Working Group on Monitoring Methodologies of CO_2 Neutral Fuels

(WGMM 2025)

Who we are

More than 50 Associations and companies representing the broad automotive value chain

Key Facts

WGMM founded in **September 2023**, in Stuttgart, Germany.

More than 50 members, including companies, OEMs and associations.

2 Sub-Groups, coordinated by a **Steering Group** and supported by a **Secretariat**.

11 Monitoring Methodologies identified to **monitor** the use of CNF in road transport.

Produced comprehensive **Report on technical assessments, a CNF definition, and regulatory analysis for the monitoring methodologies.**

Objectives

Follow-up with Stakeholders

Building on its initial objective of producing a report, the WGMM will ***follow-up with external stakeholders, political and/or civil society***, on the Report published by the WGMM on the 11th of December 2024 during its General Assembly.

Become a reference partner

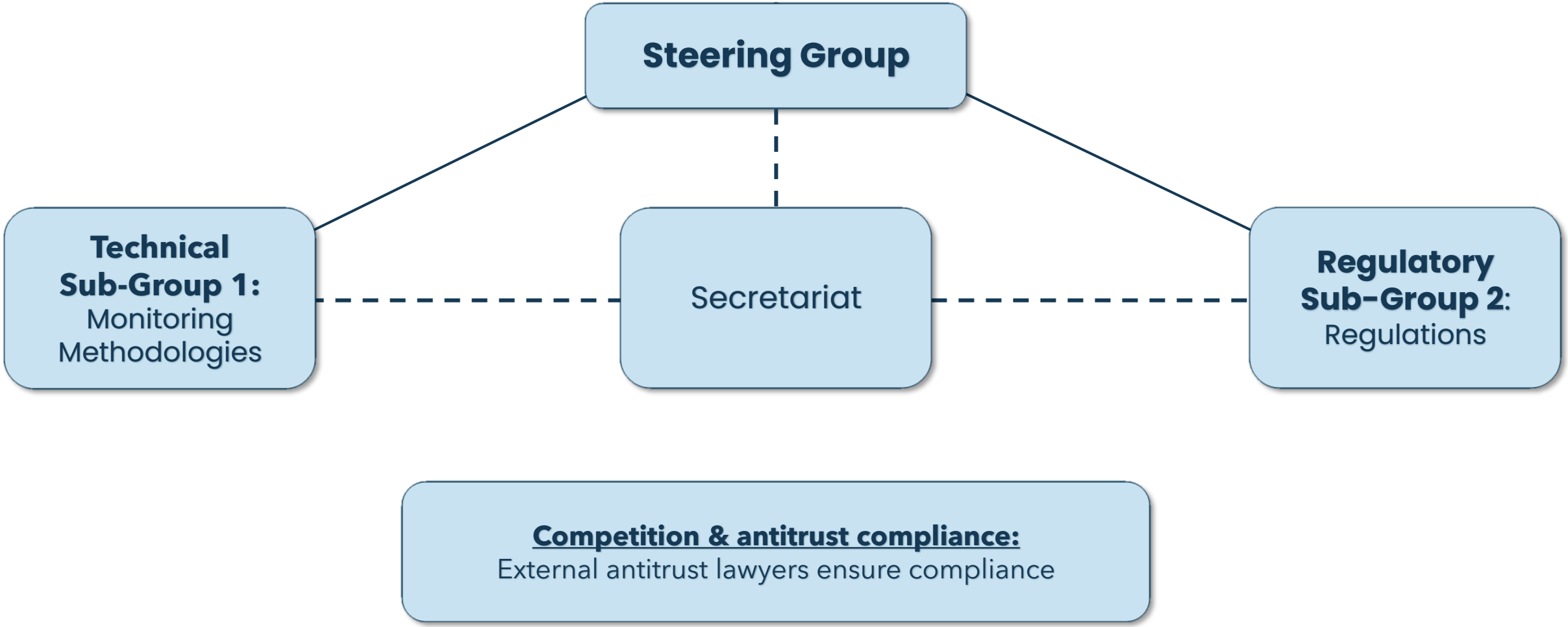
Become a reference partner on policies and regulations, and advise EU policy makers and Member States on land transport emissions, with a ***special focus on the deadlines and various revision options of CO2 regulations*** for light and heavy-duty vehicles.

Technical engagement

The WGMM will continue ***the technical assessment of monitoring methodologies of CNFs and advice*** stakeholders and national and EU policymakers on the matter, based on the principle of technical neutrality and openness.

TECHNICAL ENGAGEMENT & POLITICAL ADVOCACY **related to the 2024 Report.**

Structure of the WGMM



REGULATORY BACKGROUND

Mar 2023

Compromise on CO2 Emission Standards for Cars and Light-Duty Vehicles, which includes a new class for vehicles that are exclusively supplied with CO2 neutral fuels

Jul 2023

First proposal from the Commission on the new vehicle class

20th Sep 2023

Establishment of the Working Group on Monitoring Methodologies in Stuttgart, Germany

Feb 2024

Agreement on CO2 Emission Standards for Heavy-Duty Vehicles, which include a vehicle class for all CO2 neutral fuels – including biofuels

11th Dec 2024

General Assembly & Publication of the Report on 11 Monitoring Options

2025 (expected)

- Delegated Act on EURO 7 for a new vehicle class
- Impl. Act for type approval
- Del. Act for CO2 emission standards

End of 2025

Review of the CO2 emission standards for passenger cars and Light-Duty Vehicles

2027

Review of the CO2 emission standards for er Heavy-Duty Trucks

CO_2-Neutral Fuel Definition

- The European Commission plans to allow vehicles running exclusively on CO_2-neutral fuels to qualify as “zero-emission vehicles” under the Euro 7 regulation.
- ***However, the Commission’s drafted definition includes only eFuels (RFNBOs) and demands 100% GHG savings based on a full well-to-wheel analysis, which is technically challenging to meet.***
- Meanwhile, the existing CO_2 standards for cars and trucks (LDVs and HDVs) are based on tailpipe emissions only. This discrepancy creates a regulatory inconsistency that the Working Group seeks to address by proposing a broader and more aligned definition.

CO_2-Neutral Fuel Definition

Limitations of the Commission’s Definition:

- Excludes Biofuels: Only RFNBOs are considered CNFs, omitting renewable fuels like biofuels and biogases.
- Inconsistent with Other EU Laws: Unlike other regulations (e.g., EU ETS, RED, ReFuelEU, IPCC guidelines), which often treat emissions from bio-based fuels as zero, the Commission's CNF definition imposes stricter criteria.
- Limits Consumer and Industry Choices: The narrow scope restricts technology neutrality, compliance options, and industrial competitiveness.
- ***Technical experts don’t see any opportunity to achieve -100% reduction on a well-to-wheel basis*.**

WGMM-Proposed definition

*"**CO_2-neutral fuel**" means all fuels defined by **Directive (EU) 2018/2001**, provided that they meet the sustainability criteria of that Directive and associated delegated acts, where the same amount of CO_2 from biomass, ambient air or recycled carbon sources is bound in the fuel production as is released during combustion in the use phase. Those fuels shall include **renewable and/or synthetic fuels**, such as biofuel, biogas, biomass fuel, renewable liquid and gaseous transport fuel of non- biological origin (RFNBO) or a recycled carbon fuel (RCF).*

The Evaluation Matrix of the 11 Methodologies

	Methodology	Tracking method	Detection method	Inducement system	Fuel compatibility
1	Mechanical adaption of tank filler / nozzle	Physical	Mechanical	NO	Gaseous and Liquid fuels
2	Fuel marker along upstream and downstream (sensor in vehicle)	Physical	Sensor	YES	Liquid fuels
3	100% digital tracking from upstream to downstream (DFTS w/ digital handshake)	Physical	Electronic by re-using existing data	YES	Gaseous and Liquid fuels
4	Hybrid approach - upstream: fuel marker & sensor until EU border - downstream: DFTS w/ digital handshake	Physical	Sensor & Electronic	YES	Liquid fuels
5	Vehicle On-Board Fuel Detection Function	Physical	Sensor	YES	Liquid fuels
6	Vehicle Onboard Fuel Molecular Sensor	Physical	Existing Engine Sensor	YES	Liquid fuels
7	Bidirectional Communication between vehicle and gas station	Physical	Electronic	YES	Gaseous and Liquid fuels
8	EU market exclusively supplied with CNF	Physical	NR	NO	Gaseous and Liquid fuels
9	Mass-Balanced CNF supply to each CNF vehicle	Virtual	None	NO	Gaseous and Liquid fuels
10	Fuels Usage Balancing – FUB	Virtual	Electronic	YES	Gaseous and Liquid fuels
11	Combined mass balancing - DFTS w/ digital handshake	Virtual	Electronic	YES	Gaseous and Liquid fuels

The Classification Criteria

Tracking method

- **Physical**: the CO2 neutral fuel is physically delivered to the vehicle
- **Virtual**: the vehicle has the guarantee that the fuel consumed is covered by a corresponding CO2 neutral fuel quantity on the market

Detection method

- **Mechanical**: the CO2 neutral fuel connection is characterized by a unique mechanical design
- **Sensor**: The vehicle has onboard sensor to detect either the fuel or the marker properties
- **Electronic**: The vehicle has an electronic device to digitally track the fuel received

Inducement system

- **YES**: The vehicle needs an inducement system to prevent wrong fuel use
- **NO**: The vehicle doesn't need an inducement system due to the properties of the monitoring methodology

The Monitoring Methodologies (1/4)

- **Option 1 - Mechanical Adaption of Tank Filler / Nozzle**: Can prevent misfuelling, however, it is prone to tampering. Requires new standards and hardware. Demands integration at vehicle and station levels.

- **Option 2 - Fuel Marker along Upstream and Downstream**: Fuel marker and sensor in the vehicle that physically track the CNF. Already used for heating oil, but no off-the-shelf automotive sensor available. New developments for automotive requirements are expected. Fuel marking may offer higher tampering resistance.

- **Option 3 - 100% Digital Tracking from Upstream to Downstream DFTS w/ Digital Handshake)**: Enables full digital tracking, however, requires vehicle, logistics, and station adaptations. Ensures pairing via digital handshake. Manipulation robustness via multi-trust centre checks.

The Monitoring Methodologies (2/4)

- **Option 4 - Hybrid Approach – Upstream Fuel Marker & Sensor Until EU Border – Downstream - DFTS w/ Digital Handshake:** Could improve sensor and marker approach, in which the lack of automotive ready sensors could be bypassed by performing a digital handshake with filling station. Allows less stringent sensor requirements, reduces OEM integration effort, and enables faster time to market.

- **Option 5 - Vehicle On-Board Fuel Detection Function:** Enables onboard fuel detection via existing ECU signals. Works for CNFs with distinct properties like HVO and Diesel, but no known solution for gaseous fuels. May require calibration for future fuels, adding deployment effort.

- **Option 6 – Vehicle On-Board Fuel Molecular Sensor:** Directly tracks fuel type onboard and is not marker-based. Sensor available in series production meeting EN590 and EN228 standards. Provides real-time verification used in buses and trucks. Supports CNF detection for EN14214 and EN15940. Databases for eFuels like MtG and FT under development.

The Monitoring Methodologies (3/4)

- **Option 7 - Bidirectional Communication Between Vehicle and Filling Station:** Provides tamper-proof approach which could be used as a one-to-one pairing solution between nozzle and vehicle. Includes filling monitoring and filler neck blockage to prevent conventional fuel use. Requires technical adaptations to meet tampering standards.

- **Option 8 - CNF Exclusively Available in EU market:** Highly improbable for 2035 but possible long-term. Assumes exclusive CNF availability after large-scale production, and depends on reduced liquid and gaseous fuel demand through efficiency and electrification.

- **Option 9 - Mass-Balanced CNF Supply to Each CNF Vehicle:** "Indirect" solution which uses input-output control via certificates. System ensures equivalent CNF introduction elsewhere; benefits include high efficiency, rapid fuel production ramp-up, and no need for dedicated CNF pumps at filling stations initially.

The Monitoring Methodologies (4/4)

- **Option 10 - Fuel Usage Balancing:** Uses a mass-balancing approach based on tracking of fuel energy in the vehicle tank without a handshake between filling station and vehicle. Certificate handling is the motorist's responsibility via a marketplace. Efficient for commercial fleet customers, but may burden average passenger car users.

- **Option 11– Digital Tracking with Mass Balancing**: Hybrid solution combines mass-balancing certificate handling with DFTS digital handshake. Enables fast, accurate certificate accumulation per vehicle. Ensures timely certificate management, and includes inducement system to monitor CNF use.

Assessment options for effective Inducement systems & Flexibility mechanisms

1. Stop Vehicle Operations
2. Progressive Performance Reduction
3. Maximum Mileage Allowed
4. Financial Offsetting
    a) At refuelling (surcharge).
    b) During inspections (delayed fees).

NECESSARY NEXT REGULATIVE STEPS:

1. **New Euro 7 Regulation (EU) 2024/1257 delegated act to define a new vehicle class**

2. **New Euro 7 Regulation (EU) 2024/1257 implementing regulation to define CO_2 neutral fuels, eligible monitoring methods, inducement and flexibility mechanism**

3. **Integration in Regulation (EU) 2023/851 (CO_2 regulation for cars and light-duty vehicles) and Regulation (EU) 2024/1610 (CO_2 regulation for heavy-duty vehicles)**

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Thank you for your attention!

For more information, please visit

www.wgmm.eu