CLEVER

Creating harmonized emission factors for verified GHG emission reductions in transport

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Sustainability at Work: The MCS – ISCC Collaboration

- MCS initiated and continuously develops ISCC in a multi-stakeholder approach
- ISCC has been recognized by the European Commission for 15 years
- MCS supported the expansion of ISCC to many new markets, technologies and regions
- Close collaboration with sustainability-focused sister companies (GRAS, ClimatePal and 4C)

https://sustainability-at-work.org/

Creating Harmonized Emission Factors for Verified GHG Emission Reductions in Transport

Rationale behind CLEVER:

- Emission factors used in every GHG calculation
- Lots of interested / impacted stakeholders
- Many emission factor sources available
- Lack of clarity and consistency
- International perspective

Project Objectives

- Define a comprehensive **Emission Factor methodology**
  - Impartial, comprehensive, clear, specified, transferable
- Achieve a **consensus-based** solution via technical dialogue
  - State-of-the-art, gaps and developments
- Provide accompanying **guidance** and ‘validated’ **set of default emission factors**
  - Provide starting point for EC database
- **Market access** to the project outputs

Funded by the European Union

This project has received funding from the European Union’s Horizon Europe research and innovation program under grant agreement N° 101146908

The Stakeholder Approach

Consortium of 11 partners

alice | Alliance for Logistics Innovation through Collaboration in Europe

PNO | BY PNO GROUP

e:misia

Smart Freight Centre

ifeu | INSTITUT FÜR ENERGIE- UND UMWELTFORSCHUNG HEIDELBERG

THREE CLOCK

GreenRouter

RICARDO

meo CARBON SOLUTIONS

UITP | ADVANCING PUBLIC TRANSPORT

ZN

Expert Forum

Over 60 engaging parties from industry, associations, research, regulation & standards

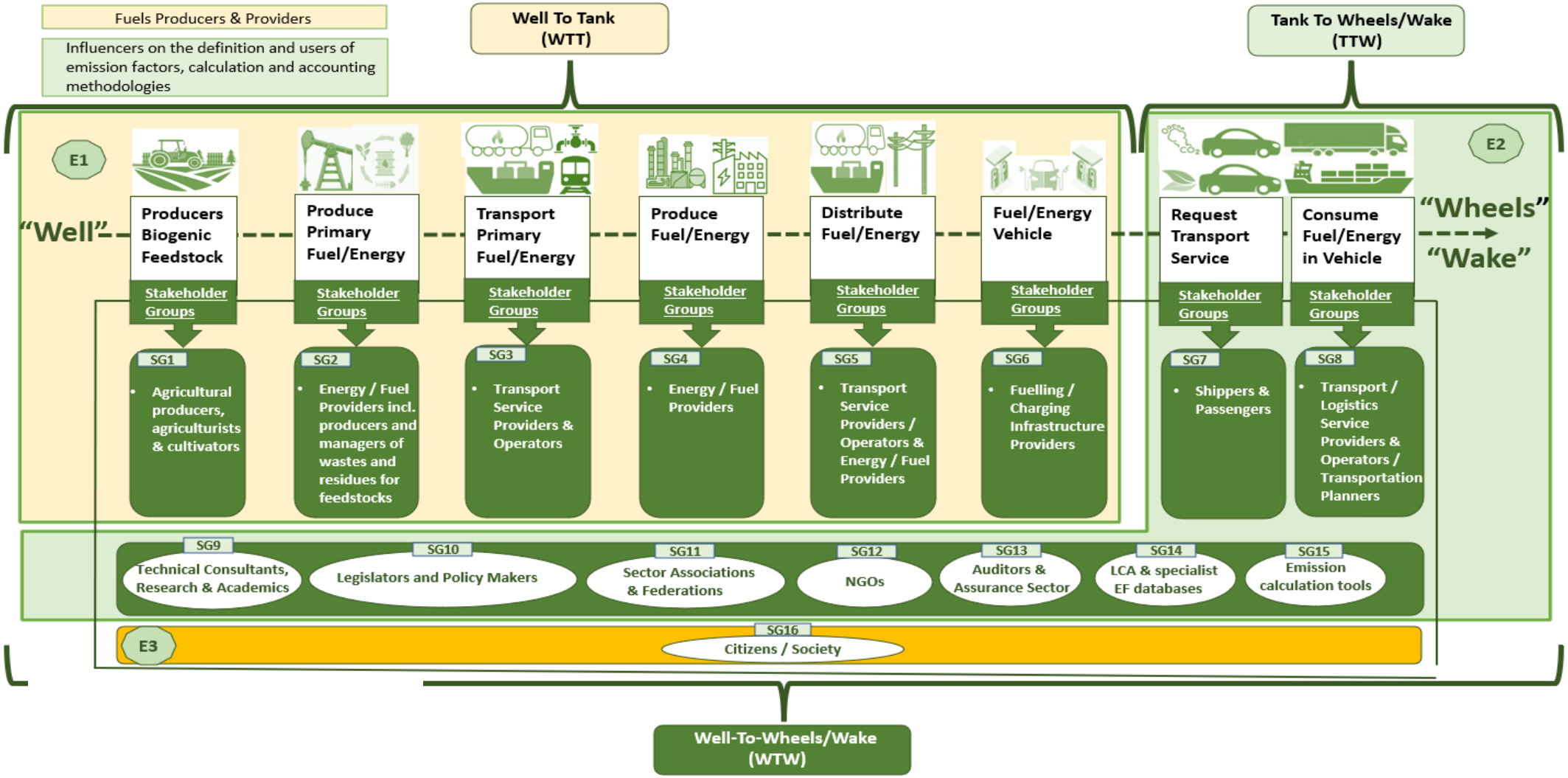
ISCC | International Sustainability & Carbon Certification

Regulators & Standards

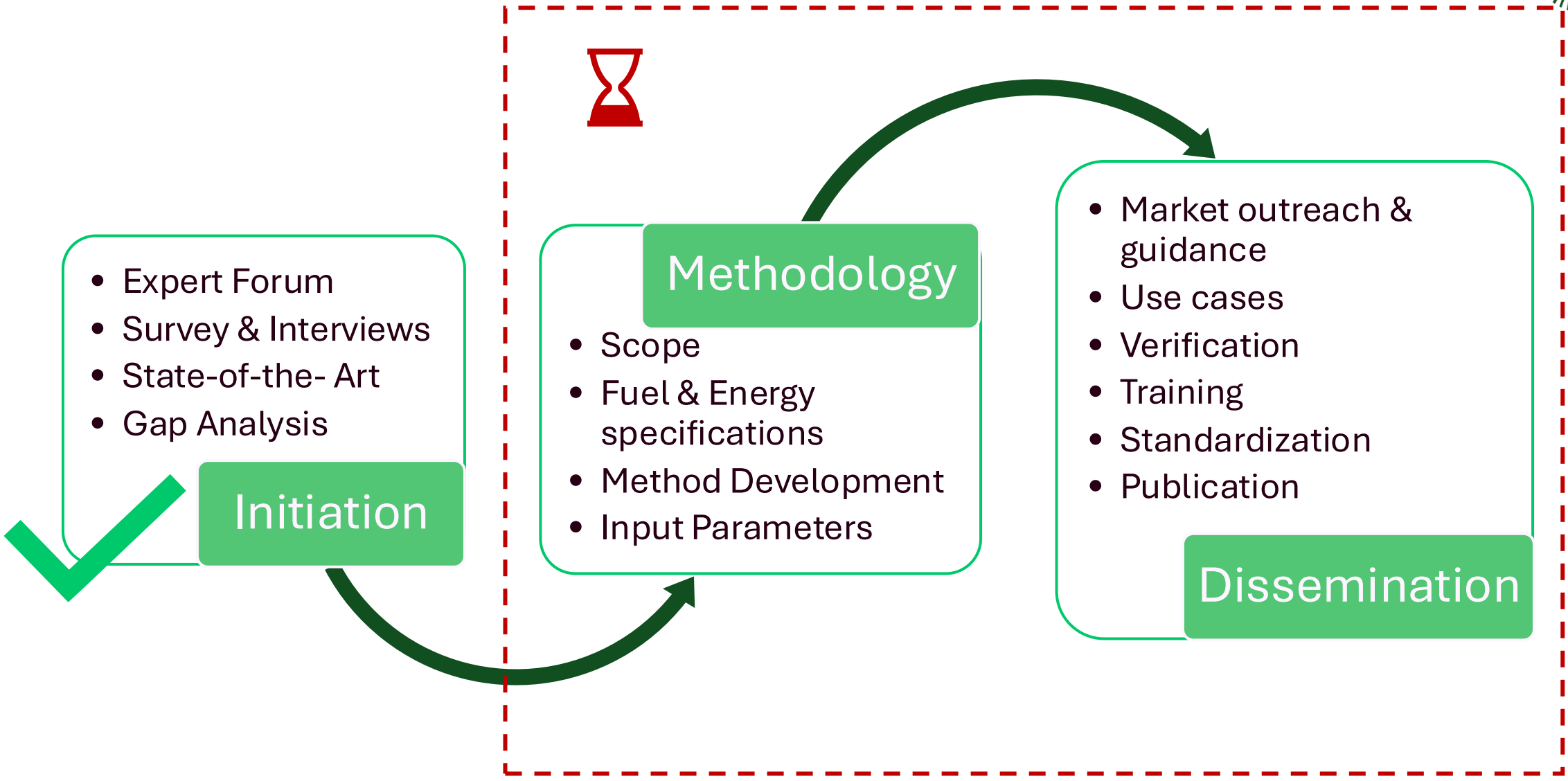
European Commission

ISO

Project Ecosystem



Current Status of Project Progress

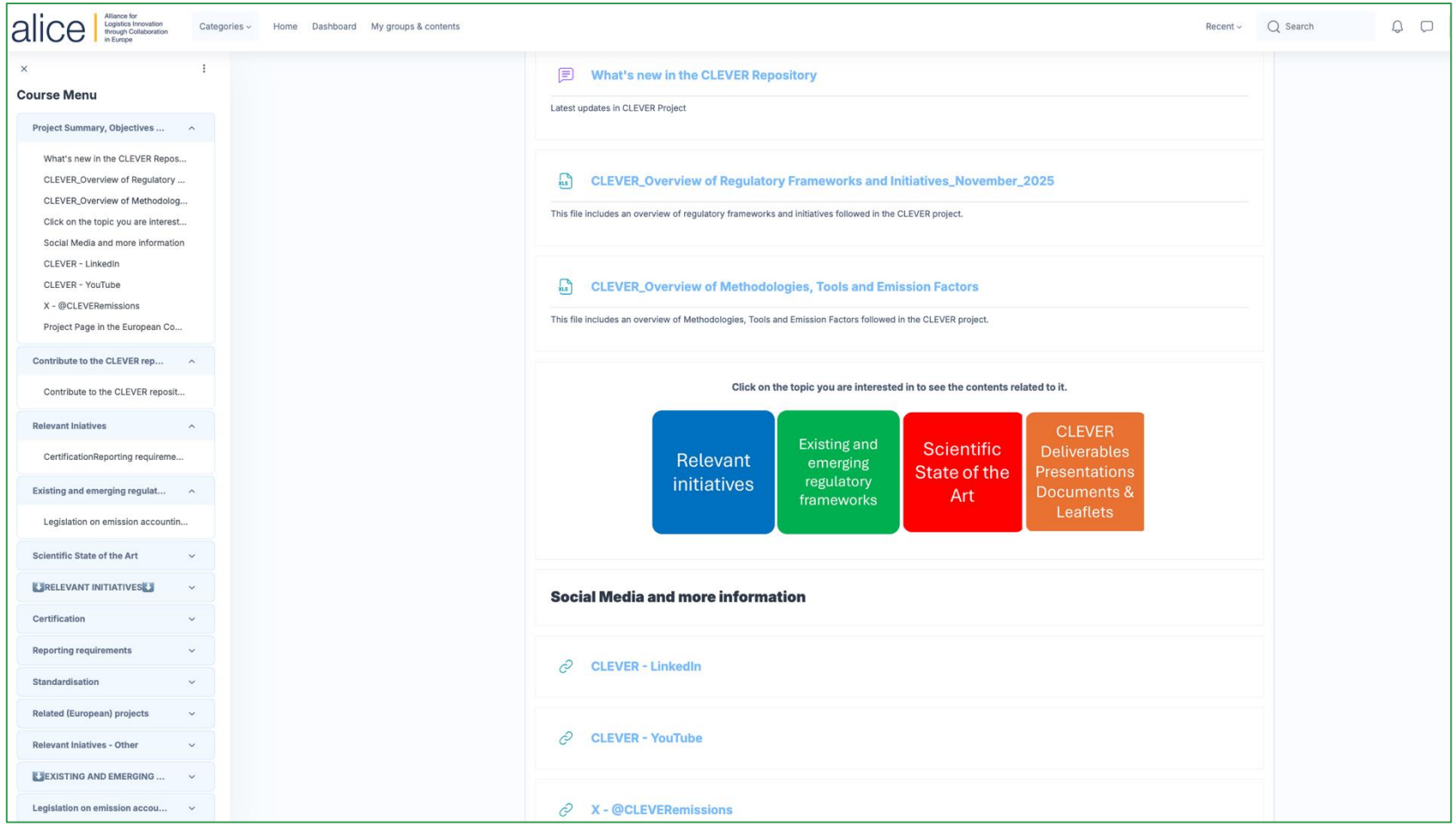


The CLEVER Repository

➢ **Accessible and updatable by everyone**

State of the art on emission reporting

Relevant initiatives and existing & emerging regulator frameworks



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Scope of Work, Status Quo & Next Steps

Goal of CLEVER GHG Emission Factors and Methodology

CLEVER is:

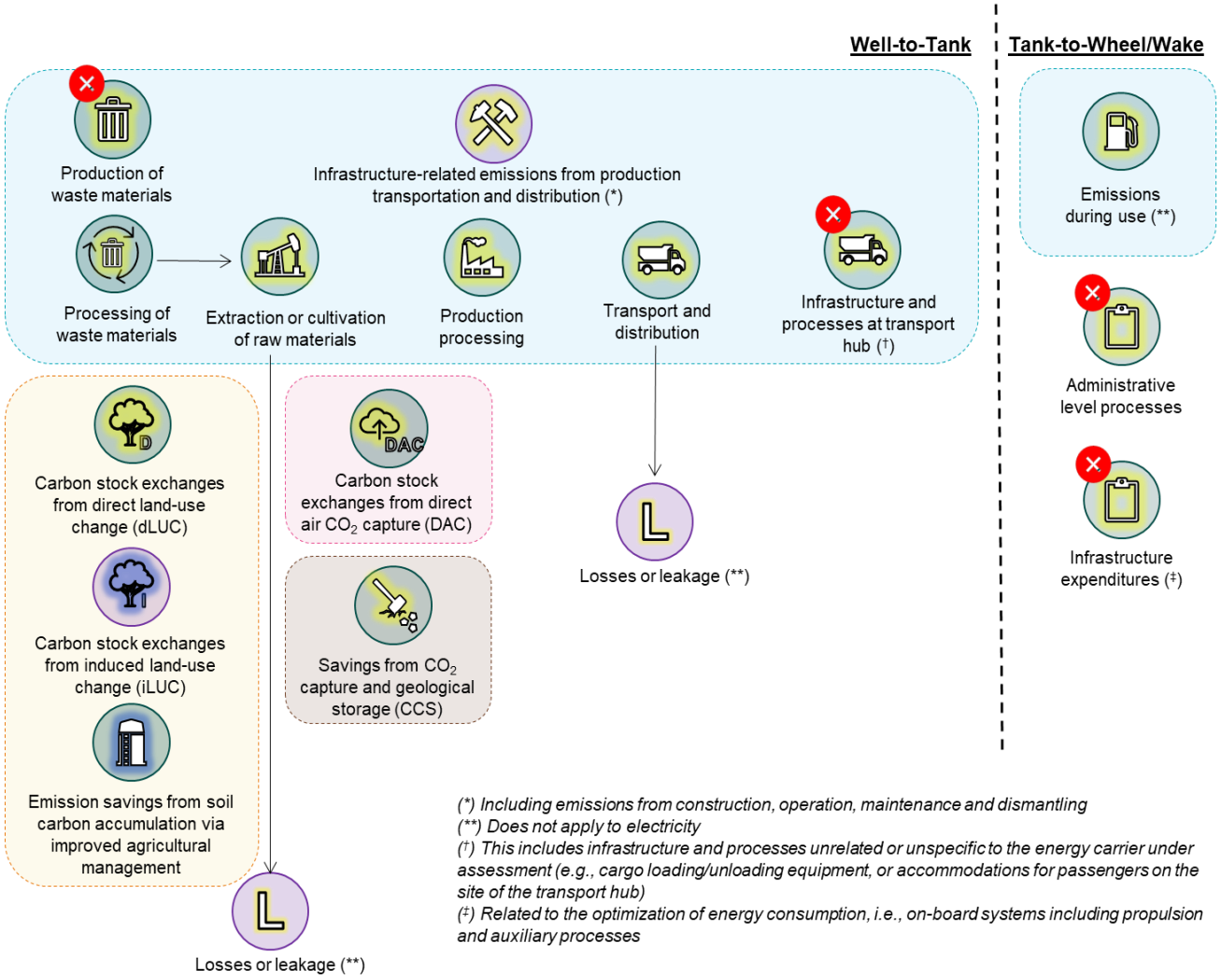
- A **universal methodology** on how to derive **GHG emission** factors for different energy carriers and pathways
- A **set of ready-to use GHG emission factors** for the most commonly used energy carriers today and in the near-future following this methodology

→ Background:

- Different methodologies and databases for GHG emission factors exist leading to the need for a harmonised approach

- For **whom** are we doing this, who will use this and how?
  - **CLEVER GHG emission factors** will be included into the **CountEmissions EU** database and be usable for everyone doing GHG calculations of transports
  - Calculation of own/ additional GHG emission factors will be possible, following the methodology
  - Adaptation of existing GHG emission factors will also be possible due to a modular approach

System boundary



- System boundary: Inclusion of all (relevant) life cycle stages (including energy provision infrastructure) → 3% cut- off criteria based on overall climate impact can be applied
- Waste is available burden-free for fuel production, but any upgrading is included

Scope of CLEVER GHG Emission Factors

- Geographical scope: average fuels used in **Europe** and country-specific values for electricity
- Temporal scope: current and emerging energy carriers (base year: 2025)
- Technological scope:
  - broad range of energy carriers and their pathways for usage in different vehicle types used in transportation covering **all modes of transport** (air, water, ocean, rail, road)
- Energy carrier pathways:
  - Fossil fuels and electricity
  - Biogenic fuels
  - Renewable fuels of non-biological origin (RFNBOs)
  - Recycled carbon fuels
  - Renewable (non biogenic) electricity
  - Other low carbon fuels

- Impact assessment:
  - “Climate change” as GWP100 (from latest IPCC report) but with the addition of hydrogen
- Inclusion of direct land use change (following IPCC guidelines with 20-years perspective)
- Approach to biogenic carbon: -1/+1 (only permanent storage of biogenic carbon can lead to negative WTW emissions)
- Coverage of additional climate impacts from high altitude emissions of airplanes, black carbon emissions and indirect land use change (iLUC)

Result presentation of CLEVER GHG Emission Factors

CLEVER results are given as:

$$EF_{Total} = EF_{Core} + EF_{iLUC} + EF_{ACI}$$

- with EF_{Total} constituting the total CLEVER GHG emission factor
- with EF_{Core} including all GHG emissions and processes inside of the system boundary (apart from iLUC and additional climate impacts)
- with EF_{iLUC} representing contributions from iLUC (indirect land use change)
- with EF_{ACI} representing additional climate impacts (divided into impacts of hydrogen, high altitude emissions and black carbon)

- Division into:
  - Well-to-tank and tank-to-wheel
  - Main GHGs (CO_2, N_2O, CH_4, H_2)
  - Biogenic CO_2
- Additional information on:
  - Energy carrier pathway and usage
  - Lower heating values
  - Densities (for liquid fuels)
  - Data quality rating
  - GWP100 of the main GHGs

Next Steps, Information & Engagement Options

- (Draft) final methodology
- LCI data collection
- Finalization of emission factor samples
- Use Cases
- Regular Expert Forum meetings (next: Amsterdam in April)

Enroll in the CLEVER **Repository**

Gain information via our **microlearning course**

Smart Freight Centre Academy

UITP ACADEMY

ISCC Academy
International Sustainability & Carbon Certification

Listen to our **podcast** series "CLEVER Chats"

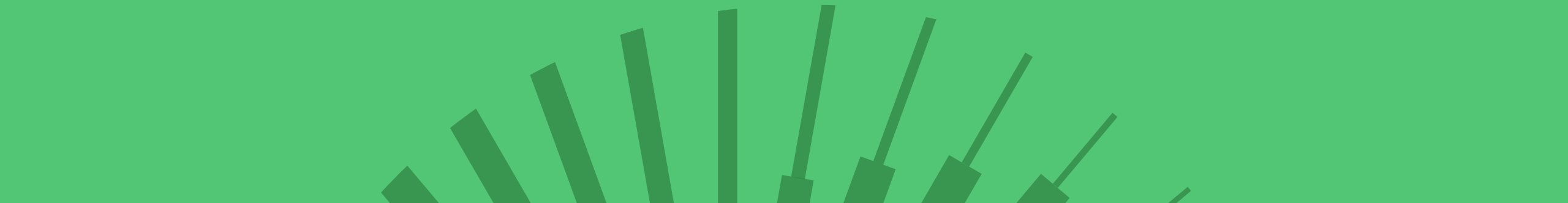
Spotify

Apple Podcasts

Subscribe to our quarterly **newsletter**

THANK YOU

Annex



Pathways and Feedstocks I

Fuel/ energy carrier	Feedstock (Tier 3) and production process (Tier 2)	Type of fuel
Renewable electricity	Member State renewables mix	Renewable
Fossil electricity	Member state grid mix	Fossil
Hydrogen (fossil)	Natural gas *(Steam methane reforming with and without CCS)*	
LNG	Crude oil (*refining)*	
Gasoline		
Diesel		
Kerosene		
HSFO		
VLSFO		
Methanol	Natural gas *(steam reforming and methanol synthesis)*	
Biomethane (as LBM)	manure & whole crop maize *(anaerobic digestion and upgrading of biogas)*	Biofuel
Bioethanol	Corn *(first generation fermentation plant)* Wheat straw (*second generation fermemation plant)*	
ATJ-Kerosene	Bioethanol produced from corn & wheat straw *(alcohol to jet)*	
FAME	Rapeseed oil & used cooking oil *(esterification)*	
HVO	Rapeseed oil & used cooking oil *(hydrotreament)*	
HEFA		
Co-processed HEFA		

Pathways and Feedstocks II

Fuel/ energy carrier	Feedstock (Tier 3) and production process (Tier 2)	Type of fuel
Bio-methanol	Lignocellulosic residue (forestry residue) (gasification & methanol synthesis)	Biofuel
FT-gasoline	*Lignocellulosic residue (forestry residue) (gasification & Fischer Tropsch (FT) sythesis & fuel upgrading)*	
FT-diesel		
FT-kerosene		
FT-gasoline	Refuse derived fuel (RDF) produced from municipal solid waste (*gasification and & Fischer Tropsch (FT) sythesis & fuel upgrading*))	Partially biofuel and partially recycled carbon fuel (RCF)
FT-diesel		
FT-kerosene		
RCF	Upgraded pyrolysis oil; End of life tyres (ELT) (*pyrolyis and fuel upgrading*)	
Hydrogen	Renewable electricity (*electrolysis*)	Renewable fuel of non-biological origin (RFNBO) / e-fuel
Ammonia	Hydrogen from renewable electricity via electrolysis (Haber *Bosch process*)	
E-gasoline	H_2 from renewable electricity via electrolysis plus CO_2 from fossil point source e.g., power plants (*Fischer Tropsch (FT) sythesis & fuel upgrading*)	
E-diesel		
E-kerosene		