



INDIA
GHG
PROGRAM

Promoting profitable, sustainable
and competitive businesses.

Tracking Emissions over time and Calculating GHG emissions

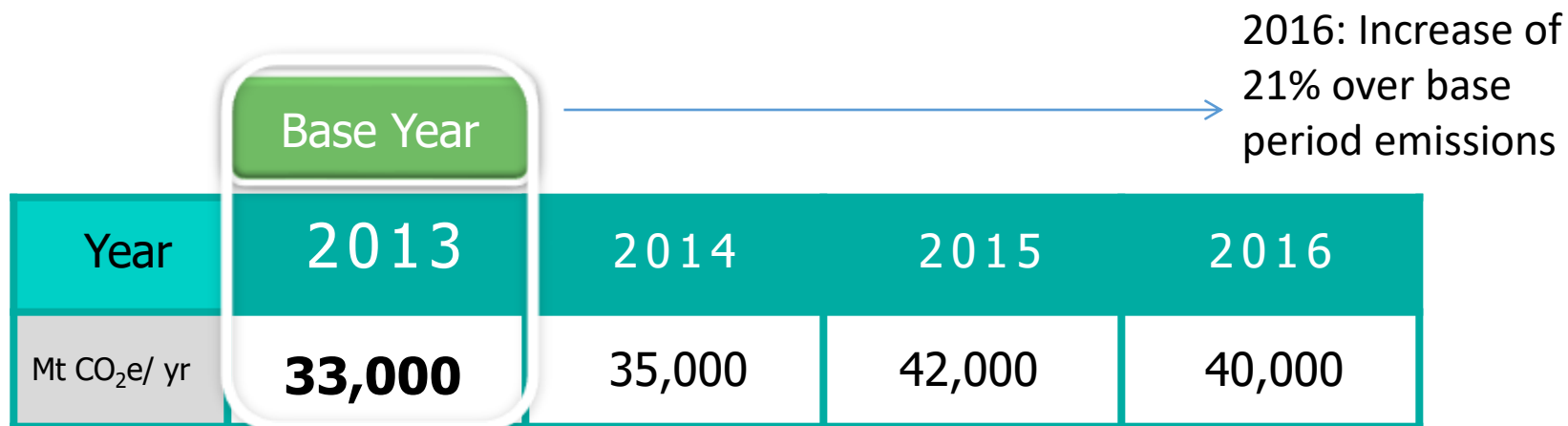


Tracking Emissions over Time

- Base year = reference point in the past with which current emissions can be compared.

Advantages

- Track progress towards reduction targets;
- Meaningful comparisons of 'like with like' over time;
- Put effects of changes in inventory into context.



Choosing a Base Year

- Select the earliest year for which verifiable emission data for required scopes is available;

2005

Scope 1	
Scope 2	8,000
Scope 3	

2006

Scope 1	
Scope 2	8,500
Scope 3	

2007

Scope 1	4,500
Scope 2	9,000
Scope 3	

2008

Scope 1	4,500
Scope 2	9,500
Scope 3	11,000

- Specify why you choose that particular year;
- If emissions fluctuate dramatically on annual basis, consider averaging over a series of consecutive years as your base year.

Recalculating Base Year Emissions

- Retroactively calculating base year emissions to reflect company changes that could compromise consistency and relevance of emission data;
- Develop a base year emissions recalculation policy and apply it in a consistent manner;
- State the basis and context of any calculations.

Recalculate for...

- Significant change in structure of organization;
 - ✓ Merger, acquisitions and divestments;
 - ✓ Outsourcing and Insourcing of emitting activities;
- Significant changes in calculation methodology;
 - ✓ Improved emission factors;
 - ✓ Improved activity data;
- Discovery of **significant** errors or small errors that are collectively significant.

Significant Thresholds

- **Significance threshold**: a criterion used to determine whether a change is significant enough to warrant recalculation;
 - ✓ Take into account what's the cumulative effect on base year emissions of number of small acquisitions and divestments;
- 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 re-calculate if out- or in-sourcing of emitting activities were previously included in a different scope;
- Structural changes happening in the middle of the year – base year emissions to be re-calculated for entire year.

If A acquires B

(assuming B existed in A's base year)

- A should include B's emissions in
 - ✓ A's base year inventory and
 - ✓ A's current year inventory

If A divests of B

(assuming B existed in A's base year)

- A should exclude B's emissions from
 - ✓ A's base year inventory and
 - ✓ A's current year inventory

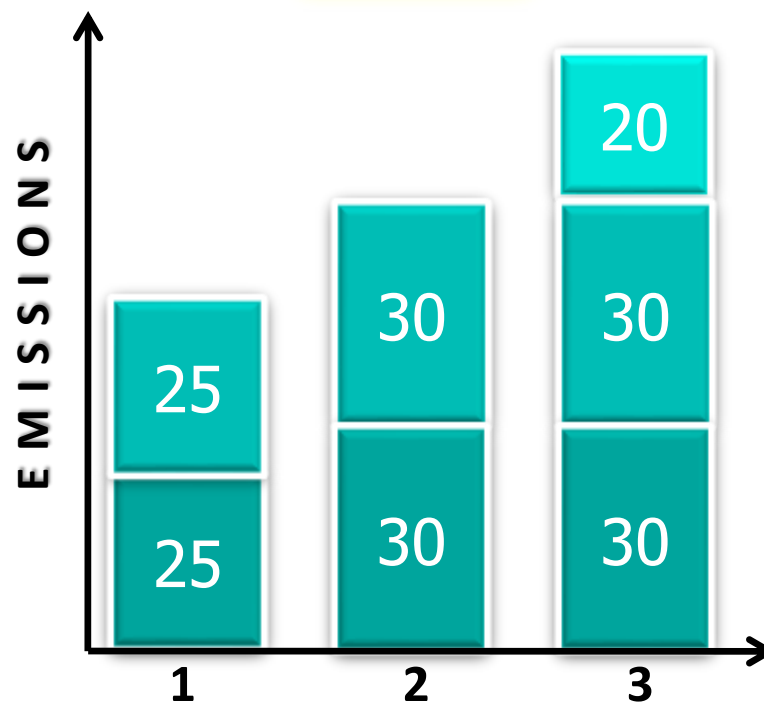
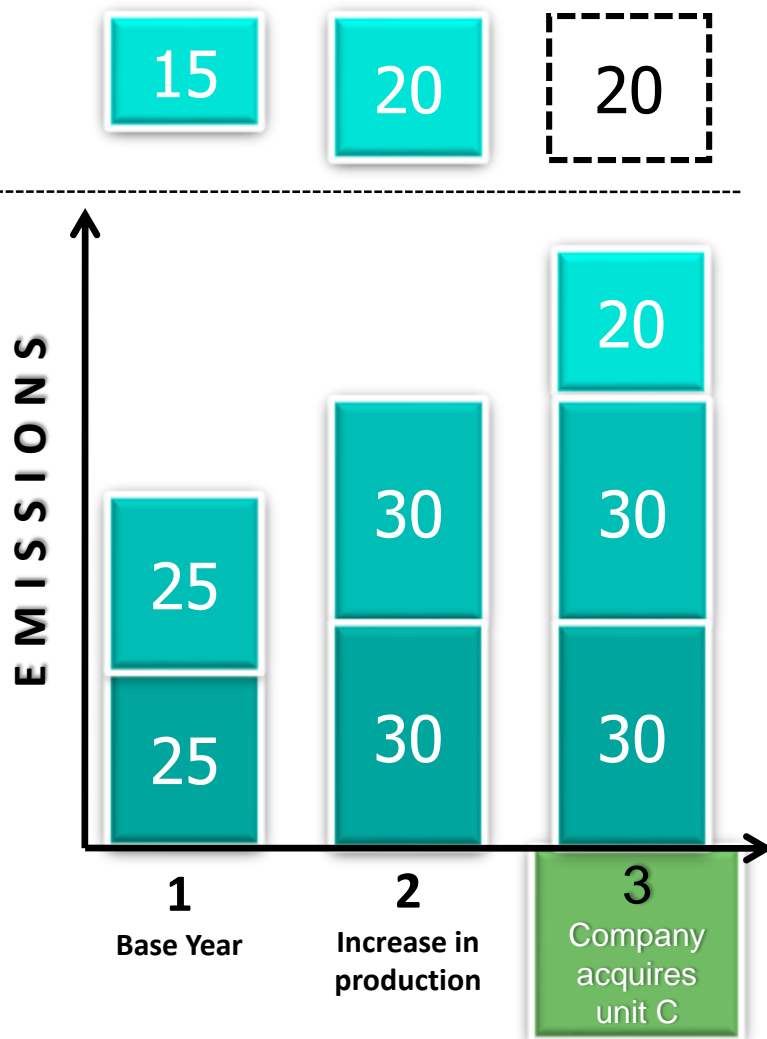
Changes not requiring Recalculation

- Changes involving facilities that did not exist in the base year;
- Out-sourcing/in-sourcing of activities previously reported under a different Scope;
- Organic growth or decline

Recalculation: Acquisition

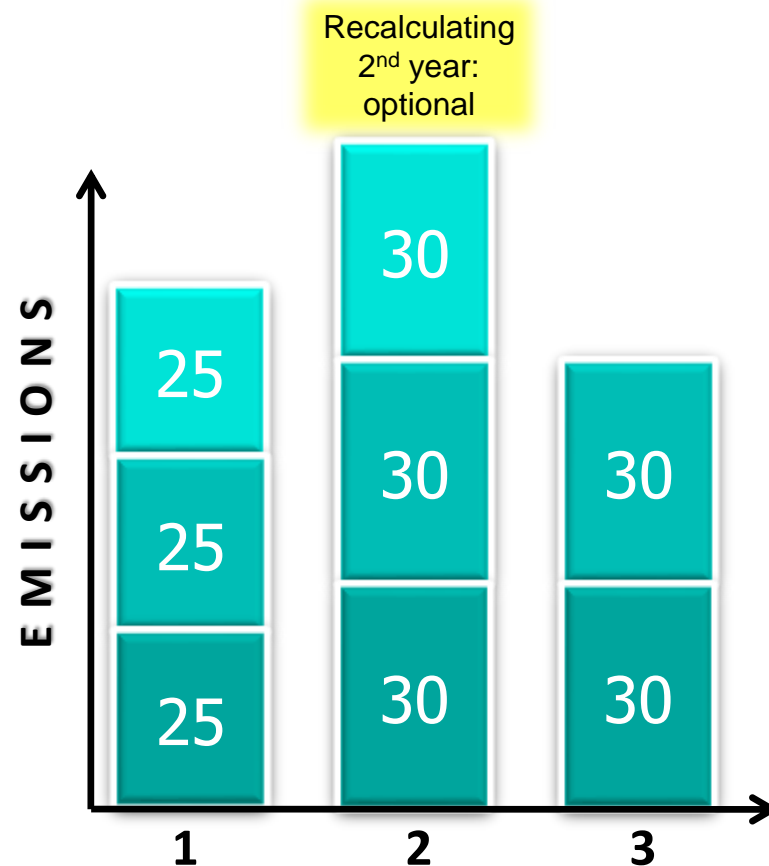
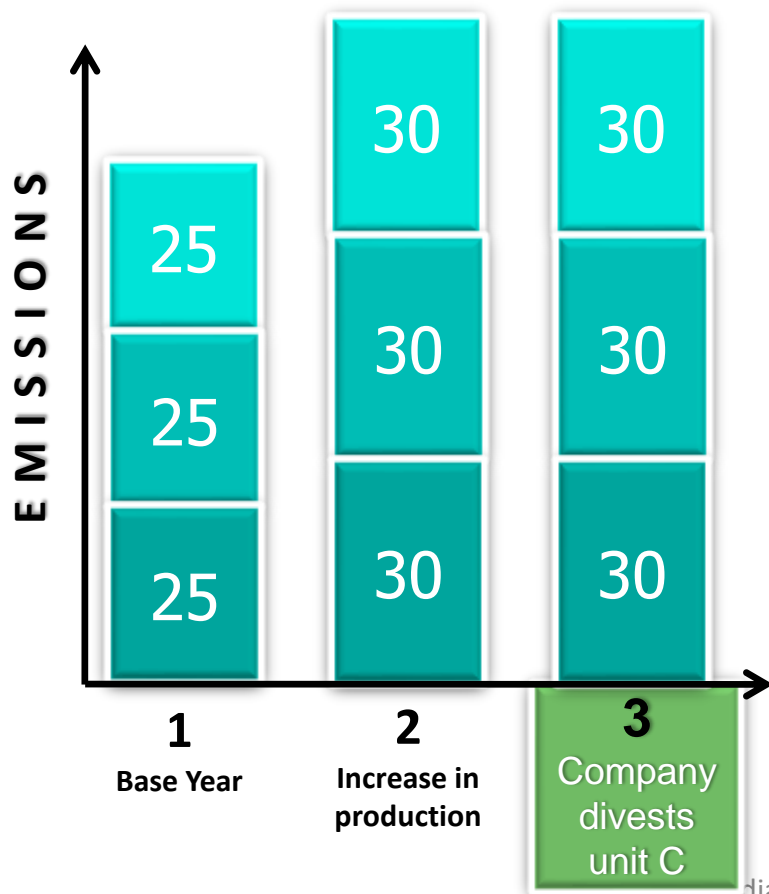
Recalculated Figures

Recalculating
2nd year:
optional



Recalculation: Divestment

Recalculated Figures

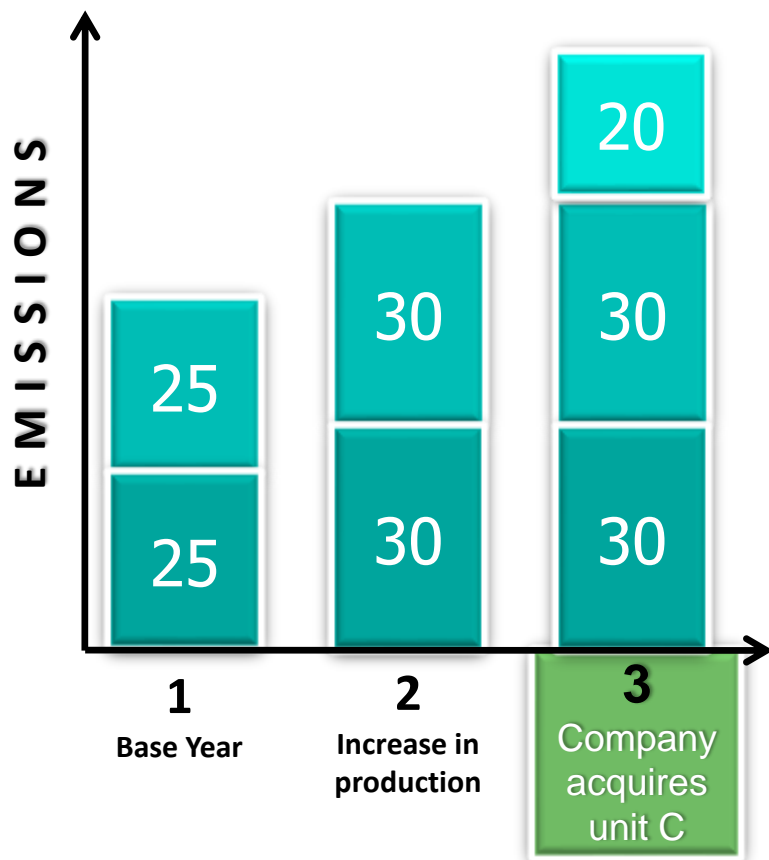


Recalculation: Acquisition of facility not in Base Year

did NOT
exist

15

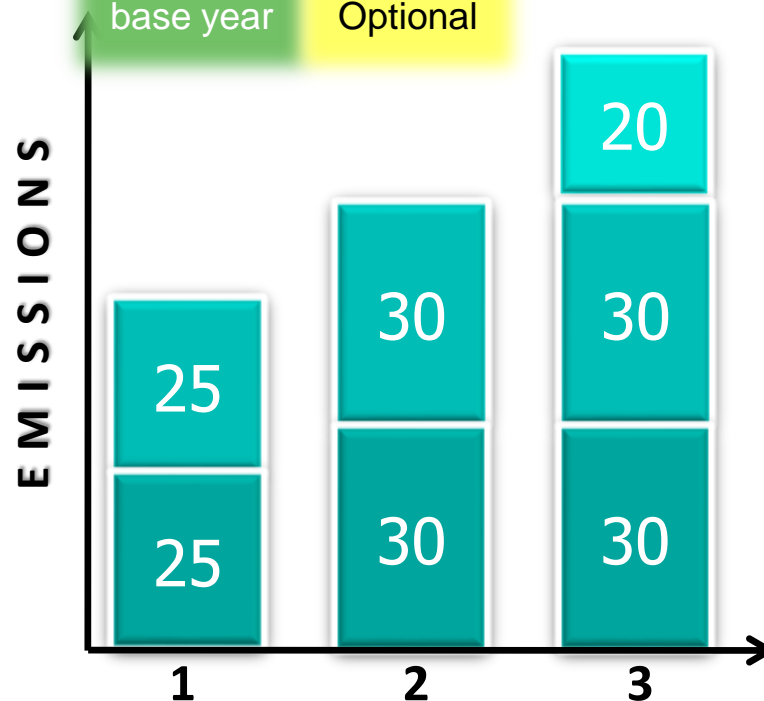
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Recalculated Figures

Do not
recalculate
base year

Recalculate
2nd year:
Optional






Timing of Recalculation

- If structural changes occur in the middle of the year, recalculate for the entire year;
- This “all-year” option:
 - is less complicated;
 - gives the same result as calculating for the remainder of the year and making adjustments;
 - avoids recalculations for subsequent years.

- The demand for Company A's products increases.
- It opens a new factory in year 2 to meet this demand.

No

(don't recalculate for organic growth)




		
Base year	Year 2	Year 3

- It acquires an older factory from Company E in year 2 to meet this demand.

Should the base year emissions be recalculated?

Yes

(recalculate for acquisitions)

		
Base year	Year 2	Year 3
50,000		

- Company sets a 5% significance threshold for errors
- Original emissions calculations:

Base year	Year 2	Year 3
325,000	300,000	330,000

- Later, an error was detected.
- Emissions were then correctly calculated:

Base year	Year 2	Year 3
90,000	80,000	85,000

Should the base year emissions be recalculated?

Yes

(errors met 5% significance threshold, triggering recalculation)

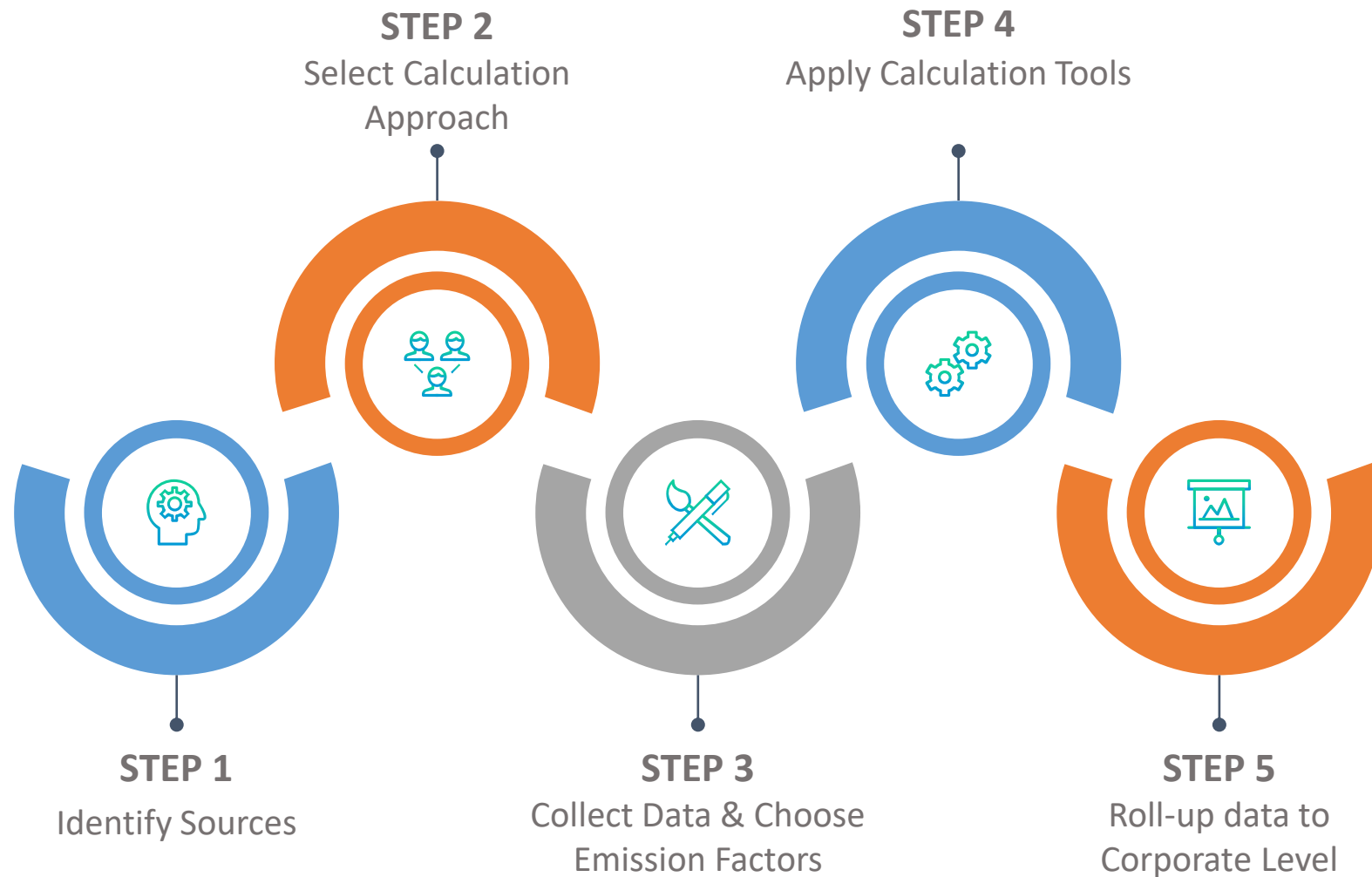
SITUATION	BASE YEAR RECALCULATION?
Company acquires another company	Yes if acquired company existed in base year of reporting company
Production of steam is out-sourced	No emissions move from Scope 1 to Scope 2
Company produces more and emissions increase	No
Company installs continuous emissions monitoring systems and collects more accurate data	Yes if more accurate data show changes that meet significance threshold

- Base year: the year in history against which an organization's emissions are tracked over time
- Define your organization's recalculation policy
 - ✓ Define significance threshold to trigger base year recalculation
- Recalculate for
 - ✓ structural changes
 - ✓ changes in calculation methodology
 - ✓ discovery of significant errors
- 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



Identifying & Calculating Emissions

Key Steps



Identifying Emission Source Categories

- Stationary combustion: fuel burned in stationary sources
 - ✓ Ex: boilers and heaters
- Mobile combustion: fuel burned during transportation
 - ✓ Ex: cars, airplanes, ships
- Process emissions: from physical or chemical processes
 - ✓ Ex: cement calcination, aluminum smelting
- Fugitive emissions: intentional and unintentional releases
 - ✓ Ex: equipment leaks, cooling towers, CH₄ from natural gas pipelines, HFCs from air conditioning and refrigeration
- Consult Appendix D: Emissions by Industry Sector and Scope

Identifying Emissions

Scope 1

- Process emissions usually in certain industry sectors
- Identify direct emission sources in 4 categories

Scope 2

- Almost all companies Purchased electricity

Scope 3

- Emissions along value chain;
- Upstream of downstream of owned operations

Calculation Approaches

- Direct Measurement: monitor GHG concentration and flow rate, such as with a filter on an exhaust pipe
 - ✓ E.g. Continuous Emissions Monitoring Systems (CEMS)
- Stoichiometric Calculation: measures which elements enters and leaves the system
 - ✓ E.g. Mass balance approach
- Estimate emissions: multiply activity data (e.g. fuel use records) by appropriate emission factors
 - ✓ Most common approach

- **Basic Equation:** $AD \times EF \times GWP = \text{Emissions (tCO}_2\text{e)}$
- Examples of activity data:
 - ✓ Electricity used (kWh);
 - ✓ Distance travelled (kms);
 - ✓ Diesel or Petrol used (Litres)
- Finding Activity Data: Most companies should consult these records:
 - ✓ Scope 1: Purchased records for fuel;
 - ✓ Scope 2: Metered electricity consumption records;
 - ✓ Scope 3: Activity data such as fuel use, passenger miles, etc.

- Emission factors convert activity data to emission values;
- Published by National (Govt.) Agencies and Intergovernmental organizations;
- Use most recent value while maintain consistency;
- How is it actually derived?

Fuel	Carbon Content	Oxidation Factor	Net Calorific Value	Carbon Molecule Mass Ration	Fuel Density	= Emission Factor
L (or kg)	Kg/GJ	-	TJ/Gg	-	Kg/L	tCO ₂ /L
Diesel	20.2	1	43	44/12	0.845	2.691

- Make sure units match!!!

Global Warming Potential

- Higher GWP = more warming capacity
- Use to calculate carbon dioxide equivalent (CO₂e)
- Source: IPCC Assessment Reports
 - ✓ Choose 2nd or 5th Assessment Report values;
 - ✓ Use of latest values is recommended.

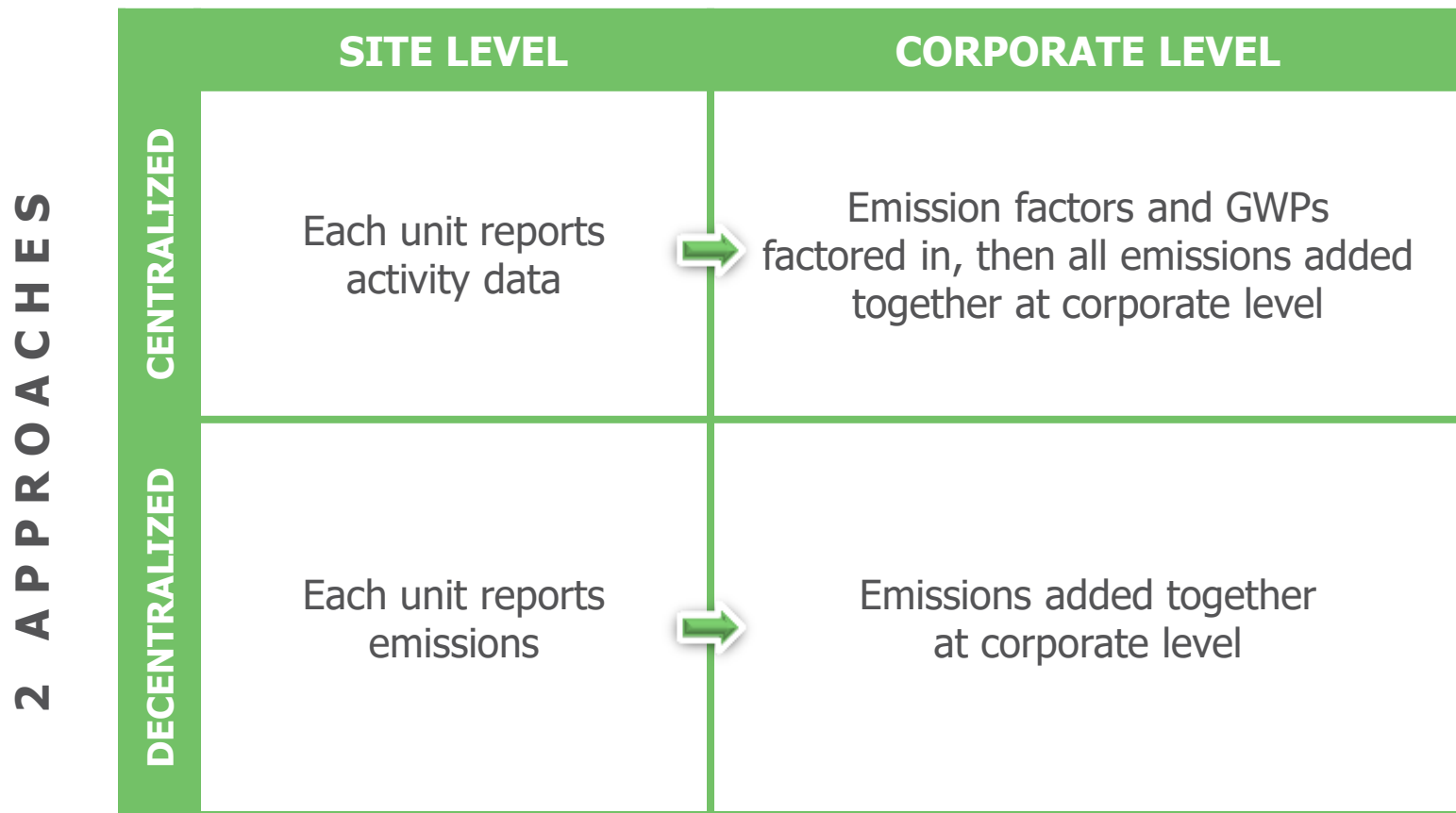
GHG	GWP
CO ₂	1
CH ₄	21
N ₂ O	298
HFCs	140 – 11,700
PFCs	6,500 – 9,200
SF ₆	23,900
NF ₃	17,200

Apply Calculation Tools

- **Cross Sector Tools:** Can be applied to different sectors.
 - ✓ Stationary Combustion;
 - ✓ Mobile Combustion;
 - ✓ HFC use in refrigeration and Air Conditioning;
 - ✓ Measures and estimates uncertainty.
- **Sector specific Tools:** designed to calculate emissions in specific sectors such as aluminum, iron and steel, cement, oil and gas, pulp and paper, office based organizations.
- **India GHG Program:** provides India-specific tools with India specific emission factors for Transport, Power sector and Do-it-yourself GHG Accounting tool

Visit: <http://indiaghgp.org/india-specific-tools>

Roll-up data to Corporate level



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