



Global Automakers
of Canada

A Brief History Of Emissions Regulations and Controls for Light-Duty Vehicles in North America

Workshop on Ultrafine Particulate Emissions from Transportation
University of Toronto (Toronto, ON)
September 18, 2019



- Introduction – Global Automakers Canada
- Integrated North American Air Quality framework
- Regulating Vehicles and Fuels as a System in the US and Canada
- Emission Reduction Regulations and Controls for LDVs
- Looking forward





Who we are:

- The trade association representing the Canadian interests of 15 leading international manufacturers of light duty vehicles (LDVs).
- In 2018, sales from member companies of the Association represented 59% of the Canadian automotive market
- GAC members produced 44% of the vehicles built in Canada
- 58% of the vehicles sold were built in the NAFTA region
- In 2018, Toyota (Cambridge - Woodstock) was the #1 assembler of vehicles in Canada while Honda (Alliston) was the third of the five Canadian vehicle manufacturers





The US and Canada have collaborated on environmental regulations for many years:

- 1991 – Canada-U.S. Air Quality Agreement (AQA) to address transboundary air pollution causing acid rain
- 2000 – Ozone Annex to AQA to address tailpipe pollutants. This included specific obligations towards aligned vehicle emissions regulatory framework.
- 2004 – On-road vehicle and engine emissions regulations introduced in Canada (aligned with U.S. EPA)
- 2015 – Regulatory amendments introduced the phasing-in of more stringent Tier 3 program, starting with Model Year 2017
- This cross-border collaboration has been extended to GHG emissions regulations and the administration of vehicle and engine compliance programs, with annual touchpoints between U.S. EPA and Environment and Climate Change Canada.





Vehicle engines and fuels are an integrated system

- Vehicles are tested and certified jointly for U.S. and Canada
- Both the Canadian Tier 2 and 3 programs are aligned with U.S. EPA in order to deliver cleaner cars, fuels and air, while maintaining the integrity of the North American vehicle and fuel markets

Tier 3 program is amongst the most stringent globally

- Supports the introduction of new vehicle technology that will further reduce smog-forming substances such as VOCs and NOx by 80% and PM by 70%
- Depends upon the availability of compatible ultra-low sulphur gasoline

Regulatory alignment across North America is vital

- We are globally-minded and constantly encouraging both research collaboration and regulatory co-operation.
- Regulatory alignment maximizes economies of scale and affords Canadian cleaner and more affordable cars without the added costs resulting from regulatory divergence.



Emissions Regulations and Controls for LDVs



US EPA's projected emissions reductions from Tier 3 program

**Estimated Emission Reductions from the Final Tier 3 Standards
(Annual U.S. short tons)**

	2018		2030	
	Tons	Percent of Onroad Inventory	Tons	Percent of Onroad Inventory
NO _x	264,369	10%	328,509	25%
VOC	47,504	3%	167,591	16%
CO	278,879	2%	3,458,041	24%
Direct PM _{2.5}	130	0.1%	7,892	10%
Benzene	1,916	6%	4,762	26%
SO ₂	14,813	56%	12,399	56%
1,3-Butadiene	257	5%	677	29%
Formaldehyde	513	2%	1,277	10%
Acetaldehyde	600	3%	2,067	21%
Acrolein	40	3%	127	15%
Ethanol	2,704	2%	19,950	16%

[Source: U.S. EPA](#)

In Canada, the estimated emission reductions from Tier 3 vehicles due to new gasoline sulphur and vehicle emission standards are (in tonnes):

NO_x: 2,644 (2020)
24,785 (2030)

VOCs: 1,473 (2020)
14,848 (2030)

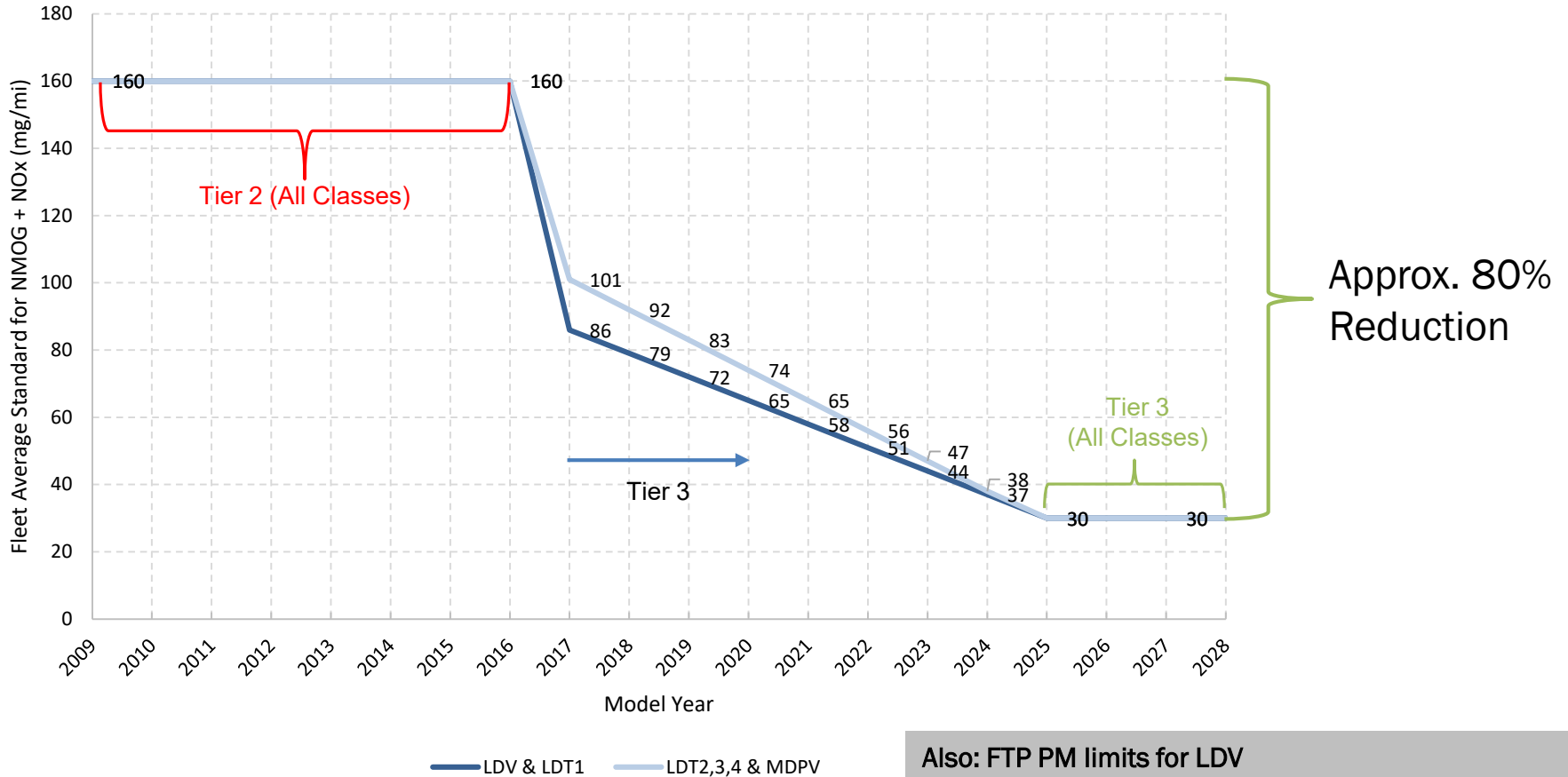
Source: Environment and Climate Change Canada



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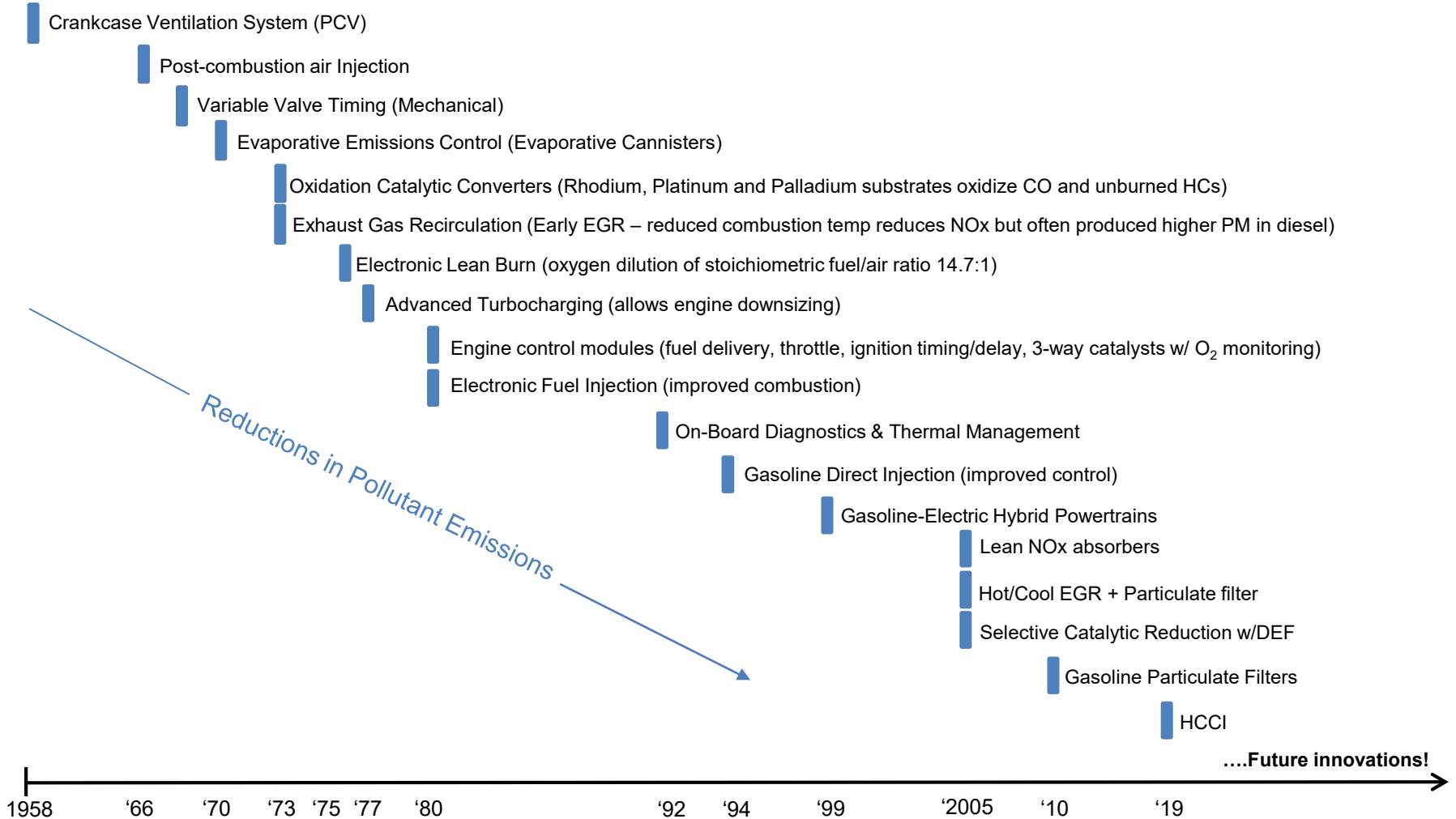
Tier 3 Fleet Average NMOG + NO_x Emission Standards (FTP-based)



Emissions Regulations and Controls for LDVs



A timeline of (some) key innovations in emissions control technologies





Zero Emissions Vehicles will increasingly disrupt the traditional fleet

- OEMs will need to increase ZEVs in order to comply with increasingly stringent federal Greenhouse Gas regulations + North American ZEV mandate patchwork
- Adequate ZEV infrastructure remains critical for large scale ZEV deployment

The Internal Combustion Engine will continue to evolve for the next decade or more

- Continued innovation in the combustion engine space is expected over the next decade or more
- Academic co-operation between world-class researchers in Canada and U.S. is encouraged to support synergies when informing regulatory solutions

The Health Effects Institute

HEI is a non-profit corporation chartered in 1980 as an independent organization to provide high-quality, impartial, and relevant science on the health effects of air pollution. HEI typically receives balanced funding from the U.S.S Environmental Protection Agency and the worldwide motor vehicle industry. Other public and private organizations periodically support special projects or certain research programs.

<https://www.healtheffects.org>





Thank you!

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