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International
Partnership for
Energy Efficiency
Cooperation



THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION



FOR ZERO CARBON VEHICLES BY 2050



Meeting of the G20 Transport Task Group

Outcome Report

December 2019





ABOUT THE G20 TRANSPORT TASK GROUP

The G20 Transport Task Group (TTG) was established in 2014 to serve as a voluntary platform for G20 countries to share experience and work together to improve the energy and environmental performance of motor vehicles, especially heavy-duty vehicles (HDVs). The group is co-led by the United States Environmental Protection Agency (US EPA) and the European Union's Directorate-General for Climate Action (DG-CLIMA). It is administered by the International Partnership for Energy Efficiency Cooperation (IPEEC) and supported by two implementing organizations: the International Council on Clean Transportation (ICCT) and the Global Fuel Economy Initiative (GFEI). Participation in the TTG is voluntary and open to all G20 economies.

Introduction to the 2019 TTG meeting

The second in-person meeting of the TTG took place from October 28-30, 2019 in Tokyo, Japan. Attendees included representatives from eleven G20 economies (Argentina, Australia, Brazil, Canada, China, European Union, Germany, India, Japan, Kingdom of Saudi Arabia, and the United States), five additional countries,¹ and ten intergovernmental and nongovernmental organizations. A full list of participants and affiliations is available from the webpage for the [meeting](#).

The meeting was co-organised by the US EPA; DG-CLIMA; the Ministry of Economy, Trade and Industry (METI) and the Ministry of Land,

Infrastructure, Transport and Tourism (MLIT) of Japan; IPEEC; ICCT; and the Global Fuel Economy Initiative (GFEI). The meeting was held at the facilities of the Japan Standards Internationalization Center (JASIC) in Tokyo.

The principal objective of the TTG meeting was to take stock of recent updates in G20 economies and engage participants in a strategic discussion of the group's activities and vision for 2020.

The 2019 TTG meeting took place over the course of three days. On the first day of the meeting, the TTG presented the important progress made in improving the energy efficiency and environmental performance of vehicles in 18 countries. The ICCT provided an update on TTG-related technical activities in India, Argentina, and South Africa, which included a proof-of-concept adaptation of VECTO in India, HDV aerodynamic drag determination tests and on-road fuel consumption measurement in Argentina, and an analysis of policy pathways

¹ Cambodia, Myanmar, Mongolia, Laos, and Singapore.

for cleaner fuels and vehicles in South Africa. Participants also had an opportunity to learn from the Tokyo Metropolitan Government on how they are accelerating the deployment of zero-emission vehicles, and from ICLEI on how they are closely working with cities on topics such as electric and shared mobility, logistics and construction, active travel and governance, and planning and coordination. These presentations were followed by update from ICCT on the status of emission standards around the world and the opportunity for international harmonisation of future emission standards from a Post-Euro 6/VI perspective. The day concluded with an interactive session for governments to brainstorm, discuss, and provide input on the next year of TTG activities.

The second day provided an opportunity for participants to hear about the latest transport innovations happening in the private sector. Industry representatives from Toyota, Honda, Nissan, Isuzu, Saudi Aramco and SABIC provided an overview of the latest emission control technology. Participants enjoyed a technical tour to the production facilities of HINO, a major truck and bus manufacturer.

The third day focused on health and compliance. Experts shared the latest research on health effects of air pollution and the transport sector's contribution to ambient air pollution. Participants discussed opportunities and challenges to further reduce transportation emissions in their regions, including world-class and next-generation emissions standards, urban mobility policies, in-use strategies to accelerate fleet renewal, and transitions to zero-emission technologies. In the afternoon session, experts also shared updates to international best practices on mobile source emissions compliance and enforcement, technical and testing methods for in-use compliance, and policy approaches to improve in-use emissions performance.

Over the course of three days, meeting participants showed a strong sense of common purpose among policymakers, international experts, and the industry to the scale up the implementation of cost-effective energy efficiency and emission control measures in the transport sector. For a list of potential action items for the TTG, see 'Action items for the TTG'.





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Meeting agenda

The meeting activities took place over three days. The final agenda is included below.

Start	End	Session Name
TTG 2019 Day 1. Meeting of the G20 Transport Task Group		
8:30 AM	9:00 AM	Registration
9:00 AM	9:20 AM	Welcome from hosts Speakers: Jim Blubaugh, US EPA and Masaomi Koyama, Japan METI
9:20 AM	9:30 AM	TTG Overview and Update Speakers: Diana Galperin, US EPA and Rashmi Jawahar, IPEEC
9:30 AM	9:45 AM	Host Country Policy Overview Presentation Speaker: Hiroshi Morimoto, Japan MLIT
9:45 AM	10:45 AM	Country Policy Roundtable Presentations of 1st Group of Countries Country Order: Argentina, Australia, Brazil, Canada, Cambodia, China, European Commission, France (via proxy)
10:45 AM	11:00 AM	Break
11:00 AM	12:30 PM	Country Policy Roundtable Presentations 2nd Group of Countries Country Order: Germany, India, Myanmar, Mongolia, Laos, Saudi Arabia, Singapore, South Africa (via proxy), United States
12:30 PM	1:30 PM	Lunch
1:30 PM	1:45 PM	G20 Country Update from ICCT ICCT provided an update on its G20-related work this year. Speakers: Josh Miller and Felipe Rodriguez, ICCT
1:45 PM	2:45 PM	Innovation and Transportation: Lessons from Local Transportation Policy This session focused on what cities are doing to improve transportation and reduce emissions and how national governments can support this work. Speakers: Mr. Kazuhiko Aoyama, Tokyo Metropolitan Government and Reggie Tricker, ICLEI
2:45 PM	3:00 PM	Break



3:00 PM	4:00 PM	Discussion: Future of Emission Standards (Where are Things Evolving?) This session provided an overview of the status of emission standards around the world and how they are evolving. Speaker: Felipe Rodriguez and Josh Miller, ICCT
4:00 PM	5:00 PM	Action items for TTG An interactive session for country governments to brainstorm, discuss and provide input on the next year of TTG activities.
5:00 PM	5:40 PM	Wrap up/Takeaways
6:00 PM	8:30 PM	Welcome Reception (Hosted by MLIT, METI, and JASIC)

TTG 2019 Day 2. Meeting of the G20 Transport Task Group

9:00 AM	9:30 AM	Registration
9:30 AM	11:20 AM	TTG Interactive Session on Innovation and Clean Technology Industry representatives from Toyota, Nissan, Honda, Isuzu, Aramco, and SABIC provided an overview of the latest emission control technology.
11:20 AM	12:00 PM	Lunch
12:00 PM	2:00 PM	Travel to Tour site
2:00 PM	4:00 PM	Tour Facilities of HINO Motors, Ltd (Truck and bus manufacturer)
4:00 PM	6:00 PM	Return to JASIC

TTG 2019 Day 3. Meeting on Health and Compliance in Transportation

8:30 AM	9:00 AM	Registration
9:00 AM	9:15 AM	Welcome and Introductions Speakers: Jim Blubaugh, US EPA and Prof. Yasuhiro Daisho, Professor Emeritus, Waseda University
9:15 AM	9:45 AM	Expert Presentation: Latest Science on Health Effects of Air Pollution Speaker: Dr. Michael Brauer, The University of British Columbia

9:45 AM	10:15AM	Expert Presentation: Transport Sector Contribution to Ambient Air Pollution Speaker: Dr. Leonidas Ntziachristos, Professor, Aristotle University Thessaloniki
10:15 AM	10:30 AM	Break
10:30 AM	12:00 AM	Group Discussion: Opportunities and Challenges to Further Reduce Transportation Emissions in G20 and Neighboring Economies Breakout groups on the following topics of discussions: World-class and next generation emission standards on-road standards, Urban mobility policies, In-use strategies to accelerate fleet renewal, Transitions to zero-emission technologies
12:00 PM	1:00 PM	Lunch
1:00 PM	2:30 PM	Compliance Panel Four G20 governments (Canada, Japan, Brazil, US) presented an overview of their compliance strategies.
2:30 PM	4:00 PM	Compliance Panel Discussion: Opportunities and Challenges to Strengthen Compliance in G20 Economies Discussion among panelists and participants on the key priorities for establishing robust compliance frameworks
4:00 PM	4:30 PM	Wrap-up and Concluding Remarks

TTG 2019 Day 4. Bilateral Discussions and Planning Meeting

08:30 AM	1:30 PM	Optional side event hosted by the International Energy Agency: Fuel economy benchmarking of light-duty vehicle sales: a Well-to-Wheels approach Location: Ministry of Economy, Trade and Industry 1-3-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8901, Japan 17th floor, conference room No. 1-3
9:30 AM	1:30 PM	Time Reserved for Bilateral Discussions
1:30 PM	5:00 PM	TTG Planning Session





Policy Developments in G20 economies in attendance



ARGENTINA

Transport accounts for 54.2 MtCO₂eq, equivalent to 15% of total GHG emissions in Argentina. By 2030, the national government aims to reduce transport emissions by 5.9 MtCO₂eq annually, largely through freight transport and urban mobility actions. The national objectives for HDVs include GHG mitigation, fuel savings, and air quality improvements. The pilot phase of [Argentina's Intelligent Transport programme](#) achieved fuel savings of 14% over a fleet of 80 trucks; the next phase aims to expand participation to additional fleets. HDV Euro V standards took effect in 2018. In 2019, 30% of the volume of on-road diesel sold nationwide contains less than 10 parts per million (ppm) sulfur. The planned introduction of HDV Euro VI equivalent standards in Brazil in 2023 is seen as an opportunity for regional harmonisation of standards.

A technical group, HDV-E Arg., comprised of multiple government agencies and private sector partners, is working to develop a regulatory framework for improving heavy-duty road freight efficiency. In 2019, HDV-E Arg. has been working with the TTG (including ICCT and US EPA) to define component testing and vehicle simulation methods to support a HDV certification and monitoring programme in Argentina. HDV-E Arg. is working with the ISO chapter in Argentina and with the Pan American Technical Standards Commission (COPANT) to promote regional regulatory harmonisation.

RESOURCES BOX

Ministry of the Environment

Ministry of Energy



AUSTRALIA

Transport is the second largest GHG emitter and consumer of energy in Australia. Many trucks on the road are at least 15 years old, which creates a challenge for air quality and fuel efficiency. Market barriers to cleaner trucks include capital constraints of owner operators and information gaps about the performance of new trucks. The government has been working on a Smart Truck Rating System that rates new truck efficiency over a range of duty cycles. It is also considering options to offer low-cost financing for cleaner trucks through the Clean Energy Finance Corporation (CEFC). A national electric vehicles strategy and a national hydrogen strategy are under development.

RESOURCES BOX

Department of the Environment and Energy

RESOURCES BOX

Ministry of the Environment

Sao Paulo's Environmental Campaign

Brazil PROCONVE P-8 emission standards

Cost-benefit analysis of Brazil's heavy-duty emission standards (P-8)



BRAZIL

HDV Euro VI equivalent standards will take effect in Brazil for new type approvals in 2022 and for all sales and registrations in 2023. The standards will require in-service conformity testing using Portable Emission Measuring System (PEMS), as in Europe. HDV manufacturers will be responsible for carrying out these tests. Brazil continues to work on a regulatory framework for improving HDV efficiency.



CANADA

The Canadian Environmental Protection Act of 1999² provides the legal basis for controlling motor vehicle emissions. Canada amended its HDV Greenhouse gas (GHG) regulations in 2018 in alignment with the US HDV Phase 2 standards. Canada's compliance and verification programme covers small spark-ignition engines up to large compression-ignition engines. The government applies a risk-based approach for choosing which vehicles and engines to sample for confirmatory testing. It conducts enhanced testing to check for undeclared behaviours. The mid-term evaluation of model year 2022–2025 light-duty vehicle (LDV) GHG standards is underway. Canada has signed an MoU with the California Air Resources Board to cooperate to advance cleaner vehicles and fuels.

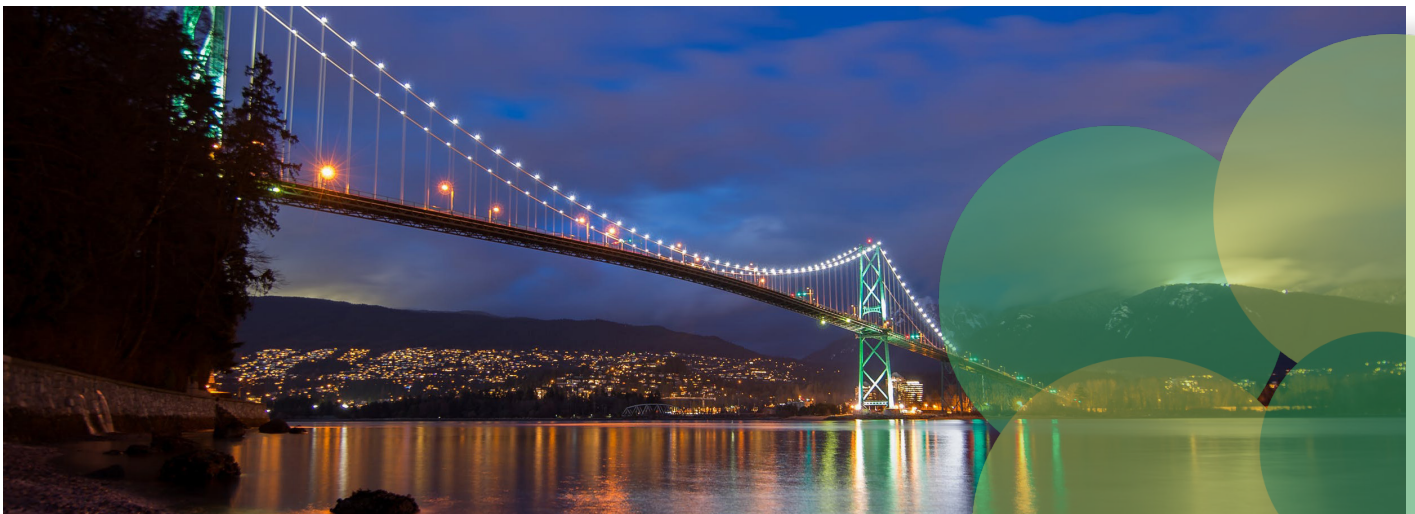
RESOURCES BOX

**Environment and Climate Change
Canada**

**Zero-emission tractor-trailers in
Canada**

**Final second-phase greenhouse gas
emissions standards for heavy-duty
engines and vehicles in Canada**

² Canadian Environmental Protection Act (1999), http://www.oas.org/dsd/fida/laws/legislation/canada/canada_epa-1999.pdf





CHINA

The 18.18 million diesel trucks in China account for only 7.9% of the total vehicle fleet but 60% of its nitrogen oxides (NOX) and 84.6% of tailpipe particulate matter (PM) emissions. The three-year action Plan for Blue Sky³ includes an action plan for diesel truck pollution control. China's standards for new on-road vehicles and non-road mobile machinery cover 958 companies and 21,321 models. China has adopted new emissions standards for LDVs (China 6) and HDVs (China VI) as well as fuel consumption standards. The three-year action plan for transport infrastructure aims to reduce the volume of long-distance road freight in favor of rail. Bulk cargo shipments to coastal ports by road freight have already been reduced by 100 million tonnes. China continues to vigorously promote the deployment of new energy vehicles.

RESOURCES BOX

Ministry of Transport

Ministry of Ecology and Environment

Heavy-duty vehicles in China

Toward greener supply chains

China Green Freight Assessment

China announced 2019 subsidies for new energy vehicles

China's Stage VI emissions standard for heavy-duty vehicles

China's Stage 6 emission standard for new light-duty vehicles

³ China Action Plan for Blue Sky (2018) http://www.gov.cn/zhengce/content/2018-07/03/content_5303158.htm



EUROPEAN UNION

The European Union has adopted post-2020 CO₂ emission standards for cars and vans⁴ and its first-ever mandatory CO₂ standards for heavy-duty trucks⁵. For new cars and vans, the EU fleet-wide targets require a 15% reduction by 2025, a 37.5% reduction for cars by 2030, and a 31% reduction for vans by 2030. Individual binding annual specific targets for manufacturers are calculated from the EU fleet-wide target, taking into account the average mass of their vehicles. The 95 and 147 grams CO₂ per km standards will continue to apply from 2021–2024, with specific emission targets translated from the New European Driving Cycle (NEDC) to the world harmonised light-duty vehicles test procedure (WLTP). The new standards include an annual monitoring cycle for manufacturers' performance against individual targets, incentives for development of zero and low emission vehicles through a crediting system based on benchmarks from 2025 and a strengthened governance to ensure real world representativeness of emissions measured during type approval testing. For new heavy-duty trucks, the EU fleet-wide targets require a 15% reduction by 2025 and a 30% reduction by 2030 compared with a 2019/2020 baseline. HDV CO₂ emissions performance will be certified using the Vehicle Energy Consumption Calculation Tool (VECTO) simulation tool. The HDV standards also include an annual monitoring cycle, an incentive mechanism for zero and low emission vehicles and a governance system to ensure representativeness of emissions.

RESOURCES BOX

European Commission, Climate Action

Road transport: Reducing CO₂ emissions from vehicles

Average CO₂ emissions from newly registered motor vehicles

CO₂ standards for heavy-duty vehicles in the European Union

CO₂ emission standards for passenger cars and light-commercial vehicles in the European Union

European vehicle market statistics, 2018/2019

The future of VECTO: CO₂ certification of advanced heavy-duty vehicles in the European Union

⁴ Regulation (EU) 2019/631 on CO₂ emission performance standards for new passenger cars and for new light commercial vehicles <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0631>

⁵ Regulation (EU) 2019/1242 on CO₂ emission performance standards for new heavy-duty vehicles <https://eur-lex.europa.eu/eli/reg/2019/1242/oj>



FRANCE

The 2019 French low-carbon strategy⁶ sets a goal to reduce transport sector emissions by 31% in 2030 compared to 2015 and achieve complete transport sector decarbonisation in 2050, except for a small amount of emissions in aviation. For passenger transport, the French government aims to completely electrify the passenger car fleet by 2050; transition buses and coaches to a combination of battery electric vehicles (BEVs), fuel cell vehicles (FCEVs), and biogas vehicles; electrify (including hydrogen) its rail system; and increase the share of biofuels in aviation to 4% by 2030 and 50% by 2050. It aims to stabilise the level of passenger car travel by shifting projected growth to bicycling and public transport and promoting teleworking.

6 France Low-carbon strategy (2019), <https://www.ecologique-solidaire.gouv.fr/sites/default/files/Projet%20SNBC%20EN.pdf>

RESOURCES BOX

French Environment & Energy Management Agency

Paris working with TRUE Initiative to evaluate real-world vehicle emissions

France and Germany: A neck-and-neck race on electric vehicle sales

Using vehicle taxation policy to lower transport emissions

Practical lessons in vehicle efficiency policy

The potential for low-carbon renewable methane as a transport fuel in France, Italy, and Spain

Remote sensing of motor vehicle emissions in Paris

Health impacts of air pollution from transportation sources in Paris



GERMANY

The German Climate Action Plan 2050⁷ set the target to reduce the emissions from the transport sector by 40 to 42 percent compared to 1990 levels. Germany aims to cut transport energy demand by 10% in 2020 and 40% in 2050, compared to 2005; however, transport energy demand in 2019 was 5% above 2005 levels. The national objectives to promote energy efficient vehicles and reduce energy demand are challenged by projected increases in passenger and freight activity: 12% and 38% growth by 2030, respectively. The German government plans to expand investments in public transport and continue to explore the potential of advanced biofuels and synthetic fuels. Also LNG has been playing an important role in the German energy transition, especially for ships and heavy-duty vehicles. Public funding for the improvement of LNG infrastructure has been announced in 2019. Finally, a national hydrogen strategy is currently under development; the transport sector will be one of its key pillars.

7 <https://www.bmu.de/en/topics/climate-energy/climate/national-climate-policy/greenhouse-gas-neutral-germany-2050/>. Goals reinforced by the Climate Action Plan 2030: <https://www.bundesregierung.de/resource/blob/975226/1679914/e01d6bd855f09bf05cf7498e06d-0a3ff/2019-10-09-klima-massnahmen-data.pdf?download=1>



RESOURCES BOX

Federal Ministry for
Economic Affairs and Energy

Federal Ministry of Transport
and Digital Infrastructure

Assessing the potential
advanced alternative fuel
volumes in Germany in 2030

Projected contribution
of advanced fuels to
Germany's RED II targets

Health impacts of air
pollution from transportation
sources in Germany

RESOURCES BOX

Automotive Research Association of India

Ministry of environment, Forest and Climate Change

Central Pollution Control Board

Market analysis of HDVs in India for fiscal year 2017–2018

Improving fuel efficiency for heavy-duty vehicles of 3.5–12 tonnes in India

Adapting the Vehicle Energy Consumption Calculation Tool

India Bharat Stage VI emission standards

Drivers and operators: What to expect from Bharat Stage VI diesel vehicles?

India heavy-duty fleet modernisation programme



INDIA

India is transitioning from Bharat Stage (BS) IV standards to BS VI standards, which take effect in 2020. BS VI is equivalent to Euro 6/VI. By leapfrogging from HDV Euro IV to Euro VI equivalent standards, India has set a precedent that other countries can follow. The transition to BS VI standards in 2020 will be accompanied by the exclusive sale of 10-ppm sulfur fuels. India has adopted first-phase CAFE standards for passenger cars and fuel consumption standards for HDVs that rely on constant-speed testing. For the next phase of HDV efficiency standards, India is planning to adapt the European VECTO simulation tool to take into account India-specific driving conditions, vehicle characteristics, and other parameters. The national government has developed purchase subsidies for electric vehicles. Additionally, India has issued a policy to establish formal vehicle scrappage centers throughout the country ahead of a voluntary nationwide scrappage policy.

Fleet and maintenance managers: What to expect from Bharat Stage VI diesel vehicles?

Electric vehicle guidebook for Indian states

Near-term incentives for electrifying ride-hailing vehicles in India

Compliance with India's first fuel-consumption standards for new passenger cars



JAPAN

In 2017, transport accounted for 213 MtCO₂, equivalent to 17.9% of total CO₂ emissions in Japan. Motor vehicles account for 86.2% of transport CO₂ emissions. Transport CO₂ emissions peaked in 2001 and steadily declined. By 2030, the national government aims to reduce transport CO₂ emissions to 32.1% below 2005 levels, compared to 12.7% in 2017. Japan has a long-term target to reduce economy-wide GHG emissions by 80% by 2050. Air quality has gradually improved with the enforcement of progressively stringent vehicle emissions standards.

Japan has adopted fuel efficiency standards for passenger vehicles through 2030, light-commercial vehicles through 2022, and HDVs through 2025. It continues to participate in activities to support international harmonization of vehicle regulations (WP.29). Japan currently defines “next-generation” vehicles as including hybrids, BEVs, plug-in hybrids (PHEVs), FCEVs, and “clean diesel” vehicles. Whereas hybrids accounted for more than 20% of new vehicle sales in 2018, the combined share of BEVs, PHEVs, and FCEVs was less than 1%. The national government provides tax incentives for hybrids, BEVs, PHEVs, and FCEVs. Additionally, it provides purchase subsidies for commercial vehicles (hybrids, BEVs, PHEVs, and FCEVs), private vehicles (BEVs, PHEVs, and FCEVs), charging infrastructure, and hydrogen supply facilities.

RESOURCES BOX

Ministry of Economy, Trade and Industry

Ministry of Land, Infrastructure, Transport and Tourism



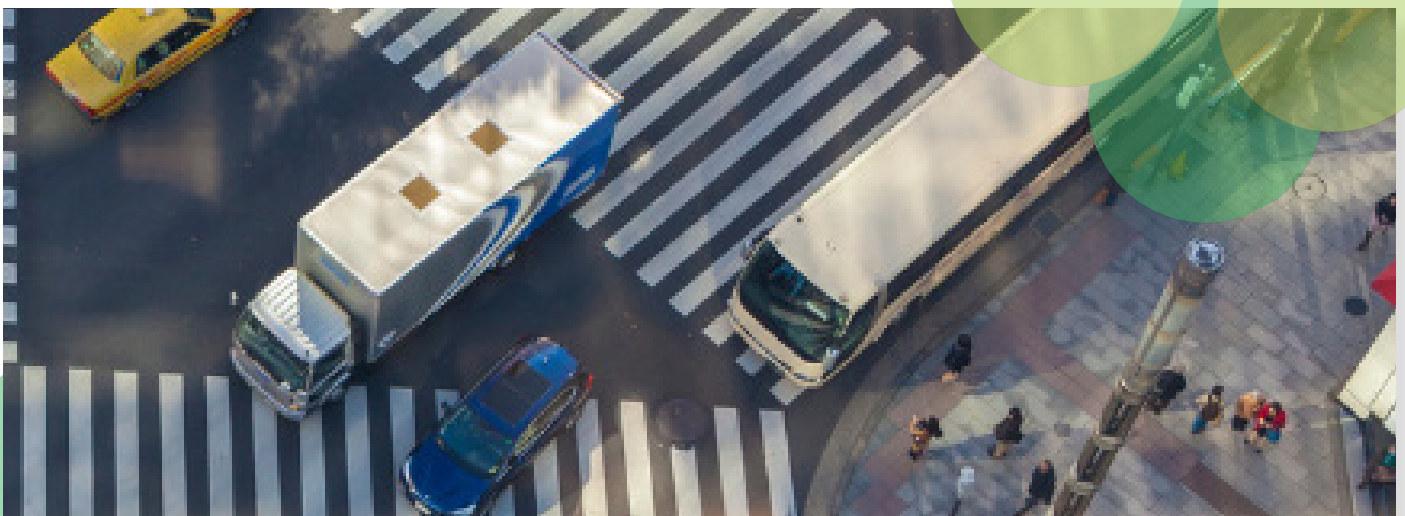
KINGDOM OF SAUDI ARABIA

Transport is the third largest consumer of energy in Saudi Arabia. The Saudi Energy Efficiency Center (SEEC) has developed energy efficiency programs for the top three sectors: industry, buildings, and transport. The LDV fuel economy label was introduced in 2014 and updated to incorporate BEVs in 2018. Phase 2 standards for tire rolling resistance and wet grip were introduced in 2019. LDV CAFE standards are expected to be tightened and extended to 2030. The regulation for HDV aerodynamic devices is still under development; SEEC expects the regulation will yield 5-9% fuel savings in 2030. Research on light weighting and on-board carbon capture systems is continuing.

RESOURCES BOX

Ministry of Energy

Saudi Energy Efficiency Center





SOUTH AFRICA

Transport accounts for 10.8% of national GHG emissions and is the fastest-growing emissions source. Road transport, primarily gasoline and diesel vehicles, accounts for 91.2% of direct transport GHGs. South Africa's Green Transport Strategy (GTS)⁸ establishes strategic pillars covering mode shifts to public transport, walking and cycling, and rail; promotion of alternative fuels and electric vehicles; and the development of green procurement guidelines, fuel economy standards, vehicle emissions standards, and appropriate fuels. A technical support unit (TSU) will be established within the Department of Transport (DoT) to oversee implementation of the GTS.

DoT has been working with the ICCT, GFEI, and GIZ to develop LDV fuel economy standards. Other actions in development include a single ticketing system for public transport; expansion of electric vehicle charging stations; congestion charging in consultation with cities; incentives for electric, hybrid, and CNG vehicles; an inspection and maintenance program for cars; a maximum lifetime mileage limit of 600,000 km for cars; and emissions-based pricing of permits or road-use charges for freight vehicles.

RESOURCES BOX

Department of Transport

Environmental Affairs

Green Transport Strategy for South Africa: (2018-2050)

Meeting South Africa's new passenger vehicle CO₂ emission standards

South Africa's new passenger vehicle CO₂ emission standards

Financing the transition to soot-free urban bus fleets in 20 megacities

SADC Regional Framework for Harmonisation of Low Sulphur Fuels and Vehicle Emission Standards

Developing a roadmap for the adoption of clean fuel and vehicle standards in Southern and Western Africa

South Africa's refining sector and potential pathways to cleaner fuels and vehicles

⁸ South Africa Green Transport Strategy (2019), https://www.transport.gov.za/documents/11623/89294/Green_Transport_Strategy_2018_2050_onlineversion.pdf/71e19f1d-259e-4c55-9b27-30db418f105a

RESOURCES BOX

Environmental Protection Agency

Cleaner Trucks Initiative

Certification and Compliance for Vehicles and Engines



UNITED STATES

Since the implementation of EPA 2010 standards for trucks, manufacturers have reduced the space requirements of emission control technologies by 70%. US EPA is developing a Cleaner Truck initiative⁹ (CTI), a new regulatory action to reduce NO_x emissions from new on-road heavy duty vehicles; a proposal is expected in 2020. US EPA is working to identify cost-effective means of ensuring real world compliance and explore opportunities to streamline existing requirements. These requirements will better reflect the capability of available emissions control technologies.

The prominence of compliance and enforcement has risen over the past 5-7 years. US EPA's compliance programme¹⁰ includes emissions testing at the certification, production line, and in-use stages. It also allows for enhanced testing.

⁹ US EPA, Cleaner Trucks Initiative (2018),¹⁰

¹⁰ US EPA, Certification and Compliance for Vehicles and Engines, <https://www.epa.gov/ve-certification>





Policy developments in non-G20 countries in attendance



CAMBODIA

Cambodia has experienced very rapid motorization: from 1997 to 2015, vehicle registrations grew at an annualized rate of 11.3% for cars, vans, and trucks, and 21.8% for motorcycles. Current mobile source emissions standards cover only idling limits for carbon monoxide, hydrocarbons, and black smoke. New emissions standards have been proposed for imported vehicles, starting with Euro III in 2020, Euro IV in 2022, and Euro V in 2025. Proposed fuel quality standards for gasoline and diesel are Euro III in 2020, Euro IV in 2021, and Euro VI/VI in 2025. A significant challenge over the next several years is to develop the technical capacity within the government to implement and enforce these standards, and to inform the public of the air pollution situation.



RESOURCES BOX

Ministry of Environment



LAO PDR

The vehicle fleet in Lao PDR is growing at a rate of 12-14% annually. Motorcycles account for about three-quarters of the vehicle fleet. Current fuel quality standards are Euro 4. Import of used LDVs has been prohibited since 2012. Import duties are reduced for electric LDVs. Priority projects under the strategy for Environmentally Sustainable Transport (EST) include development of public transport in Vientiane, implementation of a new vehicle registration system, and investing in non-motorized transport. Driver training and freight fleet management activities are being supported by GIZ, the EU, ASEAN, and Japan. Ongoing policy development activities include a new regulation for managing vehicle inspection centers nationwide; a revised type approval regulation; and a decree for managing vehicle imports and exports.

RESOURCES BOX

Ministry of Public Works and Transportation



MONGOLIA

Nearly half of Mongolia's population of 3 million live in the capital city, Ulaanbaatar. The city has a population of 1.4 million and 0.5 million cars. Traffic congestion, air pollution, and poor public transport are major challenges. A license plate number restriction applies to 20% of vehicles on weekdays. Buses account for only 0.4% of daily traffic but service 200 million passengers annually. Policy initiatives include the implementation of bus-only lanes, bus rapid transit, GPS monitoring of buses, smart tickets, and bike sharing.

RESOURCES BOX

Ministry of Road and Transport



MYANMAR

Myanmar is preparing to adopt Euro 4/IV standards for all vehicle types and gasoline and diesel fuels. Tax incentives are under development to encourage the import and manufacture of hybrid cars and electric vehicles. The government is also developing a policy to encourage the replacement of older cars. Major challenges over the next several years are to develop the capability to monitor fuel quality and enforce standards; build capacity for air quality management; and develop cooperation among the government, private sector, and international organisations.

RESOURCES BOX

**Environmental Conservation
Department**



SINGAPORE

Singapore has prioritised public transport and non-motorised transport in combination with restrictions on vehicle ownership and use. Its strategies for vehicle emissions control include stringent standards for new vehicle emissions and fuels; in-use vehicle emissions standards coupled with periodic inspection; and incentives to promote the scrapping of older vehicles and shift new purchases to cleaner vehicles. The National Climate Change Secretariat and Energy Research Institute have developed a long-term strategy for e-mobility to serve as a guide for electric vehicle and infrastructure policies to 2050. Public buses and taxis are near-term priorities for electrification.

RESOURCES BOX

National Environment Agency

G20 Country Update from ICCT

The ICCT provided an update on TTG-related activities in India, Argentina, and South Africa, which included a proof-of-concept adaptation of a vehicle simulation tool in India, HDV aerodynamic drag determination tests and on-road fuel consumption measurement in Argentina, and an analysis of policy pathways for cleaner fuels and vehicles in South Africa.

HDV EFFICIENCY RESOURCES

Stepwise guide HDVs efficiency standards

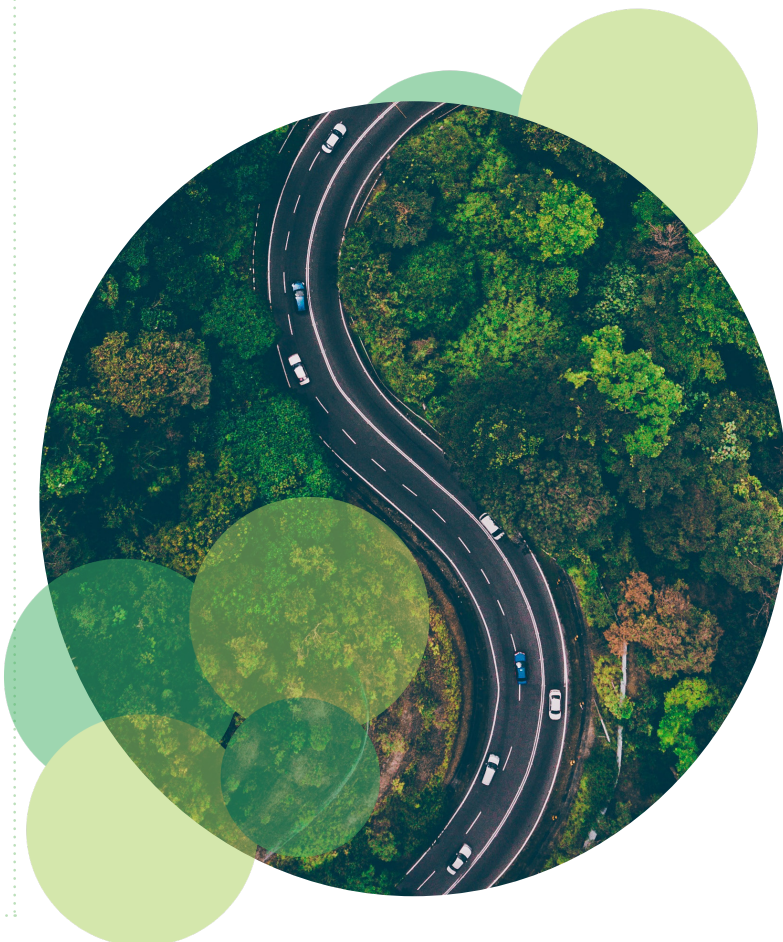
Adapting the Vehicle Energy Consumption Calculation Tool (VECTO)

HDV EMISSIONS RESOURCES

Global progress toward soot-free diesel vehicles in 2019

A global snapshot of the air pollution-related health impacts of transportation sector emissions in 2010 and 2015

South Africa's refining sector and potential pathways to cleaner fuels and vehicles





Innovation and Transportation: Lessons from Local Transportation Policy

Tokyo Metropolitan Government

Tokyo Metropolitan Government (TMG) is formulating a Zero Emission Tokyo strategy¹¹ that aims to protect its citizens from extreme climate change and contribute to zero-carbon emissions in 2050 in pursuit of a 1.5°C pathway. This strategy will include a mid-term plan to accelerate ZEV uptake to 50% of passenger vehicle sales by 2030, compared to 2.2% in 2017. TMG defines ZEVs as including BEVs, FCEVs, and (zero-emission capable) PHEVs. TMG will purchase only ZEVs starting in 2019. It offers subsidies to businesses and individuals for the purchase of ZEVs and charging equipment; these subsidies are in addition to national incentives. TMG aims to double the number of public chargers from 2018–2025, and install 150 hydrogen stations by 2030. TMG has also developed programs to familiarise consumers with ZEVs by creating opportunities through car rental and car sharing services. Further details are expected to be released in December 2019.

RESOURCES BOX

[Tokyo Metropolitan Government](#)

[Towards Zero Emission Tokyo](#)

¹¹ Zero Emission Tokyo Strategy (2019),



ICLEI

Local Governments for Sustainability Initiative

ICLEI supports a network of cities from 22 offices worldwide. Its operations focus on local frameworks for low-emission development, building critical mass through city networks, and engaging regional and national governments to support and scale up successful approaches. ICLEI's activities include pilots, research projects, and knowledge sharing. Current research projects and initiatives include electric and shared mobility; logistics and construction; active travel; and governance, planning, and coordination. The GreenCharge initiative¹² aims to create sustainable business models for electric and shared mobility through a combination of national, industrial, and local actions. The Big Buyers initiative¹³ aims to formulate buyers' groups and procurement plans to bring down the purchase costs of zero-emission non-road mobile machinery, municipal trucks, and delivery trucks. The Handshake project¹⁴ coordinates city-to-city mentorships to enhance bikeability in 10 European cities and catalyse state and national level actions.

12 Greencharge project, <https://www.greencharge2020.eu/>

13 The Big Buyers Initiative (2019), <http://circularpp.eu/circularpp/>

14 Handshake project (2018), <https://handshakecycling.eu/>

RESOURCES BOX

Local Governments for Sustainability

Buy ZET

Green Charge 2020

Hand Shake Cycling

Circular Public Procurement

EcoMobility

“The GreenCharge initiative aims to create **sustainable business** models for **electric and shared mobility** through a combination of national, industrial, and local actions.”



Future of Emission Standards

The ICCT provided an update on the current status of vehicle emission standards, recommendations for post-Euro 6/VI emission standards, and opportunities for international harmonisation and cooperation. Key recommendations for pollutant limits include adoption of technology-neutral limits; tightening limits to drive technology adoption; addressing ultrafine particles; introducing limits for unregulated pollutants and GHGs; enhancing evaporative emissions standards for gasoline vehicles; and introducing a low load test and NOX idling limits for HDVs. Key recommendations for in-service conformity include extension of durability and emissions warranty requirements; extension of boundary conditions for PEMS testing to be more comprehensive and realistic; enhancing on-board diagnostics (OBD) requirements; and using remote sensing technology to support in-service conformity.

RESOURCES BOX

Recommendations for post-Euro 6

Beyond NOx: Emissions of unregulated pollutants from a modern gasoline car

China vehicle remote sensing regulations

Global progress toward soot-free diesel vehicles in 2019

Future heavy-duty emission standards: An opportunity for international harmonisation

“The ICCT provided an update on the **current status of vehicle emission standards**, recommendations for post-Euro 6/VI emission standards, and **opportunities for international harmonisation and cooperation.**”

Industry Presentations and Technical Tour

The second day of the TTG meeting provided an opportunity for participants to hear about the latest transport innovations in the private sector. Industry representatives from Toyota, Honda, Nissan, Isuzu, Saudi Aramco and SABIC provided an overview of the latest emission control technology. Participants enjoyed a technical tour to the production facilities of HINO, a major truck and bus manufacturer.



Motor Vehicle Emissions, Fuels and Energy beyond 2030 and towards 2050

The third day of the meeting kicked off with a discussion of the views on the technology development out to 2050 led by Professor Yasuhiro Daisho. In the presentation, Professor Daisho emphasized that electric vehicles are good candidates for short and medium range transport; key benefits include the diversity of electricity generation sources and the relatively low cost of charging stations. Alternative fuels such as biofuels, ammonia, hydrogen, and e-fuels face supply and cost constraints. Sales of FCEVs are likely to remain limited to 2050 unless key barriers can be overcome: high vehicle and fuel costs, high energy demands of renewable hydrogen, and challenges siting hydrogen stations. In Japan, HEVs and PHEVs are viewed as the primary transition technology. Urgent investments are needed in renewable electricity and hydrogen, fueling and charging networks,

and battery technologies, since these transitions will take about two decades. In parallel with these efforts, more stringent vehicle standards are needed to ensure rapid deployment of best-available ICE and hybrid technologies and emission controls.

Smart grid, demand response, and power management systems are important strategies to accommodate the growing network of increasingly high-power EV chargers. In Japan, rapid charging standards have progressed from up to 150 kW in 2017 to up to 350 kW in 2020. Under METI's current proposal for the power sector, fossil fuels will still generate the majority of electricity in 2030; the accelerated replacement of fossil fuel generation with renewables is needed to meet climate goals.



Health Effects of Air Pollution

The rest of the morning was devoted to a discussion on air pollution. Professor Michael Brauer started the discussion by emphasizing that the key ambient air pollutants responsible for human health impacts are fine particulate matter (PM_{2.5}), ozone, and nitrogen dioxide. Although the risks of air pollution are small to an individual, the entire population is exposed, which leads to large public health impacts. Air pollution is a contributing risk factor to diseases. Days with worse air quality are associated with more deaths, and people living in more polluted cities die earlier than those in less polluted cities. There is no evidence of a threshold below which air pollution poses no additional health risk. Living in proximity to a polluted roadway increases the risk of death from coronary heart disease.

Air pollution reduces lung growth and function in children and accelerates declining lung function in adults. PM exposure leads to chronic, systemic oxidative stress and inflammation. Established health effects of air pollution include shorter life expectancy, stroke, heart disease, asthma, lung

cancer, and reduced lung function; possible effects include lower cognitive development, accelerated cognitive decline, poor mental health, obesity, birth defects, low birth weight, and diabetes.

An estimated 95% of the world population is exposed to ambient PM_{2.5} levels above the WHO guideline of 10 µg/m³ (annual average). Air pollution is estimated to be responsible for 9% of all deaths, \$5 trillion in annual welfare losses, and \$225 billion annually in lost labor productivity. Exposure to ambient PM_{2.5} translates to a global average loss of one year of life expectancy. Ambient NO₂ has been linked to roughly 4 (1.8 - 5.2) million new cases of pediatric asthma annually, equivalent to 13% (5.8 - 16%) of global incidence. Countries with growing and aging populations could experience an increasing health burden even if average exposure levels are stable or declining. Such demographic trends enhance the importance of reducing air pollutant exposure.

“Air pollution is a contributing risk factor to diseases.”

Transport Sector Contribution to Ambient Air Pollution

Dr. Leonidas Ntziachristos discussed the link between ambient air pollution and the transport sector and noted that the transport sector is a major contributor to ambient $PM_{2.5}$ and ozone levels in urban areas worldwide. In the case of the EU-28, transport sources emitted nearly half of NO_x and one-third of black carbon from all sources in 2017. Between 2015 and 2017, 74-81% of the urban EU-28 population was exposed to ambient $PM_{2.5}$ levels above the WHO guideline of $10 \mu g/m^3$ (annual average). The comparable fraction for ozone was 95-98%. Further controlling emissions of internal combustion engine (ICE) vehicles is important, since even in ambitious decarbonisation scenarios, ICE vehicles are projected to account for a substantial fraction of transport activity up to 2050.

Current compliance challenges include the divergence of real-world and type approval CO_2 values for LDVs and ensuring that diesel LDVs meet on-road emission limits outside

the boundary conditions of the Real Driving Emissions (RDE) test. Some under-regulated activities such as LPG retrofits have the potential to greatly increase NO_x emissions. Topics of consensus for post-Euro 6/VI standards include extension of in-service conformity to cover the lifetime of the vehicle; joint consideration of pollutant and GHG emissions; and inclusion of currently unregulated pollutants. Non-exhaust emissions including evaporative emissions and brake and tire wear account for a growing fraction of total emissions as tailpipe pollutant emissions are increasingly controlled. Further technical work is needed to measure and regulate particulate matter emissions from brake and tire wear.

Despite recent policy advancements for low-sulfur marine fuels and NO_x emission control areas, marine vessels have a disproportionate impact on transportation-related air pollution. Priority actions include improved fuel quality and emissions aftertreatment coupled with real-world measurement-based enforcement.





Compliance Panel

The third day also included a discussion about compliance. Four countries presented their compliance programs and afterwards the entire group engaged in a dialogue about compliance programs more broadly.

Brazil

Brazil's current HDV compliance program covers conformity of production (CoP) and type approval testing, trial market surveillance, and opacity and Arla 32 (diesel exhaust fluid) enforcement in the State of São Paulo. As Brazil prepares to implement P8 (Euro VI equivalent) HDV standards, the compliance program will be expanded to cover CoP audits, market surveillance, and in-service conformity (ISC) testing. Manufacturers will be required to carry out on-road PEMS tests and be audited by a technical agent such as CETESB or VCA. Although the engine type approval limits of P8 are identical to Euro VI, the applicable on-road limits (measured by PEMS testing) match the Euro VI stage c and do not yet include particle number (PN). For types with sales of more than 100 units per year, manufacturers are required to submit an ISC plan at the time of type approval, then perform on-road PEMS tests every 1.5 to 2 years during the period of production until 5 years after the end of production. Importantly, CETESB intends to audit ISC for HDVs starting with the introduction of P8. In the case of non-compliance, ISC results can be used to initiate recalls. OBD requirements have also been substantially strengthened with P8: this includes a requirement for fault codes to be recorded for 720 days, which allows for the possible development of an HDV I&M program in Brazil.

Canada

Environment and Climate Change Canada (ECCC) has generally aligned its vehicles and engines emissions regulations with US federal standards. Manufacturers are required to conduct certification testing and submit reports to ECCC to demonstrate compliance with applicable standards. Importers of vehicles and engines that are EPA-certified and concurrently sold in the US and Canada must be able to provide proof of conformity upon request. Importers of "Canada-Unique" vehicles and engines must submit evidence prior to importation. Importers are also responsible for issuing notices of defects when required. ECCC conducts confirmatory testing, reviews evidence of conformity and notices of defect, and refers alleged violations to its enforcement branch, which has authority over a range of options, including penalties. ECCC's strategy to improve its compliance program includes expansion of the types of testing used to verify compliance, new methodologies to make selections for confirmatory testing, increasing scrutiny of the reports submitted by regulated entities, and expanding collaborations with strategic partners.



Japan

The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has divisions for emission control policy, type approval and recall, and maintenance. MLIT works with the National Agency for Automobile and Land Transport Technology (NALTEC), which performs testing for type approval and recall verification. Vehicles are subject to an annual periodic technical inspection (PTI), which must be completed at a certified vehicle maintenance center. The results of the PTI program can be used to inform recalls. Japan is working on a new vehicle inspection program based on OBD, which will apply to cars, trucks, and buses.

Japan initiated market surveillance for M1 and N1 vehicles starting in 2017. Six vehicles have been evaluated thus far. These evaluations compared NO_x measurements from on-road PEMS and laboratory tests with the on-road limit of 300 mg/km, which will apply in 2022. This on-road not-to-exceed limit is equivalent to a conformity factor of 3.75, compared to 2.1 for Euro 6d-TEMP and 1.43 for Euro 6d.

United States of America

EPA estimates that its regulations will avoid 38,000 premature deaths and \$380 billion in associated damages annually in 2030. EPA's approach to compliance recognizes the responsibility of manufacturers to design and build vehicles that control emissions to the greatest degree possible over the full lifetime, and fix any defects to their products through recall and repair actions. It also aims to ensure that vehicle owners and service technicians appropriately operate and maintain vehicles. In contrast to the type approval systems of other countries, EPA requires manufacturers to obtain a certificate for each year of production. Manufacturers are required to warrant emission components, report warranty claims and defects, recall and repair defective vehicles, conduct and report their results of in-use testing, and build OBD systems that self-diagnose problems.

EPA periodically releases compliance reports to the public: the most recent report, issued in April 2019, covers the years 2014–2017. Over that period, EPA conducted 91 field inspections and 16 selective enforcement audits; it identified issues with emissions measurement software, testing practices, records, and test fuel that did not meet specifications.

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Further Reducing Transportation Emissions and Improving Compliance in G20 Economies

In this session, participants divided into groups and discussed opportunities and challenges to further reduce transportation emissions in their regions. The four discussion topics were: world-class and next-generation (post-Euro 6/VI) emissions standards, urban mobility policies, in-use strategies to accelerate fleet renewal, and transitions to zero-emission technologies. The outcomes of these discussions are summarised below:

World-class and next-generation emissions standards

Greater effort is needed to monitor vehicle emissions, both for compliance and to inform policy decisions to further control emissions. PEMS and remote sensing are promising technologies to lower the costs and effort of monitoring vehicle emissions. Periodic technical inspections are also a valuable mechanism to promote adequate vehicle maintenance and detect problems with emission control systems. The on-board diagnostics (OBD) requirements of world-class standards present opportunities for enhanced HDV inspection and maintenance (I&M) and remote OBD monitoring programs. Technical labs in neighbouring countries face similar challenges to testing and type approval, but they don't necessarily share information on their equipment calibration methods. Within the G20 and within geographic regions, there are opportunities for enhanced cooperation on emissions testing. Mutual recognition of type approval certificates can reduce the burden on individual countries' technical labs. For example, Brazil accepts Indian type approval certificates; Canada accepts US type approval certificates for

vehicles and engines that are currently sold in both markets. Even though there is a spectrum of implementation of different standards with the G20—ranging from Euro 2 to Euro 6—there are still common challenges of ensuring appropriate quality of fuels and Ad blue. Other challenges, such as the effects of biofuels on emission control systems, are limited to a few G20 countries. For countries that rely on imports of vehicles and fuels, there are still outstanding questions about the most effective approach to compliance and enforcement; this is a research issue that could be addressed by the G20.

“Within the G20 and within geographic regions, there are opportunities for enhanced cooperation on emissions testing.”



Urban mobility policies

At the local level, there is a need for increased integration of environment, transport, and city planning stakeholders. There are likewise opportunities to integrate ticketing across public transport modes and bike sharing systems. Regulatory practices for micromobility, mobility as a service (MaaS), and autonomous vehicle technologies are lagging behind the technology. International collaboration and sharing of successful and unsuccessful practices could help regulators keep up with technological advancements. Educational measures to inform the public of the climate and health impacts of their mobility decisions could have near-term benefits and lead to more public support for ambitious policies.

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In-use strategies to accelerate fleet renewal

The high average age of truck fleets in many countries poses a challenge to the effectiveness of environmental regulations that typically only apply to new vehicles. Whereas large companies tend to have newer than average fleets, companies with small fleets and owner-operators face financial obstacles to renewing their fleets. The rapid pace of technological change creates additional uncertainty, since truck buyers may put off purchase decisions in hopes that better options become available. For example, if battery costs are declining and the range and selection of battery electric models is increasing, fleet owners may have an incentive to defer purchases. Greater efforts are needed to develop effective regulations governing vehicle scrappage and recycling.

Policy makers face information gaps about the potential costs, benefits, and effectiveness of regulatory and fiscal policies targeting fleet renewal. Users face information gaps about the total cost of ownership and payback periods of new technologies. Improving fleet managers' and operators' access to this kind of information could lead to more efficient and ecological purchase decisions. Regional variation in local fleets and operational characteristics poses a challenge to policy planning efforts. Encouraging private companies to use fleet management systems could improve purchase decisions and address local data gaps. International sharing of information on the technical characteristics, costs, and real-world operational performance of new vehicle technologies could benefit policy planning. Research to compile information on clean vehicle financing programs, fiscal incentives, and successful regulatory approaches for fleet renewal would benefit multiple G20 countries.



Transitions to zero-emission technologies

G20 governments face challenges in defining an ecosystem of policies that effectively measures and reduces emissions from all sectors and at all stages of vehicles' and fuels' production and use. For FCEVs, ensuring a supply of renewable hydrogen is a significant challenge due to the high energy requirements. For plug-in electric vehicles, decarbonizing the electricity grid is a necessary complement to transport

electrification that is already needed to meet climate objectives. In some policy approaches, alternative fuels may be currently credited as low- or zero-emissions even if substantial emissions occur upstream (e.g. land use change). Although short- and medium-distance travel can be readily electrified, long-distance travel poses greater technical challenges (e.g. long-haul trucks, aviation). Regulations and economic policies need to be well-coordinated and provide stability for long-term investment decisions, yet retain the ability to respond to changes in technologies and markets.

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Action Items for the TTG

During a brainstorming session and in evaluations provided after the conclusion of the meeting, participants discussed possible activities for the TTG in the upcoming period and identified the following as areas of interest for future work:

- Discussion/compilation of compliance approaches
- Stationary Engine Regulations
- Scrappage Policies and Recycling of Vehicles
- Links between federal and local transportation policies
- Non-road emission regulations
- Air Quality Outcomes
- Best practices for sharing manufacturing data
- Inspection and Maintenance programs
- HDVs, technologies, test procedures, standards, adaptation to other countries/ regions
- In-use fleet renewal
- Well-to-wheel Emissions
- EVs
- Low emission fuels
- New energy vehicles, including FCEV, Hydrogen, etc.
- Local Mobility Policies
- Remote sensing Technologies
- Freight-to-Rail and Freight-to-Marine initiatives

Next Steps and Resources to Consult

The TTG leads are now discussing the research agenda for the next year. Participants were encouraged to continue to engage with the TTG by continuing to participate in webinars, communication platforms, and website exchanges through the resources outlined below. Additional activity detail is forthcoming.

- Meeting participants were invited to join the TTG Slack platform and [email list](#).
- Government representatives are invited to review [Transportpolicy.net](#) and submit policy updates and documents to the ICCT.
- Recordings of past TTG webinars are available [here](#).
- Additional in-person TTG meetings.

Conclusion

Participants appreciated the unique value of meeting in person and the possibility to have a collaborative forum to facilitate dissemination of information. Research papers and policy exchanges, through webinars or other channels are an important tool to enhance the awareness of effective policies. Although countries in the group are at different stages of policy development or have different domestic priorities, they are moving towards common objectives. TTG has been instrumental in enhancing cooperation between countries.

In 2020, the TTG will continue to:

- Build domestic support and enhance capability for action to reduce the energy and environmental impacts of transport, especially heavy-duty vehicles (HDVs);
- Identify best practices on implementing cost-effective energy efficiency and emissions control measures in transport, and exchange these among G20 countries;
- Conduct analysis and outreach to assess the opportunities, barriers, costs and benefits of actions, and recommend a course of action for participating G20 countries.





Meeting of the G20 Transport Task Group

