Canadian Vehicle Manufacturers' Association

Association of International Automobile Manufacturers of Canada

BACKGROUNDER

AUTO INDUSTRY - REDUCING EMISSIONS

Technologies to Reduce GHG Emissions

Across North America, the auto industry has developed a variety of technologies to reduce greenhouse gas (GHG) emission from vehicles. Most of these technologies have related effects requiring re-engineering of associated systems, increased vehicle computer power and software sophistication, as well as changes to assembly procedures and supplier systems. Some technologies will require further research, development and engineering work and in certain vehicle applications may not be appropriate, feasible or cost-effective.

The following is a general description of various types of fuel saving technologies being implemented and developed by today's auto manufacturers.

Transmissions

One way to improve drivetrain efficiency is to better match vehicle speed to engine speed. This matching is controlled by the transmission. Operating the vehicle, as much as possible, with the engine at peak efficiency, can provide a substantial benefit.

Recent developments in transmission technology which contribute to these operating improvements include CVTs (Continuously Variable Transmissions), transmissions with four, five, six or more forward gear ratios, advanced overdrive systems, and automatic transmissions with electronically-controlled torque converters.

Engines

Improvements in engine efficiency may be accomplished either through increased combustion efficiency, reduction of mechanical losses, or advanced engine management systems.

Improved combustion efficiency may be obtained through the use of increased compression ratio, better air/fuel mixing and distribution, dual ignition and optimized spark timing (all related to improved valve, ignition, and fuel injection control). In gasoline and diesel engines, electronically-controlled direct injection fuel systems provide increased fuel efficiency over a wide range of operating conditions. Newer vehicle systems that capture evaporative emissions during vehicle refueling and operation also provides benefits.

Reduced mechanical losses may be achieved by lowering internal engine friction through the use of advanced components (ceramics, rollers) and lubricants, reduced/enhanced throttling (load control by valve timing and electronic throttle control), selective cylinder shutdown, and physical engine downsizing (enabled, with power levels maintained, by turbo/supercharging).

Advanced engine management systems such as on-board diagnostics (OBD II) and engine start stop systems are designed to reduce wasted energy from out-of-tune engine operation or excessive idling, respectively.

Variable valve timing & lift enable the engine to be optimized for peak power or efficiency over its entire operating range. Enhanced responsiveness and power also make downsized engines, without compromising vehicle performance.

The use of advanced diesel engines is another way to address GHG emissions. In order to meet modern, North American exhaust emission standards, advanced catalysts and other exhaust aftertreatment technologies as well as enhanced fuel formulations are required.

Other Improvements (Applied to the Powertrain)

Improvement in powertrain management, through the use of electronic monitoring and control, enable the engine and transmission to more efficiently handle heavy vehicle loads and adverse operating conditions.

New systems such as voltage regulated electric fuel pumps, electric coolant and power steering pumps and high efficiency alternators reduce energy losses in vehicle subsystems, boosting vehicle efficiency.

Other Improvements (Applied to the Entire Vehicle)

Lightweight materials, low rolling resistance tires, tire pressure monitoring systems, and enhanced aerodynamics reducing energy requirements by reducing the friction associated with vehicle weight (done without compromising vehicle occupant safety) and drag.

Hybrid propulsion systems recover energy generated during braking. This energy is used to assist in the reacceleration of the vehicle, significantly reducing power requirements on the engine.

Modern modelling tools, advanced simulation and system optimization methods, and on-road optimization enable vehicles to be designed and manufactured more precisely to satisfy owner expectations in utility, and performance.

Alternative, renewable fuels such as ethanol from biomass (E10, E85), biodiesel & hydrogen can produce lower levels of GHGs on a life cycle basis than current gasoline and diesel fuels.

Reductions in Smog-Causing Emissions

Greenhouse gas emissions and smog-related emissions are not the same. The regulated tailpipe emissions involved in the formation of smog include hydrocarbons, oxides of nitrogen and carbon monoxide whereas GHG emissions are a result of burning carbon-based fuels in the vehicle and is proportional to the distances traveled by vehicles and the amount of gasoline consumed.

The Canadian automotive industry has been acting to reduce smog causing emissions for several decades. The implementation of the recent Tier 2 emission standards for all new vehicles (cars and light duty trucks) will ensure that smog-causing emissions are reduced by 99% from pre-control levels.

How clean are these new Tier 2 vehicles, in practical terms?

- Burning one cord of wood in your fireplace this winter will create more smog causing emissions than the entire lifetime emissions produced from ten (10) Tier 2 SUV's.

- You would have to drive 37 new Tier 2 SUV's around the earth's circumference to equal the emissions from burning that one cord of firewood.

- Painting a room with one gallon (4.54 litres) of interior water-based paint generates more smog causing emissions than driving a Tier 2 vehicle from Toronto to Vancouver and back.

For further information on these facts, please refer to the www.cvma.ca and www.aiamc.com