Canadian Fuels ASSOCIATION | ASSOCIATION canadienne des carburants

We'll take you there

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FUEL *for thought*

Canadian Environment Week (June 1–7, 2014)

Life Cycle Analysis: a Developing Science for Assessing Transportation Fuel Options

"Strengthening Our Environment Today for Tomorrow" is the theme of this year's Environment Week, celebrated from June 1 to 7 across Canada. Key to achieving this important objective is greening our transportation sector which accounts for one-quarter of Canada's total GHG emissions. Canadians own over 20 million personal vehicles which make up half of transportation GHG emissions.

Reducing GHG emissions from transportation will require a comprehensive approach spanning fuels, vehicles, transportation options and consumer behaviour and choice. Alternatives to traditional petroleum-based fuels with lower carbon intensities are an important component of a lower carbon transportation future for Canada. Biofuels, natural gas, hydrogen, hybrid and all-electric vehicles are all part of that future.

Making the right fuel mix choices to achieve real reductions in transportation GHG emissions is no easy task. All fuels have an environmental impact — there is no such thing as a perfectly "clean" fuel. Comparing the environmental performance of the various fuel options, while taking into account different technologies, infrastructures and methods of production, processing and delivery, is a complex job. Unfortunately, there just isn't "an app for that".

Life Cycle Analysis (LCA) is a tool to systematically evaluate and compare the long and short-term environmental impacts of various fuel options. LCA models use assumptions, algorithms and complex spreadsheets to estimate the environmental consequences of a product through all stages of its life cycle — from its creation to consumption.

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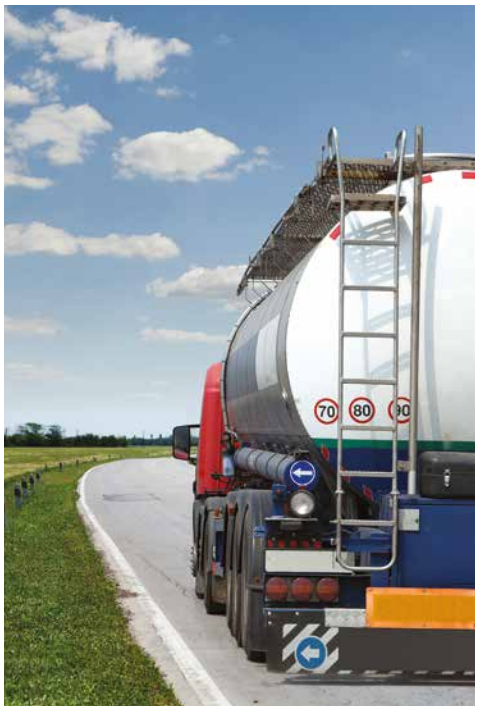

In the transportation fuels sector, LCA models consist of two main segments: well-to-tank (WTT) and tank-to-wheels (TTW), for a full well-to-wheels (WTW) assessment. WTT includes all stages of generating fuels from the feedstock source — or petroleum "well" — to a vehicle's fuel tank, including production, processing and distribution. TTW covers the environmental impact of the fuel's combustion — "tailpipe" emissions. LCA models provide a measure of the Carbon Intensity (CI) of a fuel, as expressed as CO_2 per unit of energy, or CO_2/megajoule. In Canada, the most widely used LCA model is GHGenius, developed for Natural Resources Canada.

While LCA models provide the most comprehensive estimate of fuel carbon intensity, they have their limitations. As quantitative models, they rely on assumptions and boundary conditions that are often subjective. Scope and consistency of data can also be problematic: to create reliable models that enable an accurate "apples-to-apples" comparison, the scope must encompass as many direct and indirect aspects of production measured though an equivalent methodology. Data can be limited or inconsistent for specific fuels, and many variables, such as irrigation, electricity sources and geographic location, can come into play. As a result, different models can arrive at quite different carbon intensities for the same fuel.

Thus, definitive claims that one fuel "reduces GHG emissions by x percent" need to be judged in the context of imperfect and often subjective modelling, and with a full understanding of the underlying assumptions. This is particularly important as various governments are now using LCA models for regulatory compliance purposes, a purpose for which they were not originally designed. It underscores the need for strong, unbiased and transparent governance models, sound science and rigorous peer review in the ongoing maintenance and further development of LCA models used by regulators.

While life cycle analysis represents the best method to assess and compare the environmental performance of transportation fuels, it is a developing science with significant complexity that demands careful consideration in its further development and use.

Canadian Fuels Welcomes a New Member

The Canadian Fuels Association is pleased to welcome Federated Co-operatives Limited as its newest member.

Federated Co-operatives Limited, based in Saskatoon, is the 48th largest company in Canada and the largest non-financial co-operative in the country. The Co-op Refinery Complex (CRC), located in Regina, manufactures and supplies petroleum products to FCL's members through the Co-operative Retailing System. It was the world's first co-operatively-owned petroleum refinery. The CRC's total capacity is 130,000 barrels per day. The CRC has evolved into one of North America's higher value-added petroleum refining facilities. It employs over 900 people.

Tier 3 Fuel Standards: Cleaner Fuels, Cleaner Air

It might come as a surprise, but the "recipe" for gasoline has changed significantly over the years and will continue to evolve in the years to come. Canada's refiners are continuously working to improve the quality of the fuels they produce — enabling cleaner fuel combustion and reducing emissions of smog-forming substances. Canadians pump over 75 billion litres of liquid fuels into their vehicle tanks each year, the equivalent of roughly 30,000 Olympic-sized swimming pools. Reducing emissions from consumption of those fuels is key to improving Canada's air quality, especially in urban areas.

Between 2002 and 2007 the refining sector invested over $5 billion to reduce the sulphur content of gasoline from a maximum allowable limit of 1,000 parts per million (ppm) to the Tier 2 limit of 30 ppm, and sulphur in diesel from 500 ppm to 15 ppm. As a result, a 2005 or newer vehicle using today's low-sulphur gasoline produces 90 percent less smog-forming emissions than a 1993 model.

As illustrated in the chart below, emissions of smog precursors, nitrogen oxide (NOx), volatile organic compounds (VOCs) and sulphur oxide (SOx) from light-duty vehicles have declined by 77 percent, 74 percent and 93 percent respectively since 1995.

Building on that foundation, the federal government is preparing regulations to align Canada with new US Tier 3 fuel and vehicle standards that will reduce the amount of sulphur in gasoline from 30 ppm to 10 ppm, beginning in 2017. Tier 3 requirements will result in gasoline containing 97 percent less sulphur than it did in 2004. Combined with new Tier 3 vehicle emission control technologies, this will further reduce new vehicle tailpipe emissions of smog-forming air pollutants — VOCs, NOx and particulate matter — by 80 percent from current levels.

Canada's transportation fuels industry endorses Canada-US alignment on new Tier 3 standards for gasoline and vehicles. They will deliver important air quality improvements for Canadians while maintaining the competitiveness of Canada's refining sector in the integrated North American fuels market.

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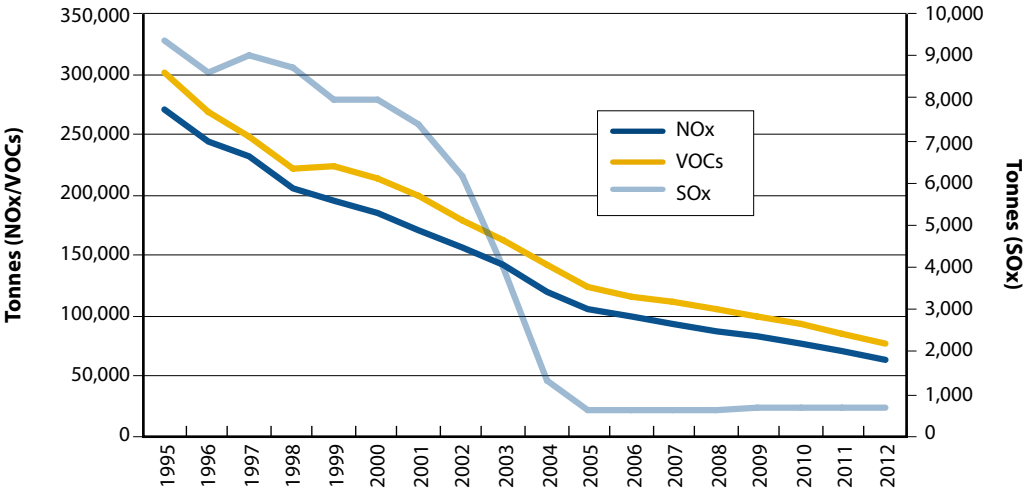
1995–2012 Historical Emissions for Canada for Light-duty Gasoline Vehicles (in tonnes)



Source: Environment Canada, Pollutant Inventories and Reporting Division, 2013

tech talk

For drivers who regularly deal with stop-and-go driving conditions, the fuel savings from idle-stop systems can be significant

Auto Idle-stop Systems

The Canadian Fuels Association is pleased to present *Tech Talk*, a new continuing series profiling innovations in fuel, vehicle and transportation technologies.

The topic of this first edition of *Tech Talk* is idle-stop systems, a technology that tackles one of the greatest sources of wasted fuel — idling. While most Canadians understand the fuel and environmental costs of unnecessary idling, it can be difficult to avoid, especially in traffic jams and at long intersection waits.

Enter the idle-stop system: when the car is at a full stop, its computer system automatically sends a signal to turn off the engine, which re-starts when the driver releases the brake, reducing the amount of time the engine spends idling. Power circuits are re-designed to enable electric devices to function when the engine is off. Idle-stop systems can significantly reduce fuel consumption, and consequently air emissions as well. They are sometimes coupled with regenerative braking, which recaptures kinetic energy "lost" during deceleration by turning it into electricity to power the vehicle's electronics. For drivers who regularly deal with stop-and-go driving conditions, the fuel savings from idle-stop systems can be significant.

Transport Canada recently conducted tests on idle-stop systems from the Smart ForTwo Micro Hybrid Drive and the BMW 118d Advanced Diesel as part of its ecoTechnology for Vehicles program to assess their performance in Canadian conditions. The tests concluded that in typical stop-and-go city traffic, idle-stop systems offered fuel savings of 11.5 percent compared to a standard vehicle. Transport Canada noted however that some systems did not engage in temperatures below -7°C.

Idle-stop systems are by no means a new technology; Europeans were first introduced to them by Fiat and Volkswagen in the 1980s and hybrid vehicles have been relying on them for added efficiency for years. Internal combustion engines equipped with idle-stop technologies have now begun to rapidly penetrate the North American market and are available on a wide range of vehicles, notably the Kia Rio, the Chevrolet Impala and Malibu, the Porsche Cayenne and in a number of Ford, Acura, Mazda, Audi, BMW and Mercedes-Benz models, among others.

Canadian Fuels Welcomes Bob I. Baird as Association Chair

The Canadian Fuels Association is pleased to welcome Bob I. Baird, Senior Vice President, Downstream, Husky Energy Inc., as Chair of the Association's Board of Directors.

Mr. Baird graduated from Concordia University with a Bachelor of Engineering, Mechanical. He also has a Management Certificate from IMD in Lausanne, Switzerland.

Mr. Baird was appointed Senior Vice President, Downstream in April 2012. He is responsible for overseeing five Husky Energy business units including Canadian Downstream, US Refining, Retail & Canadian Product Marketing, Commodity Supply & Marketing and Downstream Commercial. Prior to Husky, Mr. Baird worked in several senior roles including refining, strategy and consulting for Royal Dutch Shell in Canada and Europe.

New Coalition is Enhancing Fuel Transportation Safety

The transport of crude oil and refined products by rail is increasing across Canada. The safe transport of these goods has always been a top priority for the businesses that produce Canada's crude oil and fuels, and the railways that transport them. The Lac Megantic tragedy has reinforced our commitment to continuous improvement in safety performance and we are today working collaboratively on new measures to further enhance safety.

Together, the Canadian Fuels Association, the Canadian Association of Petroleum Producers and the Railway Association of Canada are moving forward with a broad emergency preparedness and response coalition, to create a more effective national response capability through a single response entity accessible to companies, first responders and government agencies in the event of a railway incident.

As a first step, we are implementing voluntary mutual emergency assistance measures to improve preparedness and response capabilities for rail transport emergencies involving liquid hydrocarbons. The agreement will streamline access to resources, such as equipment, supplies and expertise to incident commanders in the event of an emergency such as a spill or fires.

"Addressing the safety dimensions of rail transport is complex, involving many companies, governments and communities. The unprecedented collaboration between our industries and Associations on safe transportation underscores the importance we place on continuous safety performance improvement", says Peter Boag, President, Canadian Fuels.

For refiners, our commitment to public, community and employee safety starts back at the refinery, and is rooted in a deep safe work culture underscored by a dedication to safe and sustainable operations that goes beyond refinery boundaries and extends into the communities where they operate. Work practices are constantly benchmarked to reinforce safety and to ensure progress toward zero operating incidents with initiatives that proactively identify and eliminate hazards. "There is no greater challenge, and no higher reward, than to achieve a zero incident safety record", according to Boag.

The safety journey doesn't end when fuel is safely loaded and transported by train. Throughout the complex distribution network of pipelines, ships, trains and trucks, terminals and retail sites, Canadian Fuels Association members conduct business with a dedication to safe and sustainable operations that has produced a safety record that is among the highest of all Canadian manufacturing and processing businesses.

"We are proud of our record, but the task of producing and transporting fuels safely is never done", says Boag. "We are always looking for ways to further enhance safety; our joint work with oil producers and rail companies to improve emergency preparedness and response capabilities for rail transport of crude oil and fuel exemplifies our commitment to continuous improvement".

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Busting the Myth of Long Weekend Gas Prices

Overall, pump price fluctuations followed general and sustained trends and were not affected by long weekends. Changes were caused by underlying fluctuations in wholesale prices.

Canadians love their cars and the convenience and freedom they provide, but the fuel that powers them is often taken for granted, except for the price at the pump. With the peak driving season now upon us, pump prices are a frequent topic of animated discussions. Many Canadians believe that prices rise in advance of long weekends, but a dispassionate look at the data reveals otherwise.

Petroleum market specialists MJ Ervin & Associates have just published an update to a 2011 analysis that tracks price changes over weeks preceding long weekends since 2006. MJ Ervin & Associates looked at extensive data collected for Natural Resources Canada to assess whether gas price hikes are more likely on weeks prior to long weekends than before non-holiday weekends. To get an accurate idea of the general market trends in effect on long weekends, they kept track of prices a week before and after a holiday weekend. The study focused on the average retail prices for regular gasoline in Vancouver, Calgary, Regina, Winnipeg, Toronto, Ottawa, Montreal, Quebec City, Halifax and All Canada.

After tracking the number of times week-over-week prices increased, decreased or remained stable and measuring the average amplitude of those fluctuations, MJ Ervin & Associates concluded that pump prices aren't more likely to rise over the week preceding a long weekend and that fluctuations are comparable to non-holiday weeks. In fact, average price increases on weeks before a long weekend were somewhat lower than on non-holiday weeks, while price decreases were slightly higher before a holiday.

Overall, pump price fluctuations followed general and sustained trends and were not affected by long weekends. Changes were caused by underlying fluctuations in wholesale prices. Pump prices were more likely to increase in the spring and early summer, and drop in late summer and fall, following global seasonal patterns in retail gasoline demand.

Detailed information and market-by-market results can be found on our website: http://canadianfuels.ca/en/industry-reports-and-presentations

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