



Transport Canada's ecoTECHNOLOGY for Vehicles (eTV) Program

Task Force on Vehicle Weights and Dimensions Policy Government – Industry Meeting

November 26, 2014





PURPOSE

The objective of this presentation is to provide a program update on some of eTV's current heavy-duty vehicle (HDV) testing and evaluation activities, which include potential weights and dimensions implications:

- HDV drag reduction technology
- Use of LiDAR to enhance reliability of HDV aerodynamic drag assessments
- Dimethyl Ether (DME) literature review
- Cooperative truck platooning systems: Phase I – technology scan
- Connected Vehicles - RCC





About Transport Canada's eTV Program

- Part of Canada's \$870M *Clean Air Agenda* announced in 2011, the ecoTECHNOLOGY for Vehicles (eTV) Program is a \$37.9M Government of Canada program that tests and evaluates the **safety** and **environmental** performance of advanced light-duty vehicle (LDV) and heavy-duty vehicle (HDV) technologies.
- Focus of the program is on **near-term commercial technologies** that are anticipated to enter the Canadian market over the next 10-15 years.
- Transport Canada (TC)'s eTV program coordinates testing priorities and shares results with key Canadian federal departments (i.e. Environment Canada [EC], Natural Resources Canada), Provinces (i.e. Federal/Provincial working groups) and through participation/support of international fora (i.e. Global Technical Regulations (WP.29), Regulatory Cooperation Council, etc.).
- Program results are being used by Canada to help:
 - inform the development of future vehicle environmental regulations;
 - guide the proactive development of new or revised safety regulations, standards, codes and guidelines; and,
 - support the development of non-regulatory industry codes and standards that anchor the market and industry efforts to integrate new vehicle technologies.





About Transport Canada's eTV Program

The Federal Interdepartmental Steering Committee has endorsed the program's Multi-Year Testing & Evaluation Work-Plan, which includes testing activities organized into **seven high-level technology priorities**:

1. **Electric Vehicles (EVs)**, including battery electric and plug-in hybrid vehicles;
2. **Renewable Fuel Technologies**, including biodiesel and various ethanol blends;
3. **Natural Gas Technologies**, including compressed natural gas (CNG) and liquefied natural gas (LNG);
4. **HDV Power-train**, Emissions and Aerodynamic Improvements;
5. **Hydrogen & Fuel Cell Technologies**;
6. **Light-duty Vehicle (LDV) Power-train**, Emissions and Aerodynamic Improvements; and
7. **Connected Vehicle Systems.**





eTV Multi-Year Testing & Evaluation: Active Projects (2014-2015)

The program currently has the following **testing & evaluation projects underway**:

Electric Vehicle:

1. Electric vehicle crashworthiness
2. Battery pack destruction and abuse testing

Renewable Fuel:

3. Gasoline direct injection engines & particulate filters
4. Renewable diesel

Heavy-duty power-train, aero, emissions:

5. HDV drag reduction technology
6. Use of LiDAR to enhance reliability of HDV aerodynamic drag assessments
7. DME literature review

Light-duty power-train, aero, emissions:

8. Light-duty truck mass reduction study
9. Vehicle data modelling
10. Low rolling resistance tires
11. Alternative fuel cross-comparison
12. Field operational trial of fuel consumption displays
13. LDV drag reduction technology – Phase II

Connected Vehicles:

14. Cooperative truck platooning systems: Phase I – technology scan
15. Cyber-security of telematic systems



Project: Drag reduction evaluation of HDV aerodynamic technologies

Status: Year (3) of (3) in progress



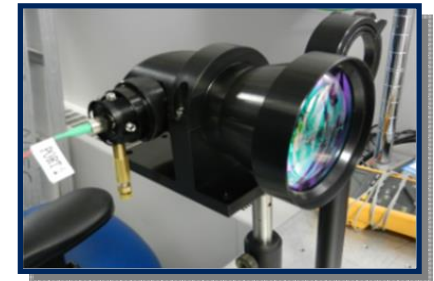
- Project aims to significantly enhance the fidelity and quality of HDV aerodynamic drag assessments – to reduce key gaps in real world vs. laboratory performance, with a focus on Canadian conditions, vehicle weights & dimensions, etc.
- Year one of the project developed a Flow-Treatment-System to better simulate real-world turbulent wind conditions in a wind tunnel, in addition to a ground treatment system that simulates wheel movement/turbulence.
- In year two of the project, a scale model of a tractor-trailer was developed in collaboration with a major OEM for various configurations (i.e., short and full-length trailer, day and long-haul tractor) and a list of drag reduction technologies to model/evaluate was selected/finalized by the project's steering committee.
- Year three of the program is focusing on testing different configurations of HDV aerodynamic technologies, and sharing data with EC/EPA and Provincial/Territorial regulators.
- **The 30% scale model fabrication and mounting system is complete and will undergo testing in the 9-metre wind tunnel in November 2014.**



Project: Use of LiDAR to enhance reliability of HDV vehicle aerodynamic drag assessments

Status: Year (3) of (4) in progress

- Project aims to significantly increase the ability to test & measure the drag performance of HDVs on test-tracks using LiDAR.
- Results could help support the development of alternative/new HDV coast-down test procedures for vehicle manufacturers.
- Over the past year, the NRC has been working with the National Optics Institute to develop a prototype instrument.
- Validation of Prototype #1 was a success based on a status report submitted in July 2014. Currently developing and testing prototype #2. System will be validated in the NRC 9-metre wind tunnel in January 2015.
- Final (4th) year will involve *in situ* testing of a fully instrumented HDV on test track.



Long-range LiDAR Head - NOI



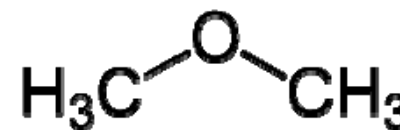
Wind Tube Generator used to validate LiDAR prototype



Project: Investigating DME (Dimethyl Ether) as an Alternative Fuel

Status: Month (1) of (5) in progress

- Literature review currently underway with the NRC considering several features of DME such as chemical composition, production, supply chain, storage, engines characteristics, maintenance issues, emission details, safety performance, etc.
- Purpose is to inform vehicle safety and environmental stakeholders about key issues that may need to be addressed, should the technology be commercialized in Canada in large numbers.
- EC, TC Motor Vehicle Safety, NRCan, HC, IC and Provincial/Territorial Weights and Dimensions officials on the steering committee for the project.
- Kick-off meeting for discussions on DME fuel study was August 28, 2014. Project is expected to be completed by January 2015.





Project : Review of HDV Cooperative Truck Platooning Systems

Status: Completed

- To better understand connected vehicle technology (cooperative platooning), including the potential operational and safety considerations, in addition to environmental and efficiency considerations, TC asked NRC to prepare a literature review of available data and existing projects.
- Results were distributed to the eTV Provincial/Territorial Weights and Dimensions Technical Expert Working Group for feedback.
- The final report was circulated to stakeholders September 2014, and identifies potential testing approaches to evaluate the safety, environmental, and efficiency performance of CTPS in Canada.
- **Key issues identified** in the report include (e.g.):
 - Unique Canadian weight & dimension restrictions;
 - Knowledge gaps in Canadian winter conditions;
 - Pros/Cons vs. Long Combination Vehicles;
 - Technical considerations, i.e. equipment, frequencies;
 - Interactions with existing traffic;
 - Aerodynamic performance.
- Potential follow-up testing may be discussed in coming months, depending on status of commercialization efforts.



European Cooperative HDV
Platooning Pilot



Connected Vehicles

Canada-U.S. Regulatory Cooperation Work-plan

A key objective under the Regulatory Cooperation Council (RCC) efforts is to help ensure the interoperability of connected vehicles between Canada and the United States (U.S.) moving forward.

“Transport Canada and the U.S. DOT have committed to coordinating and collaborating on Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) communications technology and applications development and implementation for light- and heavy-duty vehicles, including architecture and standards to support interoperable deployment. This includes, where appropriate, joint planning and priority-setting, collaborative research projects, information exchanges to support analyses as well as architecture and standards development.” (RCC WORKPLAN)

Coordinated ITS research will:

- Preclude the development and adoption of redundant standards
- Provide significant cost savings
- Support and accelerate the deployment and adoption of connected vehicle systems



THANK YOU

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