Smart Freight Centre

Transport GHG Accounting: Methodology Timeline

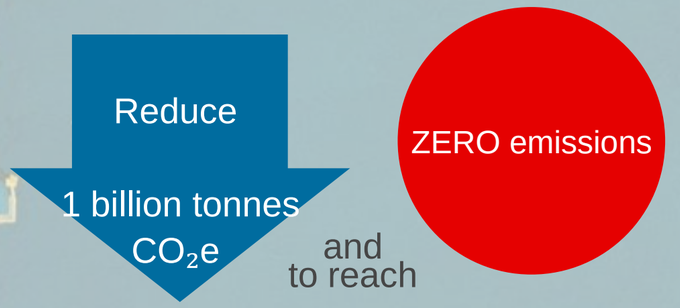
Dr. Alan Lewis
Chief Technical Officer
Smart Freight Centre

Smart Freight Centre

We are a global non-profit organization focused on reducing the emission impacts of global freight transportation.

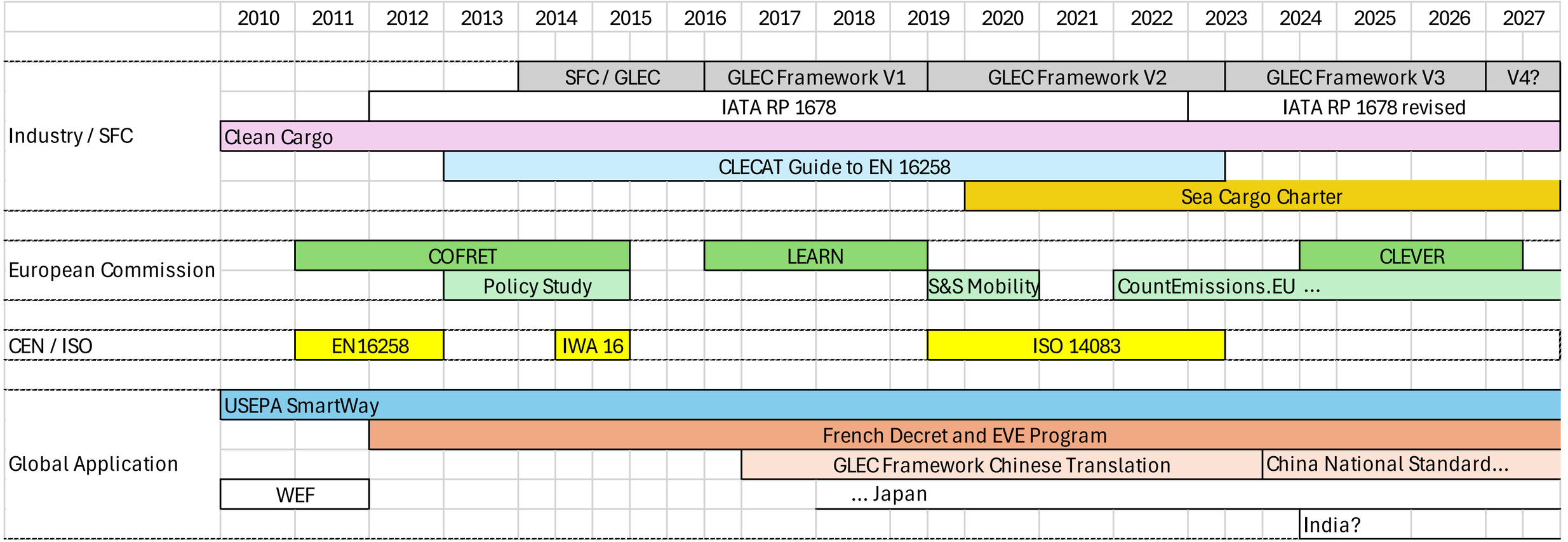
We guide the global logistics industry by tracking and reducing its greenhouse gas emissions by one billion tonnes by 2030 and to reach zero emissions by 2050 or earlier.

We collaborate with over 150 multinational member and partner organizations to quantify impacts, identify solutions, and advocate logistics decarbonization strategies.



Smart Freight Centre

(Freight) Transport GHG Methodology Development Timeline



Smart Freight Centre

Drive transparency and set the standard

2016 - 2022

GLEC Framework was the only **globally recognized methodology** to calculate GHG emissions consistently across the **multi-modal logistics supply chain**

Recognized by

Used by

150+ Multinationals

20+ Programs, tools, initiatives

2023 onwards

ISO 14083 was published in March 2023 and is **based on the GLEC Framework** to enable a tighter application structure.

SFC members

Cross-sector & role selection

Smart Freight Centre

ISO 14083

What has been delivered?

ISO 14083 Standard

- **Title**: Greenhouse gases - Quantification and reporting of greenhouse gas emissions arising from transport chain operations
- **Scope**: a common **methodology** for the quantification and reporting of **GHG emissions** arising from the operations of **transport chains** of **passengers and freight**, including hub operations
- Does not include its own verification guideline
- Existing EN16258 withdrawn and replaced by CEN version of ISO14083

Correlation between the GLEC Framework and ISO 14083

- ISO is **the** globally most recognized organization for standardization
- ISO 14083 Covers both freight and passenger transport GHG emissions
- It is based on existing standards including GLEC Framework and EN16258
- Will be updated approx. every 5 years (if there is demand)

- The GLEC Framework is the primary industry guideline for the implementation of ISO 14083
- Covers freight transport GHG emissions
- Industry-led regular updates on emission factors, default emission intensities, sector-specific application guidance and other
- Testing and development for future scope expansion
- SFC assurance scheme is under development

Reporting requirements

Two options with aligned approach
(supported by explanation of boundaries, deviations, exclusions and data type used):

Organizational Level

- Total GHG emissions
- Total GHG emissions per mode
- Overall GHG emission intensity (per tkm* or per t*)
- GHG emission intensity per mode
- Total GHG emissions =
  - Energy provision + operational emissions (WTW)
  - Optional to report operational (TTW) separately
- Default reporting period: annual
  - Shorter periods are allowed in addition

Service Level

- Total GHG emissions (WTW)
- Overall GHG emission intensity (per tkm*)
- Transport activity (tkm*)
- Hub activity (t*)
- Operational GHG emissions (TTW)
- Operational GHG emission intensity (per tkm)
- For multimodal transport service:
  - Total emissions & either transport activity or emission intensity for each mode
- Reporting period is flexible

* Other options possible in specific circumstances

Developments

Country Developments

- Count Emissions.EU
- China
- India?

Further methodology enhancement?

- Book & Claim
- Vehicle life-cycle emissions

Sector Guidelines

- Mail & parcels
- EU Chemical Sector
- Clean Cargo, RoRo, Breakbulk & Bulk Shipping (via SCC)
- Automotive Logistics
- …?

SBTI Transport Sector Update

SFC Conformity Assessment Scheme

Verification and validation of GHG emissions statements for transport chains

Smart Freight Centre

-Defines Assurance framework, incl. **performance levels for reporters**

-Approves VVBs

-Maintains a registry of approved VVBs and of reporters

-Provides mandatory training to VVB verifiers

-Provides training to reporters

-Allows approved VVBs and reporters to use SFC logos

Verification/ Validation Bodies (VVBs)

-Evaluate the reporter to verify: 1) it meets ISO 14083, 2) claims are accurate, 3) what their performance level is

-Comply with existing ISO standards for their service: 17029, 14065 & 14063-3, 14066

GHG reporters

-Calculate emissions according to ISO 14083 & determine what their performance level is

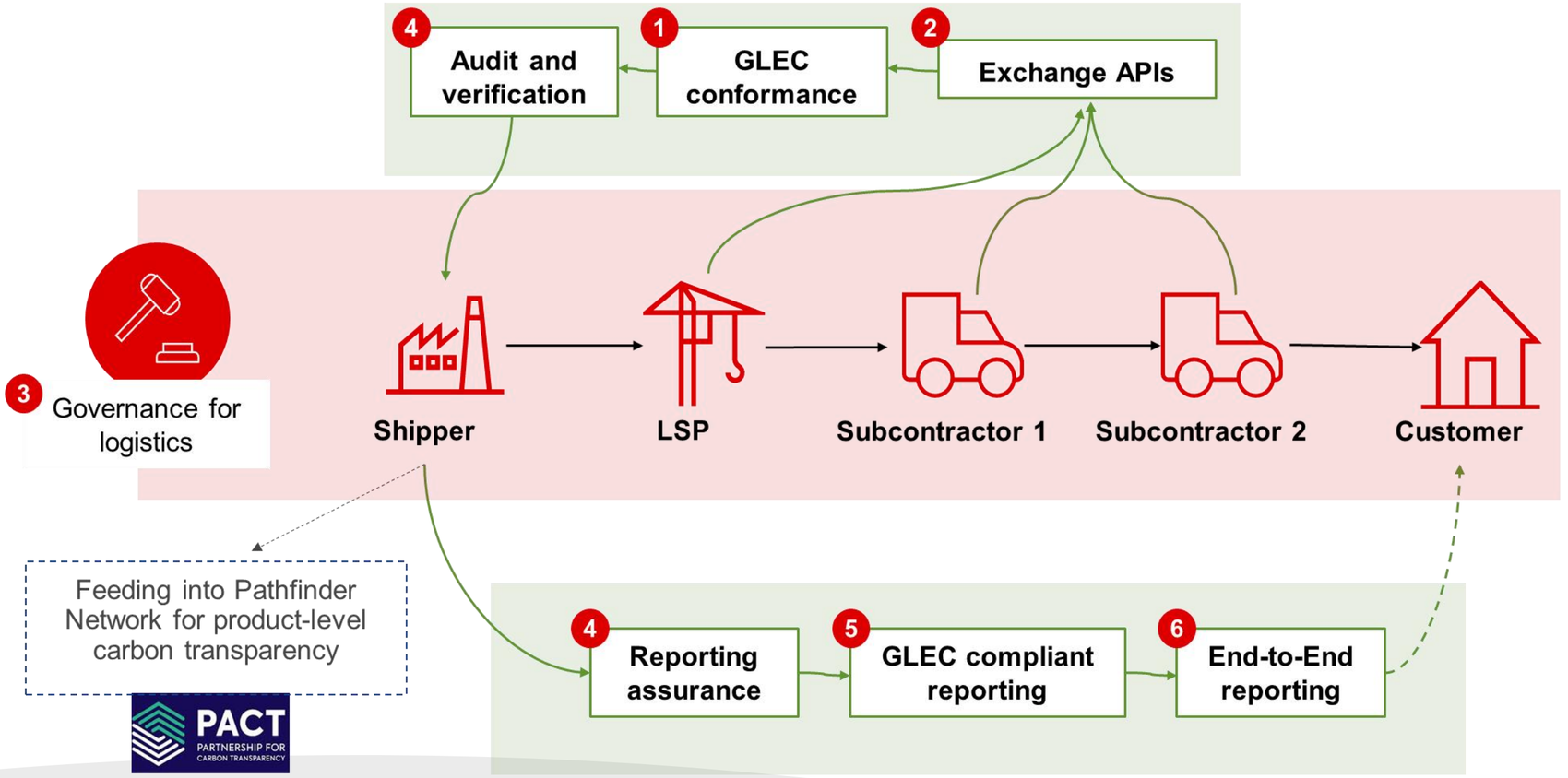
-Obtain a verification opinion and report from the VVB they selected

Value Chain Data Exchange to Support GHG Calculations

Three-in-one methodology, mechanism and infrastructure

Governance | Data flow | → Exchange of activity/emissions data

The SFC Exchange Network will enable the exchange of emissions data:



Smart Freight Centre

Join our journey towards efficient and zero-emissions global freight and logistics

Contact
alan.lewis@smartfreightcentre.org

ISO 14083 Scope, Boundary and Principles

- Full fuel cycle approach
- All UNFCCC GHGs: CO_2, CH_4, N_2O, NF_3 SF_6 PFCs & HFCs, but not black carbon or high-altitude emissions (yet)
- Transport chain operations only; (no maintenance, storage, vehicle production, scrappage, infrastructure or overheads)
- Does include repositioning, handling and transfer equipment and auxiliary engines
- Allocation by mass;
  - well-established alternatives (passengers, containers, parcels) accepted in specific circumstances
- Excludes carbon offsets
- Signals direction for more complete climate assessment of transport operations

What’s new?

- Modes:
  - Pipelines & Cable cars
- Terminology
  - TOC (TSC), Hubs, Data types, Energy lifecycle: Energy Provision and Operation
- Equations
  - e.g. more rigor in approach to allocation between different cargo types & passenger vs freight
- Emission factor methodology
  - To include construction and dismantling of energy infrastructure
- Emission factors & coverage
  - Newer & wider range of sources that EN16258 & GLEC F/w v2
  - Wider range of main energy carriers covered
  - But… ISO 14083 EFs are already outdated due to updated inputs

SFC, GLEC Framework & ISO 14083

Future relationship

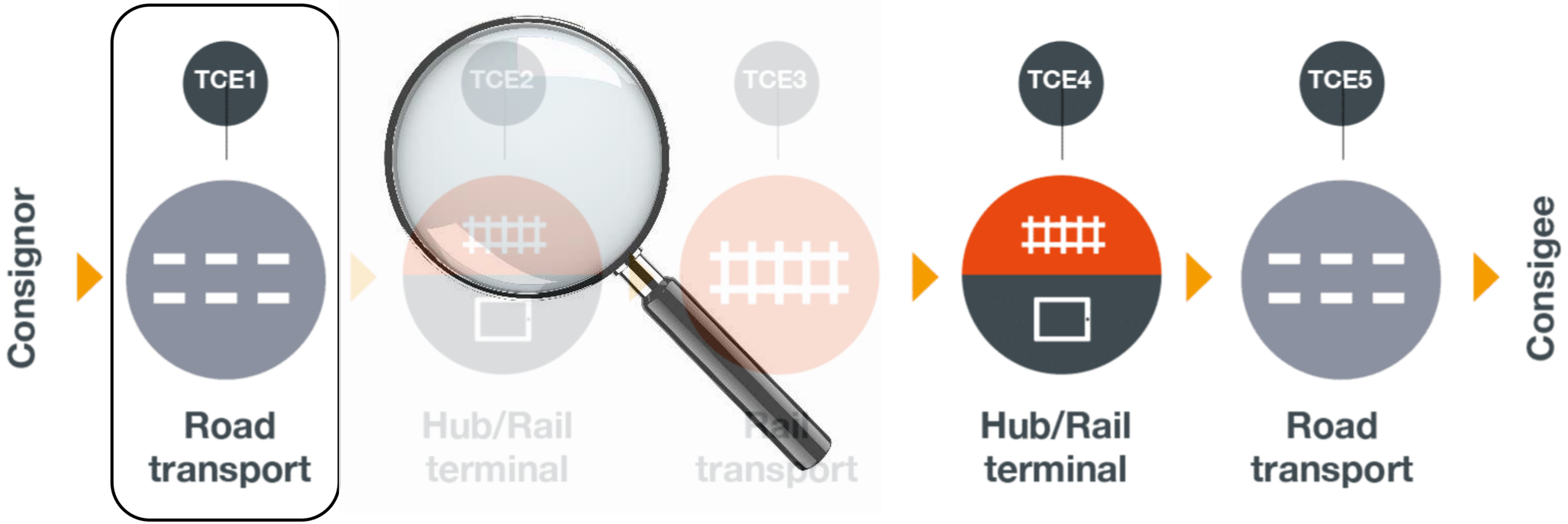
- Testing and development for future content
  - Vehicle lifecycle
  - Updated black carbon guidance
- China-specific, India-specific content
- Industry-led regular updates
  - Emission factors
  - Default emission intensities
  - Sector-specific application guidance
- SFC Assurance Scheme…

Implications for GLEC Framework Module 5

Minimal Impact

- Principles unchanged
- Terminology
- Emission factors increased
  - Better understanding of fuel production: WTT element of fossil fuels greater
- Industry-led regular updates
  - Default emission intensities
  - Electricity emission factors

Focus is the transport chain



System Approach

Linking TCEs to TOCs

Transport Operation Category (TOC) provides the context for each movement of each consignment.

- Definition:
  - “A group of transport operations that share similar characteristics”

System Approach

Linking TCEs to TOCs

Transport Operation Category (TOC) provides the context for each movement of each consignment.

- Vehicle movements don’t happen in isolation:
  - Consignments for multiple customers
  - Clients with multiple carriers
  - Multiple vehicles at a depot
  - Multi-drop vs trunking
  - Specific handling requirements

System Approach

Linking TCEs to TOCs

Transport Operation Category (TOC) provides the context for each movement of each consignment.

- Decide with your customer how best to define the transport operation – this defines what's included (the level of data aggregation you'll work with) e.g.:

Module 5 TOCs																	
Packed Goods						Bulk Goods											
Ambient			Temperature Controlled			Ambient						Temperature Controlled					
FTL	Part Load	Groupage	FTL	Part Load	Groupage	Dedicated			Shared			Dedicated			Shared		
						Tank Truck	Hopper / Silo	Tank Container	Tank Truck	Hopper / Silo	Tank Container	Tank Truck	Hopper / Silo	Tank Container	Tank Truck	Hopper / Silo	Tank Container

Calculating for the TOC

Make sure you include emissions associated with relevant empty mileage

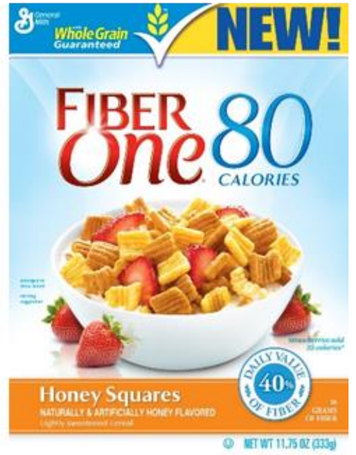
- Within a system approach the emissions associated with empty mileage are factored in as an overall average

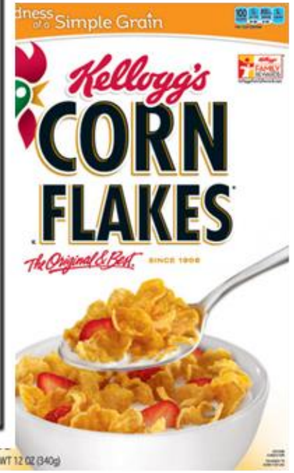
Include emissions from ancillary equipment, refrigerant losses and tank cleaning

- Is ancillary fuel / energy on the same system?
- Refrigerant losses only apply to some TOCs and likely to be only known over a long period → average additional value per tkm
- Tank cleaning: use standard value per event agreed with EFTCO

Level of data detail

Analogy





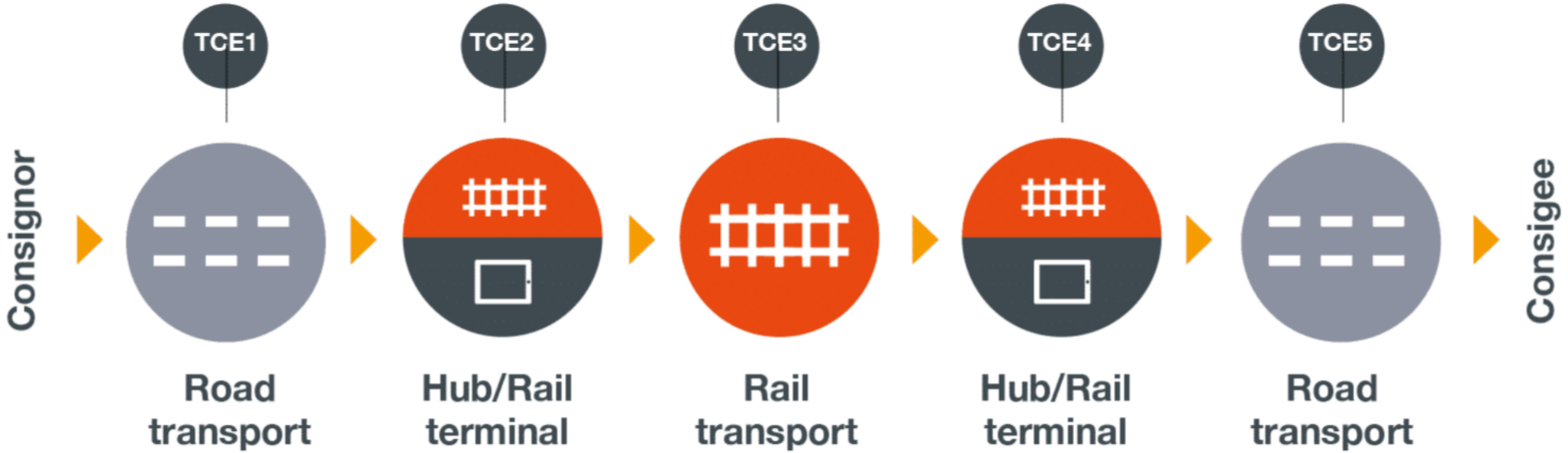
Report format for each TOC

Example from Module 5

Item	GHG intensity (WTW) CO_2e kg/tkm	Customer specific tkm	WTW GHG emission (kg CO_2e)
Ambient groupage transport	0.0617	28,600	1764.62
Total emissions kg CO_2e			1764.62
Input data type	100% primary data		
Mode coverage	Road		
Data verification statement	Data has not been independently verified by a 3rd party		
Period covered	March 2021		

Relate back to the Transport Chain

TOC to TCE correspondences



Relate back to the Transport Chain

10 tonnes of packed goods

	TCE 1	TCE 2	TCE 3	TCE 4	TCE 5	Total
TCE	Road, 100 km	Transhipment	Rail 700 km	Transhipment	Road, 50 km	850 km
Activity	1000 tkm	10 t	7000 tkm	10 t	500 tkm	8500 tkm
WTW Intensity	0.0617 $kgCO_2e/tkm$	0.6 $kgCO_2e/t$	0.021 $kgCO_2e/tkm$	0.42 $kgCO_2e/t$	0.086 $kgCO_2e/tkm$	
WTW GHG ($kgCO_2e$)	61.7	6.0	147.0	4.2	86.0	
Data type	Primary data	GLEC default	Level 1 default from Module 5	Primary data	Packed, ambient default	75% default
TTW GHG ($kgCO_2e$)	46.5	4.5	42.9	0.3	65.0	159.2
Assurance status	Not verified	N/A	N/A	Verified	N/A	

Relate back to the Transport Chain

10 tonnes of packed goods

	TCE 1	TCE 2	TCE 3	TCE 4	TCE 5	Total
TCE	Road, 100 km	Transhipment	Rail 700 km	Transhipment	Road, 50 km	850 km
Activity	1000 tkm	10 t	7000 tkm	10 t	500 tkm	8500 tkm
WTW Intensity	0.0617 $kgCO_2e/tkm$	0.6 $kgCO_2e/t$	0.021 $kgCO_2e/tkm$	0.42 $kgCO_2e/t$	0.086 $kgCO_2e/tkm$	0.036 $kgCO_2e/tkm$
WTW GHG ($kgCO_2e$)	61.7	6.0	147.0	4.2	86.0	304.9
Data type	Primary data	GLEC default	Level 1 default from Module 5	Primary data	Packed, ambient default	75% default
TTW GHG ($kgCO_2e$)	46.5	4.5	42.9	0.3	65.0	159.2
Assurance status	Not verified	N/A	N/A	Verified	N/A	

Data types

What happens if your carrier doesn’t have the data?

Use ‘secondary’ data:

- There are some sophisticated models out there
  - Make sure you get them checked against ISO 14083 (SFC Assurance Scheme)
- Pick a value from an appropriate set of defaults
  - More ‘risky’
  - Designed to over-report, giving an incentive to use primary data
  - Module 5 is our most detailed attempt to include ‘tailored’ defaults…
  - … but they still only offer a snapshot

How you can use data

				Input data source (Data type)				
				Default factor-based (+ confirm that company used GLEC set of default factors (or disclose deviations)	Models (+ specify which tools used for different modes/geographies)	Actual data: - fuel data provided by transport operator (covers both own fleet data and carrier data) - transport activity combining best information from customer and transport operator - carrier data from Programs (+ specify which programs are used for different modes/geographies)		
		CATEGORY		DEFAULT	MODELLED	PRIMARY		
						Aggregated annual	Disaggregated	Program
Reporting & tracking	Scope 1	Total emissions		x	x	✓	(✓)	x
	Scope 3	Total emissions		(✓)	✓	✓	(✓)	✓
	Scope 1	Emissions intensity (via emissions intensity KPI)		x	x	✓	✓	x
	Scope 3	Emissions intensity		(✓)	✓	✓	(✓)	✓
Decision making				ex-ante	ex-ante (+possible ex-post check for some uses)	baseline & ex-post check		baseline & ex-post check
	Carrier	Operational	Driver training	x	x	(✓)	✓	x
			Routing per leg	x	✓	(✓)	✓	x
			Consolidation	(✓)	✓	(✓)	✓	(✓)
			Vehicle size	(✓)	✓	✓	(✓)	✓
			.....					
		Telematics				✓	✓	(✓)
		Fuel switch		✓	✓	✓	✓	✓
		Vehicle purchase		(✓)	✓		(✓)	
		.....						
	Customer	Mode switch		✓	✓	✓	✓	✓
		Supply chain remodelling		(✓)	✓			
		Purchasing (change of carriers)			(✓)	✓	(✓)	✓
		Horizontal collaboration			✓	✓	(✓)	
		.....						
	3rd party	Infrastructure Investment		(✓)	✓			

How does GHG Protocol Reporting Differ?

Scopes

- ISO 14083 classifies energy production and operational emissions without assigning ‘direct ownership’ of them
- In contrast GHG Protocol allocates according to Scopes (Scope 1 = direct operational, Scope 2 = electricity use, Scope 3 = indirect) and different categories within Scope 3

Biogenic emissions

- GHG Protocol requests additional reporting of operational biogenic emissions from biofuels as well as the ‘net’ WTW emissions.