G-20 action on vehicle efficiency and emissions

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This short memo outlines issues relating to energy efficiency policies for light and heavy-duty vehicles that the G-20 could take up as part of its climate and energy agenda. It gives background on greenhouse gas emissions from the transportation sector, current trends and regulation of vehicle fuel economy, and suggested measures for consideration in the G-20 process.

Background

For context, over half of global petroleum goes to transportation, and transportation is almost entirely powered by oil. Figure 1 illustrates how transportation is 97% fueled by oil, consumes 48 million barrels of oil per day (mboe/d) globally, and equates to about 10 billion tons of carbon dioxide emissions per year when combusted by automobiles, trucks, ships, planes, etc (Based on Façanha et al, 2012; EIA, 2011, 2013; IEA, 2012).

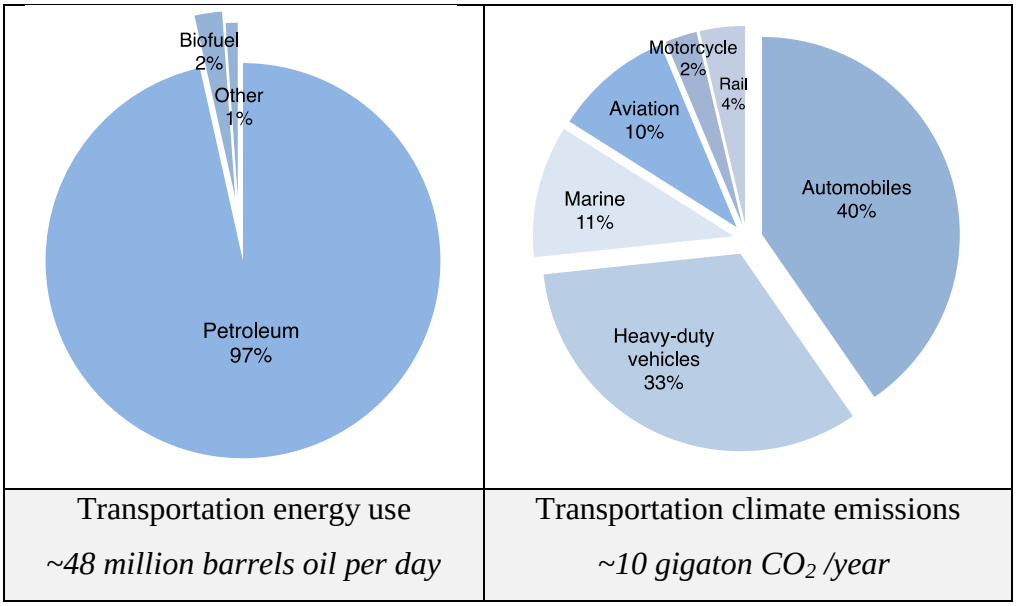


Figure 1. Global transportation energy use (by fuel) and carbon emissions (by mode) in 2010

From a climate change perspective, transportation is responsible for one-quarter of global greenhouse gas emissions. Current trends suggest that transport energy use will double over the next several decades. Within the transportation sector, light and heavy-duty vehicles accounted for more than 80 percent of the sector's energy use and greenhouse gas emissions in 2010.

Passenger Vehicles

Over three-fourths of all new passenger vehicles sold each year are regulated under some form of greenhouse gas emission standard—including nearly all of the major vehicle markets: the US, Canada, Mexico, Europe, Korea, China and Japan. The latest rounds of regulatory standards have mandated significant improvement in fuel economy, while also giving manufacturers longer timeframes to develop and integrate existing and emerging technologies. Many regulated markets set or proposed greenhouse gas targets to 2020 (EU, China, Japan), while the US and Canada have established standards to 2025 with a mid-term review. In terms of setting an overall goal, the multi-stakeholder Global Fuel Economy Initiative has called for a doubling of the fuel economy of new vehicles by 2030.

1. Affirming the Global Fuel Economy Initiative target of doubled efficiency (50% reduction in L/100km or gCO2/km) for new light-duty vehicles by 2030 would set an ambitious yet achievable aim point to mitigate a major source of greenhouse gases.

Indeed, recent trends in new light-duty vehicles give a basis for ambitious regulatory standards. Auto manufacturers in the world's regulated markets have been attaining an annual rate of improvement in passenger vehicle fuel consumption ranging between 2 and 5 percent. Given the accelerating pace of technology development, new standards should be set at the range's upper end.

2. A pledge to boost passenger car fuel economy by an average 3-5 percent annually between 2015-2025 would represent G-20 members' commitment to spur their domestic auto industries to realize the anticipated potential for efficiency gains.

While the major auto producing markets are on the same general trajectory of improved fuel economy, there is variation in the regulatory regimes they use. The imperative is to ensure manufacturers have flexibility—adopting improvements that make the most sense—while guaranteeing that efficiency gains are substantive. Increased fuel economy may be achieved, for instance, by reducing the weight of cars produced to complement improved power train technology. When the regulatory framework varies the stringency of the standard by weight, there is no regulatory incentive for mass reduction. Given the growing importance of load reduction and the availability of lightweight materials, countries should adopt a regulatory design that links stringency to vehicle size (e.g., footprint) rather than mass.

3. Recognizing the benefits of lightweight materials to reduce vehicle load and improve efficiency, the stringency of regulatory standards should vary according to size rather than mass.

Another way to reflect technological advances and set a benchmark for progress would be to specify what constitutes a light carbon footprint for light-duty vehicles that are fossil fuel-powered. Rather than a regulatory standard per se, this benchmark would serve as a global "gold standard" for efficiency and emissions, in line with GFEI's Green Global New Car Assessment Programme (NCAP) concept.

4. Definition of a *low-carbon vehicle* (measured in grams CO2 / km travelled) would be a useful normative guideline for fuel economy.

Heavy-duty Vehicles

Heavy-duty vehicles include a diverse mix of vehicle from long-haul tractor trailers to urban buses to inner city delivery truck and vans to dump trucks. In 2010, heavy-duty vehicles accounted for 45 percent of fuel consumption in the road transport sector in China, 52 percent in India, and 35 percent in Brazil. This is in marked contrast to the

situation in the US, Europe, and Japan, where passenger vehicles account for about 60% of road transport fuel consumption.

Policies to control greenhouse gas emissions from the heavy-duty sector have lagged behind passenger vehicles. Only four nations have adopted standards for heavy-duty vehicles to date: Japan, United States, Canada, and China. Other nations are working on developing standards, including Europe, Mexico and Korea. There is the potential to align certain elements of these standards in the next wave of policies in the 2015 to 2017 time frame.

5. A collective commitment to subject heavy-duty vehicles to some form of greenhouse gas or energy efficiency standard—optimally in alignment with those in Japan, U.S., or China—would help mitigate another major source of GHGs (particularly "black carbon" climate pollutants).

With regulations for heavy-duty vehicles gradually coming into effect, a good starting point is to work with fleet operators on incorporating energy efficiency technologies into vehicles that are already on the road (e.g. better tires, contours that reduce wind drag). The US Environmental Protection Agency pioneered its Smartway program along these lines, and the approach is spreading to several regions including Europe, Canada, Mexico and China—where such efforts have the generic international name of *Green Freight* and are favored by international shippers, development banks, government and civil society. The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants developed a *Green Freight Call to Action* for discussion at the High Level Assembly of the Climate Change Conference of the Parties in Warsaw Poland (currently underway, at this writing).

6. A commitment to establish Green Freight programs would enable G-20 nations to help trucking companies achieve cost-effective energy efficiency improvements in their fleets.

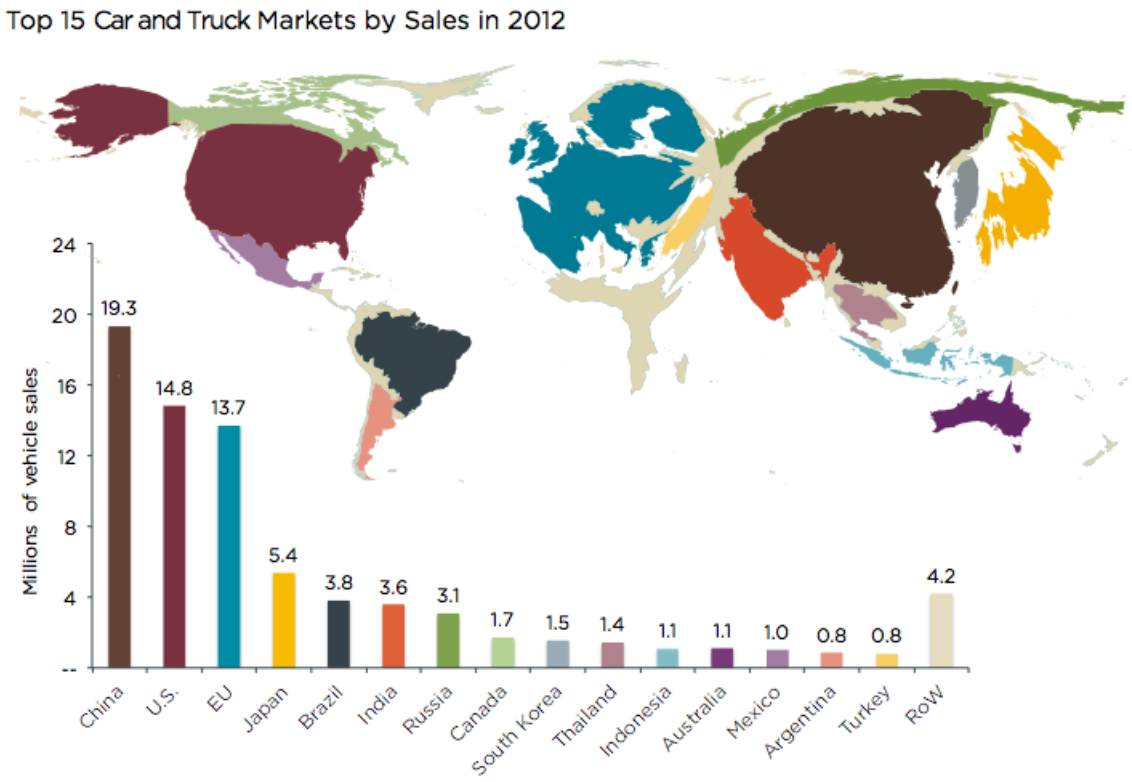
Regulation of fuel quality for heavy-duty vehicles is vital not only for climate change but also to protect human health from the hazardous pollutants in vehicle exhaust.

7. By committing to move towards Euro VI or US HD2010 emission standards—including 10 ppm diesel fuel sulfur levels—G-20 nations can reduce excess deaths from respiratory illness.

Heavy-duty vehicles (trucks and buses) are often the dominant source of fuel consumption and greenhouse gas emissions in developing nations (China, Brazil, India). Globally, heavy-duty trucks and buses are a close second in terms of fuel consumption to passenger vehicles. Several nations have pioneered setting fuel economy and greenhouse gas standards for heavy-duty vehicles (Japan, US, Canada, China) and other nations are in the process of carefully considering such standards (Europe, Mexico). There is the potential to align certain elements of these standards in the next wave of policies in the 2015 to 2017 time frame. The world's heavy-duty vehicle manufacturers have regularly called for governments around the world to align vehicle emission standards.

8. Countries should consider adopting fuel economy or greenhouse gas emission standards for heavy-duty vehicles while seeking to align programs to enable vehicle manufacturers to sell products across multiple jurisdictions.

Supporting Information

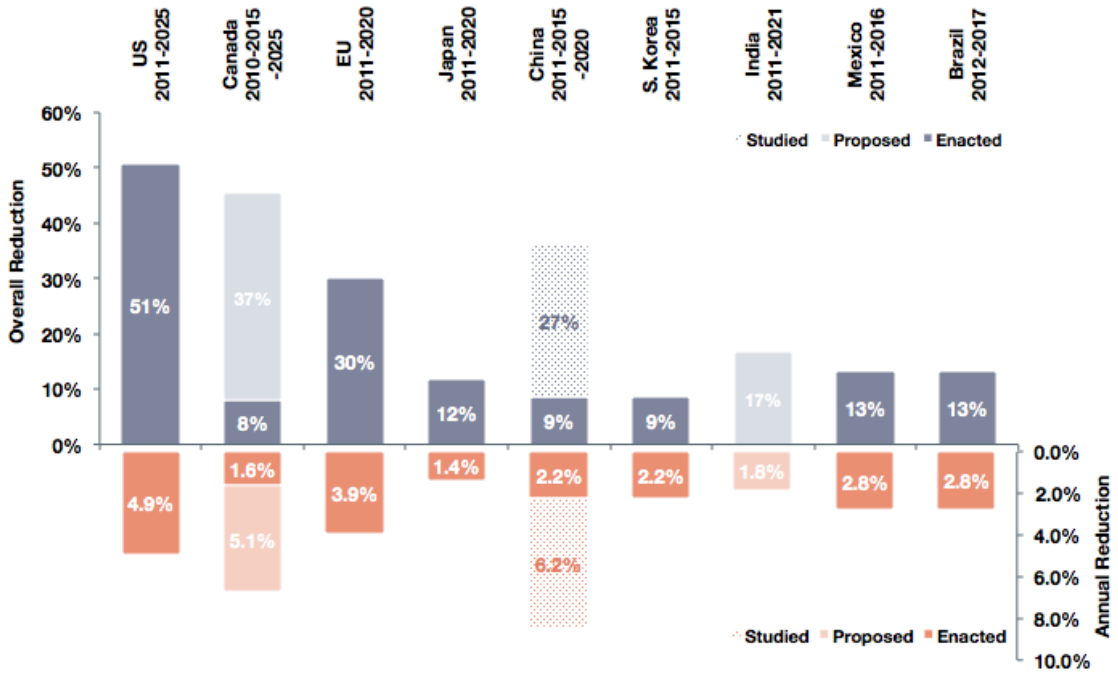


Overview of passenger vehicle GHG, CO2, Fuel Economy Standards

Country or Region	Target Year	Standard Type	Unadjusted Fleet Target/Measure	Structure	Targeted Fleet	Test Cycle
U.S.(include California) (enacted)	2016	Fuel economy/ GHG	34.1 mpg* or 250 gCO_2/mi	FP-based corporate avg.	Cars/Light trucks	U.S. combined
U.S. (enacted)	2025	Fuel economy/ GHG	49.1 mpg** or 165 gCO_2/mi	FP-based corporate avg.	Cars/Light trucks	U.S. combined
Canada (enacted)	2016	GHG	153 (157)*** gCO_2/km	FP-based corporate avg.	Cars/Light trucks	U.S. combined

EU (enacted) EU (proposed)	2015 2020	CO_2	130 gCO_2/km 95 gCO_2/km	Weight.-based corporate average	Cars/SUVs	NEDC
Japan (enacted) Japan (enacted)	2015 2020	Fuel economy	16.8 km/L 20.3 km/L	Weight-class based corporate average	Cars	JC08
China (enacted) China (under study)	2015 2020	Fuel economy	6.9 L/100km 5 L/100km	Weight-class based per vehicle and corporate average	Cars/SUVs	NEDC
South Korea (enacted)	2015	Fuel economy/GHG	17 km/L or 140 gCO_2/km	Weight.-based corporate average	Cars/SUVs	U.S. combined
Mexico (enacted)	2016	Fuel economy/GHG	35.1 mpg or 157 g/km	FP-based corporate avg.	Cars/Light trucks	U.S. combined
Brazil (enacted)	2017	Fuel economy	1.82 MJ/km	Weight.-based corporate average	Cars	U.S. combined
India (proposed)	2016 2021	CO2	130 g/km 113 g/km	Weight-based corporate average	Cars/SUVs	NEDC

Review of Annual Rates of Improvement



Overview of Heavy-duty vehicle fuel economy and greenhouse gas programs

Country/ Region	Regulation Type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Japan	Fuel economy	Phase 1 regulation implemented starting MY 2015										
United States	GHG/Fuel efficiency	Standard proposal	Final rule			Regulation implemented starting MY 2014 (mandatory DOT program starts MY 2016)						
					Phase 2							Phase 2 implementation
China	Fuel consumption	Test procedure finalized	Industry standard proposal	Industry standard implemented	National standard adopted	Regulation implemented starting MY 2015						
European Union	CO_2 test procedure	Technical studies			Impact assessment/ Test procedure finalized				Policy implementation			
Canada	GHG/Fuel efficiency			Standard proposal	Final rule	Regulation implemented starting MY 2014						Phase 2
Korea	Fuel efficiency	Technical studies			Impact assessment	Test procedure finalized	Policy implementation (second half of 2015)					
Mexico	Fuel efficiency				Proposal			Regulation implemented starting MY 2016				Phase 2 implementation
California	End-user purchase reqts	Requirements for new tractors, trailers (2011+)			Additional reqs. for existing tractors and trailers (<MY 2010)				Additional reqts. for existing trailers and reefers (<MY 2010)			