National Survey and Study of the Lubricating Oil and Antifreeze Packaging Circular Economy

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Executive Summary

In response to the global challenge of single use plastics and their impact on Canada's environment and ecological well-being, the Canadian government is taking steps to reduce Canadian plastic waste and supplant it with innovation in environmentally and economically sound alternatives. In the automotive industry, a clear source of plastic waste comes from automotive fluid products such as oil, coolant, appearance products, windshield washer fluid, and numerous other fluids necessary for the maintenance and upkeep of vehicles on the road.

Since the year 2000, the Canadian light vehicle fleet has increased by roughly ten million units, an increase of over 60 percent. The Canadian light vehicle fleet has grown from 17.10 million vehicles in the year 2000 to 27.65 million vehicles for 2019. As of 2019, the largest age grouping within the Canadian fleet are those vehicles ages 12 years and above with vehicles aged 8-12 years making up the second largest portion. The Canadian fleet is biased towards older vehicles and generally, these vehicles are the ones that require more frequent maintenance to remain on the road and in turn, are responsible for more plastic waste.

Sitting at 27.65 million units as of 2019, the Canadian national vehicle fleet is expected to increase further and reach 29.80 million units by 2024. The fleet share of older vehicles is expected to increase as well with 12+ year old vehicles expected to account for 31.6% of the overall fleet. The impacts related to COVID-19 are expected to increase the bias in the fleet towards older vehicles as reduced sales in 2020 will reduce the relative presence of younger vehicles in the fleet.

Despite more mainstream attention and new product offerings in the electric vehicle space, gasoline (87.42%), flex-fuel (8.08%), and diesel (3.03%) vehicles still make up an overwhelming majority of the Canadian vehicle fleet. Electric vehicles as of 2019 account for just 0.25% of the Canadian fleet. While fully electric vehicles require a reduced amount of automotive fluids due to the absence of a traditional internal combustion engine, their impact on the fleet remains minimal and it will take a long time for this to change, barring any aggressive regulation and policy changes. However, sales for ZEV (zero emission vehicles) are rising every year, amounting to an estimated 35,900 units sold in 2019 across Canada. By 2024, ZEVs are expected to occupy 0.77% of the Canadian fleet and it will take until roughly the late 2030's for ZEVs to occupy ten percent of the Canadian fleet according to current estimates.

With ten million additional vehicles on the road, the amount of maintenance increases in tandem. The inescapable truth of routine maintenance demands that these additional vehicles also require regular fluid changes. Historically, the size of the Canadian oil market has grown with the size of the fleet as well as total kilometers driven by the fleet. However, in the past decades, this relationship has broken down due to factors such as extended drain intervals and the cost of oil. The impacts of COVID-19 are expected the shrink the oil market in the short-term. The coolant market is expected to remain relatively flat, with slight increases yearly until ZEV vehicles occupy a larger portion of the fleet, resulting in a slow-down.

For the purposes of this study, data was gathered via informational interviews from the three key sectors in the automotive fluids industry: Fillers, package manufacturers, and recyclers.

Fillers, for the context of this study, represent manufacturers of automotive oils and fluids who fill the plastic or other containers in question. Some key points in interviews with these businesses follow:

- The variety of packaging materials used for the broad range of automotive fluids was noted to be fairly vast. HDPE plastic containers ranging from under 1 litre to 10 litres were the most commonly cited. Other popular methods were direct tanker deliveries, plastic totes, steel or plastic drums, steel kegs, and plastic lined cardboard boxes (or eco-boxes)
- Most respondents noted that they purchase their packaging from outside suppliers, with only a few noting some smaller volume packaging manufactured in-house
- The use of bulk versus packaged methods of transport varied heavily between respondents, from heavily bulk biased to entirely smaller-volume package oriented
- The larger volume methods are more often than not entirely reusable and cleaned/prepped by a third party. HDPE plastic containers can and are recycled. Fillers also suggested that the eco-boxes are partially recyclable
- Fillers indicated that customer demand has helped push them towards sourcing recycled plastic for their smaller volume HDPE containers
- Fillers noted a trend of specialization in the types of coolants and oils required by specific vehicles which has led to producing more products and varying volumes to cover as much of the market as possible. This has caused a proliferation in smaller volume container use as lower volume specialized fluids are do not generate enough revenue to justify multiple packagine types or bulk deliveries.
- To address potential regulation, fillers noted a potential switch to fully reusable smaller containers, albeit at significantly increased cost.

Package manufacturers are those companies that produce the actual containers used in smaller volume or medium bulk deliveries of the fillers' products. Some highlights follow:

- The majority of plastic manufacturers are international and automotive packaging represents just one—relatively small—portion of their business. As a result, decision-making power largely exists outside of Canada, complicating procedural change and ability to adapt quickly or pre-emptively to regulatory changes
- The option also exists for fillers to ship filled containers in from elsewhere, cutting out the Canadian arm of the package manufacturing business
- Smaller package types such as bottles and jugs are intentionally made of HDPE with recyclability in mind but the issue of contaminants is a source of concern which reduces the recyclability and rate of reuse for these plastics
- Package manufacturers noted that their decision to use new plastic versus recycled plastic is generally cost driven with new plastic currently noted as the more economically viable option. However, a willingness exists to accommodate customer needs
- Package manufacturers—in response to potential regulation regarding single-use plastics—have begun to consider solutions such as biodegradable packaging or fully re-usable smaller volume plastic packaging and a system of collection and reuse to ensure the packaging stays in use for as long as possible. At present, neither of these options are without significant caveats such as large initial research costs as well as more expensive packaging once sold.

Recyclers in the context of this study are those companies that broadly handle the collection, washing/prepping, breakdown, processing, and resale of packaging used in the automotive industry. Some highlights follow:

- A majority of recyclers in this study noted that they reduce plastic containers into resin for resale. However, the variety of methods and business processes in the recycling space can differ between the operations of one recycler versus another
- According to most recyclers, the volume of automotive fluid packaging has remained relatively flat
- Broad sentiment among recyclers has pointed to an increase in IBC containers and drums but some confusion exists among recyclers who receive these packages and are unsure about specific processing methods and associated regulations, leading to an inefficient system
- The plastic lined cardboard boxes—eco-boxes—have been consistently mentioned by recyclers to be a problematic packaging type. More often than not, these products are seen as entirely non-recyclable and are destined for land-fills
- Recyclers were quick to note there is a large volume of plastics in the system from products such as windshield washer fluid, appearance products, various additives, etc. that are made from recyclable materials but are not cost-effective to process due to a lack of incentive programs
- Recyclers also noted the impact of new resin prices on their business, a fact mentioned by both filler and package manufacturers. Less expensive new plastic causes recyclers to work within narrower and narrower margins
- Respondents in this study noted that their recycled material rarely made it back into the automotive industry. Package manufacturers noted a reliance on the USA to supply recycled plastic. As such, an ideal cyclical life-cycle for plastics in the automotive space will require significant work

Volumes of single-use plastics were noted by recyclers, package manufactures, and fillers to be relatively stable. While this stability should be considered positive in light of the rapid growth of the light vehicle fleet there are obviously still improvements to be made.

Before considering industry suggestions it should be noted that fillers and packaging manufacturers are often international companies. Their head offices are often located outside of Canada—commonly in the USA—and that is where decision-making power rests. This represents a limit to the authority of the Canadian side of their businesses and can be seen as a significant hurdle when discussing adaptation to regulatory changes and especially pre-emptive solutions to underlying issues like single-use plastic waste.

One potential solution to noticeably decrease the volumes of single-use plastics flowing from the automotive space which was agreed upon by fillers, package manufactures, and recyclers alike was the expansion of incentive programs. A large number of plastic bottles and jugs—such as those for appearance products, additives, and windshield washer fluid—end up in the hands of recyclers who cannot justify the cost of processing them without incentives. This is especially true when the market shifts towards cheaper new plastic and recycled plastic becomes less competitive.

In line with the previous point, an extension of the incentives or regulatory framework surrounding larger plastic bulk containers was suggested as being of potential benefit. IBC containers alongside plastic drums and kegs are often not worth processing/cleaning/reusing due to the relative low cost of new products. Setting clearer guidelines and incentivising the reuse of these containers would increase their utilization and subsequently reduce the volume of new products that need to be produced.

An option mentioned by package manufacturers and to a lesser extent fillers is the creation of a system of container re-use on the consumer end. For example, encourage the customers to fill their own personal reused containers from bulk containers. Alternatively, more robust containers can be combined with tracking technology, such as QR codes, to simplify the process of gathering and reusing—especially smaller volume—containers.

Respondents stated that alternative packaging methods such as PVC pouches have surfaced recently. Given the wholly non-recyclable—at present—nature of PVC pouches, they are more of a detriment to the environment than the current system. It was noted that biodegradable containers could be a potential solution to at least the smaller volume packaging waste. However, such options were seen as challenging – with such biodegradable packaging often not actually breaking down in landfills and not currently able to be processed. Extensive further research and development was seen as required. Government support or intervention in this problem would assist greatly in developing packaging types that do not require recycling at all and do not raise much in the way of environmental concerns.

The development of an industry board responsible for regulating packaging in this space is a broader overarching issue that may be worthy of discussion. This concept is an option put forward by the authors of this report (DAC) rather than by survey respondents. Such a board would represent a source of industry standardization that could oversee the approval of various packaging types, sizes and containers, track emerging trends, set recycling fees and associated incentives, as well as monitor the flow of plastic during its full life-cycle.

It was not the mandate of this study to explore such a concept in detail. Indeed, considerable addition work would be required to map out the specific goals and responsibilities of the board and the tools at its disposable to influence the industry's direction. Such an authority would likely come into conflict with package manufacturers (and to a lesser extent, fillers) who may be hard-pressed to adapt given the bulk of their decision-making power is often located outside Canada. However, in a fairly complicated and interwoven space such as this, direct oversight and co-ordination may be a potential solution that would offer considerable benefits.

Methodology

In line with the type of information required for these purposes, DAC has conducted informational interviews with key industry representatives who have offered their perspectives based on hands-on and direct experience. The interviews have been conducted predominantly by telephone call.

The information gathering process occurred in three phases:

Phase 1: Interviews were conducted with manufacturers/fillers regarding:

- Packaging types used (and the packaging manufacturers engaged)
- Quantities of product sizes produced by packaging type
- Product distribution through the market
- Assessment of the recyclability or reusability of each packaging type used
- Trends in packaging, including any planned changed to the packaging types currently used with a specific focus on how products will be distributed and sold if the Canadian government enforces stricter regulations for plastic containers
- Other trends or pressures impacting the marketplace, and more

Phase 2: Interviews were conducted with key packaging manufacturers regarding:

- Packaging types manufactured
- Quantities of product sizes produced by packaging type
- Product distribution through the market
- Assessment of the recyclability or reusability of each packaging type manufactured
- Trends in packaging, including any planned changes to the packaging types currently used with a specific focus on how products will be distributed and sold if the Canadian government enforces stricter regulations for plastic containers
- Other trends or pressures impacting the marketplace, and more

Phase 3: Interviews were conducted with Canadian recyclers regarding:

- Packaging types and sizes currently brought to the recycling facilities
- Ability to recycle or reuse each packaging type currently presented
- Referencing any emerging trends identified, ability to support potential changes in packaging materials or designs, or in the event of a reverse supply chain

DAC have constructed this report using this information alongside relevant market data to broaden the perspective on the Canadian automotive market as a whole as well as the oil market within Canada.

1 Background

1.1 Single Use Plastics

In response to the global challenge of single use plastics and their impact on Canada's environment and ecological well-being, the Canadian government is taking steps to reduce Canadian plastic waste and supplant it with innovation in environmentally and economically sound alternatives. In 2018, the Canadian Council of Minister of the Environment released a document outlining a broad strategy on reaching a zero plastic waste goal and establishing a circular plastics economy in Canada, maximizing the value of plastics moving thorough the economy by keeping materials in use as long as possible through reducing, reusing, repairing, remanufacturing, recycling, composting materials, and recovering energy at end of life if no other option is viable. Goal results were outlined in distinct areas with a specific focus on single-use plastics with a more detailed roadmap to come.

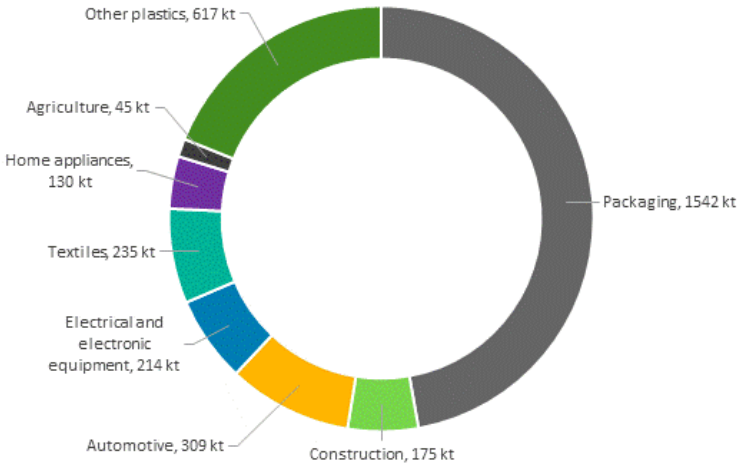
In 2019, the Canadian Council of the Ministers of the Environment (CCME) released their Canada-Wide Action Plan of Zero Plastic Waste – Phase 1 document. The focus of this first phase is product design, single-use plastics, collection systems, recycling capacity, and domestic markets. Under this first phase, six priority actions were outlined.

1. Extended Producer Responsibility December 2020
   - Develop guidance on material categories, product definitions, performance standards, options to encourage innovation, as well as monitoring and verification approaches
2. Single-Use and Disposable Products December 2021
   - Develop a roadmap to address priority single-use and disposable plastics
3. National Performance Requirements and Standards December 2020 – December 2021
   - Develop national performance requirements for plastic
4. Incentives for a Circular Economy December 2019 – On-Going
   - Develop guidelines for disposal bans of end-of-life plastics, control toxic or harmful additives in plastics, as well as implement economic and fiscal incentives or best management practises and remove regulatory barriers
5. Infrastructure and Innovation Investments 2020 – On-Going
   - Assess infrastructure needs for improved plastic life-cycle management and promote or increase access to capital funding or financing for innovation in and infrastructure for improved plastic life-cycle management
6. Public Procurement and Green Operations 2020 – December 2021
   - Develop guidelines and tools for government procurement practises to green operations and reduce plastic

The Government plans to:

- Enforce stricter regulations on single use plastics as early as 2021 where warranted and reduce waste where possible
- Align and work with local jurisdictions to develop and implement standard and targets for plastic manufacturing companies that shift responsibility for their plastic waste to them

As a portion of total plastic waste, packaging materials accounted for 1,542 kilotons in 2016, the single largest portion by industry. Of total plastic waste, 86% finds its way to unmanaged dumps or leaks with only 9% recycled, an estimated economic loss of $7.8 billion. A large portion of this plastic spreads throughout local and global ecosystems causing significant damage to plant and animal species. With the obvious impact of packaging on this environmental issue, steps to ensure further recycling and accountability for waste materials comes at a critical junction.



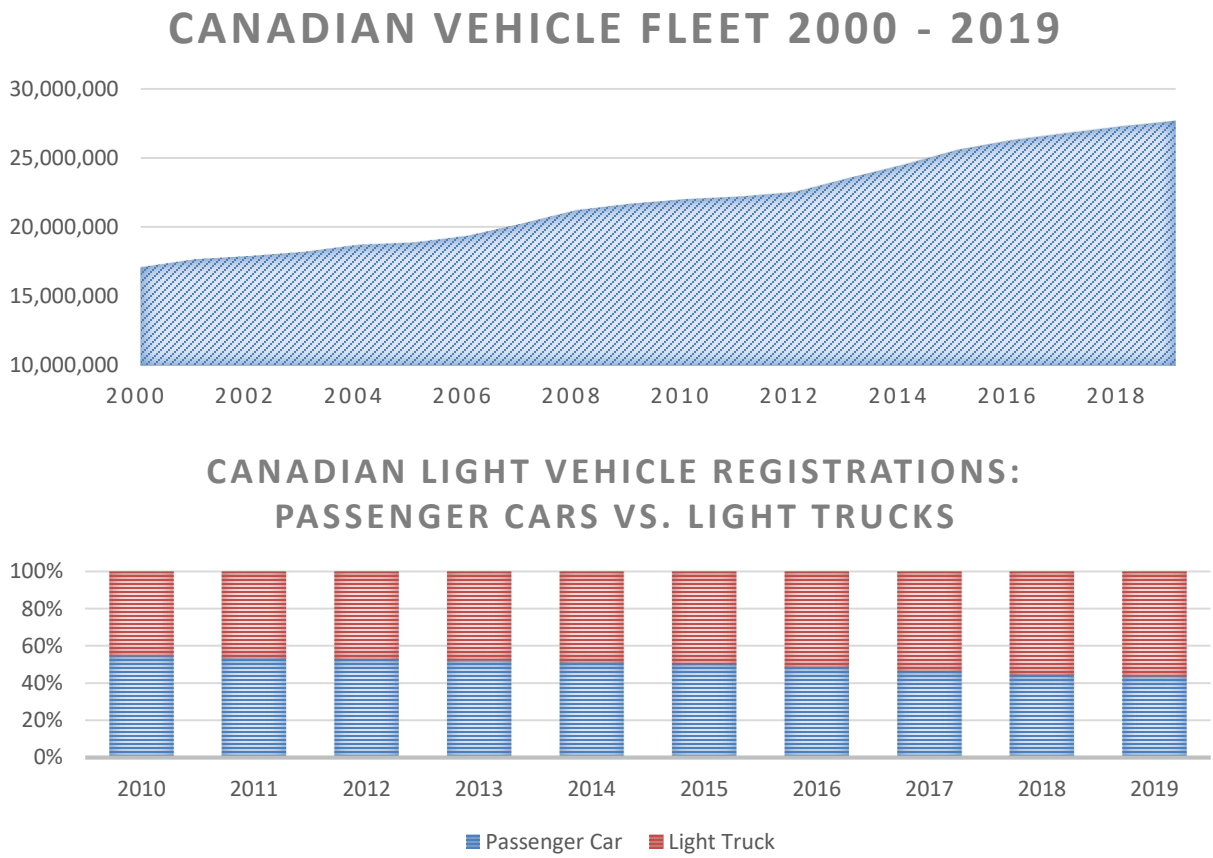
Source: Deloitte and Cheminfo Services Inc., Economic Study of the Canadian Plastic Industry, Market and Waste: Summary Report to Environment and Climate Change Canada

Sector	Proportion of Total Plastic Waste
Packaging	47%
Automotive	9%
Textiles	7%
Electrical and Electronic Equipment	7%
Construction	5%
White Goods (large and small appliances)	4%
Agriculture	1%
Other	19%

Heavily related to the zero plastic waste initiatives outlined by the Canadian Council of Ministers of the Environment, Environment and Climate Change Canada as well as Health Canada released a detailed scientific assessment on plastic pollution in January 2020. This assessment further highlighted the impact of plastic packaging materials on the environment and the cascading effects of these waste plastics moving through the ecosystem. Special focus was placed on the fact that packaging plastics, while accounting for 33% of plastics entering the Canadian marketplace, resulted in 47% of total plastic waste due to the disproportionally single-use nature of these products.

1.2 Light Vehicle Fleet

1.2.1 National



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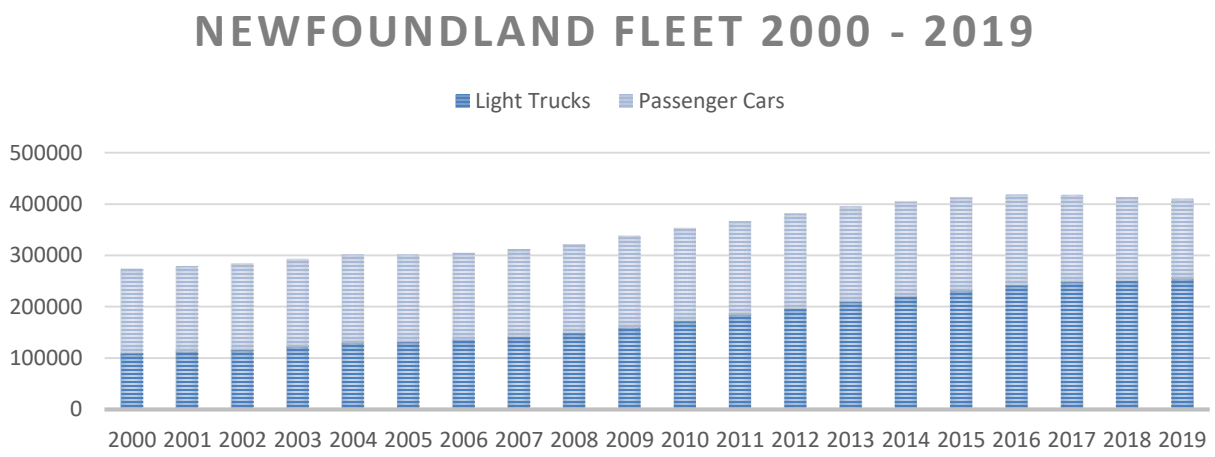
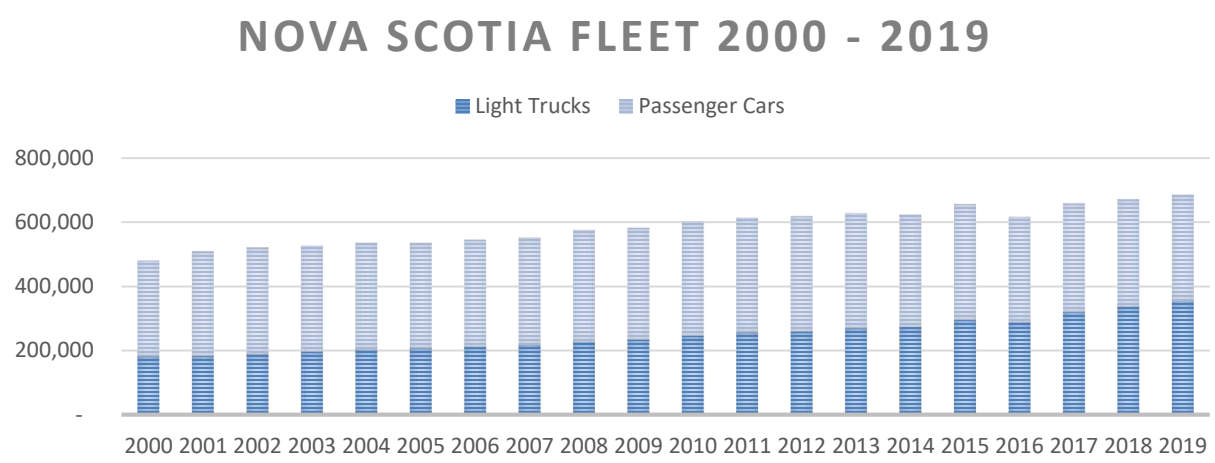
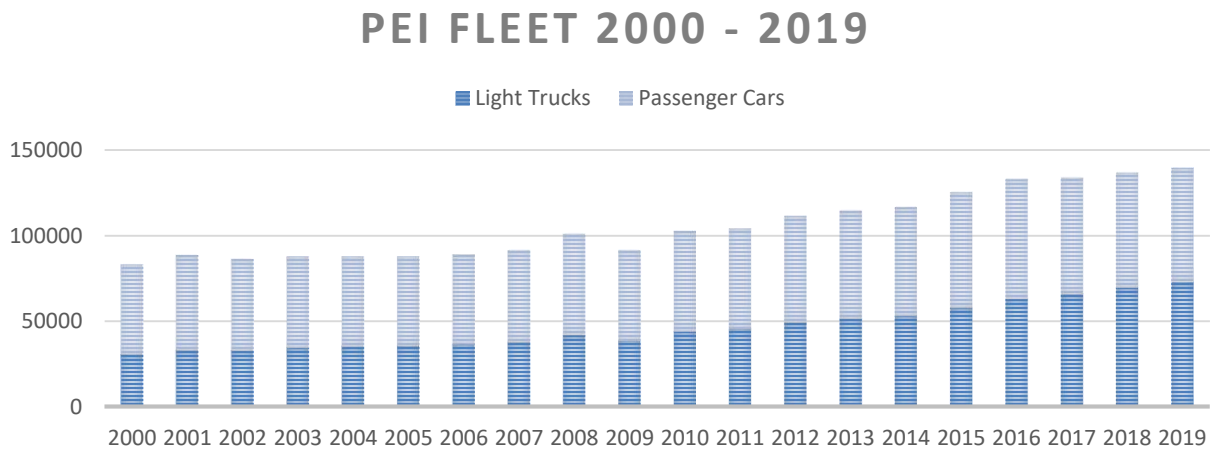
The volume of automotive-derived plastics is directly connected to key variables within the automotive space. Chiefly, the volume of vehicles in the Canadian fleet which themselves necessitate maintenance. Alongside this, factors such as vehicle age, fuel type, vehicle type, maintenance preferences, and a number of other factors all influence this plastics volume.

Since the year 2000, the Canadian fleet has increased by roughly ten million units. With ten million additional vehicles on the road, the amount of maintenance increased in tandem. The Canadian light vehicle fleet has grown from 17.10 million vehicles in the year 2000 to 27.65 million vehicles for 2019. At the tail end of this period, a clear trend developed in consumer preference as light truck sales began to increase. The once dominant passenger car side of the market began to occupy smaller portions of the Canadian fleet. In 2016, light trucks overtook passenger cars in total fleet count and have continued to increase their share of the national fleet since. With light truck sales continuing to increase against falling passenger car sales, this trend is likely to continue. The overall growth of the vehicle fleet is likely to continue as well, in sync with the forecasted growth of the Canadian economy.

1.2.2 Provincial







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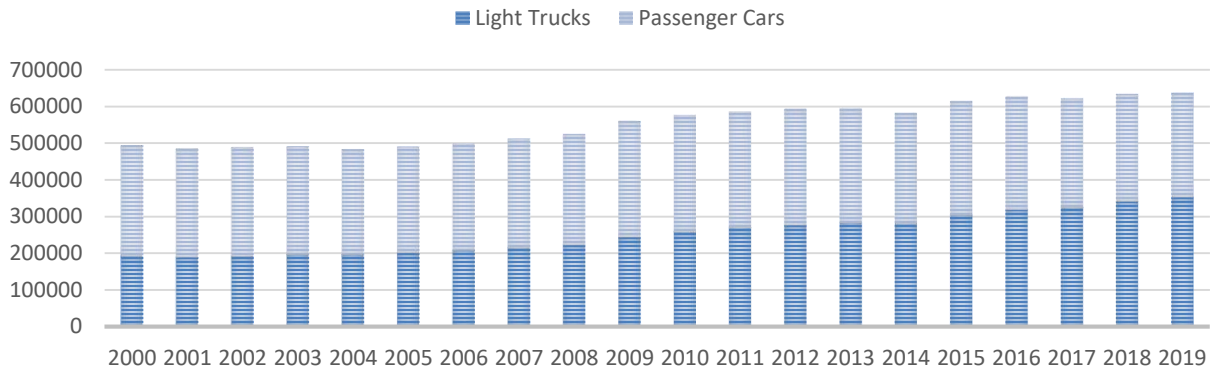
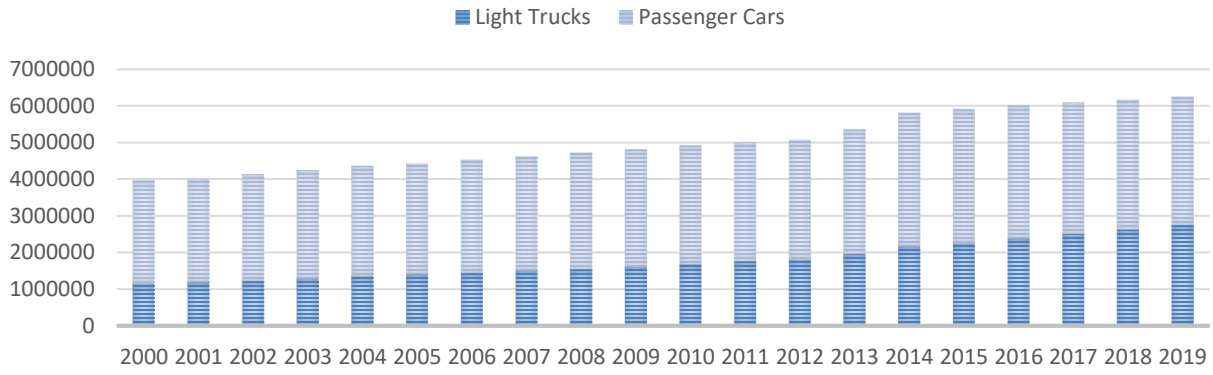
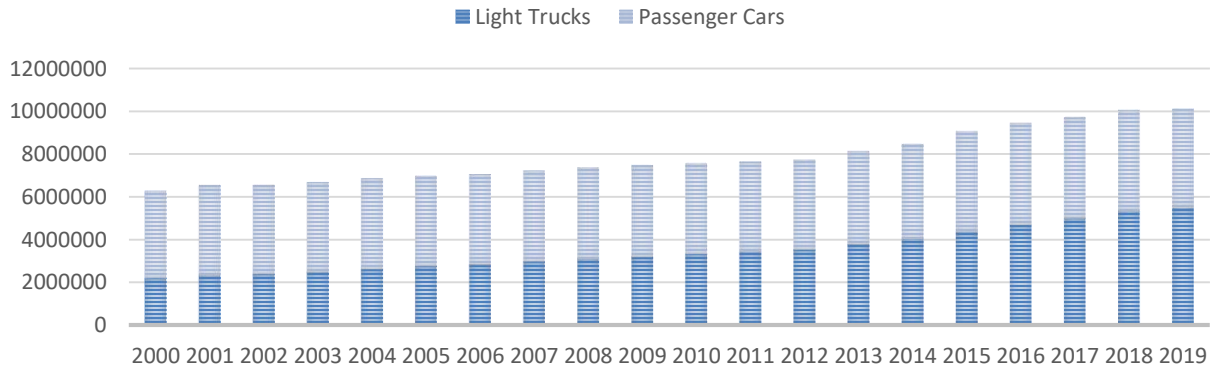
NEW BRUNSWICK FLEET 2000 - 2019



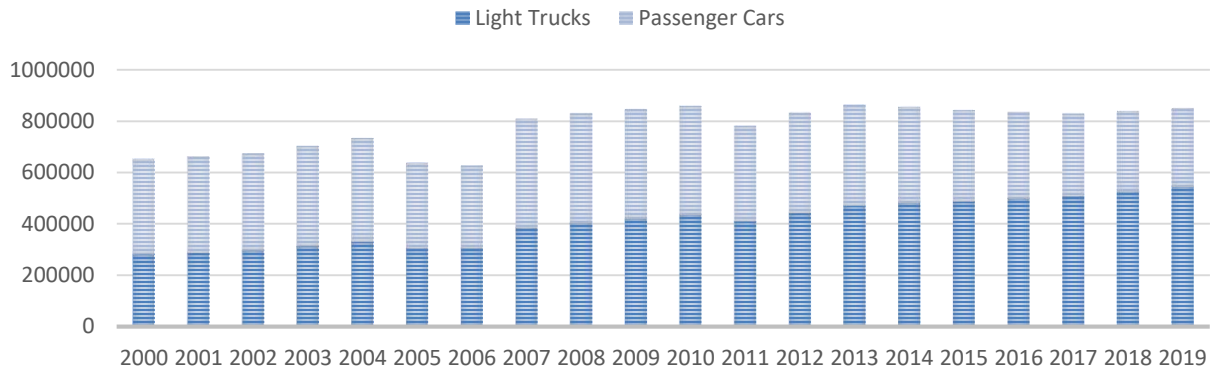
QUEBEC FLEET 2000 - 2019



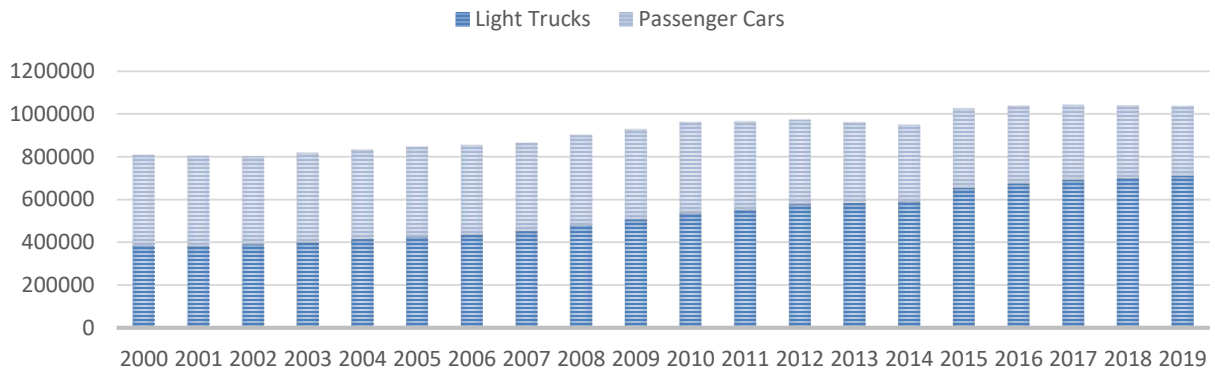
ONTARIO FLEET 2000 - 2019



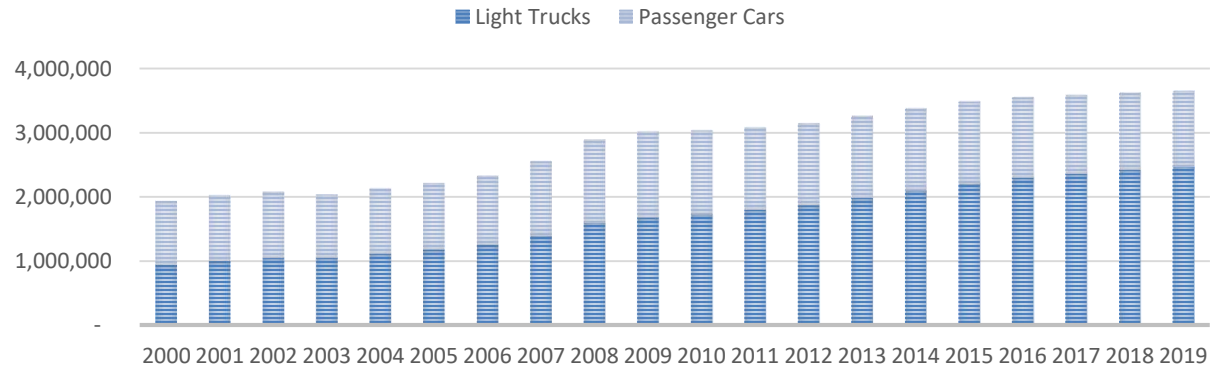
MANITOBA FLEET 2000 - 2019

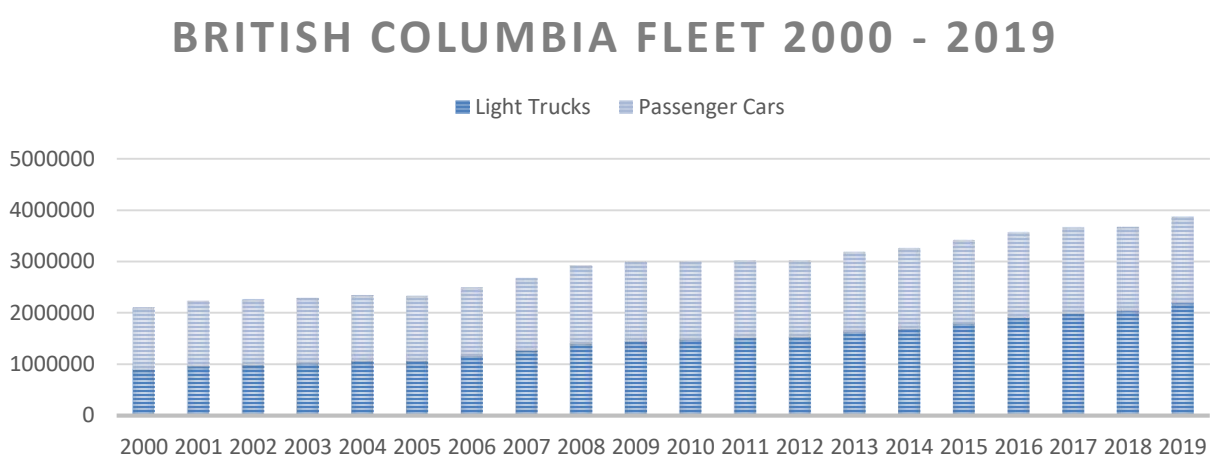


SASKATCHEWAN FLEET 2000 - 2019



ALBERTA FLEET 2000 - 2019





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- At an average rate of growth of 2.1% annually, Newfoundland's fleet has increased from 274,452 units in 2000 to 410,246 units in 2019. In this time period, the light truck fleet in the province increased 4.5% annually while passenger cars decreased 0.3% annually. Light truck counts increased from 109,836 to 254,164 units while passenger cars fell from 164,616 to 156,082

- The Provincial fleet in Nova Scotia grew from 480,470 vehicles on the road in the year 2000 to 684,836 vehicles in 2020, an average annual rate of growth of 1.9%. Light truck counts grew at 3.5% annually, rising from 182,513 to 353,749 units in 2020. Passenger cars on the road grew at a rate of 0.6%, from 297,957 to 331,087 in 2020.

- Prince Edward Island's fleet grew at a rate of 2.8% between 2000 and 2019 with total fleet volume rising from 83,028 to 139,465 total units in operation. The light truck side of the fleet grew 4.7% annually in that time period, up from 30,673 to 72,988. Passenger cars grew at an average annual rate of 1.3%, rising from 52,355 to 66,477 units

- The fleet in New Brunswick grew at an average annual rate of 1.3%, up from 494,932 to 637,439 units between 2000 and 2019. The light truck side of the fleet grew 3.2% annually while passenger cars fell at an average annual rate of 0.3%. Light trucks on the road grew from 193,005 to 352,415 while passenger cars fell from 301,927 to 285,024

- Quebec's fleet grew at an average annual rate of 2.4% between 2000 and 2019 with 6.25 million units on the road, up from 3.98 million units in 2000. The light truck side of Quebec's fleet grew 4.7% annually, rising from 1.16 million to 2.77 million units in the same time period. The passenger car side of the fleet increased at an average annual rate of 1.1%, growing from 2.81 million to 3.48 million units

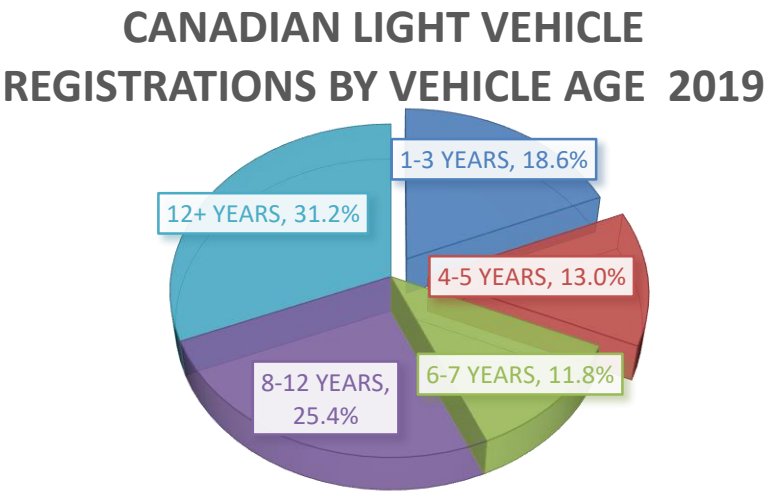
- Ontario's overall fleet reached 10.11 million units in 2019, up from 6.29 million in 2000 with an average annual rate of change of 2.5%. The light truck fleet in Ontario increased at a rate of 4.9% annually, doubling from 2.22 million to 5.49 million units. Meanwhile, passenger cars grew at an average annual rate of 0.7%, up from 4.07 million to 4.61 million units

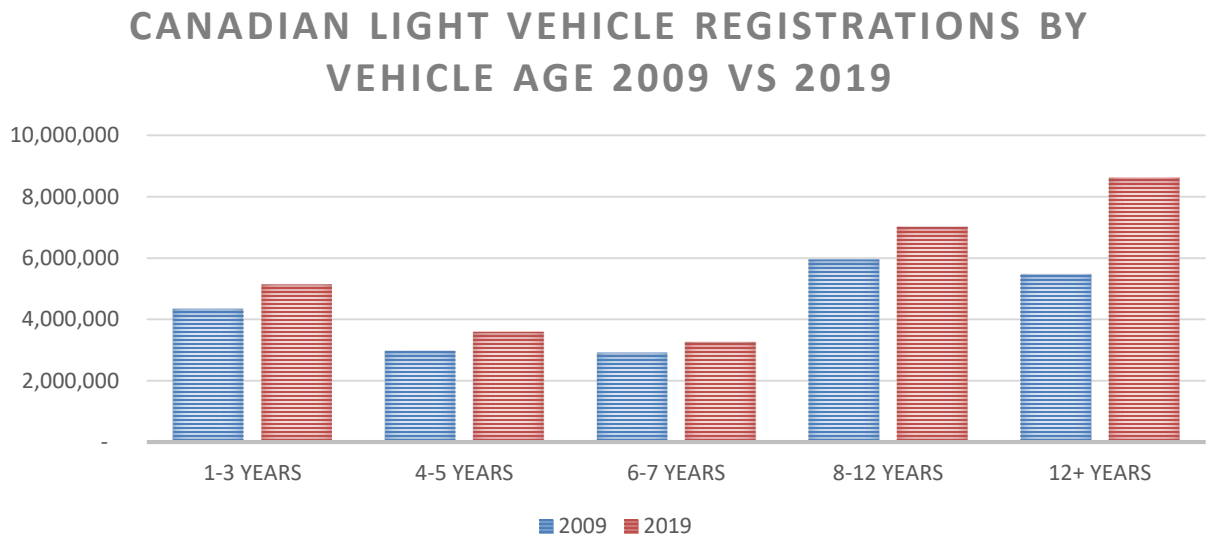
- The overall fleet in Manitoba grew at an average annual rate of 1.4% between 2000 and 2019. In this time period, the overall fleet grew from 653,245 to 851,407 units. Light trucks grew from 281,471 to 543,871 units at a rate of 3.5% annually. The passenger car side of the fleet decreased at an average annual rate of 1.0% with total counts falling from 371,774 to 307,536 units

- Alberta recorded the largest fleet growth out of the included regions at an average annual rate of 3.4%; total vehicles on the road in Alberta grew from 1.93 million to 3.65 million between 2000 and 2019. Light truck registrations increased 5.2% annually, more than doubling from 949,838 to 2.47 million units. Passenger cars grew at a modest 1.0% per year, rising from 983,639 to 1.18 million units

- British Columbia's fleet grew at an average annual rate of 3.4%; total fleet counts increased from 2.11 million in 2000 to 3.87 million in 2019. Light truck registrations grew 4.8% annually, rising from 899,655 units to 2.19 million units in operation. Passenger cars in British Columbia recorded the largest growth rate out of the included regions at 1.8% on average. Passenger cars on the road in BC totalled 1.21 million in 2000 and 1.68 million in 2019

1.2.3 Vehicle Age





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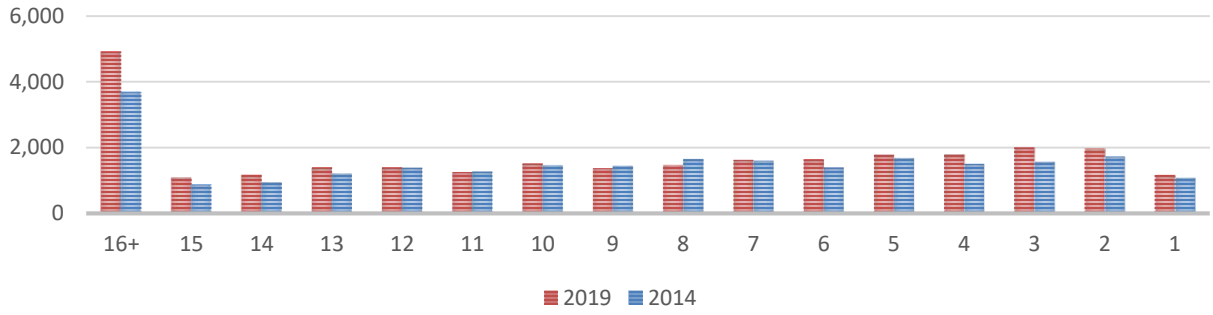
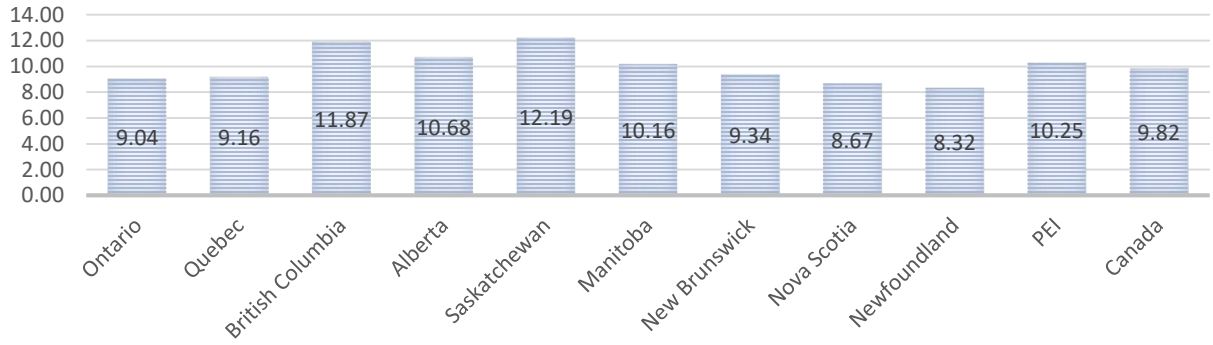
In 2009, the largest portion of the fleet fell into the 8-12-year-old category with nearly 6 million vehicles or 27.5% of the fleet. By 2019, the largest portion of the Canadian fleet fell into the 12+ year old category, accounting for 31.2% of the fleet. Vehicles aged 8-12 years fell into second position, accounting for 25.4% of the fleet. The youngest age category was the third most prevalent at 18.6% of the fleet followed by the 4-5-year-old category at 13.0% and finally the 6-7-year-old category at 11.8%.

COMPARISON OF REGISTRATIONS BY VEHICLE AGE (THOUSANDS) (2019 VS. 2014)



CANADIAN REGIONAL FLEETS - AVERAGE AGE 2019



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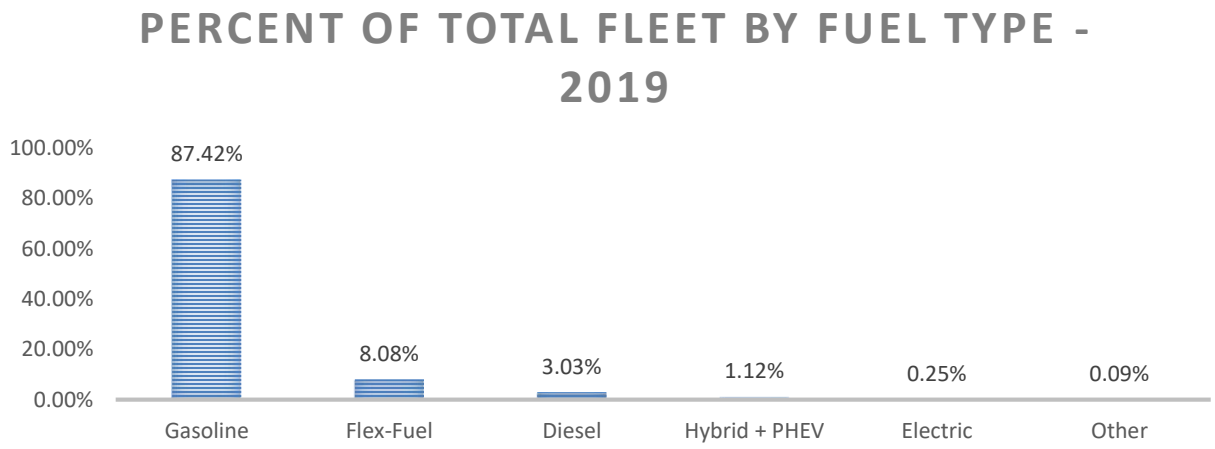
Saskatchewan recorded the oldest regional fleet in Canada for 2019 with an average age of 12.19. British Columbia followed closely with an average fleet age of 11.87. Alberta, Prince Edward Island, and Manitoba also noted fleet with an average of above 10 years at 10.68, 10.25, and 10.16 respectively. The youngest regional fleet was recorded by Newfoundland at 8.32 years old. The overall Canadian fleet's average age for 2019 was 9.82 years old. Looking at the fleet age breakdown, 16 and over year old vehicles accounted for the largest segment and their number increased by roughly 1.25 million units between 2014 and 2019. Increases were noted for most ages with the exception of 8, 9, and 11-year-old vehicles which became less common in 2019 than in 2014.

1.2.4 Oil vs. Electric

Canadian Vehicles on the Road by Fuel Type - 2019

	Gasoline	Flex-Fuel	Diesel	Hybrid + PHEV	Electric	Other
Vehicles in Operation	24,182,245	2,234,530	838,982	310,687	**70,203**	24,170
Percent of Total Fleet	87.42%	8.08%	3.03%	1.12%	**0.25%**	0.09%



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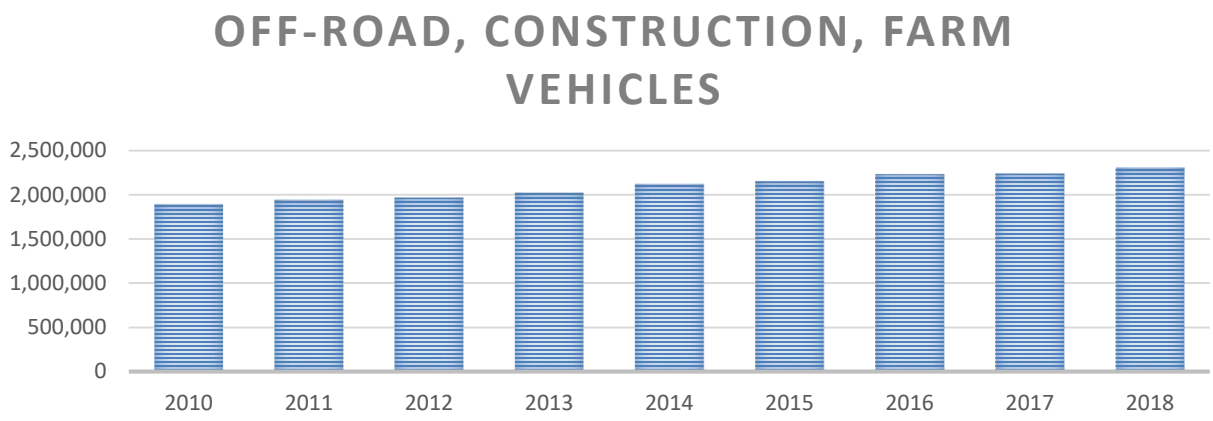
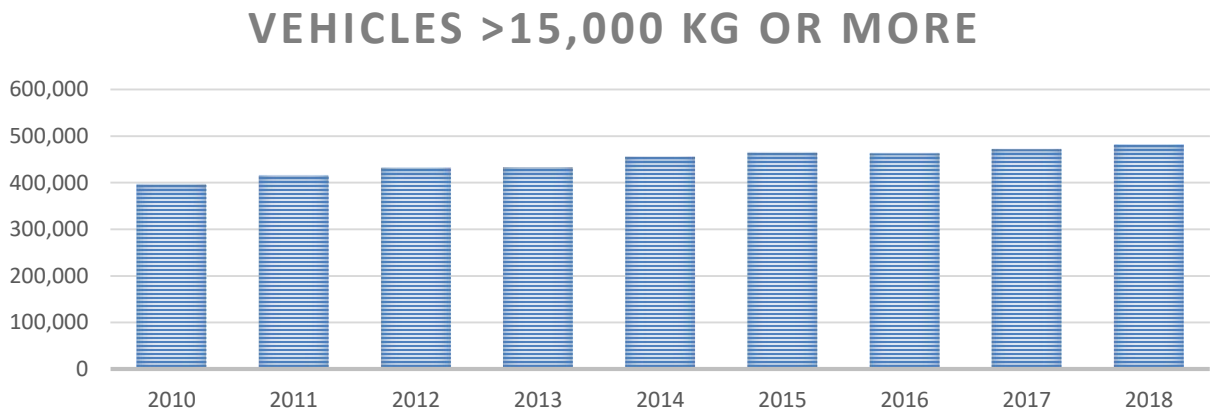
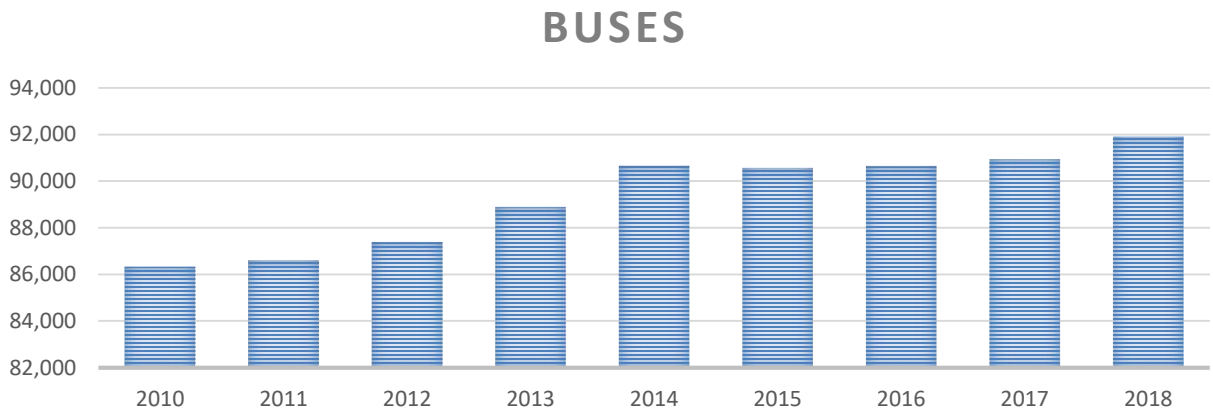
Gasoline powered vehicles continue to dominate the Canadian fleet by a very large margin, accounting for 87.42% of the overall fleet. Flex-fuel and diesel vehicles, both of which require traditional lubrication, account for 8.08% and 3.03% of the fleet respectively. Hybrid and PHEV vehicles—although growing in popularity—only account for 1.12% of the current fleet. Electric vehicles, which do not require traditional engine oil lubrication, only account for 0.25% of Canada's fleet at present. All other types of propulsion—including hydrogen fuel cell vehicles—amount to just 0.09% of the Canadian fleet. With zero emission vehicles holding such a small portion of Canada's fleet and with high sales for traditional ICE vehicles continuing into the foreseeable future, it will likely take decades for these ZEVs to dramatically shift Canada's vehicle fleet, and by extension the demand for lubricating and cooling fluids.

1.2.5 Other Vehicles on the Road







Source: DesRosiers Automotive Consultants Inc., Statistics Canada

Geography	Type of vehicle	2010	2011	2012	2013	2014	2015	2016	2017	2018
Newfoundland	Vehicles >15,000 KG or More	4,485	4,946	5,076	5,115	5,146	5,340	5,411	5,437	5,274
	Buses	1,291	1,394	1,343	1,370	1,395	1,427	1,468	1,425	1,387
	Off-Road, Construction, Farm Vehicles	174,457	182,745	191,777	201,264	212,259	223,374	234,205	243,324	251,395
Prince Edward Island	Vehicles >15,000 KG or More	3,177	3,184	3,199	3,228	3,186	2,950	2,624	2,459	3,060
	Buses	130	112	97	415	361	340	314	227	111
	Off-Road, Construction, Farm Vehicles	1,831	1,827	1,839	1,905	1,926	1,877	2,295	2,154	2,454
Nova Scotia	Vehicles >15,000 KG or More	9,240	9,464	9,404	9,240	9,369	9,255	9,485	9,548	9,756
	Buses	1,985	1,999	1,991	1,966	1,992	1,963	2,041	2,041	2,030
	Off-Road, Construction, Farm Vehicles	54,131	54,947	54,831	56,403	57,724	59,238	61,256	62,453	63,370
New Brunswick	Vehicles >15,000 KG or More	12,241	12,275	12,242	11,914	12,302	12,738	12,479	12,456	12,656
	Buses	3,042	3,096	3,216	3,305	3,266	3,315	3,421	3,513	3,635
	Off-Road, Construction, Farm Vehicles	46,572	46,215	49,929	53,634	54,802	53,585	57,864	59,046	59,940
Quebec	Vehicles >15,000 KG or More	70,132	75,534	79,832	69,536	81,057	83,056	83,247	85,713	85,932
	Buses	17,955	17,832	17,793	18,071	18,952	18,586	18,930	18,514	19,331
	Off-Road, Construction, Farm Vehicles	714,594	732,628	733,241	739,511	794,021	773,722	811,934	794,379	830,935
Ontario	Vehicles >15,000 KG or More	110,595	114,242	116,125	117,840	118,941	122,462	125,594	129,084	131,952
	Buses	28,775	29,079	29,571	29,516	29,706	29,837	30,043	30,318	30,646
	Off-Road, Construction, Farm Vehicles	627,611	644,878	651,901	673,287	695,339	714,579	729,430	754,585	774,925
Manitoba	Vehicles >15,000 KG or More	23,797	24,881	26,206	27,235	28,363	29,395	30,018	30,573	31,268
	Buses	3,976	3,964	3,994	4,094	4,189	4,203	4,212	4,348	4,440
	Off-Road, Construction, Farm Vehicles	64,780	68,425	70,819	75,371	77,455	78,298	80,582	82,735	83,631
Saskatchewan	Vehicles >15,000 KG or More	33,274	35,431	36,944	38,939	40,932	41,984	41,871	42,360	42,711
	Buses	3,772	3,767	3,851	3,950	3,972	4,014	4,052	4,003	3,875
	Off-Road, Construction, Farm Vehicles	7,626	6,836	6,483	9,785	9,004	7,926	6,106	5,330	5,128
British Columbia	Vehicles >15,000 KG or More	36,702	37,357	38,475	39,521	40,858	42,063	42,356	43,516	45,047
	Buses	9,702	9,638	9,713	9,817	9,985	10,020	9,838	10,211	10,447
	Off-Road, Construction, Farm Vehicles	19,425	19,412	19,150	19,500	20,346	36,290	53,899	54,220	60,351
Alberta*	Vehicles >15,000 KG or More	92589	98108	104111	110116	114850	115079	109823	110395	113526
	Buses	15699	15713	15818	16374	16832	16846	16324	16325	16004
	Off-Road, Construction, Farm Vehicles	185,371	187,723	189,665	195,782	199,185	202,031	194,747	181,022	177,151

Source: DesRosiers Automotive Consultants Inc. and Statistics Canada

*Alberta totals include Yukon, Nunavut, and Northwest Territories

Light vehicles are far from the only type of vehicles on the roads in Canada. Three other categories to note are busses, off-road/construction/farm vehicles, and vehicles weighing 15 thousand kg or more according to Statistics Canada classifications. Aside from some temporary dips, registrations within these three categories have been growing in Canada from 2010 through to 2018. Their total number has grown from 2.38 million vehicles registered in 2010 to 2.88 million vehicles registered in 2019. In the context of this study, these vehicles use significantly larger volumes of oil per single vehicle when compared to the rest of the light vehicle fleet. Moving alongside the national increase in registrations, oil consumption for these vehicles has also been increasing.

At a provincial level, registrations of these types of vehicles have been increasing since 2010 in most major regions and usually across all three categories. Some exceptions can be seen as with the number of off-road, construction, and farm vehicles registered in Saskatchewan or Alberta. However, the national trend largely applies at the provincial level and as registrations increase, so to does oil consumption and the plastic waste associated with that.

1.3 Light Vehicle Sales

1.3.1 National and Provincial

British Columbia Light Vehicle Sales

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Change
Passenger Car Total	67,285	64,861	73,620	74,990	77,468	77,323	75,139	70,734	62,744	52,833	-15.8%
Light Truck Total	87,088	91,654	98,506	105,315	116,330	129,947	143,096	162,881	157,851	151,444	-4.1%
Total Light Vehicle	154,373	156,515	172,126	180,305	193,798	207,270	218,235	233,615	220,595	204,277	-7.4%

Alberta Light Vehicle Sales

Passenger Car Total	57,303	53,231	59,610	62,761	60,012	51,761	47,860	46,322	38,183	31,752	-16.8%
Light Truck Total	142,785	164,194	179,265	194,379	208,407	184,472	171,562	197,980	192,533	186,019	-3.4%
Total Light Vehicle	200,088	217,425	238,875	257,140	268,419	236,233	219,422	244,302	230,716	217,771	-5.6%

Saskatchewan Light Vehicle Sales

Passenger Car Total	12,512	11,876	13,585	12,599	12,294	10,614	9,274	8,653	7,202	6,057	-15.9%
Light Truck Total	34,005	37,731	41,143	44,967	44,173	43,179	41,613	46,607	42,115	41,795	-0.8%
Total Light Vehicle	46,517	49,607	54,728	57,566	56,467	53,793	50,887	55,260	49,317	47,852	-3.0%

Manitoba Light Vehicle Sales

Passenger Car Total	15,524	15,797	17,308	18,892	17,548	16,029	14,387	13,487	14,768	9,629	-34.8%
Light Truck Total	28,501	30,884	32,359	35,600	38,368	39,791	41,267	48,174	51,153	43,344	-15.3%
Total Light Vehicle	44,025	46,681	49,667	54,492	55,916	55,820	55,654	61,661	65,921	52,973	-19.6%

Ontario Light Vehicle Sales

Passenger Car Total	260,583	264,427	292,849	295,147	304,032	285,976	269,496	267,528	249,162	209,128	-16.1%
Light Truck Total	316,046	323,975	324,918	350,384	414,531	474,817	537,003	569,952	588,054	611,550	4.0%
Total Light Vehicle	576,629	588,402	617,767	645,531	718,563	760,793	806,499	837,480	837,216	820,678	-2.0%

Quebec Light Vehicle Sales

Passenger Car Total	234,277	228,442	240,917	234,919	230,244	219,677	198,815	187,529	167,593	143,338	-14.5%
Light Truck Total	179,358	178,554	174,777	179,810	190,473	224,983	259,469	274,558	283,373	298,357	5.3%
Total Light Vehicle	413,635	406,996	415,694	414,729	420,717	444,660	458,284	462,087	450,966	441,695	-2.1%

New Brunswick Light Vehicle Sales

Passenger Car Total	16,908	16,477	18,591	19,116	18,529	16,540	14,271	13,008	10,683	8,906	-16.6%
Light Truck Total	20,832	21,832	20,198	21,195	22,888	26,748	29,452	30,453	29,177	30,621	4.9%
Total Light Vehicle	37,740	38,309	38,789	40,311	41,417	43,288	43,723	43,461	39,860	39,527	-0.8%

Nova Scotia Light Vehicle Sales

Passenger Car Total	23,874	23,276	25,773	27,470	26,564	23,312	20,284	20,973	17,524	14,602	-16.7%
Light Truck Total	22,548	21,739	22,201	24,386	26,901	31,049	33,681	38,315	35,152	36,419	3.6%
Total Light Vehicle	46,422	45,015	47,974	51,856	53,465	54,361	53,965	59,288	52,676	51,021	-3.1%

Prince Edward Island Light Vehicle Sales

Passenger Car Total	3,089	2,911	3,515	3,994	3,781	3,455	3,103	2,799	2,375	2,330	-1.9%
Light Truck Total	3,023	3,059	3,381	3,318	3,613	4,442	5,598	5,722	5,259	5,870	11.6%
Total Light Vehicle	6,112	5,970	6,896	7,312	7,394	7,897	8,701	8,521	7,634	8,200	7.4%

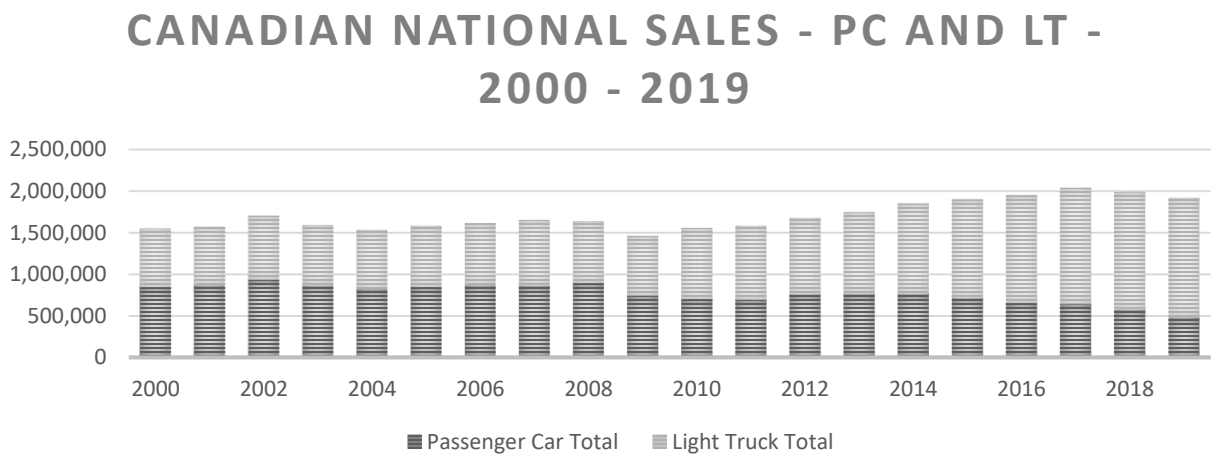
Newfoundland Light Vehicle Sales

Passenger Car Total	13,969	12,437	14,027	14,494	13,320	11,539	9,469	8,790	7,477	6,113	-18.2%
Light Truck Total	17,611	18,162	19,132	20,831	21,897	23,338	24,056	24,333	22,614	24,250	7.2%
Total Light Vehicle	31,580	30,599	33,159	35,325	35,217	34,877	33,525	33,123	30,091	30,363	0.9%

Canadian Light Vehicle Sales

Passenger Car Total	705,324	693,735	759,795	764,382	763,792	716,226	662,098	639,823	577,711	484,687	-16.1%
Light Truck Total	851,797	891,784	915,880	980,185	1,087,581	1,182,766	1,286,797	1,398,975	1,407,281	1,429,670	1.6%
Total Light Vehicle	1,557,121	1,585,519	1,675,675	1,744,567	1,851,373	1,898,992	1,948,895	2,038,798	1,984,992	1,914,357	-3.6%

Source: DesRosiers Automotive Consultants Inc., CVMA and GAC



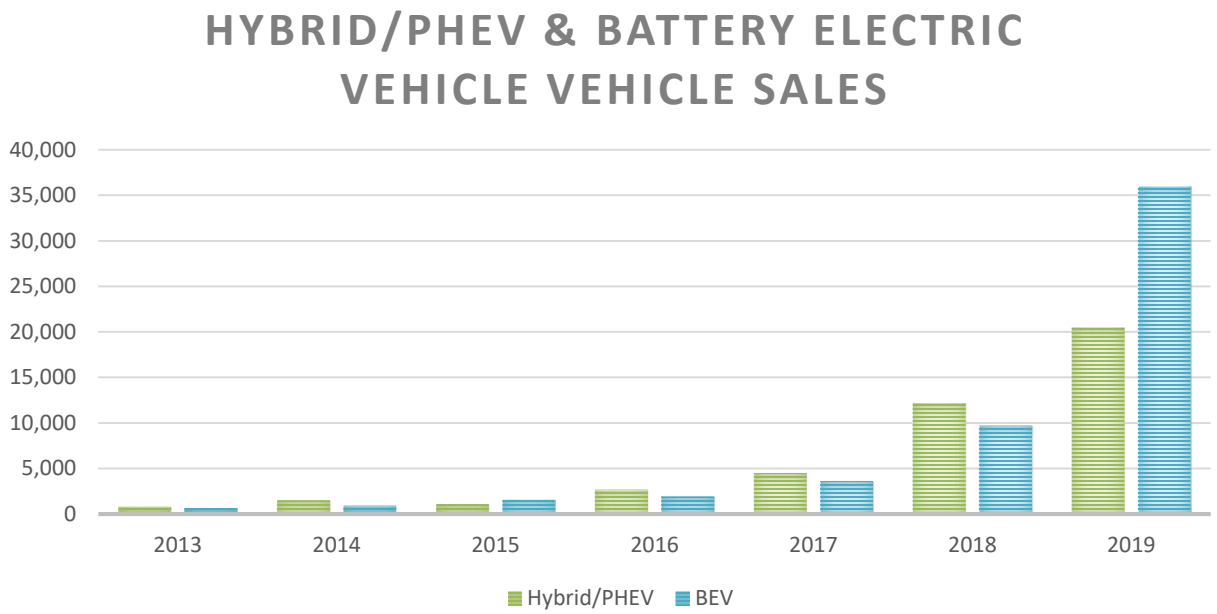
Source: DesRosiers Automotive Consultants Inc., CVMA and GAC

- British Columbia's sales trend was somewhat below the national trend for 2019 with their light truck sales falling well below average performance. As of 2019, their sales were comprised of 74.1% light truck sales to 25.9% passenger car sales
- Alberta has long been a light truck dominant region. However, their light truck sales fell in 2019, causing the province's sales performance to fell below Canada's average. For 2019, 85.4% of the vehicles sold in Alberta were light trucks
- A similar story to Alberta, Saskatchewan recorded 87.3% light truck sales against just 12.7% passenger car in 2019. Their overall sales performance was higher than the national average in 2019
- Manitoba noted a large sales setback in 2019 after sharp increases in 2017 and 2018. For 2019, the province's sales decreased 19.6% overall with passenger car sales down 34.8%. Light trucks comprised 81.8% of Manitoba's total 2019 sales against just 18.2% passenger cars
- Ontario—the volume leader in Canada—noted above average sales performance in 2019 with light truck sales up 4.0%. Of total 2019 sales, light trucks occupied 74.5% in the province for 2019
- Quebec has long been a more passenger car oriented region with 32.5% of sales occupied by passenger cars in 2019. Quebec—like Ontario—outperformed the national average thanks to a 5.3% increase in light truck sales while passenger car sales fell roughly in line with the national average
- New Brunswick noted fairly stable sales in 2019 thanks to a 4.9% increase in light truck sales against a 16.6% drop in passenger car sales
- Nova Scotia's light vehicle sales fell slightly in 2019 with a 16.7% drop in passenger car sales offsetting a 3.6% increase in light truck sales
- Prince Edward Island secured a clear sales increase in 2019 with sales growing 7.4%. Strong light truck performance and a relatively minor drop in passenger car sales helped this region outperform the national average by a wide margin
- Newfoundland's sales remained stable in 2019 thanks to a 7.2% increase in light truck sales. 79.9% of vehicles sold in Newfoundland in 2019 were light trucks
- Overall national sales declined 3.6% in 2019 with light truck sales up 1.6% and passenger car sales down 16.1%. By the end of 2019, 74.7% of vehicles sold were light trucks while 25.3% were passenger cars. Passenger car and light truck sales in Canada were roughly even in 2009 with light

trucks overtaking passenger cars in 2010. This trend of increasing light truck sales has continued into 2019 and appears to be holding

- The first quarter results for 2020 are a 20% decrease in new vehicle sales due to the COVID-19 induced decline in economic activity. This will certainly have the effect of lower overall sales for 2020, however the extent of the drop will be dependent on the extent of the economic slowdown through the rest of the calendar year

1.3.2 Electric Vehicle Sales

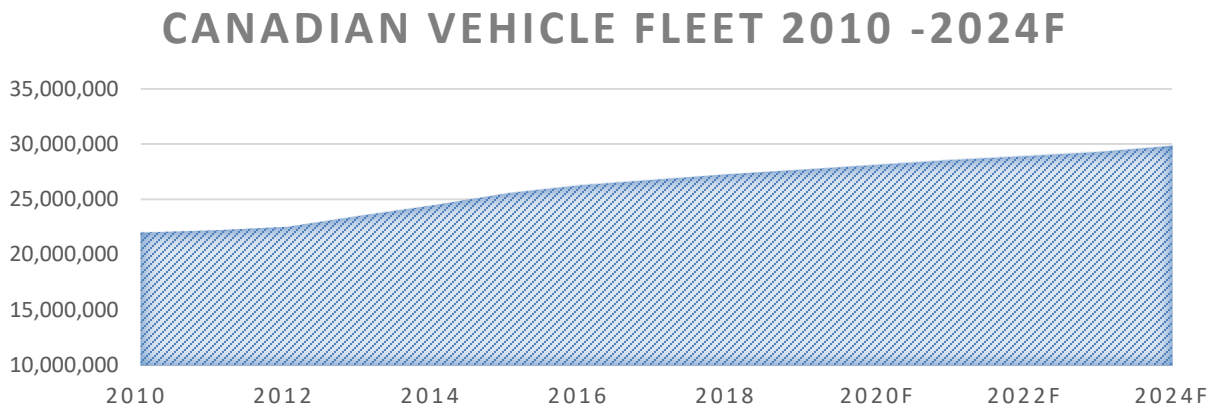


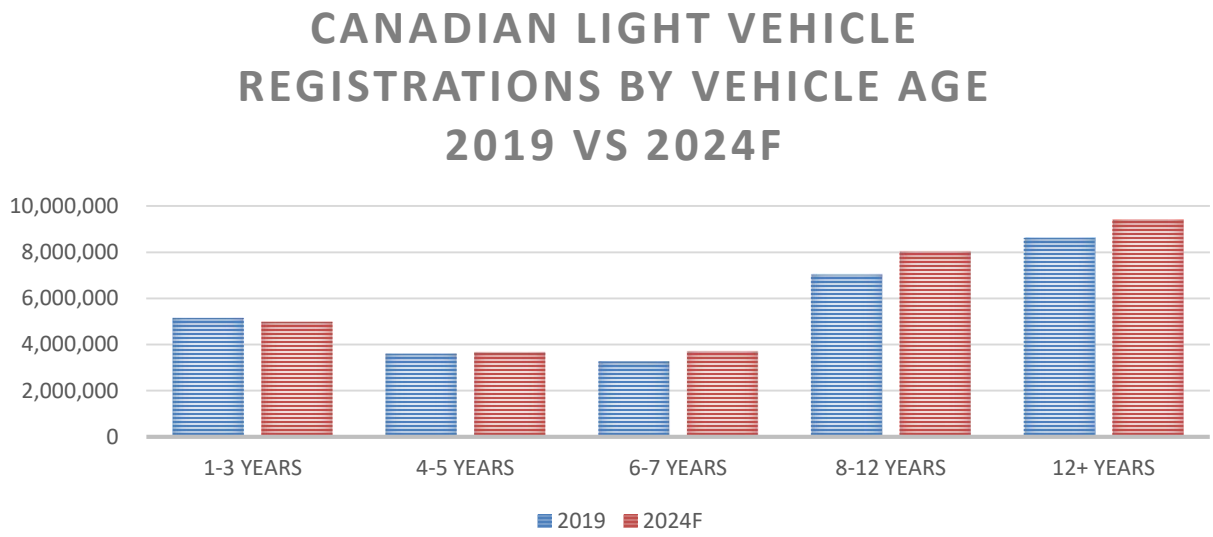
Source: DesRosiers Automotive Consultants Inc., GreenCarReports

In 2013, sales of Hybrid/PHEV and battery electric vehicles (BEVs) were both below the one thousand unit mark nationally. This sales figure has been increasing sharply through to 2018 when Hybrid/PHEV sales reached 12,191 units and BEV sales reached 9,694 units. For 2019, growth continued to be fast-paced as BEV sales reached 35,900 units and Hybrid/PHEV sales reaching 20,500 units. Although these sales volumes are still quite low, the trend that has been established shows promising growth. With a slew of BEV products hitting the market, these sales figures are likely to continue to climb and eke out a larger portion of the Canadian fleet at the expense of traditional internal combustion vehicles. Government regulation remains a point of concern which could increase or dampen this rate of growth. The rate of growth in PHEV and Hybrid vehicles does not have a large effect on the consumption of lubricating and cooling fluids, since these vehicles have fairly conventional systems under the hood, with just slightly lower system capacities than conventional ICE vehicles of equivalent size. However, the increasing fleet penetration of BEV's can have a very detrimental effect on lubricating fluids consumption, as these types of vehicles do not use any oil in the motor, eliminating the need for oil changes. Therefore, monitoring government regulations affecting the rate of acceptance and sales of BEV's is very important for producing accurate forecasts and models of future lubricating fluids consumption volumes.

1.4 Vehicle Fleet Forecast

1.4.1 National





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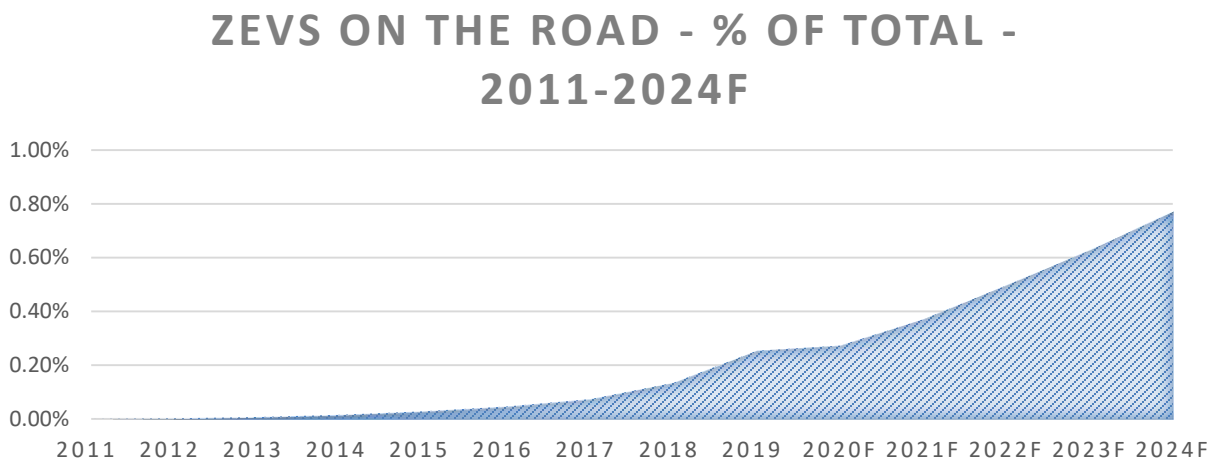
Sitting at 27.65 million units as of 2019, the Canadian national vehicle fleet is expected to increase further and reach 29.80 million units by 2024. The fleet share of older vehicles is expected to increase as well with 12+ year old vehicles expected to account for 31.6% of the overall fleet. Vehicles in the 8-12 year old age category are expected to account for 27.0% of the total fleet, up from 25.4% in 2019. The portion of vehicles falling into the 1-3 and 4-5 year age categories are expected to drop as well, settling at 16.7% and 12.3% respectively. Vehicles falling into the 6-7 year age category are expected to increase their share, rising from 11.8% to 12.4%. In general, the Canadian light vehicle fleet is expected to increase in total number and get increasingly older over the next several years.

This trend may be accelerated by the effects of the COVID-19 related economic slow down, as this will impact negatively new vehicle sales, and by extension the registration counts for vehicles in the 1-3 year

old age group within the upcoming four years. There is a very significant possibility that the 1-3 year old age group of vehicles will shrink more considerably than indicated in the current forecast.

1.4.2 Electric Vehicle Forecast



Source: DesRosiers Automotive Consultants Inc., CVMA, GAC, and GreenCarReports

Currently accounting for just 0.25% of Canada's total fleet, zero electric vehicles are expected to increase their market share and occupy 0.77% of the total national fleet as early as 2024. This sharp increase is expected to continue over the next several years with one percent of the fleet claimed by 2026, and over ten percent of the fleet by the late 2030's. Proportionally, ZEV fleet share will increase at the expense of traditional internal combustion engine vehicle sales. Of course, government regulation, incentives, and similar changes are liable to shift this pattern of growth; either a slowdown or an increase in pace could be observed depending on regulatory changes. Nonetheless, ZEV share of the Canadian fleet will continue to increase, and in the longer term negatively impact the volumes of lubricating fluid sales to the OEM's and the automotive aftermarket.

1.5 Light Vehicle Oil Market

1.5.1 UOMA Data and Broad Analysis

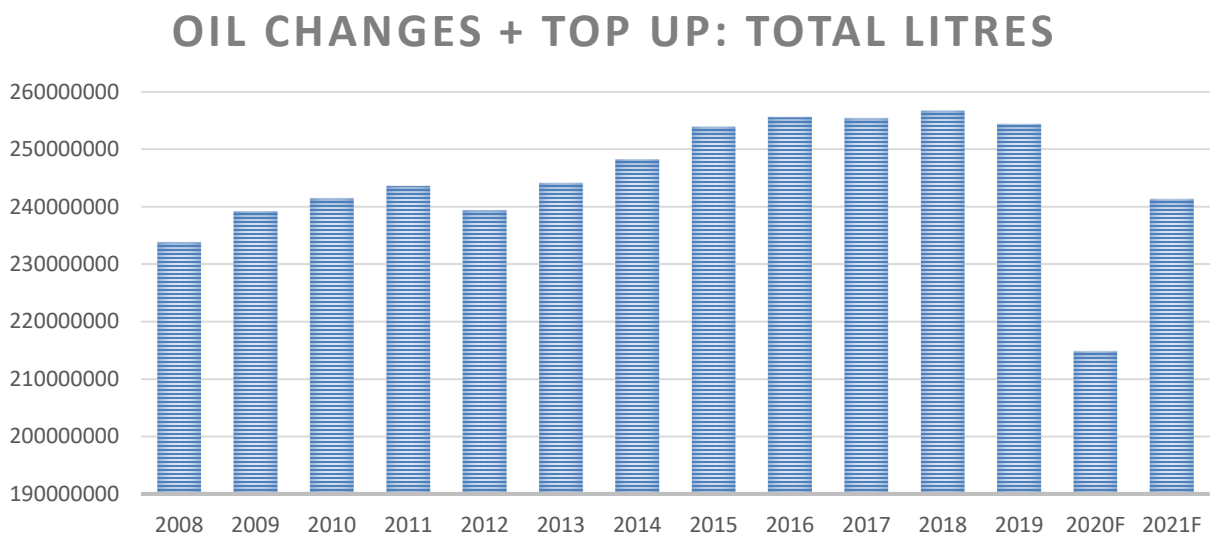
	Lubricating Oil Millions of Litres		Antifreeze Millions of Litres		Containers Millions of Kg	
	Sold	Collected	Sold	Collected	Sold	Collected
British Columbia	97.3	50.6	12.7	2.5	2.1	1.8
Alberta	170.89	84.5	*	*	2.44	2.3
Saskatchewan	38.09	18.3	3.49	0.26	1.07	0.47
Manitoba	27.2	15.6	4.65	0.36	0.72	0.36
Ontario	*	*	19.98	2.23	3.28	3.33
Quebec	103.9	62.13	16.12	1.79	2.56	2.27
New Brunswick	14.52	3.61	2.02	0.11	0.49	0.27
Prince Edward Island	2.13	0.18	0.34	0.02	0.07	0.06
Total	*****	**234.8**	**59.3**	**7.27**	**12.75**	**10.82**

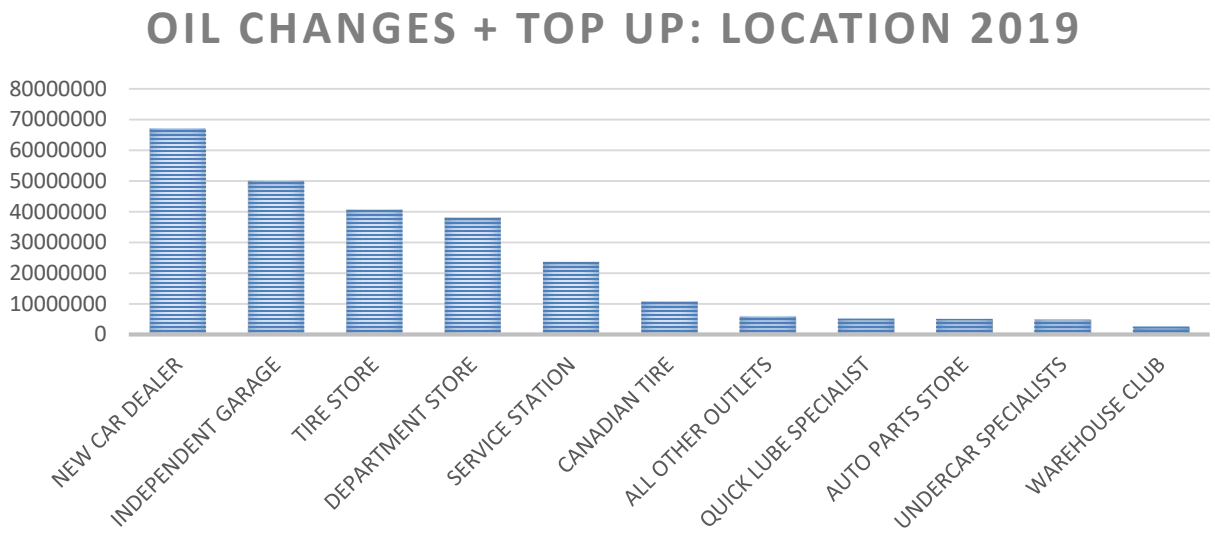
Historically, the size of the Canadian oil market has grown with the size of the fleet as well as total kilometers driven within the fleet. The inescapable truth of routine maintenance demands that these additional vehicles also require regular fluid changes. As a result, the amount of single-use plastics in the system increases as more cars are on the road, more kilometers are driven, and oil and other fluids degrade and require replacement among the now greater number of vehicles. In short, the thus-far unrelenting growth in Canada's fleet necessarily results in a greater demand for the plastic containers that carry these fluids, barring any regulatory changes. However, in the past decades, this relationship has broken down with growth in the size of the oil market slowing due to three main factors:

- The increased use of synthetic oils has allowed for extended drain intervals
- The increased rates of installation of oil monitoring systems in vehicles have allowed to extend drain intervals as well
- The cost of oil has been outpacing inflation, resulting in oil changes becoming relatively more expensive leading to more price sensitive consumers opting to extend their drain intervals

An important point to note is the impact of COVID-19 which has already had sweeping effects on the global economy. This impact is likely to be felt in the size of the oil market, which is expected to shrink considerably, by at least 15%. The oil market is expected to rebound to 2019 levels once the effects of COVID-19 pass—most importantly the shutdown of business—but growth in the market is unlikely to resume in the near future with the medium-term forecast showing the size of the oil market relatively flat. In the longer term, demand for motor oil will start to be impacted by the growth in the EV fleet and this change will likely begin to shrink the motor oil market by 2030.

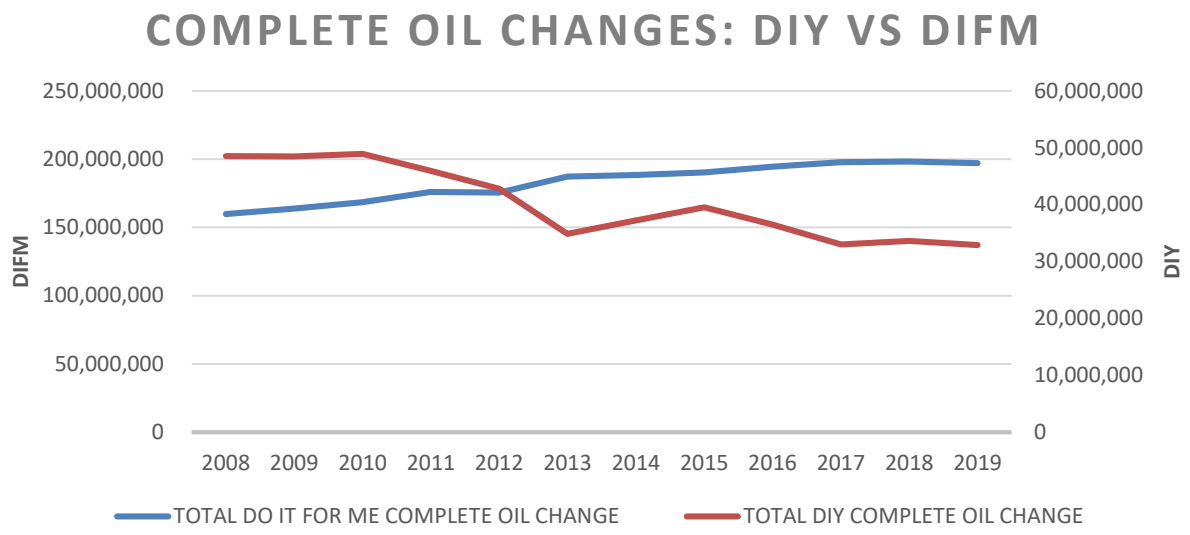
1.5.2 Oil Market Size – Light Vehicle Fleet - Current and Forecast

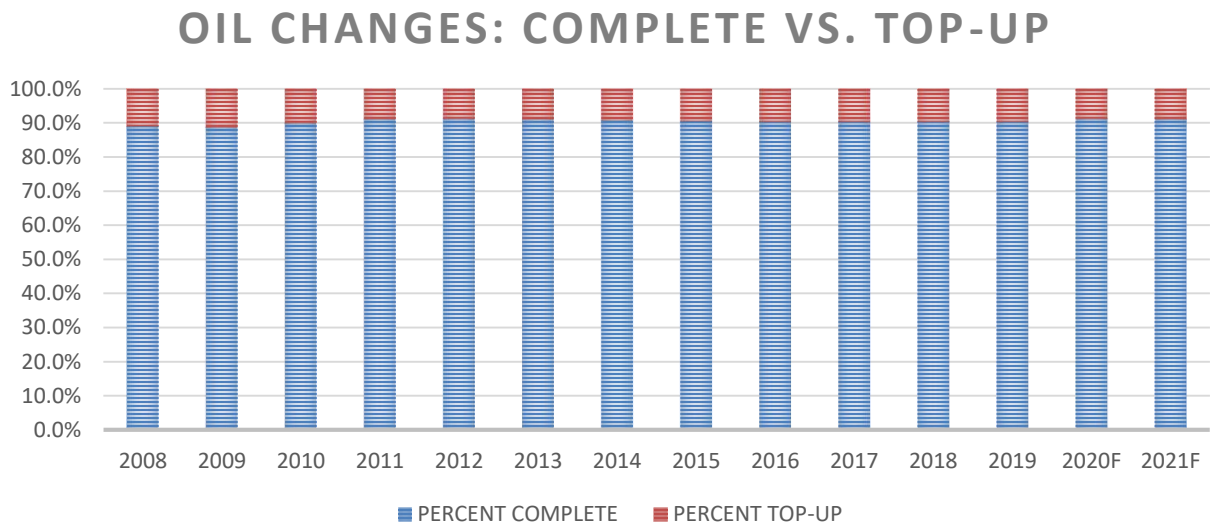




Source: DesRosiers Automotive Consultants Inc.

The total volume of oil changes in Canada—those performed on light vehicles (under 10,000 lbs. Gross vehicle weight rating) as a service—has been following a general pattern of increases since 2008 with the exception of a drop in 2012/2013. This total volume is expected to drop significantly—down over 15 percent—once 2020 data is available due to the slowdowns resulting from the COVI-19 pandemic. However, volumes are expected to bounce back within a few years. New car dealers were the most popular destination for oil changes, accounting for roughly 67 million litres or 26.4% of the market. This share has been relatively consistent despite a small decrease from 27.0% in 2008. Independent garages occupied second place with 19.7% of the market; independent garage share has decreased somewhat from 21.3% in 2008. A COVID-19 related economic slowdown is expected to impact the new car dealer market share negatively in the short run, and the independent mechanic channel should be the beneficiary of this shift.

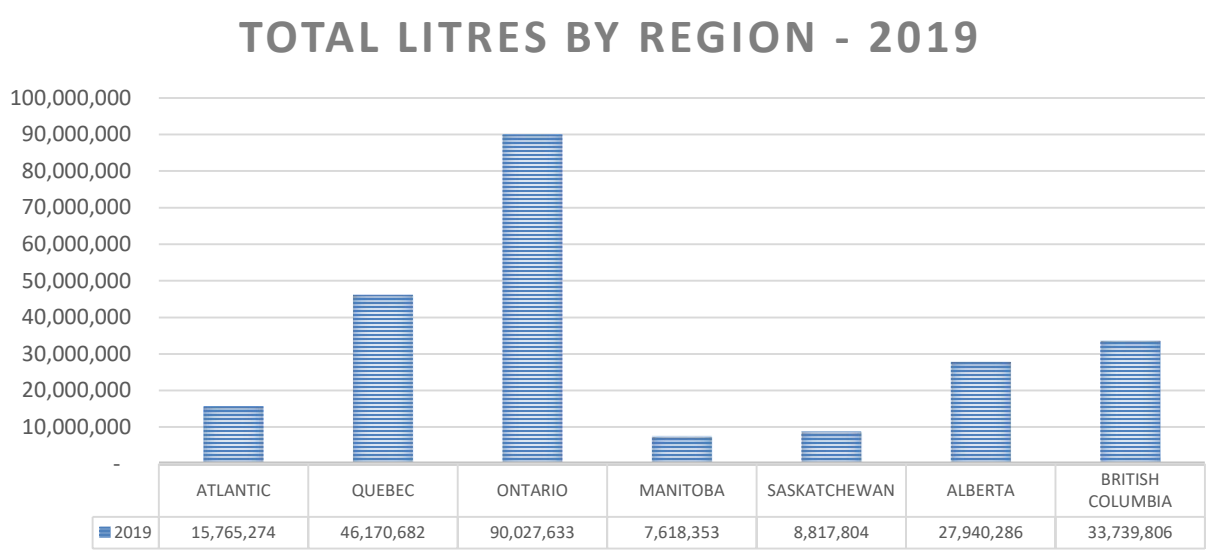




Source: DesRosiers Automotive Consultants Inc.

Following the trend of the majority of car services and maintenance work, the rate of oil changes performed by the owner of light vehicles (DIY oil changes) has been decreasing relative to the number of oil changes performed as a service (DIFM oil changes). In 2008, DIY oil changes accounted for nearly 50 million litres of oil while DIFM accounted for just under 160 million litres, a breakdown of 23.3% to 76.7%. By 2019, this ratio shifted to roughly 197 million litres DIFM against 33 million DIY, a ratio of 85.7% to 14.3%. This spilt is expected to widen slightly, settling at 86.1% DIFM against 13.9% DIY by 2021.

The ratio of complete oil changes to oil top ups for light vehicles has remained relatively consistent between 2008 and 2019, and is forecast to continue along this path through to 2021. Generally, oil top ups account for 9-11 percent of total oil volume while complete oil changes account for 89-91 percent of total oil volume. A full numerical breakdown of the oil market can be found in the summary table below.



Source: DesRosiers Automotive Consultants Inc.

Ontario accounted for the largest portion of total oil volume among light vehicle complete oil changes, utilizing 39.1% of total Canadian volume at just over 90 million litres. Quebec followed with approximately 46 million litres used at 20.1% of total volume. British Columbia followed at 14.7% with a volume of nearly 34 million litres with Alberta close behind with nearly 28 million litres at 12.1%. The Atlantic region as a whole used nearly 16 million litres amounting to 6.9%. Saskatchewan and Manitoba utilized a comparatively small volume of oil for complete oil changes at 9 million and 8 million respectively, accounting for 3.8% and 3.3%.

MOTOR OIL MARKET SUMMARY

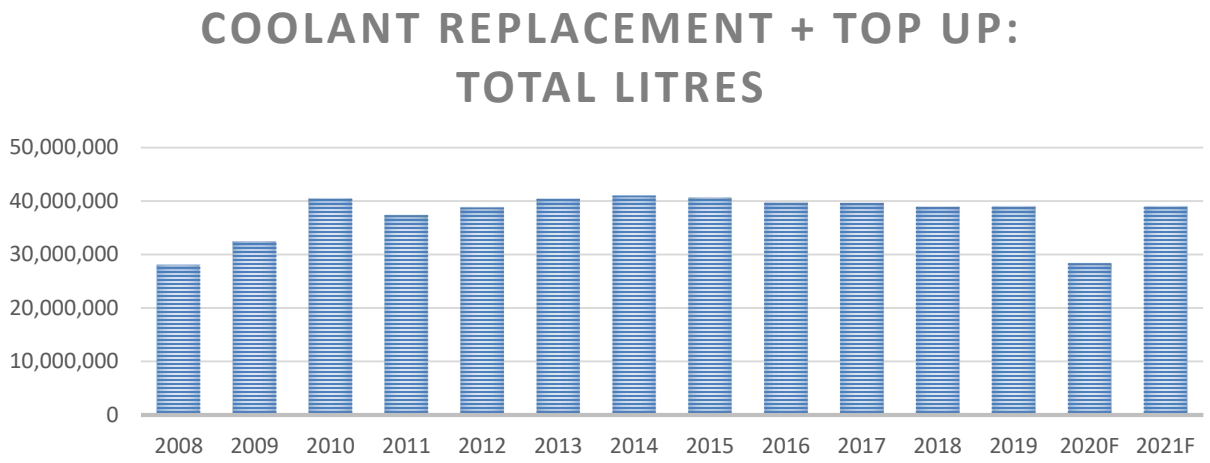
	2008	2009	2010	2011	2012	2013	2014
TOTAL DIFM COMPLETE OIL CHANGE	159,756,294	163,836,189	168,496,919	175,979,835	175,509,744	187,283,473	188,287,449
DIFM PERCENT	76.7%	77.2%	77.5%	79.3%	80.4%	84.3%	83.5%
TOTAL DIY COMPLETE OIL CHANGE	48,530,921	48,478,527	48,918,460	45,936,729	42,785,957	34,879,603	37,206,502
DIY PERCENT	23.3%	22.8%	22.5%	20.7%	19.6%	15.7%	16.5%
TOTAL OIL MARKET - COMPLETE OIL CHANGE	208,287,216	212,314,715	217,415,379	221,916,564	218,295,701	222,163,076	225,493,950
PERCENT COMPLETE	89.1%	88.8%	90.1%	91.1%	91.2%	91.0%	90.9%
TOTAL TOP-UP OIL	25,470,173	26,845,483	23,989,577	21,652,759	21,032,780	21,899,964	22,703,163
PERCENT TOP-UP	10.9%	11.2%	9.9%	8.9%	8.8%	9.0%	9.1%
TOTAL COMPLETE + TOP-UP OIL	233,757,389	239,160,199	241,404,956	243,569,323	239,328,482	244,063,041	248,197,114
LITRES IN BULK	138,894,058	139,697,749	140,578,606	146,256,533	145,288,030	154,770,038	155,603,154
LITRES IN BULK PERCENT	59.4%	58.4%	58.2%	60.0%	60.7%	63.4%	62.7%
LITRES BY CASE	94,863,330	99,462,449	100,826,350	97,312,791	94,040,452	89,293,003	92,593,960
LITRES BY CASE PERCENT	40.6%	41.6%	41.8%	40.0%	39.3%	36.6%	37.3%

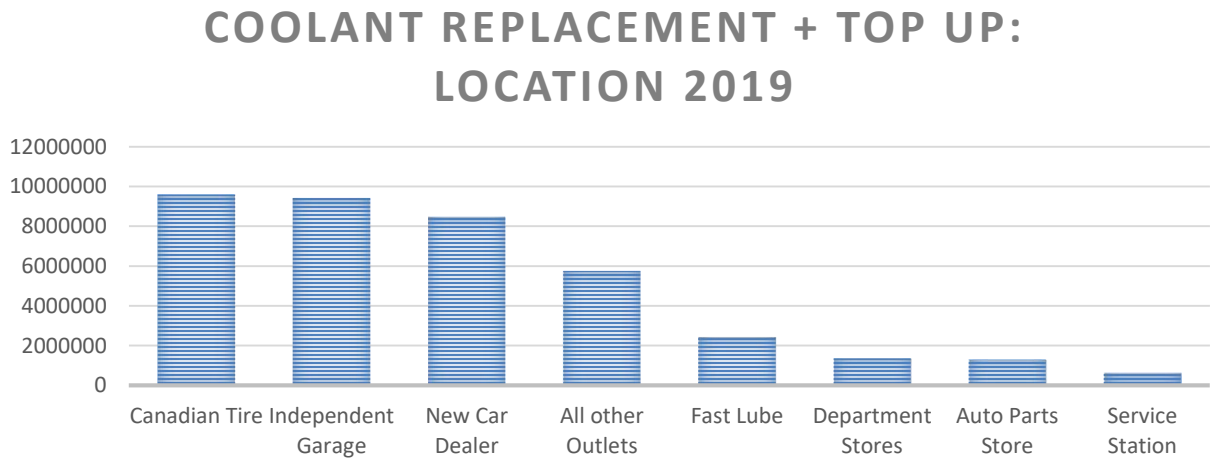
	2015	2016	2017	2018	2019	2020F	2021F
TOTAL DIFM COMPLETE OIL CHANGE	190,319,573	194,549,449	197,876,757	198,296,112	197,095,086	168,510,774	189,359,555
DIFM PERCENT	82.8%	84.2%	85.7%	85.5%	85.7%	85.9%	86.1%
TOTAL DIY COMPLETE OIL CHANGE	39,534,984	36,506,904	33,017,942	33,629,165	32,887,511	27,660,092	30,570,242
DIY PERCENT	17.2%	15.8%	14.3%	14.5%	14.3%	14.1%	13.9%
TOTAL OIL MARKET - COMPLETE OIL CHANGE	229,854,557	231,056,353	230,894,699	231,925,277	229,982,597	196,170,866	219,929,796
PERCENT COMPLETE	90.6%	90.4%	90.4%	90.4%	90.4%	91.3%	91.1%
TOTAL TOP-UP OIL	23,981,718	24,483,091	24,400,205	24,718,661	24,295,779	18,712,027	21,360,787
PERCENT TOP-UP	9.4%	9.6%	9.6%	9.6%	9.6%	8.7%	8.9%
TOTAL COMPLETE + TOP-UP OIL	253,836,275	255,539,444	255,294,904	256,643,938	254,278,376	214,882,892	241,290,584
LITRES IN BULK	157,460,927	161,005,198	164,077,350	164,489,249	163,453,811		
LITRES IN BULK PERCENT	62.0%	63.0%	64.3%	64.1%	64.3%		
LITRES BY CASE	96,375,348	94,534,246	91,217,554	92,154,689	90,824,565		
LITRES BY CASE PERCENT	38.0%	37.0%	35.7%	35.9%	35.7%		

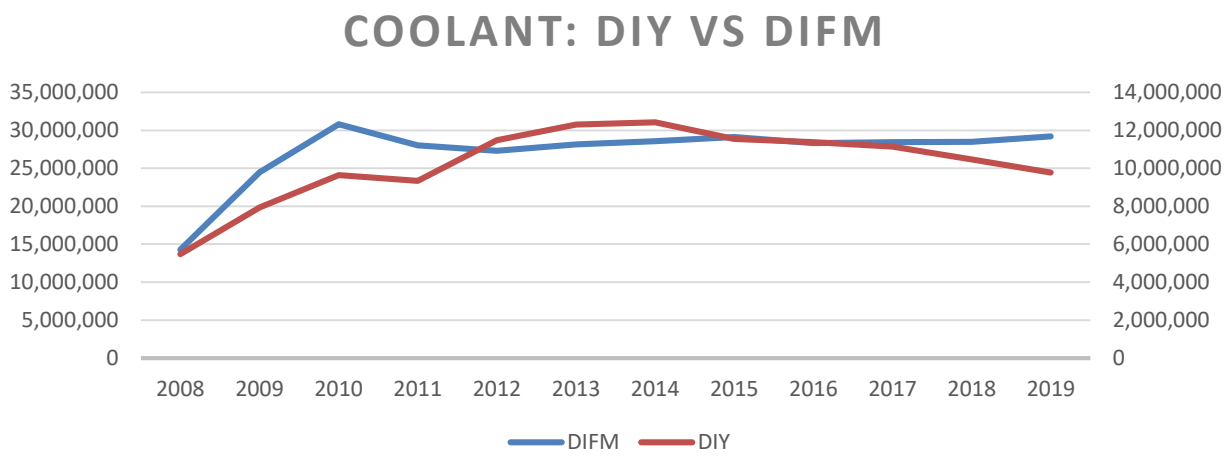
Source: DesRosiers Automotive Consultants Inc.

1.6 Light Vehicle Coolant Market

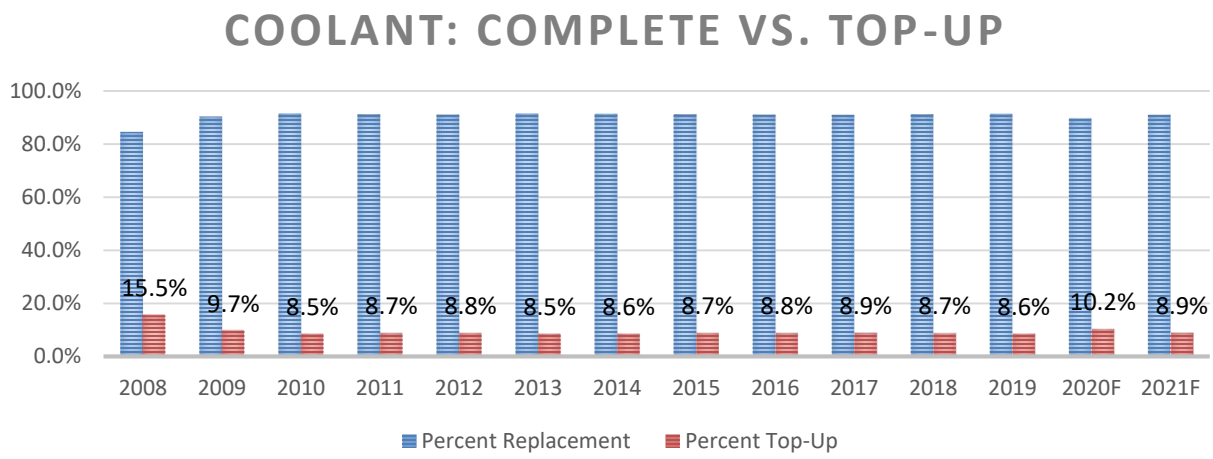
1.6.1 Coolant Market Size – Current and Forecast

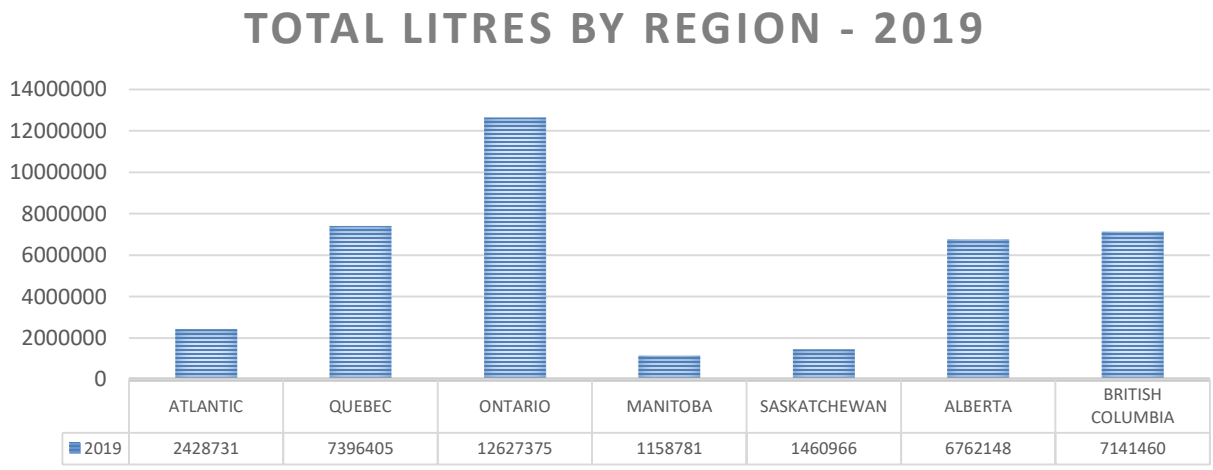






Source: DesRosiers Automotive Consultants Inc.





Source: DesRosiers Automotive Consultants Inc.

The overall coolant replacement and top-up market in Canada has experienced a period of shrinking between 2014 and 2018 after an overall period of growth following 2008. This overall amount of coolant litres used has since stabilized and is expected to grow slightly until electric vehicles become more prominent in the market. Once electric vehicles are more prominent among the provincial fleet, this total litre amount is expected to decrease. A decrease in total volume for 2020 is expected as a result of the COVID-19 pandemic but figures are expected to bounce back in the following years. In terms of outlets for purchase or service, coolant replacement occurred in the largest volumes through Canadian Tire (purchase and service) with independent garages following closely. New car dealers rounded out the top three destinations for coolant top-up and replacement with other outlets or locations falling well behind the leading three. The DIY coolant volume began to decrease in 2016/2017 with the rate of DIFM work increasing in the same period of time after periods of increases and decreases for both. This separation between DIY and DIFM is common and also observed for the oil market with rates of DIY work falling as vehicles become more complex and sentiment changes. The ratio of replacement to top-ups for coolant work follows a similar 90/10 pattern seen for oil changes with a fairly consistent under 9% or so rate for top-ups. A notable outlier presented itself in 2008 when 15.5% of total litres went towards top-ups. Another outlier is expected in 2020 with top-up rates expected to climb slightly to 10.2%. In terms of regions Ontario—as expected—accounted for the largest part of total coolant replacement Quebec as the runner-up. Similar volume of coolant was used between both British Columbia and Alberta.

2 Primary Research

2.1 Fillers

2.1.1 Description

In the context of this study, fillers represent the manufacturers who produce motor and other types of oils, transmission fluid, coolants, lubricants, diesel exhaust fluid, etc. These fillers purchase the packaging from package manufacturers or produce them in-house and fill them with the associated product which then moves further down the supply chain whether that is to distributors and marketers, wholesalers, or in some cases directly to retailers. The following interview data represents an aggregate analysis of information provided by a number of such fillers who did not wish for their specific processes and data to be isolated for the purposes of this study.

2.1.2 Questionnaire and Findings

What lines of automotive fluid products do you produce?

Responses to this question included a variety of products including motor oil, gear oil, hydraulic oils, industrial process oils, transmission fluids, drilling fluids, power steering fluids, windshield washer fluid, diesel exhaust fluid, coolants, appearance products in liquid form, and more. The vast majority of the volumes were associated with automotive related fluids for all of the interviewed fillers.

What packaging types are used?

A number of the interviewed fillers were quick to mention direct transportation of their bulk products via tanker trucks that deliver to customer specified locations, such as tanks installed at maintenance facilities. In these cases, end-customers would get product delivered and pumped directly into their own storage tanks to be removed and used when needed. At that stage, customers assume responsibility for the storage and containment of the product. Plastic totes were another frequently cited method of bulk packaging—with four fillers noting this method—using an approximately 1100-litre thin-walled plastic tote supported by a wire cage basket for cases where a full tanker delivery is sub-optimal, or the customer location does not allow for installation of a storage tank. The next largest size of packaging material was stated to be steel drums containing 205 litres of product, this was noted by four of the fillers. No mentions were made of plastic drums. Another frequent packaging type cited were steel kegs containing 60 litres of product, noted by three of the fillers.

Below these product volumes, product packaging and delivery methods were considered not to be “bulk” packaging, and began to vary more heavily. Some fillers utilized 22-litre plastic lined carboard boxes for a stop-gap measure between steel drums or kegs and HDPE plastic containers, these were referred to as “pit packs” or “eco-boxes” and cited by two of the fillers. Plastic buckets or pails were mentioned by most fillers, mostly in context of diesel and heavy duty motor oil and coolant applications, in sizes of either 2.5 gallons or 5 gallons.

Smaller plastic containers—in all cases HDPE—were utilized in the form of 4, 5 and 10-litre plastic jugs as well as plastic bottles ranging from small 375mL up to 1 litre in size. These types of HDPE jugs and bottles were cited by all of the fillers interviewed. Some infrequently mentioned packaging types included

various tubes, and small metal cans, however these were used mostly for appearance products. See the table below summarizing the major packaging types.

Packaging Type	Packaging Volume	Recycle/Reuse
Direct Tanker Delivery	Various – up to Tanker Truck Capacity	Reusable
Plastic Totes	1100 Litres	Reusable
Steel Drums, Occasionally Plastic	205 Litres	Reusable
Steel Kegs	60 Litres	Reusable
Plastic Lined Cardboard Box	~22 Litres	Non-recyclable Liner
HDPE Plastic Jugs	4-10 Litres	Recyclable by End-User
HDPE Plastic Bottles	375 Millilitres – 1 Litre	Recyclable by End-User

Source: DesRosiers Automotive Consultants Inc.

Is packaging purchased or manufactured in-house?

According to the fillers surveyed in this study, the vast majority of their packaging is purchased from outside suppliers including those in Canada, Europe, and the USA. This appears to be true for all of the larger packing methods meant for bulk purchases and all of the large HDPE jugs. Bottles of 1 litre size made of HDPE plastics are manufactured in-house by a minority of the fillers surveyed, although most smaller packaging is still purchased.

Surveyed Filler	Packaging Purchased	Packaging Manufactured
1	Yes, separate supplier	No
2	Yes, separate supplier	No
3	Yes, separate supplier	No
4	Yes, multiple suppliers	In-House Smaller Volume Packaging
5	Yes, limited specialized product	In-House, Majority of Packaging
6	Yes, multiple suppliers	No

Source: DesRosiers Automotive Consultants Inc.

How much of each product size is produced by packaging type?

Generally breaking down into bulk versus packaged, the responses from fillers varied significantly. On one extreme, a respondent noted that 80% of their product was shipped in bulk while another filler noted that 100% of their products shipped in retail packs. On average, the large fillers distributed approximately half of their output in bulk (including bulk packaging) while another 50% was distributed in retail packaging. Medium and smaller fillers were much more skewed to the retail packaging end of the market. This varied use of packaging types likely resulted from the variety in products offered by these fillers and the subsequent differences in their business processes. In other words, different fillers occupied different spaces within the oil market depending of product focus as well as target consumers. All of the large filler companies surveyed offered bulk product delivery.

How are these products distributed into the market?

All of the surveyed fillers indicated that their products are brought to market through distributors, marketers, or wholesalers with the majority also indicating that they supply products directly to the retail end of the supply chain such as retail outlets as well as repair shops and mechanics.
Large fillers distribute their product mostly through distributors and wholesalers, or directly to large retailers such as Canadian Tire and Walmart.

What is your understanding of how recyclable or reusable these packaging types are?

The larger packaging methods including drums, kegs, and totes are multi-use products that are cleaned and re-used by third parties. The extent that this is done is not known by the fillers, because they are not in contact with the recyclers that collect, clean and re-distribute the bulk packaging. Some large fillers mentioned that the rate of re-use of packaging seems to be declining as the cost of pick-up of used packaging rises, while efficiencies of scale make new bulk packaging more cost effective.

The plastic lined cardboard boxes can be separated into recyclable cardboard and the non-recyclable liner, however contamination of the cardboard by oil or other fluids usually renders it as landfill waste. However, the fillers indicated that relatively low volumes of their product is shipped in these types of containers.

The majority of fillers indicated that their HDPE plastic jugs and bottles can be recycled through standard blue box methods although they are not involved at this step. The recycling of these packages is left in the hands of the end-consumer, be it mechanics or DIY retail consumers. It is a known issue to the fillers that oil contamination of the packaging in many cases renders the packaging difficult to recycle, and therefore unattractive as a feed stock.

What does the decision-making process surrounding packaging decisions look like?

A number of fillers cited that specific packaging decisions were made by US head offices with little to no input from the Canadian office. This was the case among the small fillers as well as some medium sized ones. One respondent indicated that Canadian customer demands are passed on to the US head office as a recommendation on some packaging decisions. Other, large fillers, indicated that Canadian decisions were made by the local marketing department based on customer demand. Some fillers indicated having full local control in regards to packaging decisions. Most fillers indicated that the packaging decisions are mostly driven by customer demands, and competitive pressures.

Four of the medium and large automotive fluids fillers indicated that in order to contain costs it is in their interest to minimize the number of packaging types, as long as customer demands can still be met.

Three of the large fillers also indicated that the have responded to customer demands for more recycled post-consumer waste in their packaging material. This type of material shows up mostly in the resin that is used for the HDPE bottles and jugs, as well as in the cardboard that the bottles and jugs are packaged in. This is a priority as long as packaging integrity can be maintained.

Do you see any major changes in the packaging types in the near future?

Fillers did not indicate seeing major sweeping trends in packaging type. Some indicated a consolidation of plastic types used in smaller volume packaging as well as a push for bulk sales but have run into hurdles to varying vehicle OEM specifications and apparent product proliferation in step with vehicle OEM decisions. A number of the larger fillers noted that the market for coolant could be served with one type of product 25 years ago, while it requires several different products currently. In the same time span, the number of motor oil formulations also expanded from three to about a dozen needed to cover 95% of the market. This trend is causing fillers to choose to bring to market more of their products in smaller packages in order to satisfy the demands of the installers and distributors. It is simply not cost effective for installers to inventory so many different products in bulk containers. As certain formulations gain popularity in the marketplace, fillers encourage installers to add bulk storage for the specific product in order to reduce cost and volume of packaging involved in the distribution.

In the interest of reducing cost, fillers have noted an openness to using PVC pouches in place of other established containers. This packaging type offers significant cost reductions in terms of plastic use and marginally lower overall weight. However, the recyclability of these materials remains an area of concern.

How would you address potential additional government regulation regarding the use of plastic containers?

Fillers that used single use plastic packaging indicated a variety of potential options under consideration. The most frequently mentioned option for fillers would be to completely switch to re-usable smaller packages, although in most cases that would add to the inconvenience of returning the packaging for cleaning and refill by smaller installers and DIY consumers, which would at this point add significant cost.

Among other considerations was the use of alternate materials for packaging, such as steel cans (currently deemed much too expensive), and preferably non-plastic recyclable packaging. Currently, it was indicated by all fillers that suggested this option, that the market does not offer any type of alternates to plastic that would be recyclable, cost effective and would meet the demands of the end customers.

Increased use of reusable metal drums and kegs, different types of plastic, or conducting research into the packaging types utilized in different jurisdictions in that have similar regulations.

Specifically, two of the filling companies suggested a revamped liner for the lined cardboard packaging (eco-box) seemed to be a preference. The convenience of this type of packaging is often cited as a significant advantage, however current technology does not allow for the recycling of the liner.

Are there any other trends or pressures impacting your market regarding packaging?

The recyclability of containers was an issue raised at the consumer level which the fillers have been made aware of and some steps seem to have been taken including less reliance on smaller-volume packaging. A trend towards larger bulk packaging appears to be a likely scenario according to the surveyed fillers, as long as product proliferation does not expand from current levels.

Another trend that was quoted by four of the fillers surveyed is the pressure to reduce packaging costs – this is done by improving packaging technology, with different bottle designs that can be made with less material and still have enough structural integrity to support stacking four or five units high.

Two filling companies mentioned the trend towards using more post-consumer waste recycled resin in the HDPE bottles and jugs.

How do you pay for recycling fees?

When it comes to items in retail packaging, fillers indicated that recycling fees do not impact them directly and are instead collected from marketers and customers at the point of sale.

In the bulk packaged part of their business, recycling fees (or pick-up fees levied by third party recyclers) have generally been eliminated from the invoices because of competitive pressures. Therefore, the effect has been that the end user is now responsible for arranging pick up of the reusable packaging by the recyclers. This is noted by the fillers not to be a cost-effective option for their customers located away from populated areas, as pick up options are quite expensive because of the distances involved.

Are you involved in the recycling of your product – if so how?

Responses to this question were mixed with most of the fillers not at all involved in the recycling process. One filler indicated that recycled material was utilized in the in-house production of packaging (although the post-consumer waste based resin was procured in the US) and one filler mentioned internal waste oil being re-used in the production process. Two of the fillers noted paying regulatory fees in order to contribute financially to the recycling, but not actually taking any steps themselves. One filler noted a pilot program in Quebec to recover used coolant products in order to recycle those in-house, although currently very small in scale.

Are you involved in the recycling of your packaging – if so how?

According to fillers, larger bulk packaging types such as totes and drums are picked up by third party recyclers without a fee to the fillers, however in many cases at a fee to the product installer. Some marketers also pick up larger bulk packaging containers free of charge after use by the end customer. Generally, fillers are not involved in the recycling process in a direct physical way.

2.1 Package Manufacturers

2.1.1 Description

In the context of this study, package manufacturers are those businesses that produce the various packaging types that are used to contain and transport automotive-related fluids. These can range from small bottles, to jugs, kegs, drums, bulk packaging, and a wide range of other options. Package manufacturers have a deeply interconnected relationship with both the fillers and recyclers as the fillers themselves often purchase the package manufacturers' products. Meanwhile, the package manufacturers can choose to source their plastic resin—or similar—from recyclers depending on the market price of recycled versus new material.

For the purposes of this report, finding high quality interviews with package manufacturers presented some difficulties. The majority of the plastic manufacturers acting in or influencing the Canadian market are international. As a result of this, decision-making power—especially in regards to which types of packages are produced, etc.—often lies outside of the country. Moreover, automotive packaging specifically tends to be a smaller part of their overall business, shifting authority away from their Canadian sides further. There are cases where the fillers themselves bring pre-packaged product into Canada, filled elsewhere and outside Canada's direct sphere of influence. This complicates the process of controlling this plastic during its full life-cycle and makes it difficult for the package manufacturing businesses to make procedural changes and adapt to new regulation coming from within Canada.

2.1.2 Questionnaire and Findings

What type of packaging do you produce?

DAC established contact primarily with manufacturers of smaller volume plastic package types. This includes smaller 1 litre bottles alongside larger 4-5 litre jugs.

What is the level of recyclability of your products?

Generally, smaller packaging materials such as bottles and jugs are made out of HDPE plastic with the intent of being fully recyclable. In an ideal scenario, HDPE plastic can be reduced and reused quickly and efficiently and it makes for a reliable choice for smaller volume solutions. However, as recyclable as HDPE plastic is on its own, the issue of contaminants presents a frequent speedbump. Recyclers—according to package manufacturers—are deeply concerned with the amount of oil residue left within these HDPE containers once they reach their facilities. This contamination can make it impractical to recycle the plastic and can also negatively affect the quality of the recycled resin.

To what degree is post-consumer waste/recycled resin used in your products?

As was mentioned by a number of recyclers, the current price of recycled resin sits somewhat higher than virgin resin, or at least they are similar in price. Package manufacturers make price-driven decisions when it comes to selecting a supplier for their plastic and a more expensive recycled product does not make for a good purchase. Of course, this price balance can shift and this would push manufacturers to purchase recycled materials in greater volumes. Ultimately however, package manufactures tailor their products to their customers—which in this case are the fillers themselves. If the fillers choose to switch to recycled material from new material or vice versa, then the package manufacturers are compelled to oblige.

What are some developing trends you see in this space?

One recent trend noted by a particular respondent noted their customers—fillers—asking for more post-consumer waste resin. This recycled resin, at current market prices, raises the overall price of packaging up.

The package manufacturers have noticed the incoming regulation in regards to plastics and have for some time been taking measures in response. One particular option that was noted was a biodegradable container but this option presents difficulties in the automotive space specifically. Automotive fluids are varied in terms of chemical composition and various fluids can have detrimental effects on currently employed biodegradable packaging materials. As such, a fully biodegradable packaging option appears to still be a long way away.

Another option that was noted was a doubling down on the re-use of the packaging already utilized. These fully reusable containers can be combined with identifying labels—such as QR codes—which can smooth the process of recovering and reusing them. They can be recovered directly from retailers or perhaps from recyclers, cleaned, refilled, and re-sold. This would, in effect, create a packaging-as-a-service model. However, the re-use of smaller containers is not as economically viable as the reuse or larger containers (drums, IBCs, etc.) and these cost pressures prevent a system like this from being viable in the current market.

Although not a trend in Canada, in other markets such as Mexico or India, an option exists for customers to re-use their own container. Customers would fill personal owned containers from a bulk container in a store and use the fluid as needed. This canister can be reused several times and so long as it is used for the same product (i.e. a shop always filling a particular container with a particular motor oil) this option would reduce at least some of the plastic waste in circulation.

2.2 Recyclers

2.2.1 Description

In the context of this study, plastics recyclers are those companies that broadly handle the collection, washing/prepping, breakdown, processing, and resale of packaging used in the automotive industry. The businesses that handle these products have varying processes, revenue streams, targeted products, and end-users with the common unifying factor being that they handle these packaging materials post-use and are more often than not incentivised to do so through government and other recycling/green initiatives.

Broadly, two main processes can be examined among these recyclers. The first relate to those that focus on the breakdown of used plastics into a raw material for re-use in the form of pellets, flakes, etc. The second involve those that decontaminate, process, and resell packaging in their more-or-less original form. These two functionalities are not mutually exclusive and depending on the particular company in question, they may do either or both of these tasks.

2.2.2 Questionnaire and Findings

Are you involved in the re-use of plastic or do you process and recycle plastic into resin/pellets/etc.?

A majority of the recyclers that were surveyed primarily processed and recycled plastic into raw materials. When asked about volumes of automotive specific plastic packaging, responses varied with some reporting low double digits to up to half of their total volume being automotive specific. Recyclers who handled consumer plastics were more likely to have a smaller volume of automotive related plastics compared to those that focused on intermediate bulk containers (IBCs), drums, and pails.

While recyclers can generally be cast into categories depending on their focus on re-using packaging versus reducing the plastic contents into raw materials, this is fairly inaccurate. These businesses vary strongly from one to another in terms of how much they do of either task. Moreover, the quantity of automotive plastic packaging as a percentage of their total business can vary from the smaller single digits to approximately half of their business. A lot of this variety can come about as the result of focus on general consumer waste/recycling products versus targeted collection of plastics, such as those gathered directly from mechanics and workshops. Due to the great number of approaches these companies take, their specific volumes vary greatly alongside their areas of operation which can be strictly local, across provinces, national, and even stretch into business in the USA in some regard. This variety adds significant complexity in addressing the needs of these recyclers and has significant impact on their opinions in regards to best practices and suggested regulation. However, plenty of common ground can be found among recyclers regardless of the specifics of their business.

Has the overall volume of consumer waste—automotive fluids specifically—increased in the past 5 years?

According to participants, the volumes of automotive fluid packaging materials has remained relatively flat. Single digit decreases were noted by a respondent in Quebec, but volumes largely have been observed to be stable.

Does your business receive bulk fluid containers such as drums or crates?

These bulk packaging mediums have found their way throughout a large number of recycling business, even when those businesses were noted to not have any particular focus—or need—for these packages.

In fact, it was noted that IBC containers specifically often end up sitting on the lots of many of these companies that are unsure of how to process them or how to move them to an appropriate location given the heavy cost of transportation in the recycling industry. This confusion is aided by the lack of programs to facilitate and incentivize the processing of the bulk containers, or in general those over fifty liters. Oftentimes, recyclers who handle their own collections would pick these containers up in the interest of customer satisfaction but would be unable to do anything with them due to lack of expertise, guidance, or simple financial incentive.

When recyclers have a focus on these bulk containers specifically, they are prepared to process, decontaminate, and re-introduce these containers back into the supply chain with the important caveat that this is not a seamless process with many IBC containers specifically getting 'lost in the system'—at least temporarily. Broadly speaking, sentiment from respondents has pointed towards an increase in bulk packaging methods with a nod primarily towards IBC containers and drums having risen in volume.

We understand there are difficulties in recycling some newer automotive fluid containers. Can you list the types of products that you currently have problems with?

A common point of contention brought up by recyclers has been the rise in alternative packaging methods. The largest culprit by far have been the 'eco-boxes' which are in essence plastic-lined carboard boxes. This packaging type was noted to be increasing in volume. The important detail rests in the fact that this type of packaging is at present non-recyclable and is more often than not shifted immediately into landfills, hazardous waste landfills in some cases. None of the material in these packaging types is recycled or reduced and is therefore a strong example of a harmful single-use plastic, one that would benefit from some measure policy change or regulations. One respondent in particular also noted that plastic containers made of PVC were making their way into their supply chain and that these products were largely relegated to landfills as well. These may be related to the PVC pouches that fillers have been eager to adopt due to the cost-saving benefit of them. At present, recycling these materials is not possible given current technologies and profit margins. The introduction of higher fees on these packaging types could lead to recyclers having the funds to develop the technologies necessary to recycle them, but at present this does not occur.

Have you noticed any other changes to the types/sizes of automotive related consumer waste in the past 5 years?

Although not directly related to the question, participants used this opportunity to express displeasure with several types of product packages which could be easily processed through existing recycling methods—specifically reduction into raw plastic—but are not due to a lack of incentive through the programs that encapsulate other plastic packaging materials. The most commonly cited example was windshield washer fluid containers which are often not recycled and end-up as 'single-use' although this is not a necessary fate. This concern was placed on other products as well such as various additives, waxes and other appearance products, etc. While some of these products are recycled—largely as a gesture of good-will—even a small incentive to recycle would eliminate the bulk of this inefficiency.

When a bulk reusable container is at the end of its usable life, is it recycled? If so, does your company handle that or else how does this occur?

Participants noted that several sites have begun to accept reusable bulk containers with the intent of processing them or recycling them but the lack of programs or clear guidelines have made this a difficult and inefficient process. A clear financial incentive alongside clear guidelines would ensure that these bulk containers are used as efficiently as possible and recycled when appropriate at end of life without undue costs associated with wasted transportation and storage. Another note is that reusable bulk containers, such as IBCs, are oftentimes fairly inexpensive to purchase new when compared to the cost of cleaning and reusing them and as such a large supply of these containers end up not being reused for long periods of time or not at all. Clearer guidelines and incentives to actually reuse these containers would be a benefit in this scenario.

Product Type	Main Concern
Plastic-lined cardboard box, 'eco-box'	Non-recyclable
Windshield washer fluid containers	No incentives
Small accessory containers, appearance products/additives	No incentives
Bulk containers	No clear guidelines

Above: A summary of commonly cited troublesome packaging types and associated issues

Who pays for the drop-off/pickup of materials during the process?

In general, participants noted two methods. Outside collection—primarily utilized by recyclers who also handle generic consumer waste—is a common method by which a number of automotive-related plastic packaging materials are recycled although they are not a focus. More efficiently, some participants noted handling the collections themselves directly from mechanics, workshops, etc. with transportation costs covered by the recycler. This method was noted to be more efficient in isolating the types of plastics that can be feasibly recycled or reused.

Are there any other issues to note with regards to recycling automotive related plastics?

One clear point of note among recyclers has been the impact of reduced virgin resin prices on their business, tied directly to the cost of petroleum. When the petroleum market's prices recede, the cost of new plastic material drops similarly. Recyclers by nature indicate that their operations work with narrow margins and price changes for the competing new product can be difficult to adjust to. This may reduce the likelihood of recycling non-incentivized product or product that is by nature more difficult to process.

Have there been any major changes in the costs/prices/fees associated with automotive related single use plastics that have affected your business in the past 5 years?

Respondents noted fairly stable metrics in regards to the prices, fees, and costs associated with their product with the exception of petroleum prices.

Has the demand and price for recycled material changed in the past 5 years? What percentage change?

Tied to the price of petroleum, the price of new plastic has declined in the past 1-2 years. While clear figures were difficult to discern, this would have shifted demand among those recyclers who were unable to adjust their prices low enough to compete while those that could faced narrower margins, relying more on the incentives that help fuel their business.

Do automotive fluid container manufacturers also purchase this recycled material?

Participants in this study noted that the majority—if not all—of their recycled (reduced to resin, pellets, flaked) material is sold to other industries. One clear example was in the use of piping, a material this is not frequently recycled. The participants noted that this flow of materials breaks the chain of events necessary to facilitate a circular economy. Recycled products do not have clear and structured means to find their way directly back into the automotive fluids (and related) industries; back into the hands of the fillers, in other words.

How would proposed legislation with additional regulation on single use plastics affect your business and operations?

The reactions of particular recyclers as well as the industry depends on the specific flexibility and existing business processes at the level of the individual companies. Some points of note:

- Businesses that are already positioned to process and recycle bulk containers can more easily switch to that as a focus of their business with those that rely strictly on smaller container sizes likely suffering a business slowdown as a result of additional single-use plastic regulation
- There are some container types that can clearly be reused—such as pails and large bottles—which are recycled immediately. There is not reason for these to be reduced to their constituent components as most of these containers are easily reusable despite a small decrease in cosmetic appeal
- Recyclers would likely push regulators much harder to expand the existing programs to encompass more of the currently used container types, push for more bulk containers, and make clear their difficulty with recycling certain types of containers such as the aforementioned ‘eco-boxes’

3 Conclusion

3.1 Key Stakeholders and Supply Chain

Fillers—or, the companies that manufacture automotive fluids and need to get them to customers—are the central link in the overarching process – with consumers and recyclers on one side of them, and the packaging manufacturers on the other.

The suite of products made by these companies are destined for customers with diverse requirements in terms of fluid types, volumes, delivery times, etc. This variety of needs necessitates having different transportation and packaging options to suit end-user requirements. This can range from small-volume plastic bottles all the way to IBCs and direct tanker delivery. Fillers are primarily driven by certain key factors including:

- customer demands from retailers, installers and consumers
- cost in regards to their packaging solutions
- the regulatory framework

Fillers are also often international companies, many of them with a Canadian branch office answering to a head office internationally.

Package manufacturers are companies that produce the packaging which—in this context—addresses the needs of the fillers. While some fillers produce some of their packaging themselves, this is not the norm. Due to the wide variety of use-cases, package manufacturers offer a range of products to meet the filler's demand. Again, package manufacturers operate under the regulatory framework and attempt to best meet the demands of the fillers but are themselves motivated by cost. One method by which package manufacturers keep costs down is through carefully selecting new versus recycled resin to use in their packaging materials. At present, new resin is low enough in price as to compete directly with recycled materials so package manufacturers lean towards specific filler demands (i.e. if a filler was a recycled material quota to meet) when choosing a plastic supplier. Most of the time, however, the plastic used in their products does not come from other recycled automotive fluid containers. As with fillers, package manufacturers are largely international companies with head offices outside of Canada.

Recyclers in theory function as the end and start of the line for many of the plastics used for fluids in the automotive space as well as a supplier for the package manufacturers. In practise, recyclers are beholden to incentive programs to recycle material and stay competitive. This is especially pronounced when the prices of new resin are low. As such, recyclers often throw away a large number of plastic containers (such as the lining of eco-boxes, PVC pouches, windshield washer fluid, etc.) because it is not cost-effective or profitable for them to recycle the product. Furthermore, given the competition between new and recycled plastics, recyclers often end up selling their recycled materials to other industries where greater motivation exists in buying recycled material. As such, a circular economy for automotive fluid packaging is a goal beyond the current system in place.

In terms of specific volumes of these single-use plastics in the automotive space, most interviewees among the three major categories indicated fairly stable levels of packaging materials moving through the production/use/recycling/reuse process. The growth in the use of these plastics that was expected to rise alongside the growing Canadian fleet and subsequent growth in the oil and coolant markets may have

been offset somewhat by a general trend towards larger bulk packaging methods, although there appears to be a large supply of bulk containers that are under-utilised at present. Alternative packaging methods also muddy the waters with packaging such as eco-boxes which are predominantly made of paper products relegated to landfills alongside a layer of unrecyclable plastic.

3.2 Key Trends

Several important emerging trends have been highlighted in the interview results. Of note are the shifts and introductions of packaging types in response to an increased specialization of automotive fluids. Product proliferation is an issue across the automotive industry and is having a significant impact in all sectors including automotive fluids. This has led to an increased number of packaging types and materials that complicate the recycling process and can fall outside of the regulatory framework.

As part of product proliferation has been a trend toward smaller volume container use – as lower volume specialized fluids often do not generate enough revenue to justify multiple packaging sizes or bulk delivery.

A third dynamic noted by many in the industry was that there are a number of products that come in recyclable packaging but with no recycling fees attached – for example window washer fluid containers. Respondents noted that these containers could be recycled if there was even a small incentive to do so.

While progress has been made in pushing for bulk deliveries of products to save costs, materials, and simplify the supply chain, this process is not without its caveats. For example, IBC bulk containers present issues with recyclers often unsure of how to process these products although they continue to end up in the hands of their businesses. Moreover, these containers appear to be relatively inexpensive to purchase new versus going through the cleaning and reuse process, leading to an increasing dead stock in the hands of recyclers or elsewhere. These containers are not being reused or even recycled in an efficient manner.

A push by fillers and package manufacturers to produce and utilize PVC pouches for automotive fluids has caught the attention of recyclers. Although this packaging type is relatively inexpensive to produce, sell, and utilize it is at present generally non-recyclable. Recyclers themselves note that these pouches almost always end up in landfill sites and a marked switch to these pouches will likely increase the volume of single-use plastic waste in Canada.

In response to lower petroleum prices in recent years, the price of new plastic resin has reduced to become very competitive with recycled plastics. Due to the potential for contaminants—alongside a slew of other variables—present in recycled plastics, companies which utilize that plastic find themselves more likely to purchase new at current prices. This decision complicates the recycling processes and can result in reduced sales and a tightening profit margin. In turn, recyclers may choose not to process plastics that do not bring with them wider profit margins, relegating some of their otherwise recyclable materials to landfills. While some fillers specifically ask package manufacturers to sell them products made of recycled plastics, the overall price for the packaging may be higher relative to new plastic produced packaging.

3.3 Key Solutions from Stakeholders

Volumes of single-use plastics were noted by recyclers, package manufactures, and fillers to be relatively stable. While this stability should be considered positive in light of the rapid growth of the light vehicle fleet there are obviously still improvements to be made.

Before considering industry suggestions it should be noted that fillers and package manufacturers are often international companies. Their head offices are often located outside of Canada—commonly in the USA—and that is where decision-making power rests. This represents a limit to the authority of the Canadian side of their businesses and can be seen as a significant hurdle when discussing adaptation to regulatory changes and especially pre-emptive solutions to underlying issues like single-use plastic waste.

One potential solution to noticeably decrease the volumes of single-use plastics flowing from the automotive space which was agreed upon by fillers, package manufactures, and recyclers alike was the expansion of incentive programs. A large number of plastic bottles and jugs—such as those for appearance products, additives, and windshield washer fluid—end up in the hands of recyclers who cannot justify the cost of processing them without incentives. This is especially true when the market shifts towards cheaper new plastic and recycled plastic becomes less competitive.

In line with the previous point, an extension of the incentives or regulatory framework surrounding larger plastic bulk containers would be of benefit. IBC containers alongside plastic drums and kegs are often not worth processing/cleaning/reusing due to the relative low cost of new products. Setting clearer guidelines and incentivising the reuse of these containers would increase their utilization and subsequently reduce the volume of new products that need to be produced.

An option mentioned by package manufacturers and to a lesser extent fillers is the creation of a system of container re-use on the consumer end. For example, encourage the customers to fill their own personal reused containers from bulk containers. Alternatively, more robust containers can be combined with tracking technology, such as QR codes, to simplify the process of gathering and reusing—especially smaller volume—containers.

Respondents stated that alternative packaging methods such as PVC pouches have surfaced recently. Given the wholly non-recyclable—at present—nature of PVC pouches, they are more of a detriment to the environment than the current system. It was noted that biodegradable containers could be a clear solution to at least the smaller volume packaging waste. However, such options would require extensive research and development given the various chemical compositions of automotive fluids. A single package manufacturer would be hard-pressed to develop these products on their own. Government support or intervention in this problem would assist greatly in developing packaging types that do not require recycling at all and do not raise much in the way of environmental concerns.

The development of an industry board responsible for regulating packaging in this space is a broader overarching issue that may be worthy of discussion. Such a board would represent a source of industry standardization that could oversee the approval of various packaging types, sizes and containers, track emerging trends, set recycling fees and associated incentives, as well as monitor the flow of plastic during its full life-cycle.

Such an authority would likely come into conflict with package manufacturers (and to a lesser extent, fillers) who may be hard-pressed to adapt given the bulk of their decision-making power is often located outside Canada. However, in a fairly complicated and interwoven space such as this, direct oversight and co-ordination may be a potential solution.