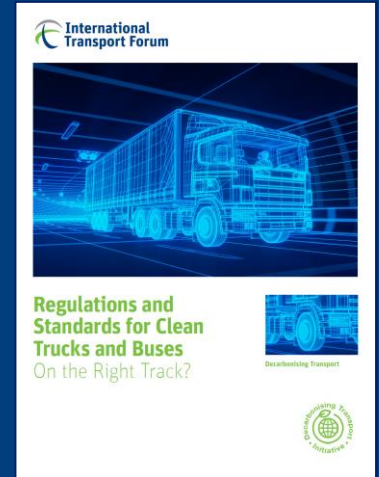


Regulations and standards for Clean trucks and buses On the right track?

GRPE workshop on low- and zero-emissions heavy duty vehicles

2 June 12.00 - 15.45 CET



The ITF

- **Intergovernmental organisation**
 - OECD framework, but 63 member countries
- Only global body covering **all transport modes**
- **Think tank** for transport policy
 - **Data and statistics**
 - **Analysis, identification of best practices**
 - **Knowledge sharing**
- Organising global dialogue for better transport
 - **Annual Summit**, largest gathering of transport ministers
 - **Corporate Partnership Board**
 - “Platform for **discussion and pre-negotiation**”
- Current **focal areas**
 - Digitalisation, connectivity, safety & security, universal access, **decarbonisation**



Decarbonising transport initiative

Key activities



Progress tracking

- Evaluate how current mitigation measures contribute to reducing transport CO₂
→ **NDC analysis**

In-depth sectoral reports

- Identify effective policies for decarbonising transport sub-sectors
→ **urban passenger, road freight, maritime transport, aviation...**

Focus studies

- **Analyse specific decarbonisation issues**
→ e.g. Impact of decarbonising road transport on tax revenues, Vehicle technology choice in the case of France,
Regulations and standards for clean trucks and buses

National pathways

- **Help countries define pathways to meet their transport CO₂ reduction ambitions**

Policy dialogue

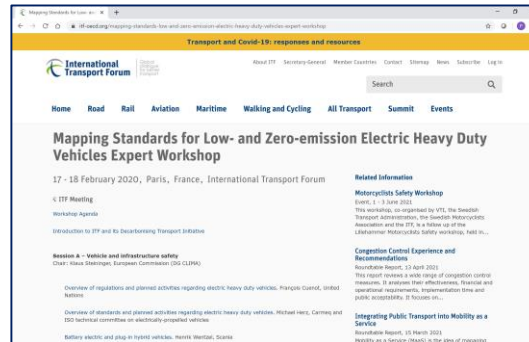
- Organise global dialogue on transport and climate change → **ITF Summit**, roundtables, briefings, workshops
- Act as a conduit for transport sector input to climate change negotiations → **Involvement in UNFCCC & COP**
- **Transport Climate Action Directory**

Regulations and standards for clean trucks and buses – On the right track?

Project milestones

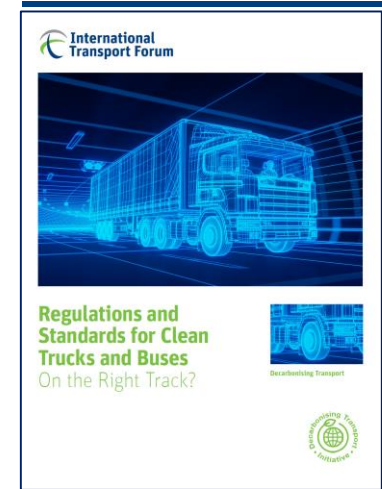
- **Workshop:** 17-18 February 2020

Link: <https://www.itf-oecd.org/mapping-standards-low-and-zero-emission-electric-heavy-duty-vehicles-expert-workshop>



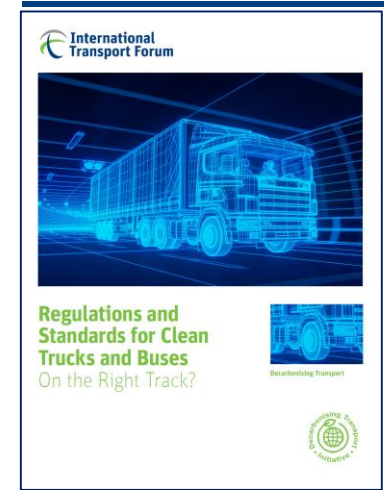
- **Publication:** September 2020

Link: <https://www.itf-oecd.org/regulations-and-standards-clean-trucks-and-buses>



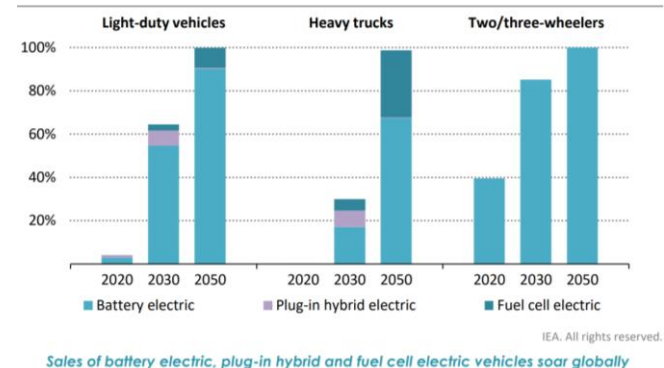
Report purpose

- Review progress on truck regulations and standards
- Focus on technologies that enable low- or near-zero emissions: battery, plug-in hybrids and fuel cell electric vehicles
- Look at core regulatory aspects such as vehicle safety, charging/refueling infrastructure, environmental performance, energy use



Background

- Rapid developments in the transport sector
- Different pathways for decarbonising trucks still possible, but direct electrification and hydrogen feature prominently for road (including heavy duty)
- Regulations & standards are major pre-requisites for large-scale deployment of new technologies



Vehicle safety

- Significant work done at the United Nations (WP.29)
- International safety R&S tend to cover cars, light commercial vehicles and heavy vehicles together - but focus is more on light vehicles (larger market size)
- Provisions for heavy vehicles have gaps - in particular for fuel cell electric vehicles
- Different technical requirements and duty cycles between light and heavy vehicles - require more specialized regulations and standards



Hydrogen refuelling



- International standards developed at ISO and SAE
- Existing regulations mainly on compressed gaseous on-board storage
- Most fuel cell busses now use 35 MPa tanks
- Manufacturers look at 70 MPa tanks already used in cars – better suited for trucks
- Regulatory framework is not ready - no refuelling protocol, nozzle for high flow
- Alternative hydrogen storage solutions (e.g. liquid hydrogen, chemical bonding or swapping) unlikely to be commercially viable within next decade
- High purity requirements in PEM fuel cells could make transition toward hydrogen-propelled trucks using internal combustion engines an option

Electric vehicle charging



- International standards developed at IEC, ISO and SAE
- CHAdeMO (rooted in the electricity industry) and CharIn (roots in European automotive industry) associations are key players
- EV charging standards can apply to different vehicle categories - but they were first developed for cars
- Existing framework suitable for buses and delivery vehicles, not yet for trucks
- DC charging is now looking beyond electric car charging (<450 kW) to 1 MW or more
- Progress made in new standards for electric road systems (ERS) with overhead contact lines for use by heavy vehicles on motorways, less so for other systems

Environmental performance (1)



Vehicle focus (tailpipe)

- Significant work done at the United Nations (WP.29), national and EU framework
- Regulations primarily focused on tailpipe energy use and emissions (pollutants, GHG)
- Technical regulations of air pollutant emissions from heavy vehicles typically apply to engines, complemented with PEMS on-road tests
- Tailpipe GHG emissions and final energy use relate to the entire vehicle: greater regulatory complexity (VECTO, GEM, HILS...)
- International harmonisation far more developed for air pollutants than GHG emissions
- Further work needed to align tailpipe GHG emission regulations and to integrate LZEVs

Environmental performance (2)



Vehicle manufacturing & fuel production

- Need to account for the full environmental impacts over vehicle life cycle
- Batteries a core feature of LZEVs and an important contributor to carbon emissions
- Important to manage impacts of battery production and end-of-life treatment - several governments are active on this, with EU at the forefront
- Governments also working on regulating the carbon intensity of fuels/energy vectors (“well-to tank”, not only “tank-to-wheel”)
- Important requirement for an effective transition towards lower carbon intensity overall
- Need to properly integrate electricity and hydrogen used in LZEVs (incl. trucks)

What we recommend on environmental performance



- Harmonise regulations on tailpipe GHG emissions and energy consumption of heavy vehicles + integrate measurement of LZEV's energy use
- Fully integrate electricity and hydrogen into regulatory policies on low-carbon fuels
- Make sure that sustainability criteria are clearly defined, including in cases when they do not exist yet – e.g. for hydrogen (Guarantees of Origin) or for e-fuels
- Address non-regulated pollutants and integrate hydrogen-powered vehicles using internal combustion engines in regulations on tailpipe pollutant emissions
- Address the environmental performance of vehicle batteries through innovative regulation that targets their durability, carbon footprint and the sustainability of associated supply chains
- Integrate developments enabling the application of road charges and policies requiring geofencing in regulations on connected vehicles



What we recommend on vehicle safety

- Ensure that vehicle safety regulations & standards cover all classes of for electric and hydrogen road vehicles and better differentiate between light and heavy vehicles
- Leverage the experience of international regulatory fora to extend the coverage of safety-related requirements to heavy electric vehicles
 - Larger size of batteries, relevance for thermal runaway and propagation
- Ensure safety regulations for hydrogen-powered trucks address aspects that are currently not adequately considered
 - Higher lifetime travel of heavy vehicles
 - Need for periodic inspections for high-pressure vessels
 - Crash-related safety provisions (rollover)



What we recommend on EV charging

- Involve diverse transport and energy stakeholders in the development of charging standards for electric heavy vehicles
 - High power and “mission critical” nature of heavy vehicle charging comes with important implications for the electricity system. Need for cooperation between truck manufacturers, components producers, road infrastructure providers and the electricity industry
- Address missing elements in regulations and standards related to e-roads
 - Need to ensure interoperability, technology shall be developed by more than a single manufacturer; metering of electricity consumption; safety specifications
 - Catenary-based solutions can build on experiences and standards with railway and trolleybus services, have less impact on road maintenance and are therefore closer to commercial deployment
 - Competition with charging stations with high power

What we recommend on hydrogen refueling



- Develop refuelling protocols for trucks with gaseous hydrogen storage at 70 MPa
- Develop new high-flow nozzles - necessary for efficiently refuelling long-haul trucks
- Ensure compliance with stringent fuel quality requirements
- Focus pre-normative research on the safe use of low- and zero emission vehicles with existing vehicle infrastructure
 - Especially relevant for hydrogen-powered options – use in constrained spaces like tunnels, garages, etc.
 - Fire code also relevant, along with safety requirements for depots (buses)
- Questions remain on economic competitiveness of hydrogen vs. EVs
 - Higher thermodynamic losses, much higher low carbon electricity production requirements with green hydrogen, need for CCS for blue hydrogen to limit GHG emissions, path dependency of distribution infrastructure investments (and higher risk profile), all with cost implications

What we recommend on international harmonisation



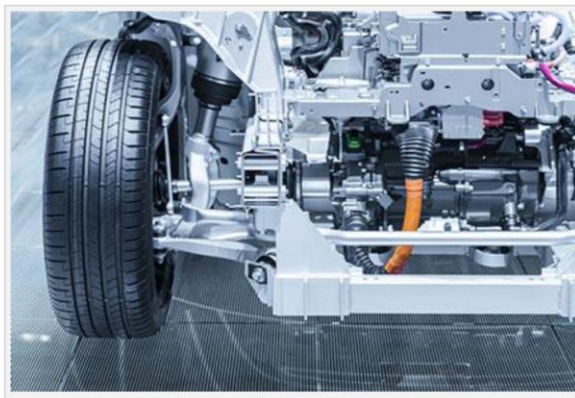
- International harmonisation can make product development cheaper by reducing administrative burdens and thanks to economies of scale, accelerating the transition to clean and connected vehicles and helping ensure that it is orderly and fair
 - International harmonisation is crucial to guarantee a levelled playing field for international competition, not only on clean vehicle and clean energy technology, but also on digital technologies needed for connected and autonomous vehicles
 - International harmonisation also offers greater opportunities to scale up the application of high standards, in all fields of application
- International cooperation is essential to ensure greater international harmonization of regulations and standards

Coming up next from ITF on clean vehicles...

Cleaner Vehicles

Achieving a Resilient Technology Transition

This report evaluates policies for transitioning to clean vehicles and clean energy for road transport. The review includes measures that can help to scale up the transition quickly and instruments to manage it. It analyses technologies for clean passenger cars, light commercial vehicles, buses and trucks, and identifies solutions that deliver the greatest benefits. It reviews the policies for the promotion of clean vehicles currently in place and assesses the response of private sector stakeholders. The study specifically takes account of increasing digital connectivity and automation.



Stay tuned!

Link to project page

<https://www.itf-oecd.org/cleaner-vehicles>

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Thank you!

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