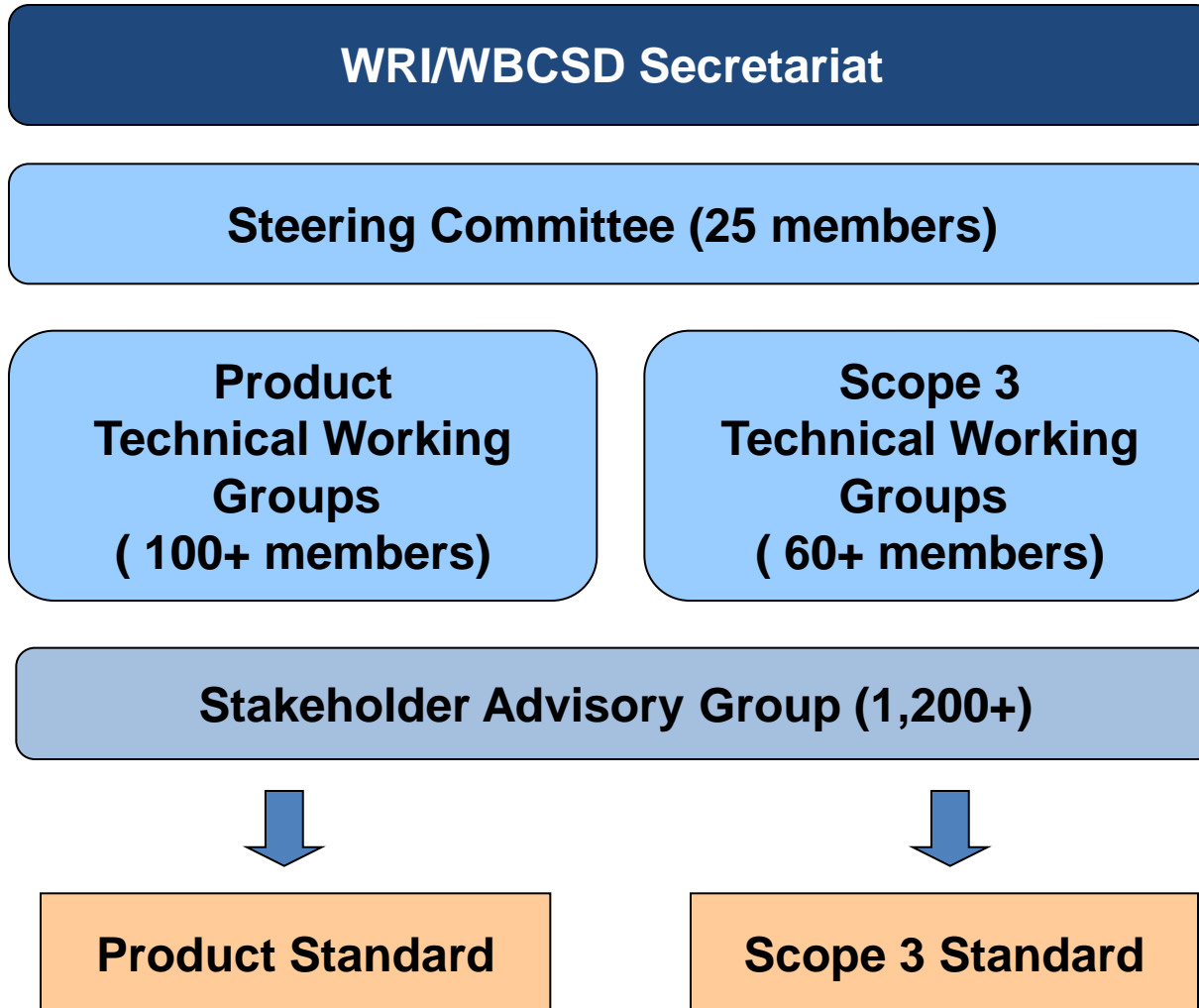
# Drivers for New Standards

- Corporate GHG management and reporting moving beyond companies' own operations (i.e., scope 1 and 2), toward the full value chain
- Increasing focus on GHG emissions associated with production and consumption of goods and services
- Increasing need for disclosure and management of climate-related risk in the value chain
- Increase in business-to-business requests for GHG information throughout the supply chain
- Increasing public reporting of product and scope 3 GHG emissions
- Increasing inclusion of scope 3 emissions in corporate GHG reduction goals

# Standard Development Process

- The GHG Protocol Initiative follows an independent, multi-stakeholder, open, and inclusive process to develop standards
- Participation from businesses, government agencies, nongovernmental organizations, and academic institutions from around the world

# Process Structure



# Steering Committee Members

Alcan Packaging  
Carbon Disclosure Project  
Carbon Trust  
Carnegie Mellon University  
Dow Chemical Company  
DNV  
Energy Research Institute, China  
Environmental Defense Fund  
ERM  
European Commission, Joint  
Research Centre  
General Electric  
Georgia Pacific  
Harvard School of Public Health

Natural Resources Defense Council  
New Zealand Ministry of Agriculture  
and Forestry  
Product Carbon Footprint Pilot  
Project, Germany  
PricewaterhouseCoopers  
Shell  
Tsinghua University, China  
UNEP/SETAC Life Cycle Initiative  
Unilever  
UK Department for Environment,  
Food and Rural Affairs  
US Environmental Protection Agency  
ISO TC207 - US TAG  
Walmart

# Timeline

Date	Activity
November 2007	✓ Survey and consultations to assess need for new standards
September 2008	<ul style="list-style-type: none"> <li>✓ Steering Committee Meeting #1 (Washington DC)</li> <li>✓ Technical Working Group Meeting #1 (London)</li> </ul>
January 2009	✓ Working groups begin drafting
March 2009	✓ Steering Committee Meeting #2 (Geneva)
June 2009	✓ Technical Working Group Meeting #2 (Washington DC)
August 2009	✓ Stakeholder webinar and comment period
October 2009	✓ Steering Committee Meeting #3 (Washington DC)
November - December 2009	<ul style="list-style-type: none"> <li>✓ First draft of standards released for stakeholder review</li> <li>✓ Five stakeholder workshops (in Berlin, Germany; Guangzhou, China; Beijing, China; London, UK; Washington, DC, USA)               <ul style="list-style-type: none"> <li>▪ Stakeholder comment period on first drafts</li> </ul> </li> </ul>
January - June 2010	<ul style="list-style-type: none"> <li>▪ Pilot testing by several companies</li> </ul>
Summer 2010	<ul style="list-style-type: none"> <li>▪ Public comment period on second drafts</li> </ul>
December 2010	<ul style="list-style-type: none"> <li>▪ Publication of final standards</li> </ul>



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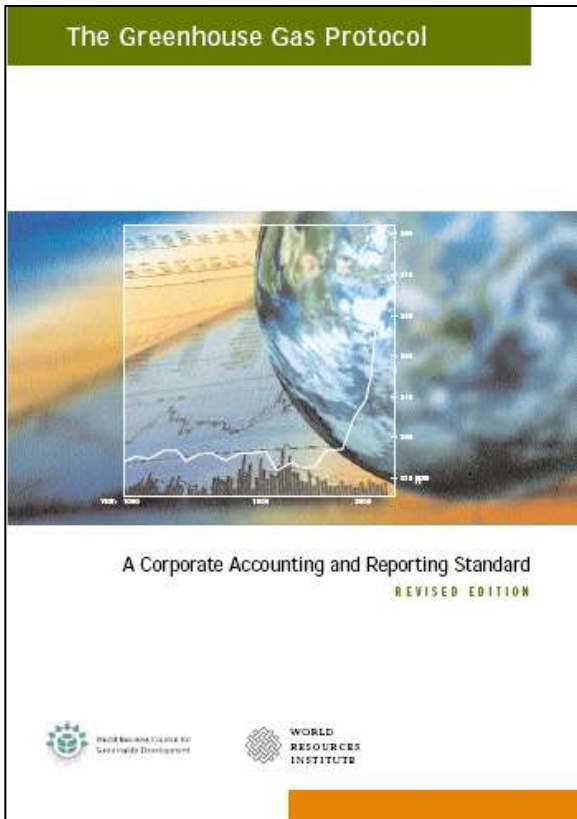


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# Scope 3 Accounting & Reporting Standard



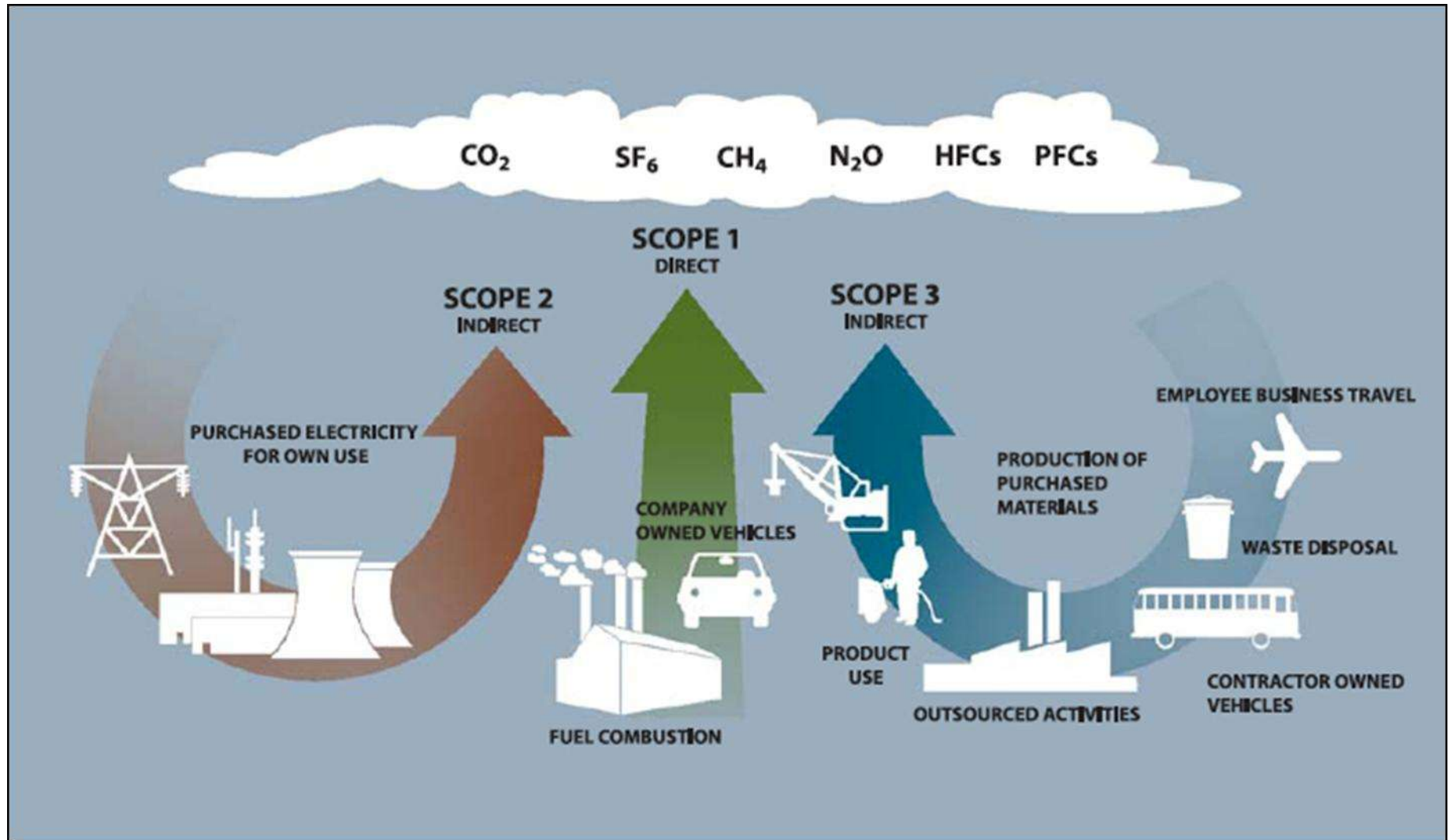
# Accounting for Corporate Emissions



- **Scope 1** emissions = All direct emissions, i.e. owned or controlled by your company
- **Scope 2** emissions = Indirect emissions from use of electricity, steam, heating and cooling
- **Scope 3** emissions = All other indirect emissions upstream & downstream of a company, e.g. production of purchased goods & services; third-party transportation; use and disposal of a company's products; etc.



# Scopes Across the Value Chain



# Scope 3 Standard Contents

## Part 1: General Requirements & Guidance

1. Introduction
2. Accounting and reporting principles
3. Business goals and inventory design
4. Mapping the value chain
5. Setting the boundary
6. Collecting data
7. Calculating emissions
8. Accounting for GHG reductions
9. Performance tracking
10. Setting a reduction target
11. Managing inventory quality
12. Assurance
13. Reporting and communication

# Scope 3 Standard Contents

## Part 2: Guidance for Specific Scope 3 Categories

1. Purchased Goods & Services – Direct Supplier Emissions
2. Purchased Goods & Services – Cradle-to-Gate Emissions
3. Energy-Related Activities Not Included in Scope 2
4. Capital Equipment
5. Transportation & Distribution (Upstream / Inbound)
6. Business Travel
7. Waste Generated in Operations
8. Franchises (Not Included In Scope 1 and 2) – Upstream
9. Leased Assets (Not Included In Scope 1 and 2) – Upstream
10. Investments (Not Included In Scope 1 and 2)
11. Franchises (Not Included In Scope 1 and 2) – Downstream
12. Leased Assets (Not Included In Scope 1 and 2) – Downstream
13. Transportation & Distribution (Downstream / Outbound)
14. Use of Sold Products
15. Disposal of Sold Products at the End of Life
16. Employee Commuting

# Standard Terminology

- “**Shall**” indicates a requirement in order to be in conformance with the standard
- “**Should**” indicates a recommendation, but not a requirement
- “**May**” indicates an option that is permissible or allowable



# GHG Protocol Reporting Requirements

Report in conformance with the  
GHG Protocol *Corporate Standard*

- Shall report all scope 1 and 2 emissions
- Should optionally report scope 3 emissions

Report in conformance with the  
GHG Protocol *Corporate Standard*  
and *Scope 3 Standard*

- Shall report all scope 1 and 2 emissions
- Shall report scope 3 emissions (following the requirements/guidance in this standard)

# Scope 3: Steps in Accounting & Reporting

Review  
Principles  
*Chapter 2*

Define  
Business  
Goals  
*Chapter 3*

Map the  
Value Chain  
*Chapter 4*

Set the  
Boundary  
*Chapter 5*

Collect Data  
*Chapter 6*

Calculate  
Emissions  
*Chapter 7*

Report  
Emissions  
*Chapter 13*

# Business Goals of Scope 3 Accounting & Reporting

- A. GHG management**, including identifying GHG reduction opportunities in the value chain; guiding investment and procurement decisions; and managing climate-related risk
- B. Performance tracking**, including setting a baseline, setting GHG reduction goals, and tracking progress over time
- C. Engaging partners** in the value chain to expand GHG accountability, transparency and management throughout the value chain
- D. Public reporting** of GHG emissions to meet the decision-making needs of stakeholders (e.g., policy-makers, investors, purchasers, customers, suppliers, employees, NGOs, etc.), as well as participation in corporate-level GHG reporting programs and registries

# Accounting & Reporting Principles

Principle	Definition
Relevance	Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.
Completeness	Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.
Consistency	Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.
Transparency	Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.
Accuracy	Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

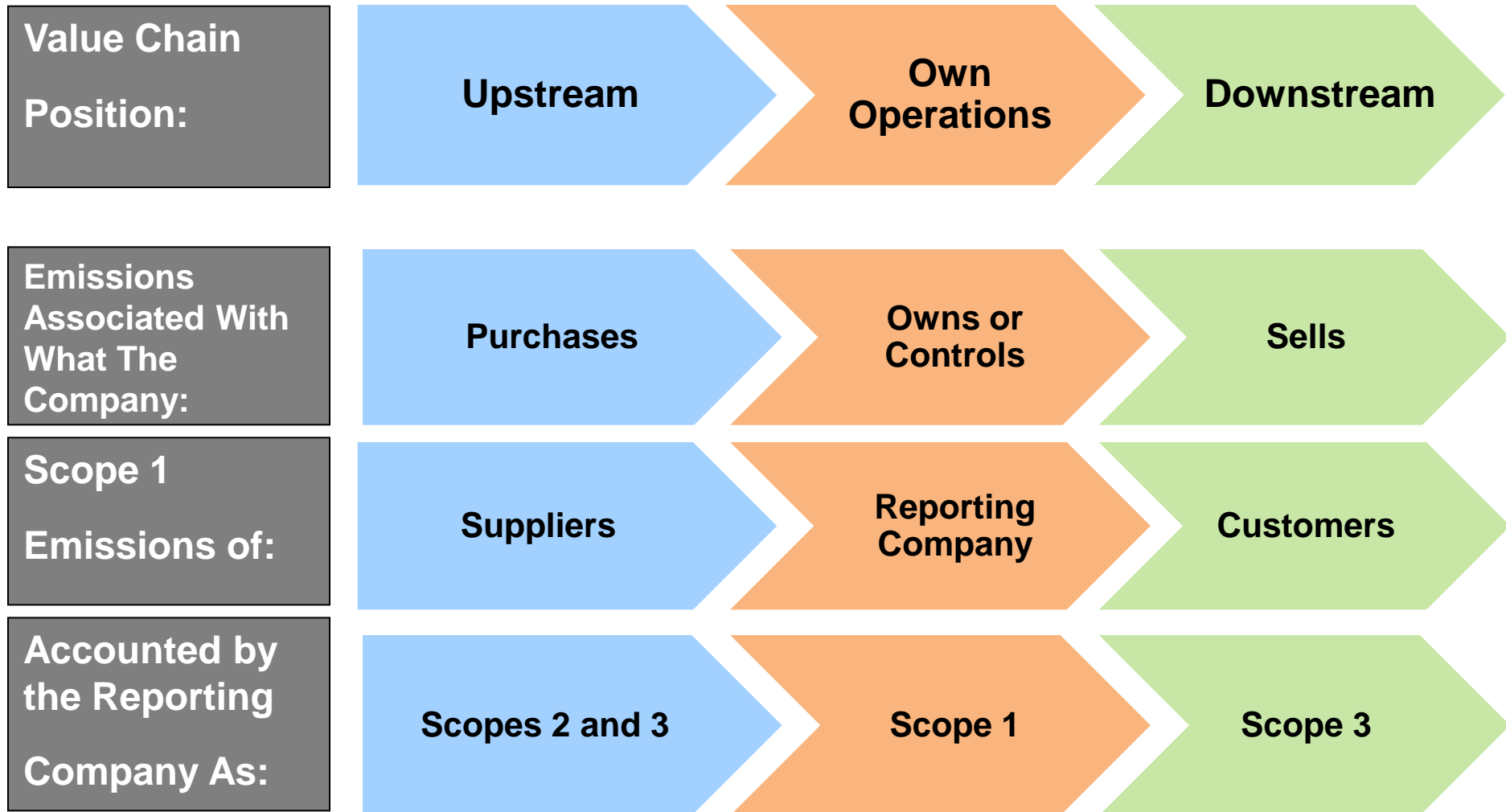


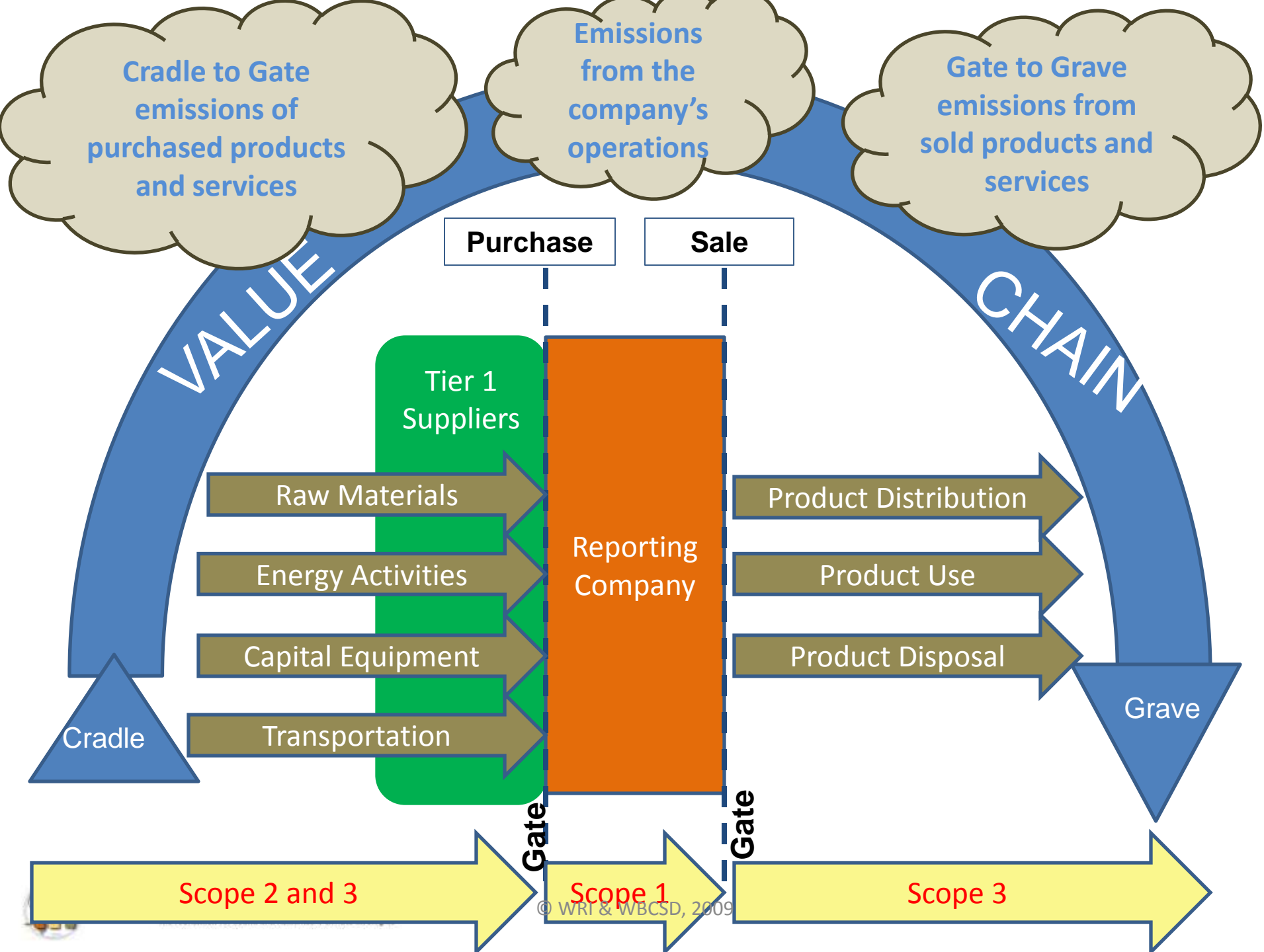


# Mapping the Value Chain: Upstream & Downstream Emissions

- A. Upstream emissions are the emissions that occur in the life cycle of purchased or acquired goods, services, materials, and fuels up through receipt by the reporting company
  - These include the emissions of your suppliers
  
- B. Downstream emissions are the emissions that occur in the life cycle of sold goods and services subsequent to sale by the reporting company
  - These include the emissions of your customers
  
- C. Other scope 3 emissions: employee commuting

# Mapping the Value Chain: Upstream & Downstream



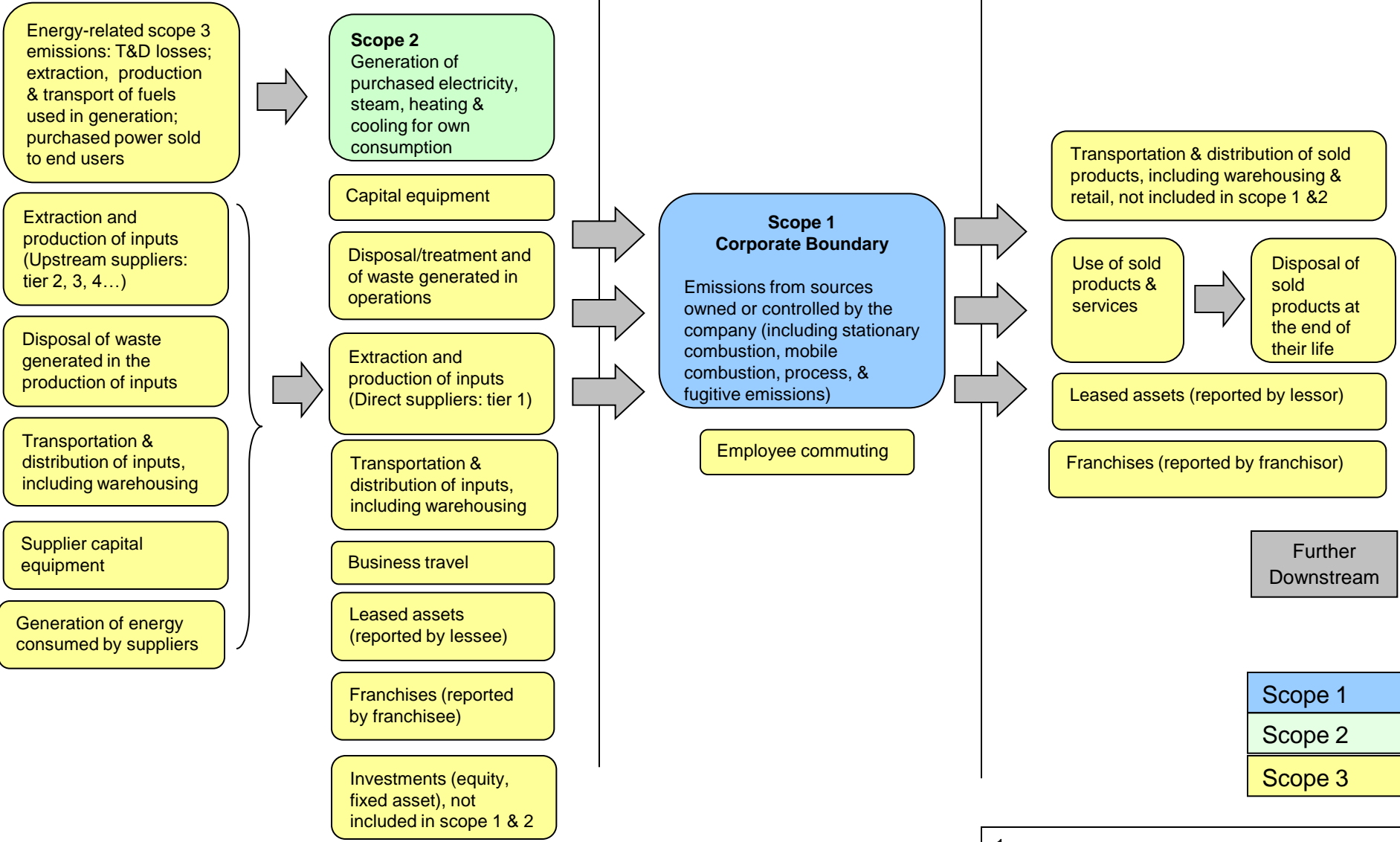


# UPSTREAM ACTIVITIES

# DOWNSTREAM ACTIVITIES

**Purchase<sup>1</sup>**

**Sale<sup>2</sup>**



Further Upstream

Directly Purchased

<sup>1</sup> Receipt of purchased goods and services  
<sup>2</sup> Delivery of sold goods and services

	Category	Source Description
Upstream Scope 3 Emissions from Purchased Products	1. Purchased Goods & Services: Direct Supplier Emissions	<ul style="list-style-type: none"> <li>Extraction and production of inputs (i.e., purchased or acquired goods, services, materials, or fuels) associated with tier 1 suppliers</li> <li>Outsourced activities, including contract manufacturing, data centers, outsourced services, etc.</li> </ul>
	2. Purchased Goods & Services: Cradle-to-Gate Emissions	<ul style="list-style-type: none"> <li>Extraction and production of inputs (i.e., purchased or acquired goods, services, materials, or fuels) associated with suppliers further upstream (tier 2, 3, 4, etc.)</li> <li>Manufacturing/construction of tier 1, 2, 3, 4... suppliers' capital equipment</li> <li>Disposal/treatment of waste generated in the production of inputs (i.e., purchased or acquired goods, services, materials or fuels)</li> <li>Transportation and distribution of inputs associated with suppliers further upstream (tier 2, 3, 4., etc.)</li> </ul>
	3. Energy-Related Activities Not Included in Scope 2	<ul style="list-style-type: none"> <li>Extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating and cooling (either purchased or own generated by the reporting company)</li> <li>Generation of electricity, steam, heating, and cooling that is consumed in a T&amp;D system (reported by end user)</li> <li>Purchase of electricity, steam, heating, and cooling that is sold to an end user (reported by utility company)</li> </ul>
	4. Capital Equipment	<ul style="list-style-type: none"> <li>Manufacturing/construction of capital equipment owned or controlled by the reporting company</li> </ul>
	5. Transportation & Distribution	<ul style="list-style-type: none"> <li>Transportation and distribution of inputs (i.e., purchased or acquired goods, services, materials or fuels), including intermediate (inter-facility) transport &amp; distribution, warehousing &amp; storage, warehousing and storage, associated with direct suppliers</li> <li>Transportation of waste generated in operations</li> </ul>
	6. Business Travel	<ul style="list-style-type: none"> <li>Employee business travel</li> </ul>
	7. Waste Generated in Operations	<ul style="list-style-type: none"> <li>Disposal/treatment of waste generated in operations</li> </ul>
	8. Franchises	<ul style="list-style-type: none"> <li>Operations of franchisor (reported by franchisee)</li> </ul>
	9. Leased Assets	<ul style="list-style-type: none"> <li>Manufacturing/construction and operation of leased assets not included in lessee's scope 1 (reported by lessee)</li> </ul>
	10. Investments	<ul style="list-style-type: none"> <li>GHG emissions associated with investments, including fixed asset investments and equity investments not included in scope 1 and 2</li> </ul>
Downstream Scope 3 Emissions from Sold Products	11. Franchises	<ul style="list-style-type: none"> <li>Manufacturing/construction and operation of franchise not included in franchisor's scope 1 (reported by franchisor)</li> </ul>
	12. Leased Assets	<ul style="list-style-type: none"> <li>Manufacturing/construction and operation of leased assets not included in lessor's scope 1 (reported by lessor)</li> </ul>
	13. Transportation & Distribution	<ul style="list-style-type: none"> <li>Transportation and distribution of sold products, including warehousing and retail</li> </ul>
	14. Use of Sold Products	<ul style="list-style-type: none"> <li>Use of sold products and services</li> </ul>
	15. Waste	<ul style="list-style-type: none"> <li>Disposal of sold products at the end of their life</li> </ul>
Other Scope 3 Emissions	16. Employee Commuting	<ul style="list-style-type: none"> <li>Employees commuting to and from work</li> </ul>

# Setting the Boundary

- After mapping the value chain, companies should identify which scope 3 emissions are most relevant for the company
- Companies shall account for and report all relevant scope 3 emissions of the reporting company
- Relevance means the GHG inventory:
  - Appropriately reflects the GHG emissions of the company, and
  - Serves the decision-making needs of users – both internal and external to the company
- Which scope 3 activities are most relevant differs by industry sector and by reporting company

# Setting the Boundary

- Scope 3 activities shall be considered relevant and reported if they are large (or expected to be large) compared to the reporting company's other sources of emissions
- To determine which scope 3 activities are most significant in size, companies should follow these steps:
  1. Use screening methods to individually estimate the emissions from all scope 3 activities (examples provided in Part 2 of the standard for each category)
  2. Express each individual scope 3 activity's estimated emissions as a fraction of total anticipated scope 3 emissions
  3. Rank all scope 3 activities from largest to smallest to determine which activities are most significant

# Setting the Boundary: Boundary Requirements

- Companies shall account for and report:
  - The largest scope 3 sources that collectively account for at least 80%\* of total anticipated scope 3 emissions;
  - The use phase emissions of select product types; and
  - All scope 1 and scope 2 emissions, as required by the GHG Protocol *Corporate Standard*

\* *The selection of an 80% threshold is tentative pending road testing*



# Use of Sold Products: *Required Product Types*

Product Type	Examples
<ul style="list-style-type: none"><li>Consumes fossil fuels in the use phase</li></ul>	Automobiles, engines, motors, buildings
<ul style="list-style-type: none"><li>Consumes electricity in the use phase</li></ul>	Appliances, electronics, lighting, buildings
<ul style="list-style-type: none"><li>Fuels</li></ul>	Petroleum products, natural gas, coal
<ul style="list-style-type: none"><li>Contains GHGs that are emitted during use</li></ul>	Aerosols, refrigerants, industrial gases, SF <sub>6</sub> , HFCs, PFCs, fire extinguishers



# Use of Sold Products: *Optional* Product Types

Product Type	Examples
<ul style="list-style-type: none"> <li>Indirectly consumes energy in the use phase</li> </ul>	Pots & pans (heating), textiles (washing), food (refrigeration)
<ul style="list-style-type: none"> <li>Other products that emit GHGs directly or indirectly during use</li> </ul>	Fertilizers Financial products/services
<ul style="list-style-type: none"> <li>When used, reduces the GHGs of other entities compared to a baseline</li> </ul>	Wind turbine or solar panel (compared to coal plant); ICT (compared to air travel); CFL bulb (compared to incandescent bulb)
<ul style="list-style-type: none"> <li>No GHG impact in the use phase</li> </ul>	Furniture
<ul style="list-style-type: none"> <li>Raw materials and intermediate goods where the eventual end use is unknown</li> </ul>	Iron ore, cement

# Prioritizing Relevant Emissions Based on Other Criteria

- Additional scope 3 activities (below the threshold) should be considered relevant if they meet any of the following criteria:

Criteria	Description
Influence	There are potential emissions reductions that could be undertaken or influenced by the company
Risk	They contribute to the company's risk exposure
Stakeholders	They are deemed critical by key stakeholders (e.g. customers, suppliers, investors or civil society)
Outsourcing	They are outsourced activities typically insourced by other companies in the reporting company's sector
Other	They meet additional criteria developed by the company or industry sector



# Collecting Data

Four-step process for collecting and evaluating data:



# Collecting Data: Data Types

Data Type	Description	Examples
<b>Primary Data</b>	Observed data collected from specific facilities owned or operated by the reporting company or a company in its supply chain	The reporting company surveys its suppliers and collects product-level data or scope 1 and 2 emissions data from specific facilities in its supply chain.
<b>Secondary Data</b>	Generic or industry average data from published sources that are representative of a company's operations, activities, or products	Data from life cycle inventory databases, literature studies, environmentally-extended input-output models; default IPCC emission factors; industry associations; etc.



# Collecting Data: Methods to Fill Data Gaps

Estimation Method	Description	Examples
<p><b>Extrapolated Data</b></p>	<p>Primary or secondary data related to a similar (but not representative) input, processor activity to the one in the inventory that are adapted or customized to a new situation to make more representative. For example, using data from the same or a similar activity type and customizing the data to the relevant region, technology, process, temporal period and/or product.</p>	<p>For example, there is secondary data available for electricity in Ukraine but not for electricity in Moldova. The company customizes the data for electricity in Ukraine to make it more representative of electricity in Moldova (e.g., by modifying the electricity generation mix).</p>
<p><b>Proxy Data</b></p>	<p>Primary or secondary data related to a similar (but not representative) input, process, or activity to the one in the inventory, which can be used in lieu of representative data if unavailable. These existing data are directly transferred or generalized to the input/process of interest without adaptation.</p>	<p>For example, there is secondary data available for electricity in Ukraine but not for electricity in Moldova. The company uses the data for electricity from Ukraine without modification as a proxy for electricity in Moldova.</p>

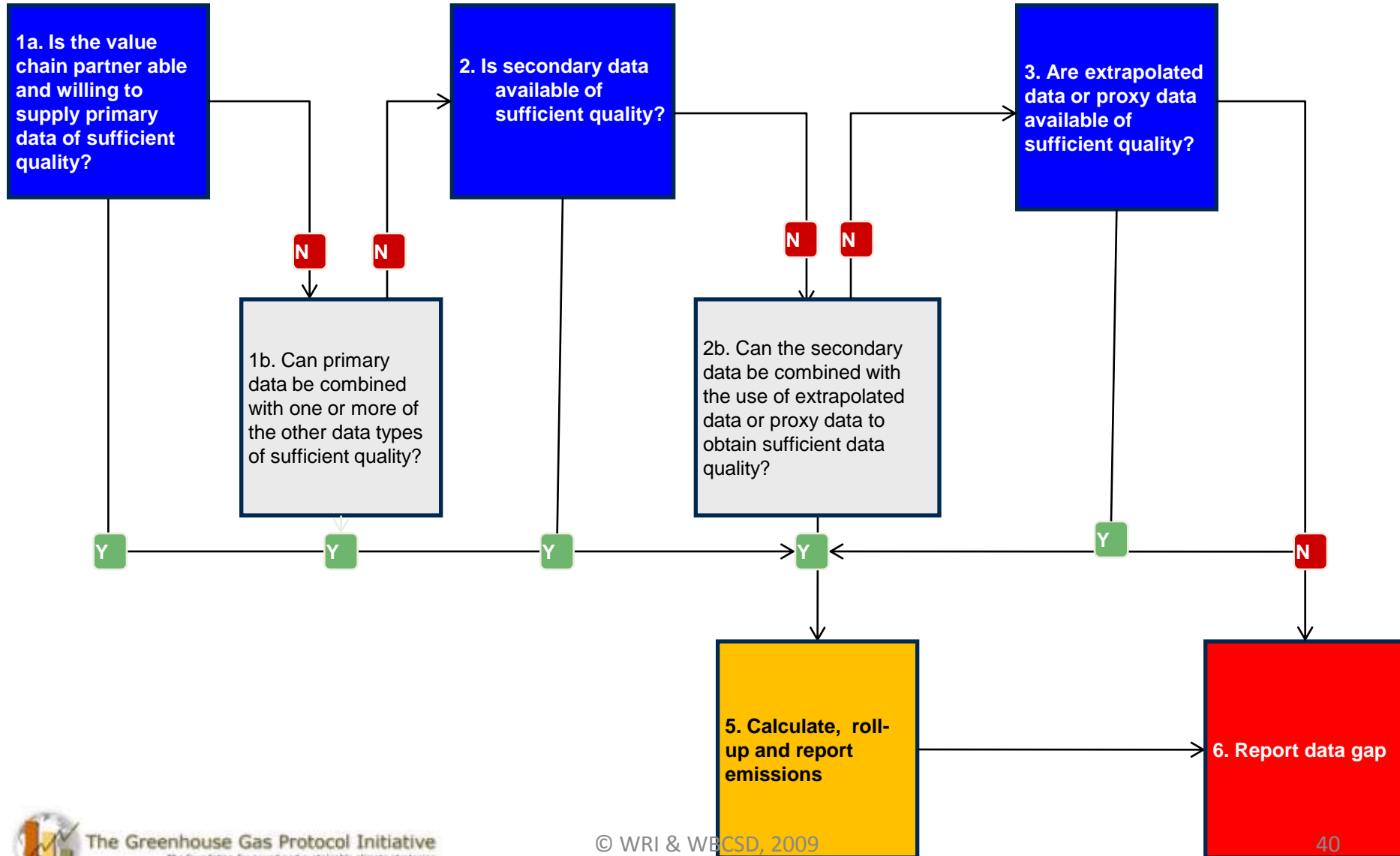


# Collecting Data

- As a general rule, companies should apply the following hierarchy in collecting data:
  1. Primary data
  2. Secondary data
  3. Extrapolated data
  4. Proxy data



# Collecting Data: Decision Tree





# Collecting Supplier Data

- When collecting primary data from value chain partners, companies should obtain the most product-specific data available, according to the following hierarchy:
  1. Product-level data
  2. Process-level data
  3. Facility-level data
  4. Business unit-level data
  5. Corporate-level data



# Data Quality Criteria

Criteria	Description
Technological representativeness	<ul style="list-style-type: none"><li>•Degree to which the data set reflects the actual technology(ies) used</li></ul>
Temporal representativeness	<ul style="list-style-type: none"><li>•Degree to which the data set reflects the actual time (e.g., year) or age of the activity or whether an appropriate time period is used (e.g., annual/seasonal averages may be appropriate to smooth out data variability due to factors such as weather conditions)</li></ul>
Geographical representativeness	<ul style="list-style-type: none"><li>•Degree to which the data set reflects actual geographic location of the activity, e.g., country or site</li></ul>
Completeness	<ul style="list-style-type: none"><li>•The degree to which the data represents the relevant activity</li><li>•The percentage of locations for which site specific or generic data are available and used out of the total number that relate to a specific activity. Generally, a percent target is identified for the number of sites from which data is collected for each activity</li></ul>
Precision	<ul style="list-style-type: none"><li>•Measure of the variability of the data points used to derive the GHG emissions from an activity (e.g., low variance = high precision). Relates mostly to where direct measurements have been used.</li></ul>



# Reporting Requirements

A public GHG emissions report shall include:

- Total scope 1 emissions, total scope 2 emissions, and all required scope 3 emissions, separately reported for each scope
- Emissions for all six Kyoto GHGs (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>)
- Scope 3 emissions reported separately for each scope 3 category
- List of excluded scope 3 emission sources with justification
- Emissions reported separately for sources calculated using primary data and sources calculated using secondary data
- Methodologies used to calculate or measure emissions
- Description of the uncertainties of reported emissions data
- Summary of data types used to calculate the inventory (e.g., the percentages of scope 3 emissions calculated using primary data, secondary data, and extrapolated/proxy data)



Illustrative GHG Reporting Form	Primary	Secondary	Total	Uncertainty
Scope 1: Direct Emissions from Owned/Controlled Operations				
Scope 2: Indirect Emissions from the Use of Purchased Electricity, Steam, Heating and Cooling				
Scope 3: Other Indirect Emissions				
a. Indirect Emissions from Purchased Products (Upstream)				
1. Purchased Goods & Services (Cradle-to-Gate Emissions) (Not Otherwise Included in Categories 2-10)				
2. Energy-Related Emissions (Not Included in Scope 2)				
3. Capital Equipment				
4. Transportation & Distribution				
5. Waste Generated in Operations				
6. Business Travel				
7. Franchises (Not Included in Scope 1 or 2)				
8. Leased Assets (Not Included in Scope 1 or 2)				
9. Investments (Not Included in Scope 1 or 2)				
10. Other				
b. Indirect Emissions from Sold Products (Downstream)				
1. Franchises (Not Included in Scope 1 or 2)				
2. Leased Assets (Not Included in Scope 1 or 2)				
3. Distribution of Sold Products				
4. Use of Sold Products				
5. Disposal of Sold Products at the End of Life				
6. Other				
c. Other Indirect Emissions				
1. Employee Commuting				
2. Other				
Direct (Tier 1) Supplier Emissions		N/A		
% of suppliers accounted for (as a % of total spend)				
CO <sub>2</sub> from Biomass Combustion	© WRI & WBCSD, 2009			44

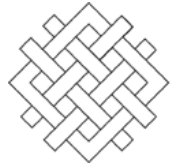


# Part 2: Guidance for Specific Scope 3 Categories

For each scope 3 category, Part 2 provides:

- Description of the category
- Guidance for determining relevant emissions
  - Emissions-based screening method
  - Financial-based screening method
  - Other criteria for determining relevant emissions
- Methods for calculating emissions
- Case studies and examples





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# Product Life Cycle Accounting & Reporting Standard



# Goal & Scope of Product Standard

- The primary goal of the standard is public disclosure of product level GHG emissions
- Implementing the standard may support additional business goals:
  - Identification of GHG reduction opportunities in the supply chain of a product
  - Performance tracking
  - Supply chain engagement and improved disclosure practices
  - Product differentiation
- The standard is intended for all product types and for companies in all sectors and sizes



# Goal & Scope of Product Standard

- The standard does not fully support product comparison
  - Valid product comparison, comparative assertion, and labeling require more sector-specific detail than is provided in the standard
- The standard will include guidance on how programs, product category rule (PCR) developers and organizations can create sector level consistency so that valid product comparisons and claims can be made





# Accounting & Reporting Principles

Principle	Definition
<b>Relevance</b>	Ensure the product GHG report serves the decision-making needs of all users identified within the report. Present information in the report in a way that is readily understandable by the intended users.
<b>Completeness</b>	Ensure that the GHG report covers all product life cycle emissions within the specified boundaries
<b>Consistency</b>	Use methodologies to allow for meaningful comparisons of subsequent GHG inventories over time.
<b>Transparency</b>	Address and document all relevant issues in a factual and coherent manner, based on a clear audit trail.
<b>Accuracy</b>	Ensure that reported GHG emissions are not consistently greater than or less than actual emissions and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the reliability of the reported information.



# Steps to Conducting a GHG Inventory



Establish the Methodology

Define the Functional Unit

Set the Boundary

Collect Data

Allocate Emissions

Assess Data Quality

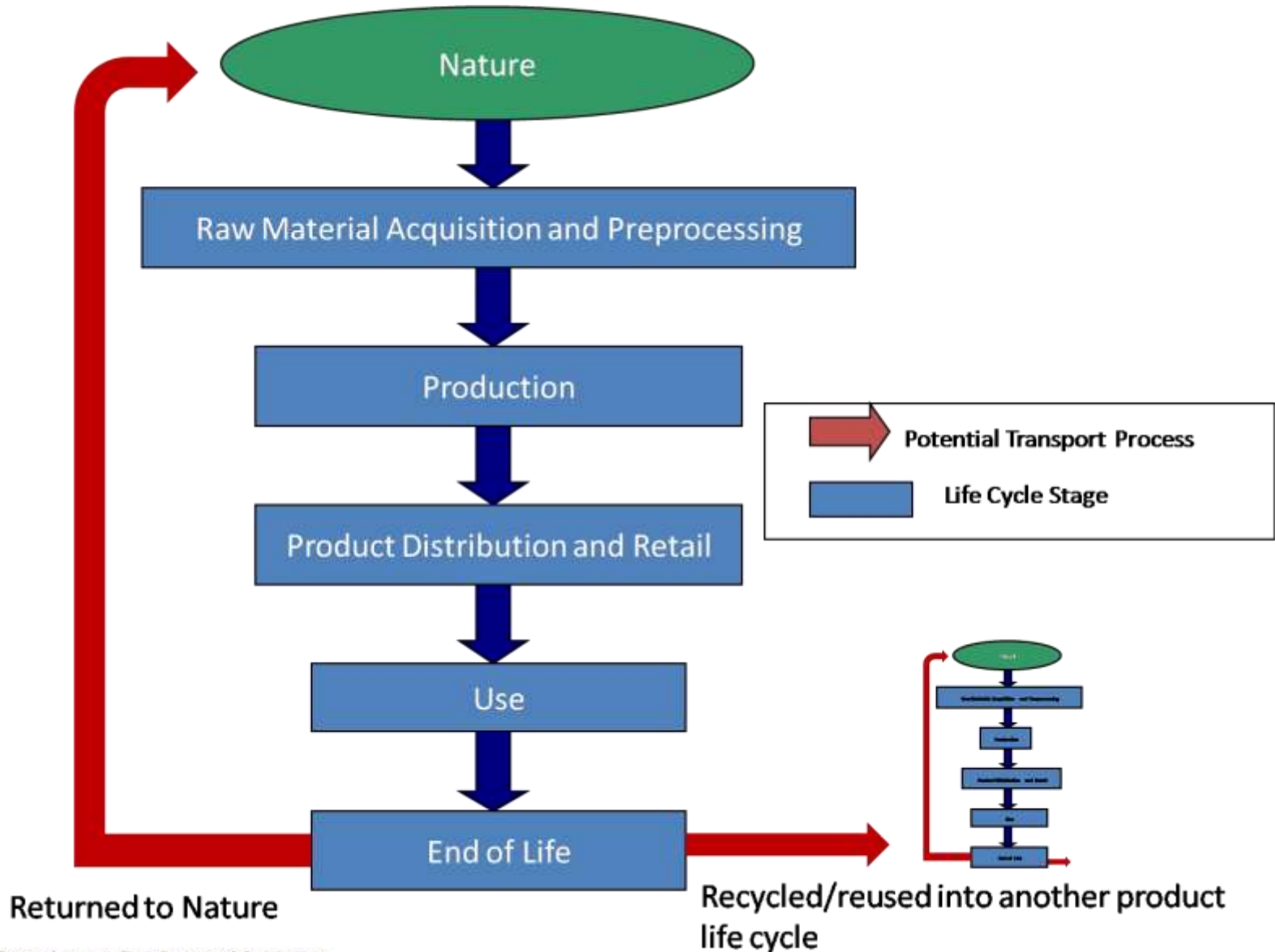
Calculate GHG Emissions

Conduct Assurance

Report the GHG Inventory



# Life Cycle Approach



# Establishing the Methodology

- Companies shall follow the process life cycle accounting approach
  - Quantify and aggregate the emissions from each specific process within the established boundary
- Companies shall report emissions of all six Kyoto Protocol greenhouse gases
- Companies shall use an attributional approach to assign life cycle GHG emissions to an individual product
  - An attributional approach provides information about the GHGs emitted directly by a product and its lifecycle
  - Companies should consult existing sector specific or program guidance to determine if any indirect or consequential emissions sources are applicable to a specific product



# Defining the Functional Unit

- Companies shall define the unit of analysis as the functional unit of the product
- Companies shall indentify the following elements when determining the functional unit:
  - The function or performance characteristics provided by the product system
  - Reference flow (i.e., amount of product necessary to fulfill the function and the quantity to which assessment results will be normalized)
  - Relevance to the study goal (i.e., why a particular functional unit was chosen in the context of a particular goal)



# Defining the Functional Unit

## Example

Functional Unit = Illumination



### *Function or performance characteristics*

- Lighting 10 square meters with 3000 lumens for 50000 hours

### *Reference flow*

- 300 light bulbs

### *Relevance to the study goal*

- To establish the GHG inventory of the Illumination characteristics of a specific light bulb over its full life cycle

### *Benefits of using a functional unit:*

- Allows comparison of similar products with the same function

# Setting the Boundary

- Companies shall account for all processes that are directly connected over the product's life cycle by material or energy flows
- Capital goods shall be included in the product system if deemed significant for the studied product or product sector
- Facility operations and corporate activities not directly connected to the product are optional
- Companies shall conduct a cradle-to-grave assessment for all final products
- Companies may conduct a cradle-to-gate assessment for intermediate products when the eventual fate of a product is unknown



# Setting the Boundary

## Examples of Foreground Processes

### Raw Material Acquisition and Preprocessing

- Mining and extraction (materials or fossil fuels)
- Cultivation of land, harvesting of trees or crops
- Preparation of product materials

### Production

- Production of the intermediate (semi-finished) product(s)
- Transport of intermediate products between foreground processes
- Production of final product by assembling of intermediate products
- Any additional preparing of finished product including forming, surface treatment, machining and other processes

### Distribution and Retail

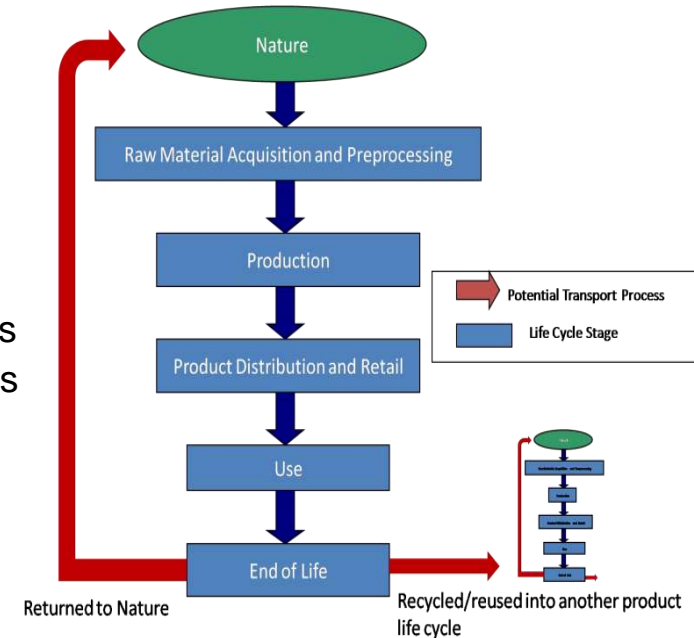
- Storage Operations, transportation between storage locations
- Shipping activities
- Retail activities

### Use

- Transportation to the use location
- Storage at the use location
- Preparation of product and normal use
- Repair and maintenance occurring during usage time
- Transportation to end-of-life

### End of Life

- Collection of end-of-life products and packages
- Dismantling of components from end-of-life products
- Shredding and sorting;
- Incineration and sorting of bottom ash
- Landfilling and landfill maintenance
- Transformation into recycled material, e. g. by remelting





# Setting the Boundary: Capital Goods

- Companies shall include capital goods if significant; companies may exclude capital goods if determined to be insignificant
  - Companies are encouraged to collect data or estimate emissions for capital goods before testing significance
  - Companies shall first look to sector-specific guidance or literature to determine qualitative significance
  - If no information is available, use a quantitative significance test

The influence of Capital Goods on Specific Sectors (Frieschknecht *et al.*, 2007)

Sector	Capital Goods Impact on Climate Change
fossil energy	minor
nuclear energy	substantial
biomass energy	substantial
renewable energy, not else covered (hydro, wind, solar)	major
metals	minor
mineral construction materials	minor
wood products	minor
agricultural products	minor
transport services	substantial
waste incineration	minor
landfilling	substantial
wastewater treatment	major



# Setting the Boundary: Intermediate Products

- Companies should first try to identify a use and end-of-life profile for the product
- If not possible, a company may perform a cradle-to-gate inventory
- The inventory report shall:
  - Clearly state that a cradle-to-gate inventory was performed
  - Justify why a cradle-to-grave inventory was not applicable

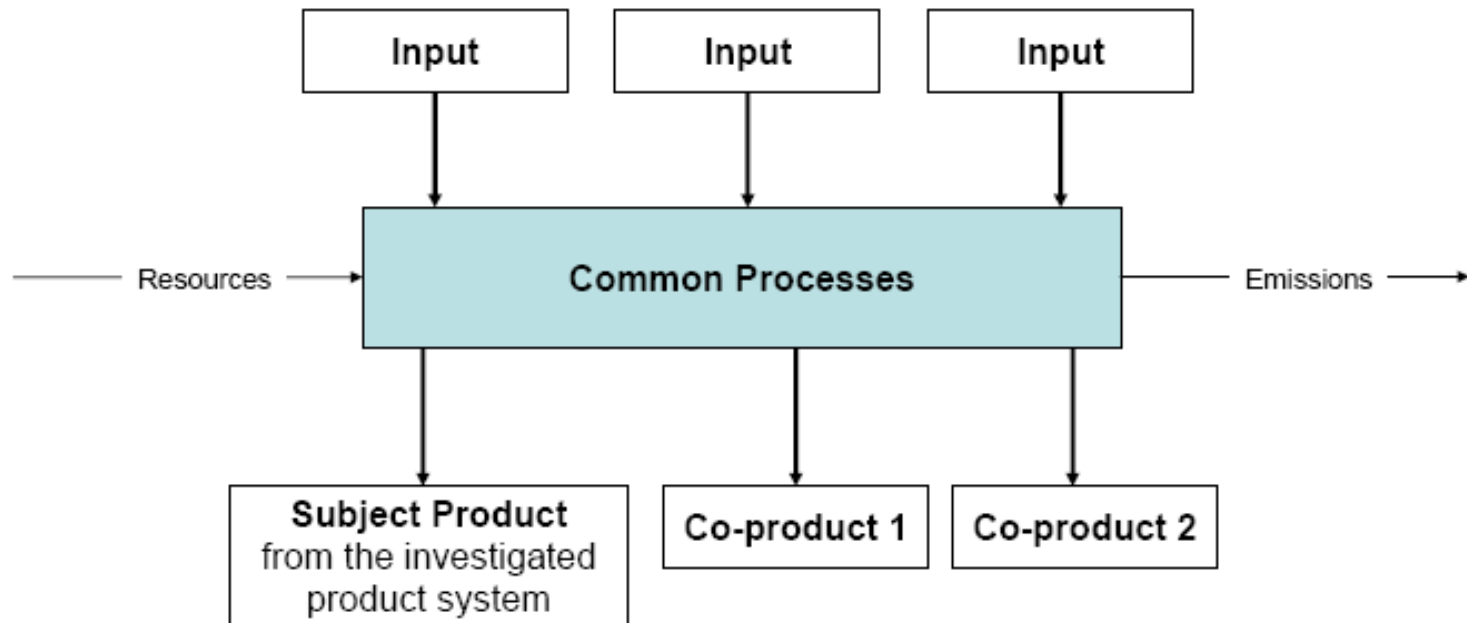
Intermediate products: goods and services that are used as inputs in the production of other goods and services. Intermediate goods do not enter the use stage in their current form, but are instead inputs to other products and require further transformation within the system. Examples include a steel bar, microchip, and electrical motor.

Final products: goods and services that are ultimately consumed by the end user rather than used in the production of another good or service. Final goods enter the use stage in its current form without further transformation. Examples include a car, laptop computer, or vacuum cleaner.



# Allocation

- Allocation problems exist when a process involves multiple inputs and/or multiple outputs



# Allocation

- When addressing a shared process, a company shall first consider if allocation can be avoided, by using one of the following methods:
  - Process subdivision: Avoid allocation by disaggregating shared processes
  - Direct system expansion: Avoid allocation by expanding the functional unit to include outputs (co-products) from a shared process
- To perform allocation, a company shall adhere to the general accounting principles of completeness, transparency, accuracy, and consistency
- The appropriate allocation methods shall be chosen with a preference for decisions based on natural science



# Allocation Methods

- If allocation is necessary, the company shall use one of the following methods (following a decision tree provided):

Method	Description
Physical Allocation Factors (e.g. mass, energy, volume, etc.)	Allocating the inputs and emissions of the system based on an underlying physical relationship between the quantity of product and co-product and the quantity of emissions generated.
Substitution	Using the emissions from an alternative product that comprises the same functional unit as a co-product to estimate the emissions of the co-product with the remaining emissions being allocated to the subject product and remaining co-product(s).
Market Value	Allocating the inputs and emissions to the subject product and co-product(s) based on the market value of each product at the exit of the process.
Other Relationships	Dividing the process emissions among the outputs using a factor based on other scientific approaches than natural science (e.g. from social and economic sciences) or international conventions
Value Choice/ Arbitrary	If none of the above methods is applicable, a company should allocate based on value choice or arbitrary factors



# Collecting Data

- Primary data shall be collected for all processes under the control of the reporting company
- For all other processes, primary or secondary data of the highest practical quality shall be collected
- Data gaps shall be filled using extrapolation or proxy data



# Collecting Data: Data Types

<b>Primary Data</b>	Relates to activity data, emissions factors, or direct emission measurements for a specific process related to a specific product manufactured by a company or another company in its supply chain.
<b>Secondary Data</b>	Relates to activity data, emissions factors or direct emissions measurements for processes related to a specific product that are <b>not directly measured</b> by the reporting company or a company in its supply chain. Secondary data may be process data or non-process data
<b><i>Process Data</i></b>	Physical flow data relating to the individual process within the defined system boundary, and may consist of site specific primary data, generic/average secondary data, and secondary data from literature studies, expert estimates, and impact assessments
<b><i>Input Output Data</i></b>	Non-process data derived from an environmentally extended input-output analysis (IOA), which is the method of allocating GHG emissions (or other environmental impacts) associated with upstream production processes to groups of finished products by means of inter-industry transactions.
<b>Extrapolated Data</b>	Primary or secondary data related to a similar (but not representative) input, processor activity to the one in the inventory that are adapted or customized to a new situation to make more representative.
<b>Proxy Data</b>	Primary or secondary data related to a similar (but not representative) input, process, or activity to the one in the inventory, which may be used in lieu of representative data if unavailable. These existing data are directly transferred or generalized to the input/process of interest without adaptation.

# Data Quality Assessment

- A data quality assessment shall be undertaken for all GHG emissions sources that cumulatively sum to 75% of total product emissions, beginning with the largest emissions source
- For all processes quantified using *any* primary data, a qualitative data quality assessment shall be undertaken based on technological, temporal and geographical representativeness, completeness, and precision
- For processes that only used secondary data, the data quality assessment shall be undertaken based on technological, temporal and geographical representativeness





# Criteria to Evaluate Data Quality

Score	Representativeness to the process in terms of:			Completeness	Precision (for direct measurement only)
	Technology	Time	Geography		
<b>4 (Very Good)</b>	Data from enterprises, processes and materials that are part of the product account	Data with less than 3 years of difference to the product account	Data from the area relevant to the product account	Representative data from all relevant sites over an adequate time period to even out normal fluctuations	Data has less than 5 percent standard deviation for large emissions sources
<b>3 (Good)</b>	Data on processes and materials from the product account but from different enterprise	Data with less than 6 years of difference to the product account	Average data from a larger area but includes the area relevant to the product account	Representative data from more than 50 percent of sites for an adequate time period to even out normal fluctuations	Data has less than 20 percent standard deviation for large emissions sources
<b>2 (Fair)</b>	Data on processes and materials from the product account but with different technology OR related processes and materials and same technology	Data with less than 10 years of difference to the product account	Data from an area smaller that that relevant to a product account	Representative data from less than 50 percent of sites for an adequate time period to even out normal fluctuations OR more than 50 percent of site but for shorter time period	Data has less than 50 percent standard deviation for large emissions sources
<b>1 (Poor)</b>	Data on related processes and materials to those in the product account but different technology OR data where technology is unknown	Data with more than 10 years of difference to the product account OR the age of the data is unknown	Data from an area that has slightly similar production conditions to that relevant to the product account OR area that data relates to is unknown	Representative data from less than 50 percent of sites for shorter time period OR representativeness is unknown	Data has more than 50 percent standard deviation for large emissions sources

# Calculating Emissions

- The total GHG emissions for a product inventory shall be calculated as the sum of GHG emissions, in CO<sub>2</sub>e, of all processes within the system boundary



# Assurance

- The product GHG Inventory shall be assured
- Assurance may be:
  - First Party (“Self” or “Internal”) assurance – Persons from within the organization but independent of the product GHG inventory determination process
  - Third Party (“External”) assurance – Persons from a certification or assurance body independent of the product GHG inventory determination process
- Assurance providers shall be sufficiently independent of any involvement in the determination of the product GHG inventory
- The assurance opinion shall be expressed in the form of either reasonable (high) assurance or limited (moderate) assurance

Assurance (referred to as “verification” in the GHG Protocol *Corporate Standard*) is an objective assessment of the accuracy, completeness and presentation of a reported product GHG inventory and the conformity of the product GHG inventory to the standard. In order to state compliance with the standard, the product GHG inventory shall be assured



# Reporting

- A company shall publicly disclose a GHG inventory report
- The report shall include both a summary report and detailed report
  - Summary report for a general audience
  - Detailed report for an audience familiar with GHG accounting
- The summary and detailed reports shall be disclosed together



# Summary Report

- The summary report shall include:
  - An introduction to the inventory
  - Process map
  - Emissions data, in total and by life cycle stage
  - Assurance and data quality information



# Summary Report

<i>Type of Inventory</i>	
<b>Final Product - Complete GHG Inventory (Cradle to Grave), OR Intermediate Product - Partial GHG Inventory (Cradle to Gate)</b>	
<b>General Information</b>	
<i>Parameter</i>	<i>Description [Template Notes]</i>
Company Name and Contact Information	
Product Name	[Material Product or Service, Brand Name if applicable]
Product Description	[Brief product description including whether it is a final or intermediate product]
Functional Unit	[For Cradle to Gate assessments, the boundary of the functional unit should be clearly stated]
Country/ Region of Product Consumption	[for Cradle to Grave assessments]
Inventory Date and Version	[Year inventory was finalized] [1 if first inventory, 2, 3, etc. for future versions]



# Summary Report

Study Results: Total Product GHG Inventory		
<i>Parameter</i>	<i>Value</i>	<i>Unit</i>
Total GHG Inventory	[Value]	[gram base unit CO <sub>2</sub> e per Functional Unit]
Study Results: Percent of Life Cycle Stage		
<i>Stage Name</i>	<i>Value (Percent of Total CO<sub>2</sub>e)</i>	<i>Comments</i>
Raw Material Acquisition & Preprocessing	[Value]	<i>[Brief description of inclusions and end points for each stage]</i>
Production & Service Delivery		
Distribution & Storage		
Use		
End-of-Life		
Quality Assessment Information		
Assurance Type	[External or Internal, Performed by Whom]	
Assurance Opinion	[Limited or Reasonable]	
Data Quality Assessment	[Statement on Overall Data Quality]	



# Detailed Report

- The detailed report shall include additional information on:
  - Sector or product specific data used
  - Assumptions and justifications
    - Cradle to gate inventories
    - Temporal boundary
    - Exclusion of capital goods
    - Allocation (performed on data collected under the ownership of the company)
    - Recycling
  - Data quality







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# Next Steps



# Timeline

Date	Activity
November 2007	✓ Survey and consultations to assess need for new standards
September 2008	<ul style="list-style-type: none"> <li>✓ Steering Committee Meeting #1 (Washington DC)</li> <li>✓ Technical Working Group Meeting #1 (London)</li> </ul>
January 2009	✓ Working groups begin drafting
March 2009	✓ Steering Committee Meeting #2 (Geneva)
June 2009	✓ Technical Working Group Meeting #2 (Washington DC)
August 2009	✓ Stakeholder webinar and comment period
October 2009	✓ Steering Committee Meeting #3 (Washington DC)
November - December 2009	<ul style="list-style-type: none"> <li>✓ First draft of standards released for stakeholder review</li> <li>✓ Five stakeholder workshops (in Berlin, Germany; Guangzhou, China; Beijing, China; London, UK; Washington, DC, USA)               <ul style="list-style-type: none"> <li>▪ Stakeholder comment period on first drafts</li> </ul> </li> </ul>
January - June 2010	<ul style="list-style-type: none"> <li>▪ Pilot testing by several companies</li> </ul>
Summer 2010	<ul style="list-style-type: none"> <li>▪ Public comment period on second drafts</li> </ul>
December 2010	<ul style="list-style-type: none"> <li>▪ Publication of final standards</li> </ul>

# Road Testing

## **Considerations for Selection**

*WRI/WBCSD will select a diversity of road testing companies, based on:*

- Sector and product type
- Company sizes
- Geographic locations of operation
- Experience with GHG inventories and product life cycle assessment

## **Commitment Level**

*Road testing companies are expected to:*

- Designate a lead staff contact to manage the road testing process of the Scope 3 and/or Product Standard
- Participate in monthly progress calls
- Attend a road testing workshop in May 2010 to share feedback
- Complete an inventory report in accordance with the respective standard within the 4-6 month time period
- Provide detailed feedback on the strengths and challenges of the draft standard(s) and suggestions for improvement
- Assist in the development of a case study highlighting key lessons learned

*For more information, visit [www.ghghprotocol.org](http://www.ghghprotocol.org)*

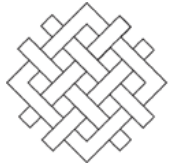


# Process for Submitting Written Comments

- The draft standards are open for stakeholder comment from November 11, 2009 through December 21, 2009
- To provide written comments, please use the comment template provided
- Comments due by December 21, 2009
- Draft standards and comment templates available at [www.ghgprotocol.org](http://www.ghgprotocol.org)

# Process for Revising Draft Standards

- In 2010, WRI and WBCSD, in collaboration with the Steering Committee and Technical Working Groups, will:
  1. Revise the draft standard based on feedback received during 5 stakeholder workshops and the stakeholder comment period
  2. Road test the draft standards with 25 companies from a diversity of industry sectors and geographic locations during January to June 2010
  3. Revise the draft standards based on feedback received during road testing
  4. Circulate second drafts for public comment in mid-2010
  5. Revise second drafts based on feedback received
  6. Publish the final standards in December 2010



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