SUSTAINABLE FUELS FOR LAND TRANSPORT -Technical Conclusions from the Industry Hearing

Consolidated technical conclusions - October 2026

Purpose. To synthesize technical evidence and participant perspectives on sustainable renewable fuels in land transport and identify policy-relevant considerations. This document records Industry Hearing discussions and does not constitute an agreed position of any participating organization.

1. The land transport decarbonization challenge

Land transport decarbonization is simultaneously a fleet, fuel, infrastructure and energy-system challenge. In 2023, global transport energy demand reached 123 EJ, representing 29% of world final energy consumption, and transport greenhouse gas emissions were 8.44 $GtCO_2eq$. The sector remained 95% fossil-based, with oil products alone supplying 90% of transport energy. Global biofuel use in transport was 4.7 EJ.

Vehicle sales are changing more rapidly than the transport energy matrix: electrified vehicles represented 25% of sales, while electricity supplied 1.5% of transport energy. In addition, more than 70% of the fleet expected in 2030 is already on the road. Another important aspect is the substantial difference across countries and vehicle segments regarding the availability of biofuels, the scale and speed of fleet turnover, the carbon intensity and expansion of electricity systems, and the availability of charging, fuel distribution and refueling infrastructure.

The challenge is particularly acute in emerging economies. Between 2000 and 2023, transport energy demand increased by 37 EJ outside OECD countries, compared with 3.7 EJ within the OECD. These regional asymmetries are relevant when evaluating differentiated pathways for measurable near-term reductions and longer-term technological change.

2. Technical framing: near-term deployment and future technology options

IEA Bioenergy TCP Task 39's contribution to the COP30 Presidency Roadmap consultation on transitioning away from fossil fuels proposed a two-lane framework (https://task39.ieabioenergy.com/wp-content/uploads/sites/37/2026/06/26_0330_IEA-BIO_T39_Contribution-to-COP30-Presidency-Roadmaps-GMS-300326.pdf).

- Lane 1 - Rapid deployment of sustainable biofuels: immediate scaling of production capacities for ethanol, biodiesel, renewable diesel and biomethane, using sustainable feedstocks and existing infrastructure where compatible to reduce emissions from current fleets.
- Lane 2 - Accelerated scale-up of advanced and emerging biofuels and renewable fuels: development of fuels from residues, wastes, lignocellulosic biomass, biogenic CO_2 and renewable electricity for harder-to-abate applications and sustained long-term progress.

For land transport, the two lanes are complementary and contribute to defossilization and net zero CO_2eq emissions. Immediate deployment addresses emissions from vehicles and infrastructure already in use; continued innovation expands feedstock options, improves lifecycle performance and enables new fuel pathways. Electrification, hybridization, efficiency, modal measures and sustainable renewable fuels can be assessed as a portfolio, with combinations adapted to regional resources, power systems, fleet profiles and infrastructure.

3. Evidence and consultation pathway

The Industry Hearing examined how the technical framing could inform implementation across end uses and regions. The process combined a stakeholder questionnaire with 103 respondents, consultations with Task 39, an International Advisory Committee and invited experts, structured online discussions, and international prioritization of draft conclusions. The consolidated material records 93 comments on barriers and 79 comments on solutions (https://task39.ieabioenergy.com/wp-content/uploads/sites/37/2026/10/Industry_Hearing_Analytical_Report_Final_300926.pdf). The six highest-prioritized conclusions are presented below as a synthesis of the evidence and deliberations for further technical review; they do not constitute negotiated text or an agreed position of participating organizations.

4. Six prioritized conclusions from the Industry Hearing

1	**Existing fleets and near-term emissions reductions** The discussion indicates that sustainable renewable fuels may contribute to near-term emissions reductions from existing road fleets, particularly where fuel supply, vehicle compatibility and infrastructure permit. Use of existing assets can be considered alongside targeted upgrades where technical or operational constraints arise. **Technical basis and implementation relevance.** This conclusion reflects slow fleet turnover, limitations on higher blends, engine-compatibility concerns and uneven distribution infrastructure. Implementation options identified by participants include flex-fuel and hybrid vehicles, targeted fleet upgrades, demonstrations, government procurement, biomethane, bioethanol, biodiesel projects and expansion of distribution and refueling systems.

2	**A complementary technology portfolio** Evidence and participant perspectives support assessing a portfolio of complementary technologies for land transport, including sustainable renewable fuels, electrification and other low-carbon solutions. The roles of these options vary with vehicle segment, electricity-system conditions, regional resources and infrastructure. **Technical basis and implementation relevance.** No single pathway addresses all fleet categories, electricity-system conditions or regional resource profiles at the same pace. A portfolio approach allows solutions to be considered for passenger, commercial, heavy-duty and agricultural transport, based on their respective operating conditions and emissions performance.
3	**Predictable and context-appropriate policy frameworks** Participants identified policy predictability, technology openness and context-appropriate implementation instruments as factors that can reduce investment uncertainties and support deployment. Options discussed include carbon-intensity-based regulation, blending mandates and other mechanisms, selected according to national circumstances. **Technical basis and implementation relevance.** Electoral cycles, shifting priorities, fragmented regulation and the absence of predictable targets can weaken demand signals and investment. Participants identified stable tax and pricing regimes, carbon-intensity standards, blending mandates, predictable targets and market incentives as instruments that may be selected and combined according to national circumstances.
4	**Lifecycle climate performance and evidence** Lifecycle greenhouse gas (GHG) performance provides a relevant basis for assessing the climate outcomes of transport fuels. Its application depends on transparent data, credible methodologies and periodic updates that reflect technological progress and improved regional evidence, enabling comparison of measurable emissions reductions across pathways. **Technical basis and implementation relevance.** Technical gaps include inconsistent well-to-wheel and lifecycle assessment methods, limited or non-comparable data, traceability gaps and divergent land-use accounting. Shared databases, verified carbon-intensity systems, capacity building, prospective lifecycle assessment and periodic methodological updates can improve comparability while incorporating regional evidence.
5	**Renewable fuels in transport policy frameworks** Participants highlighted that sustainable renewable fuels can be considered alongside electrification and other low-carbon options in transport policy frameworks, particularly when evaluating existing fleets, infrastructure constraints and opportunities for near-term emissions reductions. **Technical basis and implementation relevance.** This consideration connects climate objectives with the practical conditions of the existing fleet and infrastructure while retaining a complementary relationship with electrification and other measures. Assessment of credible pathways can draw on measurable lifecycle performance and relevant operating conditions.
6	**Interoperability and international cooperation** Greater interoperability across sustainability frameworks, certification systems, fuel specifications and lifecycle accounting principles may facilitate trade and reduce transaction costs, while allowing implementation to reflect regional circumstances. **Technical basis and implementation relevance.** Road transport has no global coordinating institution equivalent to those serving international aviation or maritime transport. Incompatible specifications, certification requirements and accounting rules can delay deployment and raise transaction costs. Meta-standards, mutual recognition, international forums, regional roadmaps, knowledge exchange and capacity building were identified as options for improving interoperability while retaining regional differentiation.

5. An integrated implementation framework: cross-cutting considerations

The barriers and solutions (https://task39.ieabioenergy.com/wp-content/uploads/sites/37/2026/09/Final_Consolidated_Barriers_and_Solutions_Task39-250926.pdf) identified through the Industry Hearing can be read as an integrated implementation framework, with the considerations below interdependent and relevant in different ways across jurisdictions and transport segments.

- **Policy certainty and market creation.** Durable, transparent and consistent frameworks can support predictable demand and investment. Instruments may differ by jurisdiction; their design, duration and interaction with other policies can influence

implementation. Stakeholder consultation can inform policy design. Participants identified blending mandates as one possible demand-creation instrument and proposed a minimum three-year lead time for major blend changes.

- **Economics, finance and bankability.** Deployment can require investment across feedstock supply, conversion capacity, storage, blending, distribution and refueling. Participants identified green premiums, concessional finance, carbon credits, public support and stable government commitments as factors that may improve bankability, particularly in emerging economies.
- **Fleet and infrastructure compatibility.** Participants identified the use of existing assets where compatible, together with targeted upgrades, vehicle validation and infrastructure expansion, as possible responses to segment-specific constraints. Participants discussed E10 and B5 for legacy fleets, E20 and B10 readiness for current production vehicles, and E30 and B20 as future targets. These levels are illustrative, not universal, and require validation against fuel standards, OEM requirements, emissions compliance and regional conditions. Biomethane can displace fossil fuels where technically and economically feasible.
- **Credible lifecycle and sustainability accounting.** Transparent greenhouse gas accounting, traceability and robust sustainability governance support environmental integrity and comparability. Transparent application of lifecycle methods requires explicit specification of the selected metric and time horizon of impacts. The implications of alternative metrics and time horizons require further technical assessment and can be addressed in the white paper.
- **Efficient and transferable certification.** Certification processes can avoid repeated verification of the same information and enable reuse of verified data across markets and, where requirements overlap, transport modes. This could shorten approval timelines and reduce compliance costs while preserving integrity.
- **Public understanding and social legitimacy.** Clear communication, real-world cases and lifecycle evidence can help explain portfolio approaches. Food-versus-fuel, forest and land-use concerns require assessment through science-based safeguards and governance that reflect differences among pathways and regions.
- **International coordination with regional differentiation.** Greater alignment can reduce unnecessary market fragmentation, while implementation pathways continue to reflect differences in resources, development conditions, fleets, infrastructure and institutional capacity. Knowledge exchange and capacity building can contribute to interoperability.

6. Policy relevance and potential application

Taken together, the conclusions identify technical and implementation factors relevant to land transport decarbonization: near-term emissions reductions from the existing fleet; the complementary assessment of vehicle, fuel and electricity options; credible lifecycle metrics; predictable and context-appropriate policy instruments; investment across the value chain; validated fleet and infrastructure compatibility; and international interoperability that accounts for regional circumstances. These findings can inform further technical and policy discussion by research, industry and governmental partners.

7. Industry Hearing participants and contributions

This synthesis draws on evidence and multidisciplinary technical input from the Industry Hearing; it does not represent or imply endorsement by any participating organization. Participants included Task 39 National Team Leaders and contributors from international organizations, industry associations, public agencies, research institutions, universities and companies across the transport and biofuel value chains. Organizations included ABIOGÁS, ABIOVE, AFRY, Agroicone, ANFAVEA, Bayer, BEST, BNDES, Bosch, CEM Biofuture Platform, CGEE, the Chinese Academy of Sciences, Copersucar, DBFZ, FS, Geo Biogás & Carbon, Global Biofuels Alliance, Guangxi Academy of Agricultural Sciences, IEA, IICA, IPT, ISSCT, John Deere, Mauá, MBCBrasil, Praj, Raízen, SAE Brasil, SINTEF, Toyota, Toyota Foundation, Tupy, UFSCar, UNICA, Unicamp, UNIFEI and World Bioenergy Association. Input was gathered through a questionnaire with 103 respondents, expert and International Advisory Committee meetings, online discussions (93 comments on barriers and 79 on solutions), prioritization, symposium presentations and closed-session deliberations. The Advisory Committee helped shape the scope and review the materials; participants brought evidence, operational experience and regional perspectives to assess implementation barriers, cases and knowledge gaps.

Concise statement on Sustainable Renewable Fuels for Land Transport

Decarbonizing land transport requires progress across vehicles, fuels, infrastructure and energy systems. Fleets turn over gradually and conditions vary across regions and vehicle segments. Sustainable low-carbon fuels can contribute to reducing emissions from the existing fleets, where fuel quality, vehicle compatibility and sustainable feedstock supply allow. They can complement electrification, efficiency, hybridization and other low-carbon measures within portfolios adapted to local circumstances. Several low-carbon fuel technologies are commercially available and can contribute to near-term emissions reductions in land transport, depending on regional, technical and infrastructure conditions.

Predictable, technology-open policy frameworks can help reduce investment uncertainty. Blending mandates were identified by participants of the Industry Hearing as one possible instrument to support deployment. Frameworks with well-to-wheel transparent and credible lifecycle greenhouse gas accounting, supported by reliable data and periodic methodological updates, can help assess climate performance across fuel and technology pathways.

Greater interoperability among sustainability and certification systems, fuel specifications and lifecycle accounting methods could reduce market fragmentation and facilitate trade, while accommodating regional differences. International cooperation, including knowledge exchange, capacity building and mutual recognition where appropriate, can support implementation.

These considerations may inform discussions on practical, context-sensitive approaches to land transport decarbonization.