EIB Project Carbon Footprint
Low Carbon Transport Projects

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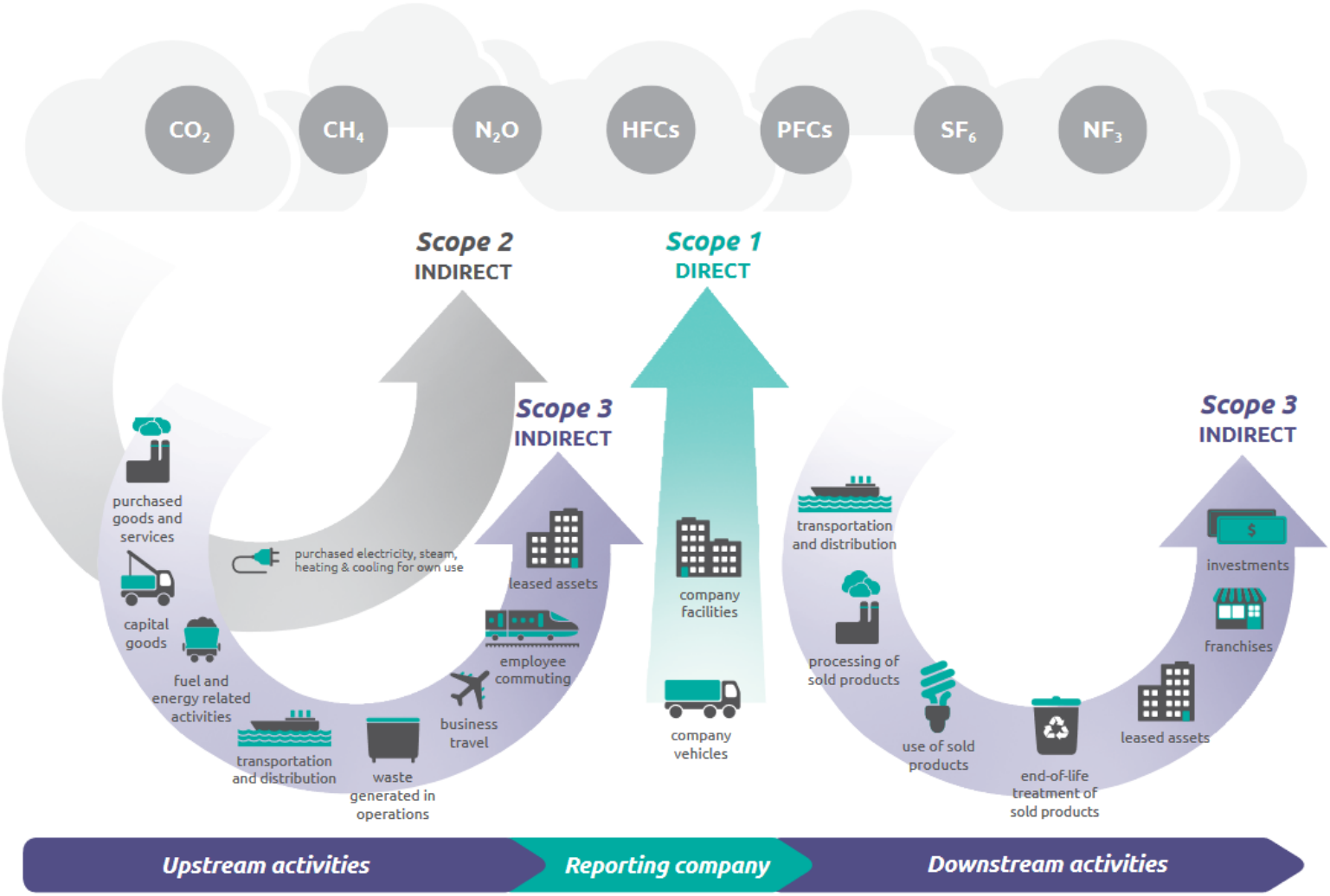
Scope 1, 2 & 3 emissions

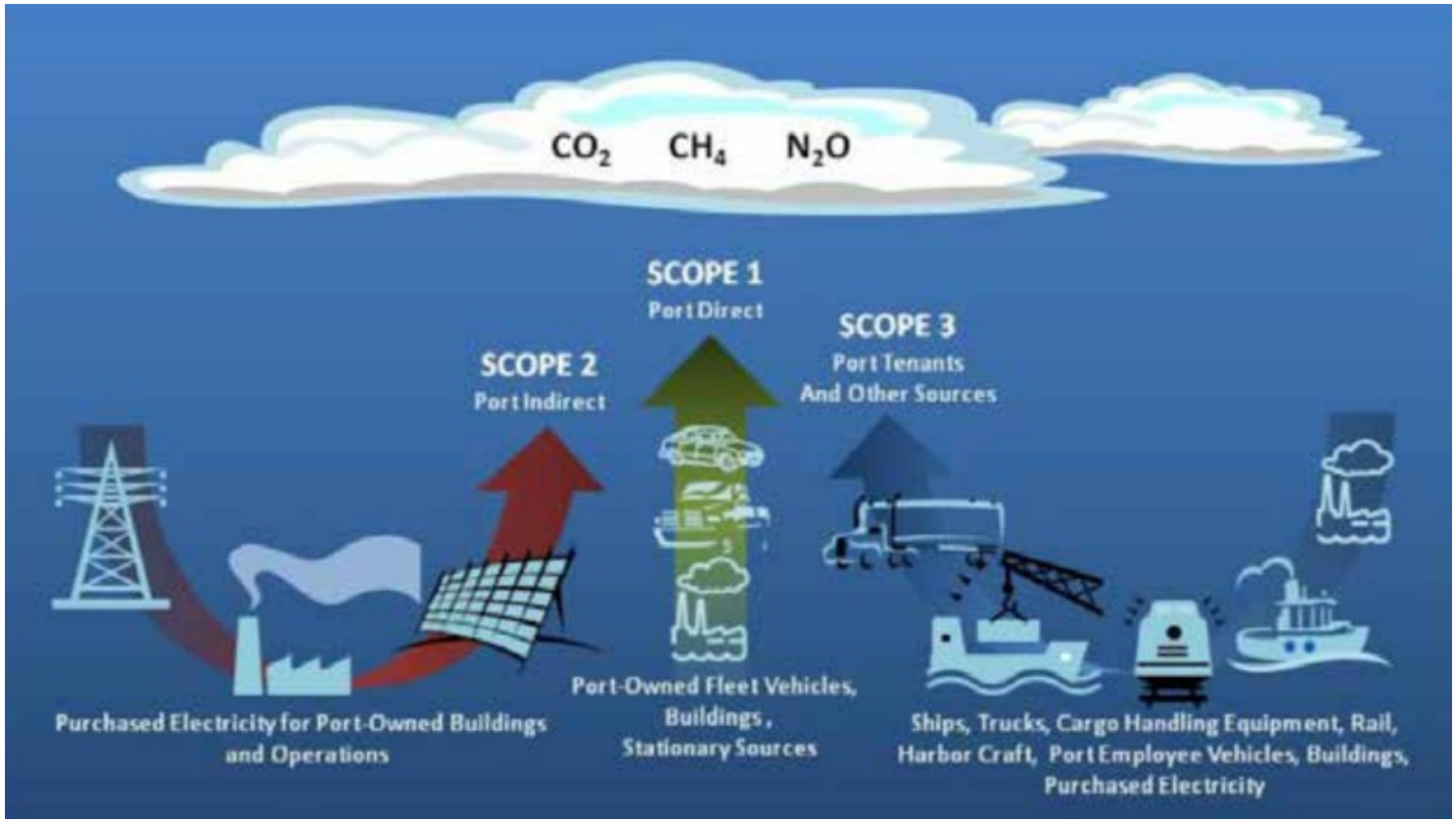
Figure [I] Overview of GHG Protocol scopes and emissions across the value chain



Source: Figure 1.1 of *Scope 3 Standard.*

https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf

Example: Scope emissions in a port



And Construction/embedded emissions? Often not included

Basics of CO2 assessment in Transport

Absolute Emissions

- Project emissions: Activity Data x Emissions factor
  - → Careful with emission factors (explain assumptions)
  - → Scope 3 is very important in Transport infra

- Baseline Emissions

- *Project baseline scenario or ''without project" scenario* is defined as the (credible) expected alternative means to meet the output supplied by the proposed project
  - → If available, in line with CBA.
  - → Baseline cannot assume to continue using existing assets beyond their economic life
  - → Be conservative and explain assumptions!

= Relative emissions

- GHG impact of the project (+ or -)

→ Calculations on a "Typical year of operation" (i.e. not including commissioning, ramp up, etc.)

Case study: Modernization of rail line with CBA

Project scope: Modernization of an existing 140 km electrified double track line , with approx. 60 electric trains per day (ap. 2.2 million passengers in base year)

There is a CBA model built upon some traffic forecasts→ 3.2 million pax in average year):

- Induced traffic considered (sometimes 5-10%)
- 10% of project demand will come from road (modal shift)

Use same assumptions! CO2 must be consistent with CBA scenarios

Absolute emissions = 11. 4 kton CO2 e

Activity average year (60x140x365 train-km)

x Power consumption (10.5 kWh/train km)

x Grid emission factor (355 g/kWh)

Activity in an average year (no year 1)

Which emission factors? Explain assumptions

Baseline emissions = 11.4 + 6.1 = 17.5 kton CO2e

- Ap 80% demand (2.6 million pax) from existing rail
- 10% demand from car: 0.32 million pax x 140 km 190 g/veh-km / 1.4 pax/veh = 6.1 kton CO2

If same number train-km… rail emissions do not change

Demand baseline < absolute (induced traffic)

Relative emissions = 11.4 ktCO2e – 17.5 ktCO2e = - 6.1 ktCO2e

Urban mobility example 1: what's the project?

- **Tram system**: 11 km of infrastructure + 20 stations + 19 new trams and 1 new depot.
- **Supply**: +1.5m tram kms and – 0.7m bus kms, in first year of full operation.
- **Demand**: 26m/year after ramp-up period, based on traffic model.
- **Modal shift**: 76.9% existing public transport users, 12.7% former car users, 10.4% generated demand.
- **Other info**: traffic model is not multimodal; first tram line, no track records of tram consumption

Urban mobility example 1: what's its CF?

Project's activity	**1,516,364**	**Tram*kms**	**Based on demand model inputs/outputs. Dead runs?**
Average consumption	5.00	kWh/Tram*kms	Often unknown, best EIB's estimate "à dire d'expert"
Average grid emissions	250.00	gCO2/kWh	Grid emission factors from EIB's CF Methodology
Absolute emissions	**1,895**	**tCO2**	**Scope 2. First year of full operation. Average year?**
Baseline activity 1	**725,000**	**Bus*kms**	**Based on demand model inputs/outputs. Dead runs?**
Average bus emissions	1,150	gCO2/bus*km	Based on EIB CBA model using TREMOVE fleet DB
Baseline emissions 1	**834**	**tCO2**	**First year of full operation. Average year?**
Project's demand	26,000,000	Passengers	Based on demand model inputs/outputs
Shifted from cars	12.70	%	Based on demand model inputs/outputs
Car average load factor	1.10	Passengers/car	Based on demand model inputs/outputs
Car user average trip length	4.30	Kms/passenger	Based on demand model inputs/outputs
Baseline activity 2	**12,907,818**	**Car*kms**	**Is the traffic model multimodal?**
Average car emissions	266	gCO2/car*km	Based on EIB CBA model using TREMOVE fleet DB
Baseline emissions 2	**3,439**	**tCO2**	**First year of full operation. Average year?**
Baseline emissions	**4,273**	**tCO2**	**Baseline emissions 1 + 2**
Relative emissions	**- 2,377**	**tCO2**	**Absolute - Baseline**

But what if there is no traffic model at all?

Urban mobility example 2: what's the project?

- **Metro system**: renewal of the **Rolling Stock** (**RS**) and upgrade to full driverless operation.
- **Supply**: from 2.9m to 3.7m train*km and from 472 to 536 pax/train.
- **Demand**: from 93m to 111m pax/year, based on operator statistics/trends.
- **Saturation**: from 60%/70% to 50%/60% in peak periods.
- **Other info**: new trains have **Regenerative Braking Systems** (**RBS**) allowing 10%/20% reduction in energy consumption

Urban mobility example 2: what's its CF?

- **Absolute emissions**: Scope 2 emissions of trains

Train*Kms **X** kWh/Train*km **X** gCO2/kWh

3.7m **X** 13.7 (1-10%) **X** 250

= 11,250 tCO2

- **Baseline emissions**: what's a credible alternative?
  - Purchase of metro **RS** without **RBS**/supply increase?
  - No purchase of metro **RS** at all?

Urban mobility example 2: what's its CF?

	A credible alternative is…	ABS2030	BAS2030	REL2030
BUY METRO RS	Purchase metro RS without RBS and no supply increase	11,257	10,027	1,229
	Purchase metro RS without RBS and increase supply	11,257	12,507	- 1,251
	Purchase metro RS with RBS and no supply increase	11,257	9,025	2,232
	No credible alternative (project is BaU = Baseline)	11,257	11,257	-
DO NOT BUY METRO RS	Do Nothing with long-term equivalent bus supply (EURO VI)	11,257	25,011	- 13,754
	Do Nothing with long-term equivalent bus supply (50% e-Bus)	11,257	17,399	- 6,142
	Do Nothing with long term equivalent demand % split	11,257	106,925	- 95,668
	As previous case, but based on additional demand only	11,257	17,676	- 6,420

- For like-to-like renewals, the Project is often "**Business-as-Usual**" (**BaU**) → **BaU** = Baseline
- Do-Nothing alternative are not conservative and difficult to estimate (inaccuracy)
- Does it mean that neutral/positive relative emissions question the project's contribution to Climate Action (**CA**)?

CF is not necessarily a good metric for CA assessment in low carbon transport

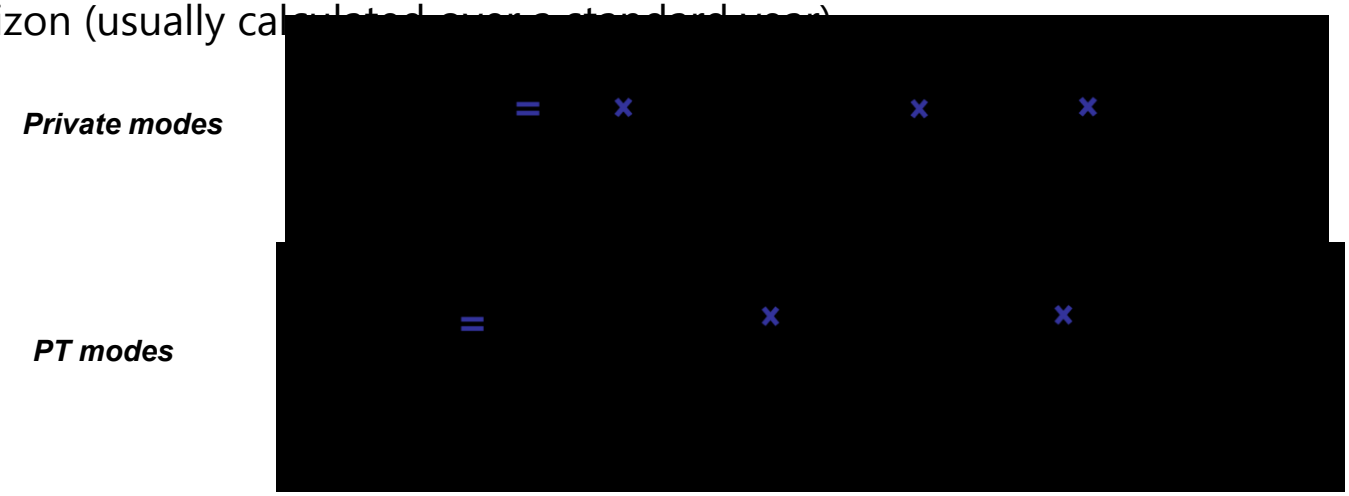
- **CF** guiding principles are tailored on “negative” **CF** (net increases). Prudent “Without Project” scenarios are the rule for CBAs/traffic models: a project’s **CF** is “at the margin of a plan".
- For **BaU** projects, “neutral” **CF** is a prudent choice and does not question the project contribution to **CA** policies which comes out clear from Do-Nothing alternatives. Prevention of modal shift back is a key consideration for **CA**’s eligibility of MDBs and policy/project level should not be confused.
- Policy goals are set in terms of “Past vs Future” emissions at a higher level (e.g. sector/country or plan) → ≠ metrics such as application of thresholds (e.g. 50 gCO2eq/pkm) → no comparison between future credible project alternatives.

Some considerations on GHG emissions for Transport Plans (incl. SUMPs) (i)

- GHG emission reduction in transport can be summarized as follows:
  I. Avoiding unnecessary traffic (better spatial planning, better system integration, etc.)
  II. Shifting traffic to more environmentally friendly modes like PT or 0-emission modes (*Modal shift*)
  III. Improving the remaining traffic – electrification of individual traffic, time savings, etc.
- All these steps (in particular I & II) start from/pertain mainly to the planning stage –> integrated land-use/spatial planning and transport planning
- -> CC Mitigation therefore concretely starts from the Plan and continues with the technical/technological choices done for the Project
- Climate change impact in terms of GHG emission of a Plan (or an Investment Programme) can be calculated with analogy with that of a Project
- It needs a multimodal traffic model for the estimate of flows and conditions of circulation on the entire network considered in the reference area for the Plan

Some considerations on GHG emissions for Transport Plans (incl. SUMPs) (ii)

- **Plan Absolute Emissions** = those in the selected Plan Scenario, associated with private vehicles flows and operation of public transport in the reference Plan Area, for a selected future time horizon (usually calculated over a standard year)



- **Plan Relative Emissions** = difference between Absolute Emissions in the reference future Scenario ("Trend" / "Do-Nothing/Do-Minimum" / "Business-As-Usual"), and the Plan Scenario
- Additional indicators could be considered with reference to Plans:
  - ***Current Absolute Emissions*** = those in the current (base year) Strategy Scenario, also associated with operations of all the modes considered relevant (see above) – over the reference current year for the Plan and the related traffic model

Based on this indicator, a second indicator of Relative Emissions can be calculated:

- ***Current vs Plan Relative Emissions*** = difference between Current Absolute Emissions and Strategy Scenario Emissions for a defined time horizon.

Thank you!