

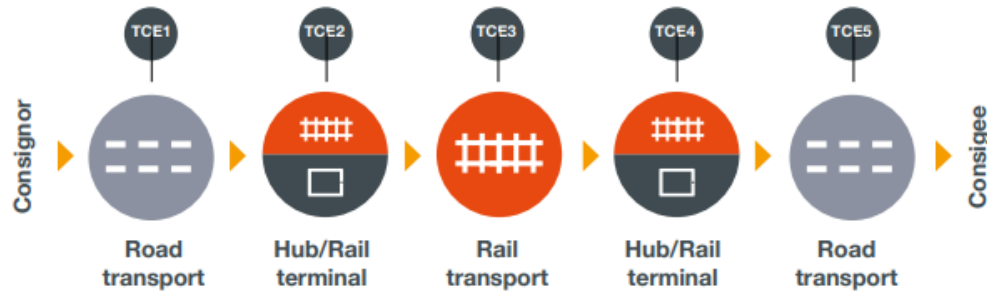
# EMISSION CALCULATION EXAMPLES IN PRACTICE

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**Part 1: How to calculate GHG emissions according to ISO 14083**

Figure 3  
Example of a transport chain and its TCEs

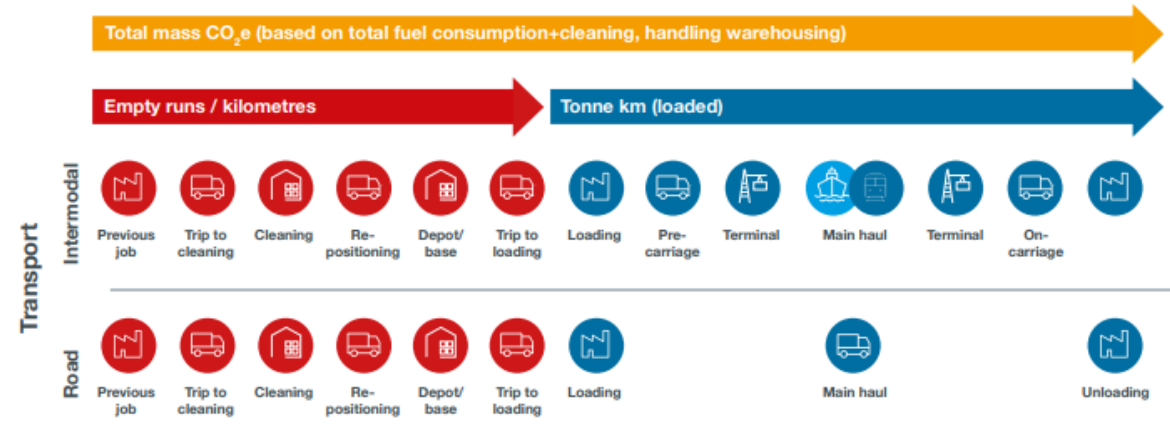


**Part 2: How to allocate empty kilometers to shippers**

Figure 2  
Examples of empty running and its relation to the calculation of emissions

Blue bar represents the tonnes loaded from the loading place to the unloading place multiplied by the loaded km. Yellow bar represents Total tonnes CO<sub>2</sub> emitted by all modes and activities in that chain.

Emission intensity is yellow divided by blue  
Red line are 'empty runs / kilometres'



# DATA COLLECTION – PROCESSING THE INFORMATION

980	1716478	V i		02.05.24 (O)	NEOPENTYL GLYCOL, 90%
LEN		N i		16.05.24 (O)	EDI: 7
O25'000	300 Container	i	L 6.05	350 Init. Lade St.Cleaned	360 Vorbelad
290 E24'900	BIDU 494454-3	T 4060	Temp i 73 C	370 pla	Bahntransport
V26'046	F 93%			ordered	Bahntransport
10 Leg	20 Leg Typ		30 TransportMode Leg	35 Verfügbar	
70	trucking (Trucking des		Strassentransport (Road)		36 Leg Notizen
40 Von	50 Nach		60 TransportLine	61 Zoll Info	62 Zuständig
MARC	SAPA				LQPomezi
70 Zug i	FR908PV	72 Auf i	XA372AW	74 Fahrer	
					75 Gr:Pomezia.1

Leg	Resp	Type	Mode	From - To	Carrier	Equipment	Plan / Eff	Estimated	App	->
10	LQGoeteb	COLLEC	ROAD	TCPE > > MAKT (CHANGE_APPROVED)	i	MRU10T	i L 02.05	02.05	i	↔
20	LEN	IM_ROU	RAIL	MAKT > KOEL (CHANGE_CONFIRMED)	i		A i 05.05	06.05	i	↔
30	LEN	IM_ROU	RAIL	KOEL > BUS2 > POME (CHANGE_CONFIRMED)	i		A i 10.05	10.05	i	↔
40	LQPomezi	TRUCKI	ROAD	POME > SAPA (NEW_APPROVED)	i -	FX740WZ	A i 13.05	-	i	↔
50	LQPomezi	HEATIN	-	SAPA (NEW_CONFIRMED   CLOSED)	i -		D i 15.05	-	i	↔
60	LQPomezi	DELIVE	ROAD	SAPA > > MARC (CHANGE_APPROVED)	i -	FT929DK	i U 16.05	16.05	i	↔
70	LQPomezi	TRUCKI	ROAD	MARC > SAPA (NEW_APPROVED)	i -	FR908PV	i A 20.05	-	i	↔

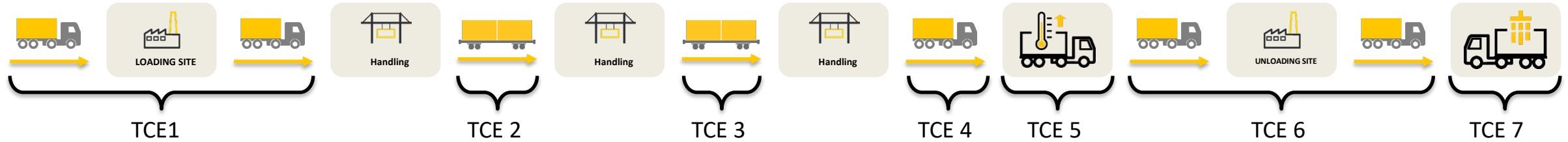
Step	Type	Date	End-Date	Address	Reference	Pin Code	Remarks	Action
10	pickup	17.05.2024 11:10 Eu/Rome	-	MARC (				
20	cleaning	17.05.2024 11:11 Eu/Rome	-	ACSE	i			i
30	drop	20.05.2024 06:58 Eu/Rome	-	SAPA				



- Product information
- Equipment information
  - Tankcontainer attributes
  - Truck attributes
- Leg (TCE) information
  - Routing
  - Transport mode
  - Heating / Cleaning / Store
  - Repositioning

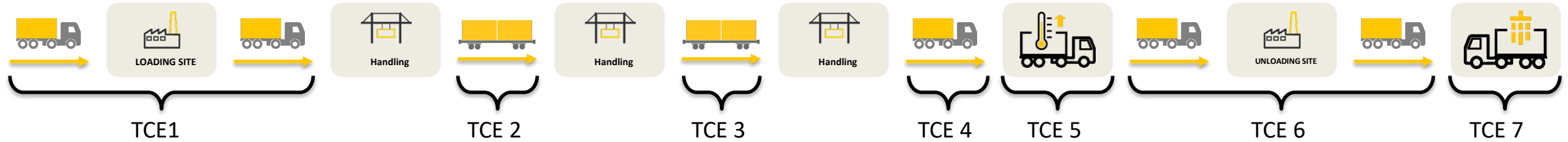
➔ EcoTransit calculation file with 53 parameters

# CALCULATION EXAMPLE | BERTSCHI



Leg	Mode	Data source	Start point	End point	Payload (tonnes)	Distance (km)	Activity (tkm)	Fuel used (litres)	Emission factor (kg CO <sub>2</sub> e/[unit])	Total WTW Emissions (kg CO <sub>2</sub> e)	Emission Intensity (g CO <sub>2</sub> e/tkm)
1_1	Road	Primary data	TCPE	Loading station	0	2.4	-	0.56	3.43	1.94	-
1_2	Road	Primary data	Loading station	MAKT	24.9	103.61	2'579.89	37.56	3.43	128.85	49.94
	Handling	Default data	MAKT	MAKT	24.9	0	-	-	1.2	29.88	-
2	Rail	Modelled data	MAKT	KOEL	24.9	968.66	24'119.64	electrical	-	220.10	9.12
	Handling	Default data	KOEL	KOEL	24.9	0	-	-	1.2	29.88	-
3	Rail	Modelled data	KOEL	POME	24.9	1'411.50	35'146.45	electrical	-	343.79	9.78
	Handling	Default data	POME	POME	24.9	0	-	-	1.2	29.88	-
4	Road	Primary data	POME	SAPA	24.9	3.1	77.19	0.93	3.43	3.19	41.32
5	Heating (incl. 2 handlings)	Modelled data	SAPA	SAPA	24.9	0	-	-	228.57	288.33	-
6_1	Road	Primary data	SAPA	Unloading station	24.9	314.89	7'840.71	138.14	3.43	473.83	60.43
6_2	Road	Primary data	Unloading station	MARC	0	167.65	-	38.60	3.43	132.41	-
7_1	Road	Primary data	MARC	ACSE	0	9.8	-	2.31	3.43	7.94	-
7_2	Cleaning	Default data	ACSE	ACSE	0	0	-	-	86.6	86.6	-
7_3	Road	Primary data	ACSE	SAPA	0	216	-	50.99	3.43	174.92	-

# CALCULATION EXAMPLE | BERTSCHI



Leg	Mode	Payload (tonnes)	Distance (km)	Activity (tkm)	Fuel used (litres)	Emission factor (kg CO <sub>2</sub> e/[unit])	Total WTW Emissions (kg CO <sub>2</sub> e)	Emission Intensity (g CO <sub>2</sub> e/tkm)
1_1	Road	0	2.4	-	0.56	3.43	1.94	-
1_2	Road	24.9	103.61	2'579.89	37.56	3.43	128.85	49.94
	Handling	24.9	0	-	-	1.2	29.88	-
2	Rail	24.9	968.66	24'119.64	electrical	-	220.10	9.12
	Handling	24.9	0	-	-	1.2	29.88	-
3	Rail	24.9	1'411.50	35'146.45	electrical	-	343.79	9.78
	Handling	24.9	0	-	-	1.2	29.88	-
4	Road	24.9	3.1	77.19	0.93	3.43	3.19	41.32
5	Heating (incl. 2 handlings)	24.9	0	-	-	228.57	288.33	-
6_1	Road	24.9	314.89	7'840.71	138.14	3.43	473.83	60.43
6_2	Road	0	167.65	-	38.60	3.43	132.41	-
7_1	Road	0	9.8	-	2.31	3.43	7.94	-
7_2	Cleaning	0	0	-	-	86.6	86.6	-
7_3	Road	0	216	-	50.99	3.43	174.92	-

## LOADED ACTIVITIES

**2'819.76**

Distance (km)

**69'763.88**

Activity (tkm)

**1'547.73**

Total WTW  
Emissions (kg CO<sub>2</sub>e)

**22.19**

Emission Intensity  
(g CO<sub>2</sub>e/tkm)

## EMPTY ACTIVITIES

**395.85**

Distance (km)

**12.31**

% of Total Distance

**403.81**

Total WTW  
Emissions (kg CO<sub>2</sub>e)

**20.69**

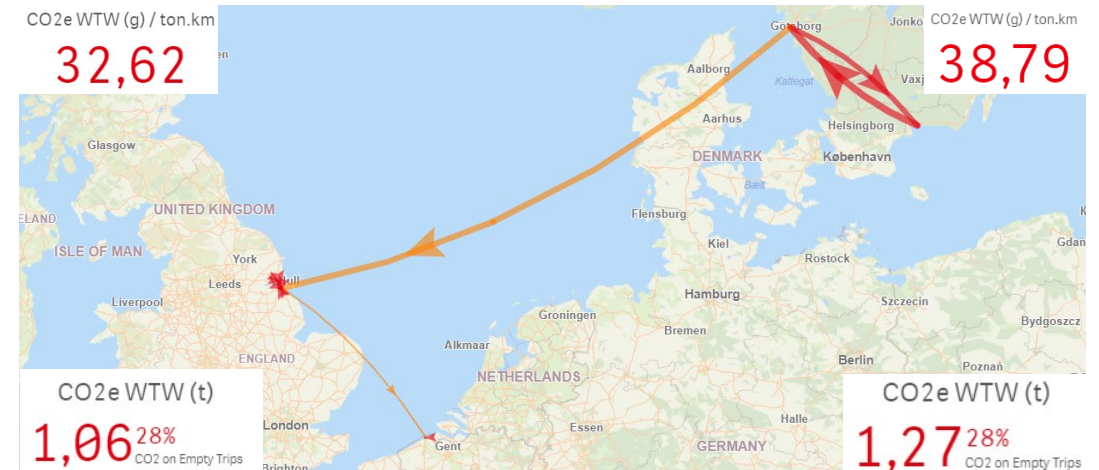
% of Total WTW  
Emissions

# CALCULATION EXAMPLE | HOYER

- Individual separation of transport chain elements (road and vessel transport + hub/terminal activities)
- Combination of modeled and default data:
  - road legs: individual fuel consumption per HOYER truck cluster
  - vessel/train legs: individual intensity factor based on EcoTransIT calculation logic
  - hub/terminal activities: default average factors

From Country	From City	To Country	To City	Modality	Tank Status	CO2e WTW in (t)	Distance (km)	Transported Weight (t)	#Cleanings	Cleanings CO2 (t)	#Heatings	Heatings CO2 (t)	#Handlings	Handlings CO2 (t)
SE	GÖTEBORG	SE	KARLSHAMN	TRUCK	Empty	0,232	327	0,1						
SE	KARLSHAMN	SE	GÖTEBORG	TRUCK	Full	0,370	327	25,2					1	0,02
SE	GÖTEBORG	GB	IMMINGHAM	VESSEL	Full	0,325	918	25,2					2	0,01
GB	IMMINGHAM	GB	IMMINGHAM	TRUCK	Full	0,004	3	25,2			1	0,05	1	0,02
GB	IMMINGHAM	GB	HULL	TRUCK	Full	0,063	46	25,2					1	0,02
GB	HULL	GB	KINGSTON UPON HULL	TRUCK	Empty	0,006	7	0,1					1	0,00
GB	HULL	GB	KINGSTON UPON HULL	TRUCK	Empty	0,001	1	0,1						
GB	KINGSTON UPON HULL	GB	IMMINGHAM	TRUCK	Empty	0,046	50	0,1	1	0,08			2	0,00
GB	IMMINGHAM	GB	IMMINGHAM	TRUCK	Empty	0,008	9	0,1						
GB	IMMINGHAM	GB	NORTH KILLINGHOLME	TRUCK	Empty	0,004	5	0,1					1	0,00
GB	NORTH KILLINGHOLME	BE	ZEEBRUGGE	VESSEL	Empty	0,001	360	0,1					2	0,00
BE	ZEEBRUGGE	BE	ZEEBRUGGE	TRUCK	Empty	0,004	5	0,1					1	0,00
<b>Total</b>						<b>1,064</b>			<b>1</b>	<b>0,08</b>	<b>1</b>	<b>0,05</b>	<b>1</b>	<b>0,07</b>

- Inclusion of cleaning, heating and handling activities leads to significant increase of absolute emissions and emission intensity



# ALLOCATION OF EMPTY KILOMETERS

	From Country	From City	To Country	To City	Modality	Tank Status	CO2e WTW in (t)	Distance (km)	Transported Weight (t)	#Cleanings	Cleanings CO2 (t)	#Heatings	Heatings CO2 (t)	#Handlings	Handlings CO2 (t)
Positioning	SE	GÖTEBORG	SE	KARLSHAMN	TRUCK	Empty	0,232	327	0,1						
	SE	KARLSHAMN	SE	GÖTEBORG	TRUCK	Full	0,370	327	25,2					1	0,02
	SE	GÖTEBORG	GB	IMMINGHAM	VESSEL	Full	0,325	918	25,2					2	0,01
	GB	IMMINGHAM	GB	IMMINGHAM	TRUCK	Full	0,004	3	25,2			1	0,05	1	0,02
Re-Positioning	GB	IMMINGHAM	GB	HULL	TRUCK	Full	0,063	46	25,2					1	0,02
	GB	HULL	GB	KINGSTON UPON HULL	TRUCK	Empty	0,006	7	0,1					1	0,00
	GB	KINGSTON UPON HULL	GB	IMMINGHAM	TRUCK	Empty	0,046	50	0,1	1	0,08			2	0,00
	GB	IMMINGHAM	GB	IMMINGHAM	TRUCK	Empty	0,008	9	0,1						
	GB	IMMINGHAM	GB	NORTH KILLINGHOLME	TRUCK	Empty	0,004	5	0,1					1	0,00
	GB	NORTH KILLINGHOLME	BE	ZEEBRUGGE	VESSEL	Empty	0,001	360	0,1					2	0,00
	BE	ZEEBRUGGE	BE	ZEEBRUGGE	TRUCK	Empty	0,004	5	0,1					1	0,00
	<b>Total</b>							<b>1,064</b>			<b>1</b>	<b>0,08</b>	<b>1</b>	<b>0,05</b>	<b>1</b>

CO2e WTW (t)  
**1,06** <sup>28%</sup> CO2 on Empty Trips !

Total Distance (km)  
**2.058** <sup>37%</sup> Total Empty Distance

Truck Distance (km)  
**780** <sup>52%</sup> Empty Truck Distance

Vessel Distance (km)  
**1.278** <sup>28%</sup> Empty Vessel Distance

Train Distance (km)

**0** Empty Train Distance

- ISO14083 and GLEC framework require calculation of emissions from empty mileage
- Allocation to transport orders of shippers required to drive collaboration and incentives for improvements:
  - Location of production sites impact trade imbalances and asset networks
  - Pre-product restrictions of shippers have an influence on asset networks and cleaning patterns

- **Harmonization of input parameter of calculation**
  - Level of detail
  
- **Data Quality**
  - From default data to primary data
  - Scope 3 data
  
- **Lack of consistency in reporting**
  - Internal vs. external