



**Smart Freight
Centre**

Emissions Accounting For Electric Transport Services

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The **business case** (e.g. income, compliance or finance) for reducing transport and logistics emissions is becoming more tangible.

60% of shippers and **59%** of carriers are able to calculate its transport-related CO₂ emissions.

69% of shippers and **41%** of carriers consistently use an established standard.

Agenda

Overview of the ISO 14083 GHG emissions reporting standard

Emissions Accounting For Electric Transport Services

State of the Art Electricity Emission Factor Databases

Industry-first framework for multimodal logistics emissions reporting

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



200+
Multinationals



50+
Programs,
tools,
initiatives

2023



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

GLEC FW will co-exist to ensure accessible and detailed industry guidelines, supporting the ISO standard.

Today

GLEC FW with annual updates for default emission factors and emission intensities on a yearly basis with extended range of focus topics and regional specifics

Slido:

How familiar are you with the GLEC Framework or ISO 14083?

(Please select one)

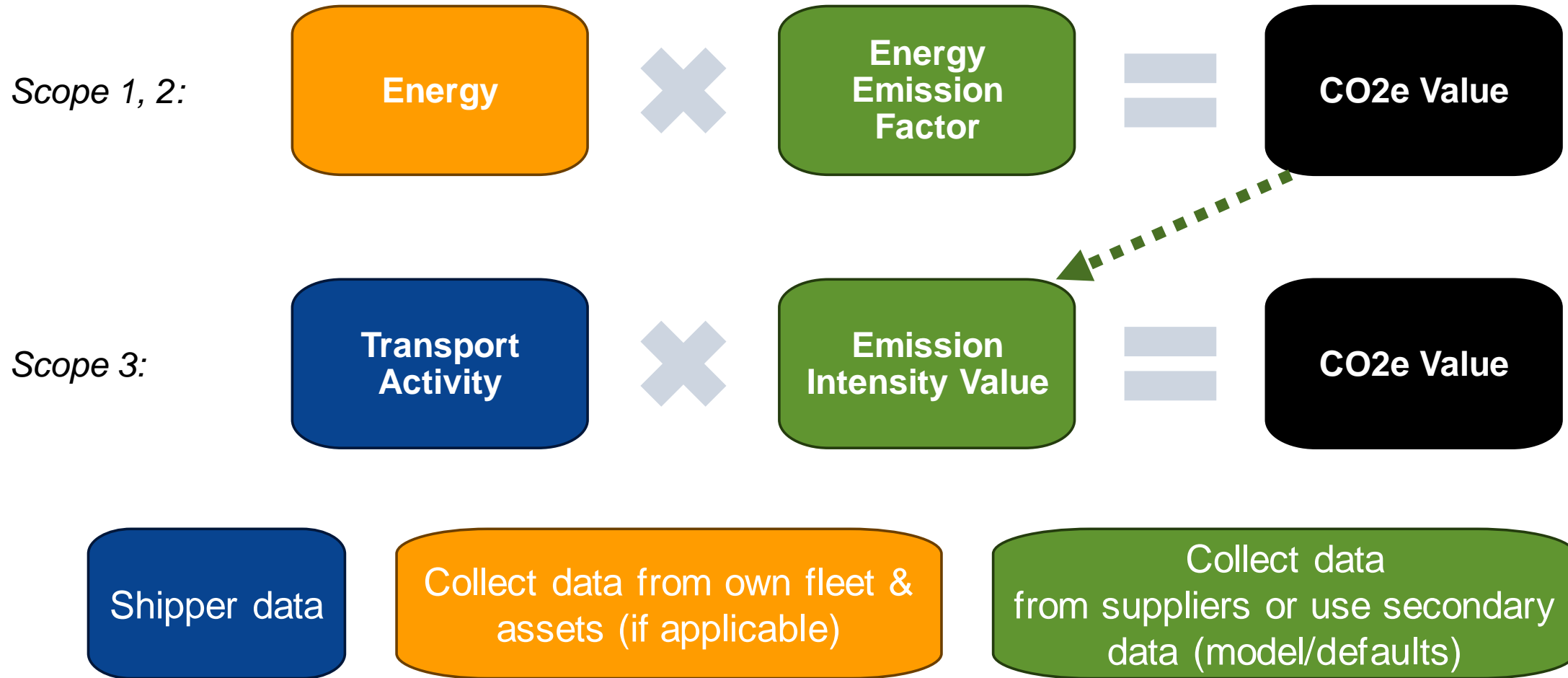
- Very familiar – I use it regularly.
- Somewhat familiar – I have read or referred to it occasionally.
- Heard of it – but I am not very familiar with the details.
- Not familiar at all.



(Some) Principles of the ISO 14083:2023 methodology

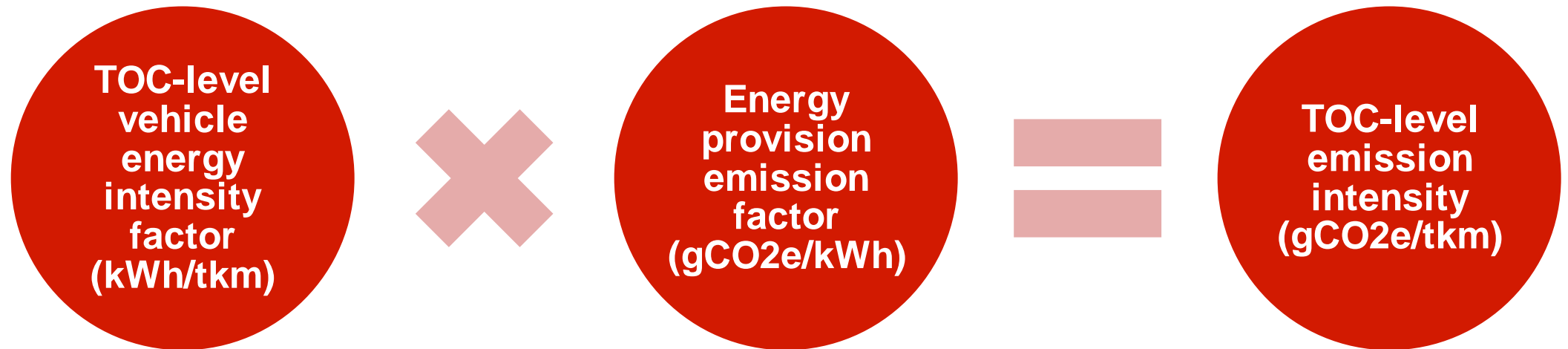
- **Multimodal Transport Chain:** All modes and hubs
- **Compatible with GHG Protocol Scopes:** Scope 1, 2, 3
- **IPCC Greenhouse Gases:** CO₂, N₂O, CH₄ and others → **CO₂-equivalent (CO₂e)**
- **Full Energy Lifecycle (Well-to-Wheel):**
 - **Well-to-tank (Energy Provision):** Fuel and electricity production & distribution
 - **Tank-to-wheel (Operational):** Fuel combustion
- **Activity-based Calculation:**
 - **Quantity of Freight** (tonnes, TEUs, items) X **Transport activity Distance**
 - **Impact of Load Factor and Empty Running**
- **Absolute emissions (kg CO₂e) and emissions intensity (kg CO₂e/tonne-km)**

Calculating GHG emissions depending on access to data



Calculating Emission Intensity for EV-based operations

How much emissions are produced by the fleet when it carries out 1 tonne-kilometre worth of transport activity?

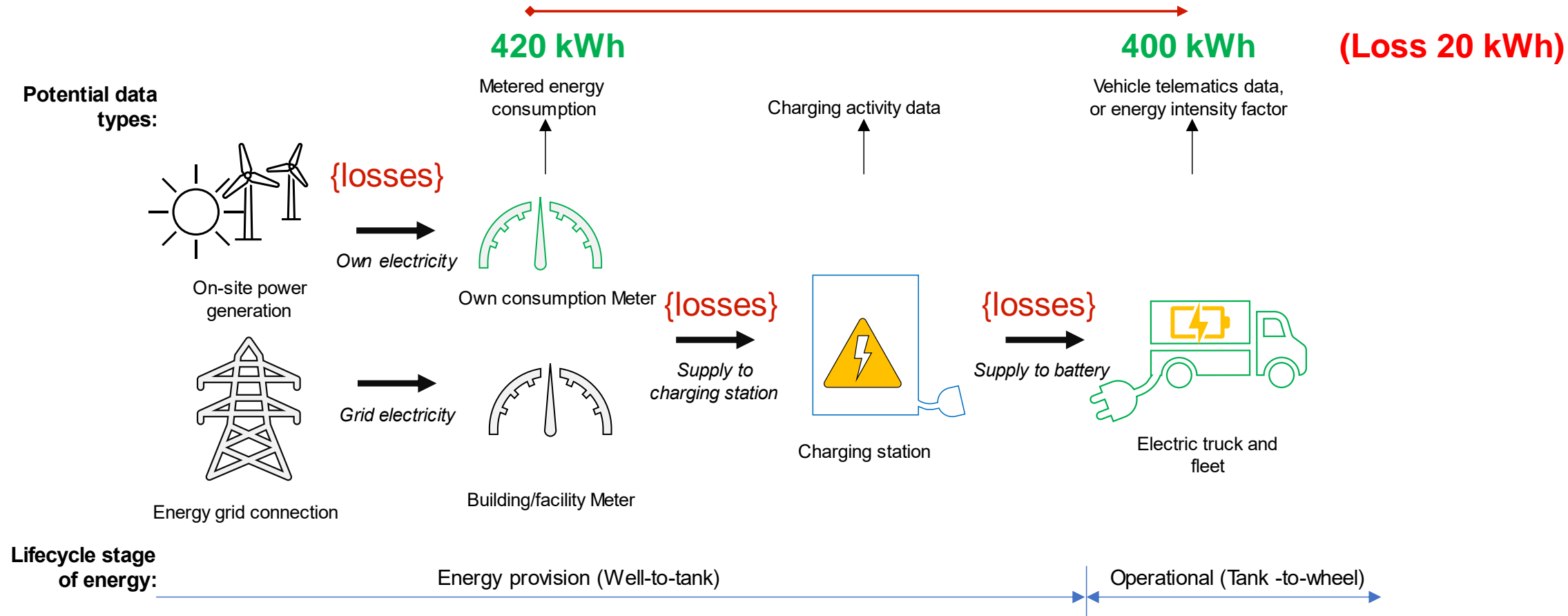


Electricity-based transport
>>> **Zero tailpipe or vehicle operation emissions**
→ Only **Energy Provision Emission Factor @ Vehicle**

Calculating the TOC-level vehicle energy intensity factor

How much energy (kWh) is required by the fleet to carry out 1 tonne-kilometre worth of transport activity?

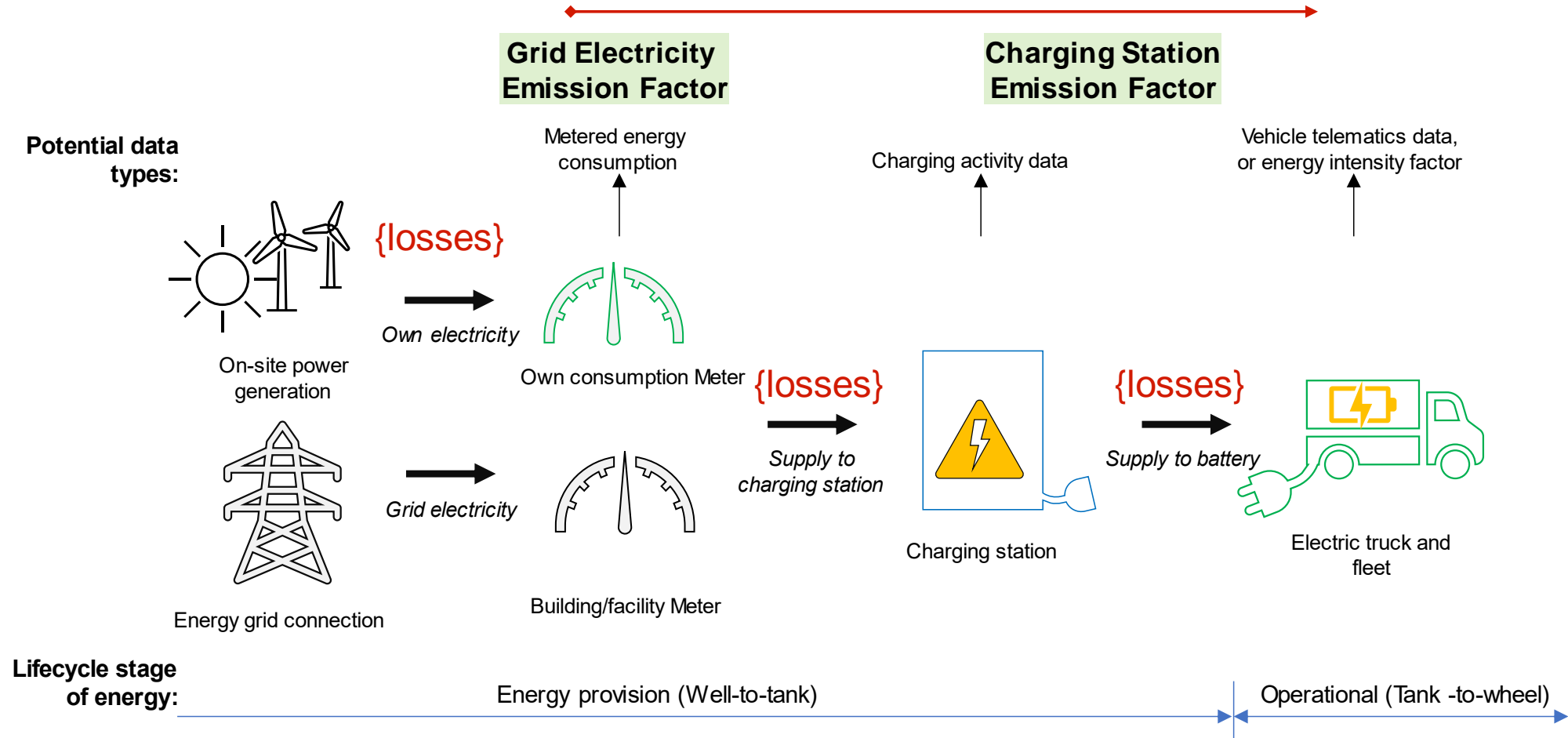
Multiple data sources can be used, as long as the efficiencies are accounted for



Calculating Energy Provision Emission Factor (gCO₂e/kWh)

How much emissions are produced for each kilowatt-hour of energy delivered to the vehicle?

Energy losses will increase the Energy Provision Emission Factor



Electricity emission factor categories according to ISO 14083:

What is the emissions contribution of each activity in the electricity generation and provision lifecycle?

At Power Plant

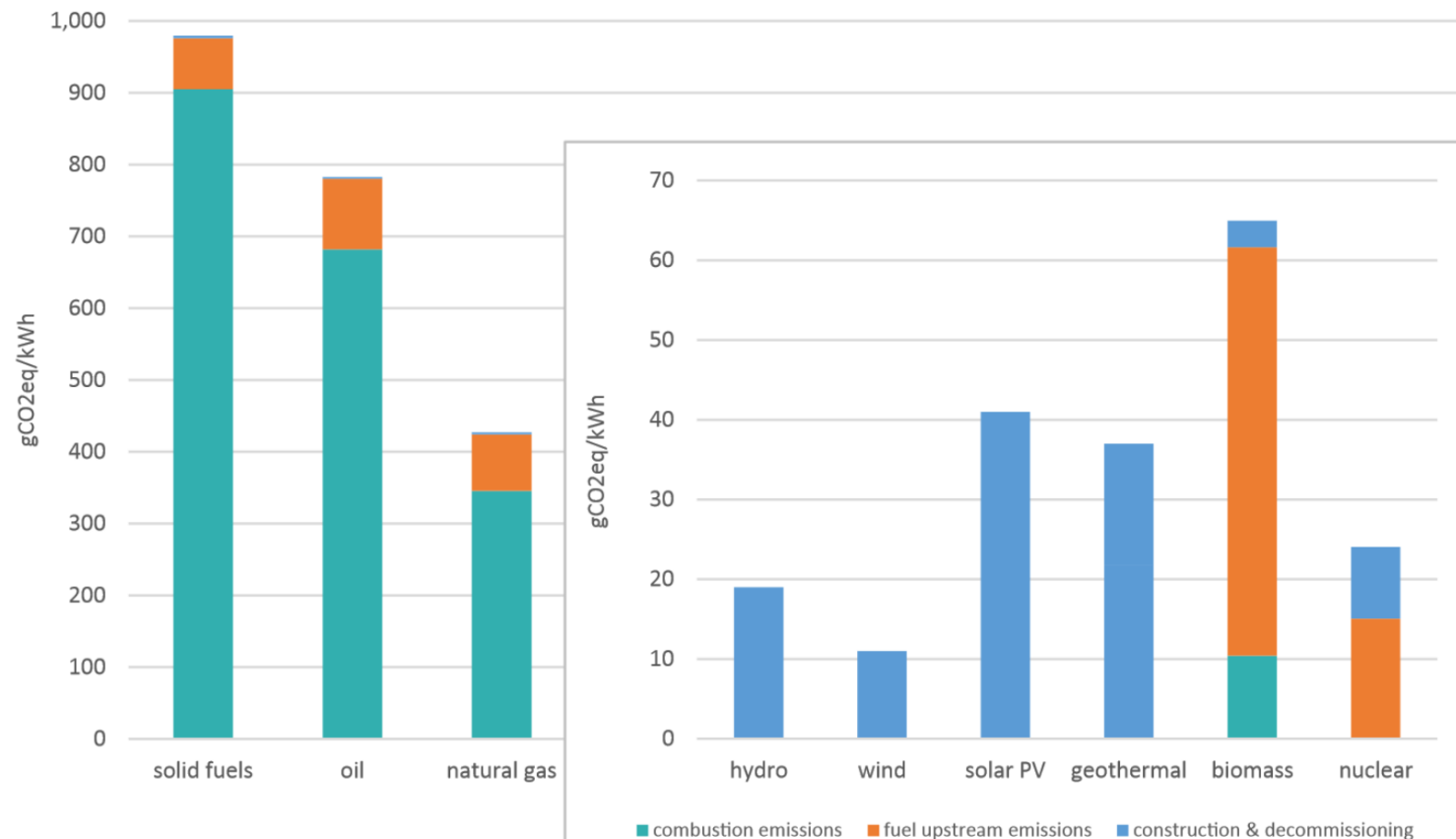
- Fuel combustion
- **Fuel** extraction, production, transport (upstream)
- Power generation infrastructure
 - Especially when significant proportion of total → 10 to 40 g CO₂e/kWh for renewables
 - May be reported separately

To Charging Station and Vehicle

- Consumption mix of the grid
 - Effects of electricity trade
- (Grid-average) losses from transmission and distribution (T&D):
 - The EU average is 3 to 4% or 15 to 19 g CO₂e per kWh of consumption.
- Electrical and charging infrastructure losses
 - 3% to 10% losses

Renewable and nuclear electricity are much lower but not zero emissions according to the ISO 14083

GHG emission factors (gCO₂e/kWh) for different power plants and fuels



Sources of electricity emission factors

Not every database provides the categories that ISO 14083 needs



Table 6. Summary of sources reviewed and scope of electricity production chains considered.

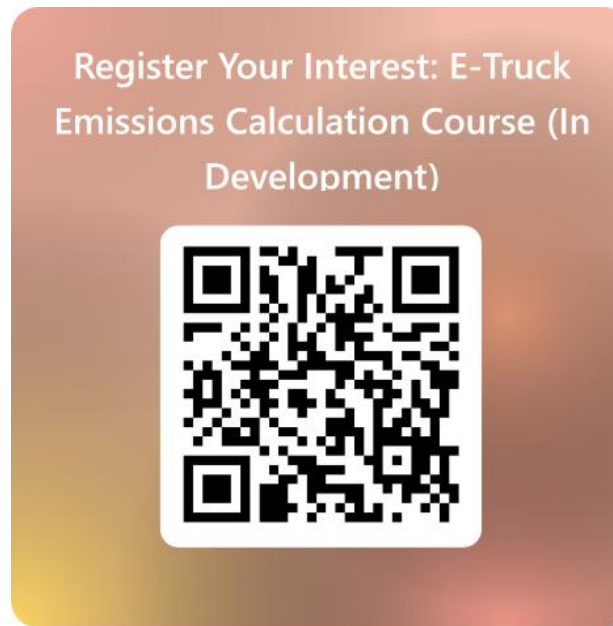
| | UPSTREAM | CORE | | | | DOWNSTREAM | |
|---------------------------------|--------------------------------|---------------------------|------------|---------------------------|---------------|--------------------|--------------------------|
| Source | Fuel preparation and provision | Generation Infrastructure | Combustion | Operation and Maintenance | EOL processes | T&D infrastructure | T&D to customer (losses) |
| JEC | | | | | | | |
| RED | | | | | | | |
| IEA | | | | | | | |
| GREET | | | | | | | |
| Ecoinvent | | | | | | | |
| Sphera | | | | | | | |
| GLEC | | | | | | | |
| FuelEU Maritime | | | | | | | |
| EcoTransIT World | | | | Partly included | | | |
| UK GHG Reporting: Conv. Factors | | | | | | | |
| NREL | | | | | | | |
| HBEFA | | | | | | | |

Legend Included Excluded

- Transparency over the emission categories included is necessary.
- Any deviation has to be justified in the ISO 14083 report.

<https://emissionfactors.eu/>

Measuring and Reporting the Carbon Footprint of Electric Freight Vehicle Operations



<https://forms.office.com/e/BVGjGXUgdf>

- Road freight basic calculations
- Location- vs market-based
- Applying TOC-logic
- Processing primary data



**Join our journey towards
road freight electrification**

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