

Q2 April-June 2021



Petroleum pricing in Canada

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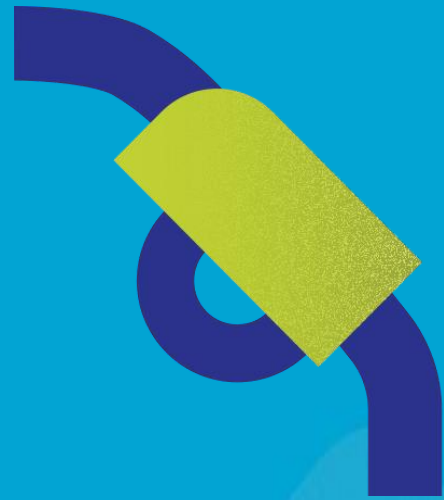
05 Guide and
glossary



Kalibrate

01 Introduction

Canadian retail fuel prices climbed in the second quarter as crude prices rose and refining margins expanded



In the second quarter, retail gasoline and diesel prices reached highs not experienced since 2018 as crude prices and gasoline refining margins climbed to two-year highs, and diesel refining margins expanded to a 14-month high.

Global crude oil consumption has outpaced crude production throughout 2021 as the world recovers from the extreme stock build that formed when the pandemic unfolded a year ago. Refineries have ramped up activity to keep up with increased demand for refined products as economic activity picks up momentum, and consequently, crude oil inventories have contracted. Further tightening occurred as extreme cold weather in the previous quarter took a significant amount of North American crude oil production offline. Although crude production returned to levels prior to this weather event, North American crude oil production remains below pre-pandemic levels. Consequently, Canadian crude prices reached a 25-month high in June, averaging nine cents per litre above the previous five-year average for the quarter.

Several factors have led to higher gasoline prices in the second quarter in North America. Numerous regions have begun to reopen following pandemic-related shutdowns and as vaccination rates increase, leading to increased travel and falling gasoline inventories. Also, extreme cold weather experienced during the previous quarter took several refineries offline and contributed to lower gasoline inventories. Inventories along the East Coast tightened further in May as the Colonial Pipeline was shut down due to a cyber attack. The pipeline is the largest refined product pipeline in North America, moving refined products from the Gulf Coast to heavily populated markets along the East Coast. The pipeline remained shut for a week, and along with panic-buying, led to gasoline shortages. Additionally, higher ethanol prices, a gasoline additive, this past quarter from higher Renewable Identification Number (RIN) credit prices and higher feedstock (corn) prices also lent support to higher gasoline refining margins and prices.

Diesel refining margins also rose in the second quarter. Diesel demand is associated with several factors, including freight demand, heating fuel, and agriculture use. Although heating fuel demand declined from the previous quarter, increased freight demand and the spring planting season contributed to declining North American distillate inventories. The decision by refineries to produce more gasoline over diesel this past spring further exasperated the decline in distillate stocks. By the end of the quarter, North American distillate inventories have fallen by over thirteen percent from the start of this year.

Figures 1 & 2 show the historical movement of retail gasoline and diesel prices in Canada, along with their component prices.



Figure 1:
Canadian average regular gasoline and component prices

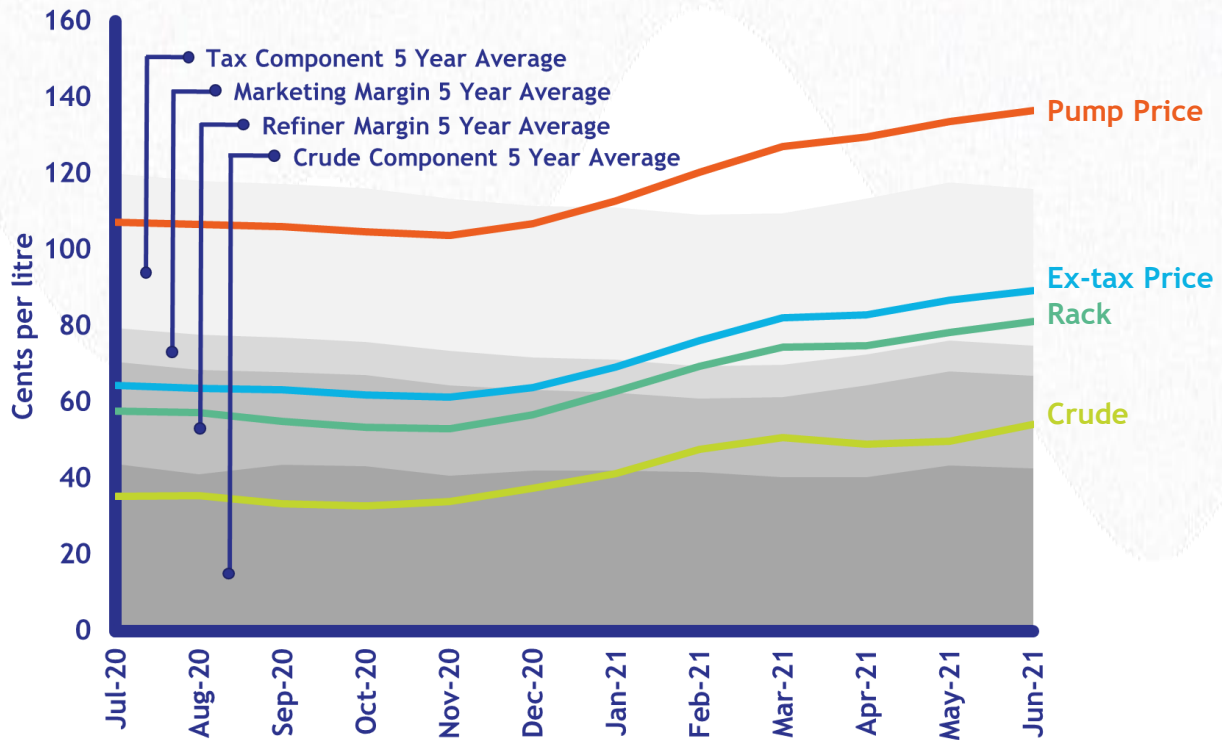
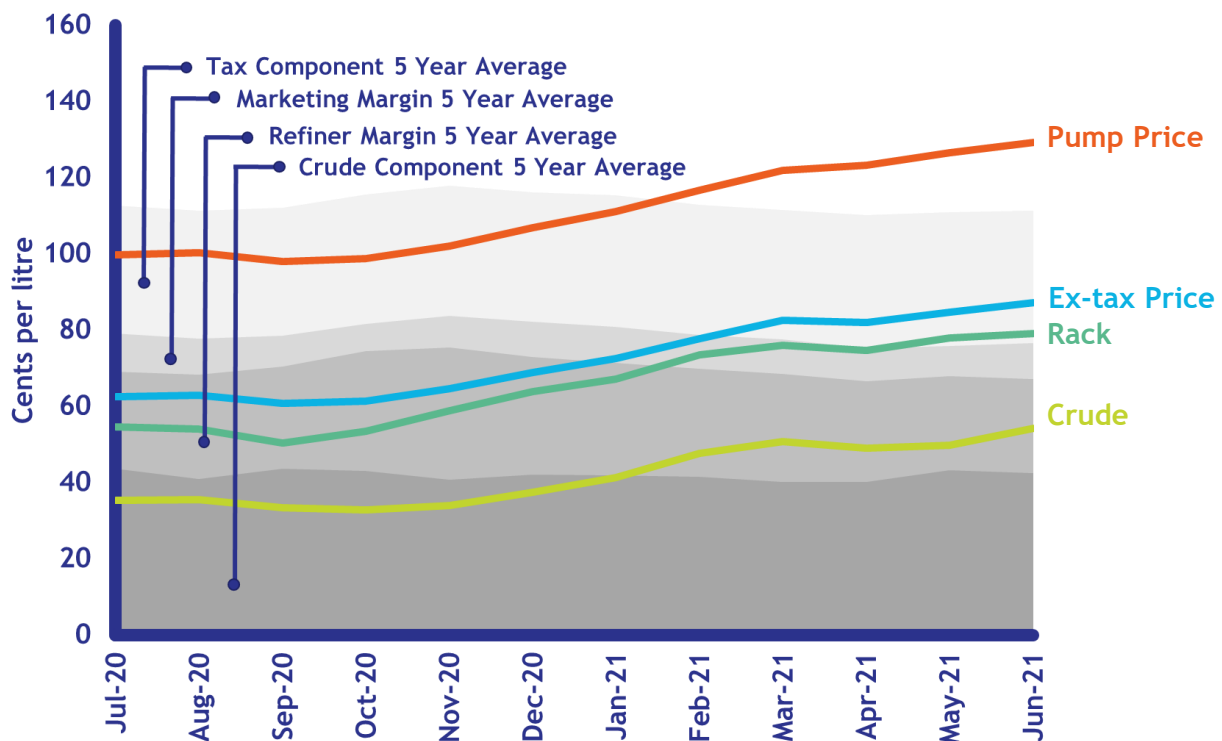


Figure 2:
Canadian average diesel and component prices



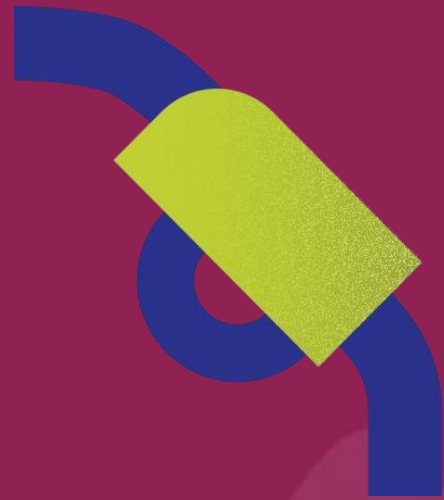
Crude prices increased in the second quarter as inventories tightened upon increased refined product demand and limited crude oil production.

The price of Brent crude (a global benchmark) ended the quarter at 74.76 \$US/BBL, 18.4 percent above the end of the previous quarter. Similarly, the WTI benchmark ended the quarter at 73.31 \$US/BBL, 23.9 percent above the previous quarter's finish. Both benchmarks reached price levels in early June not seen since October 2018. Brent's premium to WTI contracted in the second quarter, ending the quarter at 1.45 \$US/BBL, down 2.51 \$US/BBL from the previous quarter's end, falling as low as 1.04 \$US/BBL in mid-June. North American refinery inputs have reached pre-pandemic levels, yet, crude oil production remains below pre-pandemic levels causing North American crude markets to tighten, down nearly ten percent from the end of the previous quarter.

The heavy-light crude oil price spread between WTI and Western Canadian Select (WCS) widened in the second quarter, particularly in late May and June. This was likely due to an increase in U.S. demand as the spring maintenance season ended and PADD 2 refinery utilization ramped up. PADD 2 imports a significant amount of Canadian heavy crude oil and as demand picks up, marginal barrels of heavy crude move by rail. The discount widens to compensate for higher transportation costs. The heavy-light price spread was as wide as 15.71 \$US/BBL in mid-May, ending the quarter weaker by 2.51 \$US/BBL from the previous quarter.

02 Gasoline and diesel market overview

Canadian retail gasoline prices reached their highest levels since July 2018, driven by higher crude prices, expanding refining margins, and higher taxes.



Higher demand has led to both tighter crude and gasoline inventories and pushed prices higher. Additional carbon taxes have also increased the tax component of the price of gasoline this past quarter.

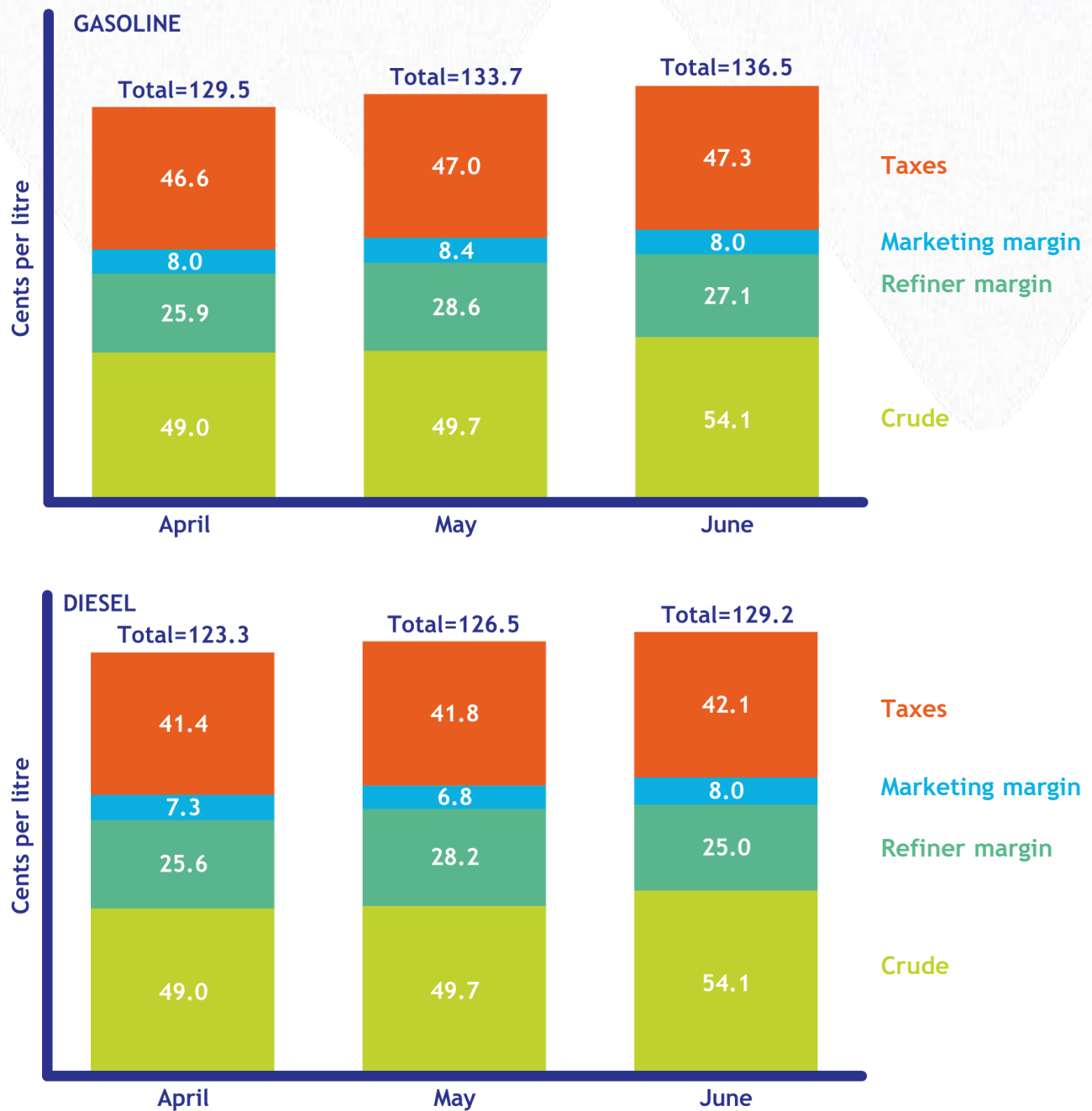
Regionally, refining margins expanded along the West Coast, rising 8.4 from the end of the previous quarter, while the East Coast saw little change from the end of the last quarter. The West Coast is geographically isolated from the rest of North America with limited options for re-supply. Increased demand for gasoline consequently had a disparate effect on wholesale prices in the area.

Similar to gasoline, Canadian retail diesel prices rose to a level not experienced since November 2018, also pushed higher from rising crude prices, higher-average refining margins and higher taxes. Diesel fuel production has not kept up to demand this past quarter, and diesel fuel inventories have declined leading to larger refining margins at a time of year when diesel demand typically tapers.

Diesel refining margins in Central and Eastern Canada changed little over the last quarter compared to Prairie provinces which contracted. This is likely a consequence of tightening North American distillate inventories, which contracted significantly during the second quarter along the East Coast. ([Figure 3](#))



Figure 3:
Canadian average gasoline and diesel price components for Q2 2021



03 Next quarter market outlook

Several factors in the next quarter will likely see crude prices sustained at or near current levels, and in turn, keep refined product prices higher than in most recent years.



OPEC and allied countries in mid-July have reportedly come to an agreement on higher crude production easement levels, but it is unclear if it will be enough to prevent further crude oil market tightening, and pressure crude prices higher.

Additionally, vaccination efforts continue to make progress, and all indications are that travel will increase. Most recently, the U.S. Energy Information Administration's gasoline demand data showed gasoline demand reached an all-time high in early July. Although refinery activity has increased, gasoline inventories will likely remain tight for the summer driving season if demand remains strong. Diesel demand has also returned to pre-pandemic levels, and inventories have shown significant contraction in 2021, likely keeping diesel refining margins above typical levels in the coming months. This is despite seasonal trends, which would normally see diesel prices at their lowest levels of the year during the summer months. As the summer draws to an end, diesel margins might expand further as refiners build inventories for the winter heating season.

04 Analysis: premium fuel trends

This section of the newsletter will analyze trends in premium fuel use in Canada and the effects of premium fuel prices.



Premium fuel is a higher octane fuel in the range of 91-94 octane. This compares to regular grade gasoline which is 87 octane. Higher octane fuel aims to provide greater fuel-burning stability to protect engines from the damage caused by engine knock - also known as abnormal combustion.

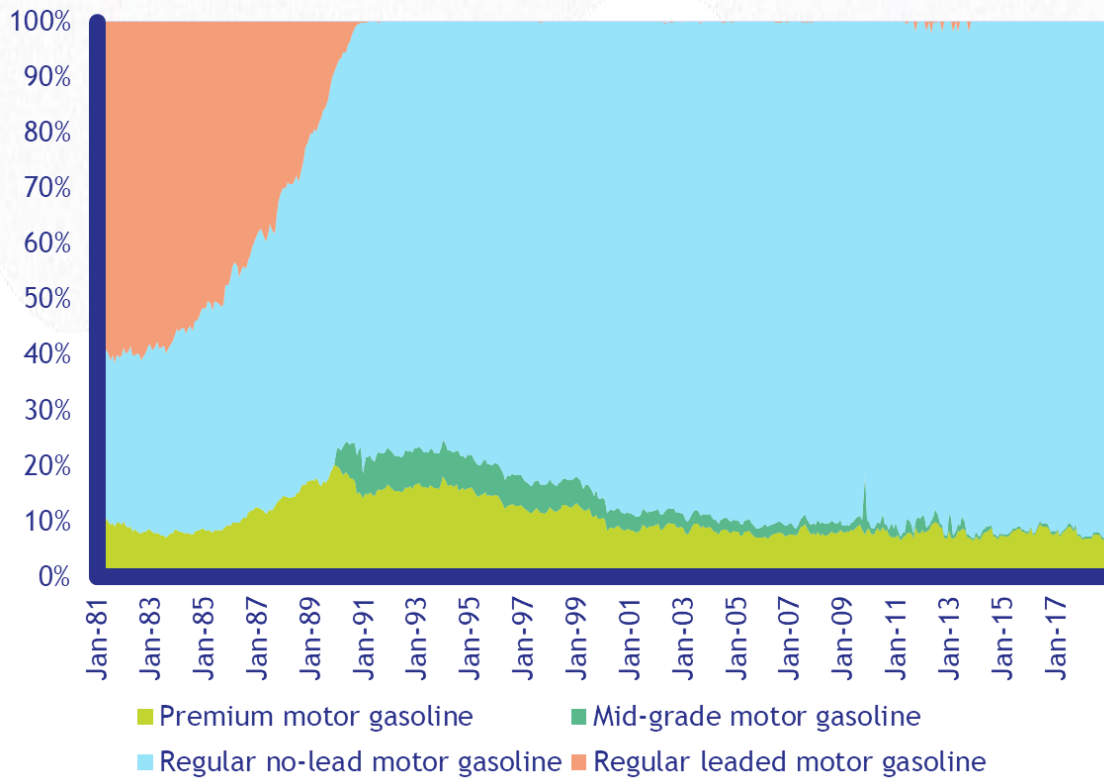
Before the use of computerized ignition systems, engine knock was more common, particularly in high-compression vehicles.

As [Figure 4](#) shows, the use of premium fuel peaked in August 1990 at 19.4 thousand cubic metres a day, 17.8 percent of domestic gasoline sales. Since then, the use of premium fuel in Canada has declined, falling to 9.2 cubic metres a day in 2018, or 7.1 percent of gasoline sales (Statistics Canada, Table #25-10-0044-01). As computerized ignition systems began to make up a greater proportion of the vehicle pool, premium fuel use declined. The majority of vehicles on the road today are optimized to run on regular 87 octane fuel with few if any benefits to using higher octane fuel.

How is fuel octane increased? Octane can be increased in gasoline by adding additives such as lead, methyl tertiary butyl ether (MTBE), benzene, toluene, ethyl-benzene & xylene (BTEX) and ethanol. Many of these additives have been shown to have adverse health and environmental consequences. Accordingly, several substances are no longer used in the production of gasoline. Most commonly, BTEX (also known as gasoline aromatics) and ethanol are used today. However, the use of ethanol is capped at ten percent of the fuel pool as most vehicles can not use more without damaging engine components. The use of aromatics to boost octane has required significant investment in the refining industry, and consequently, the cost to produce higher octane fuel has increased over the years.



Figure 4:
Canadian consumption trends by fuel grade, 1981-2018



Source: Statistics Canada, Table #25-10-0044-01

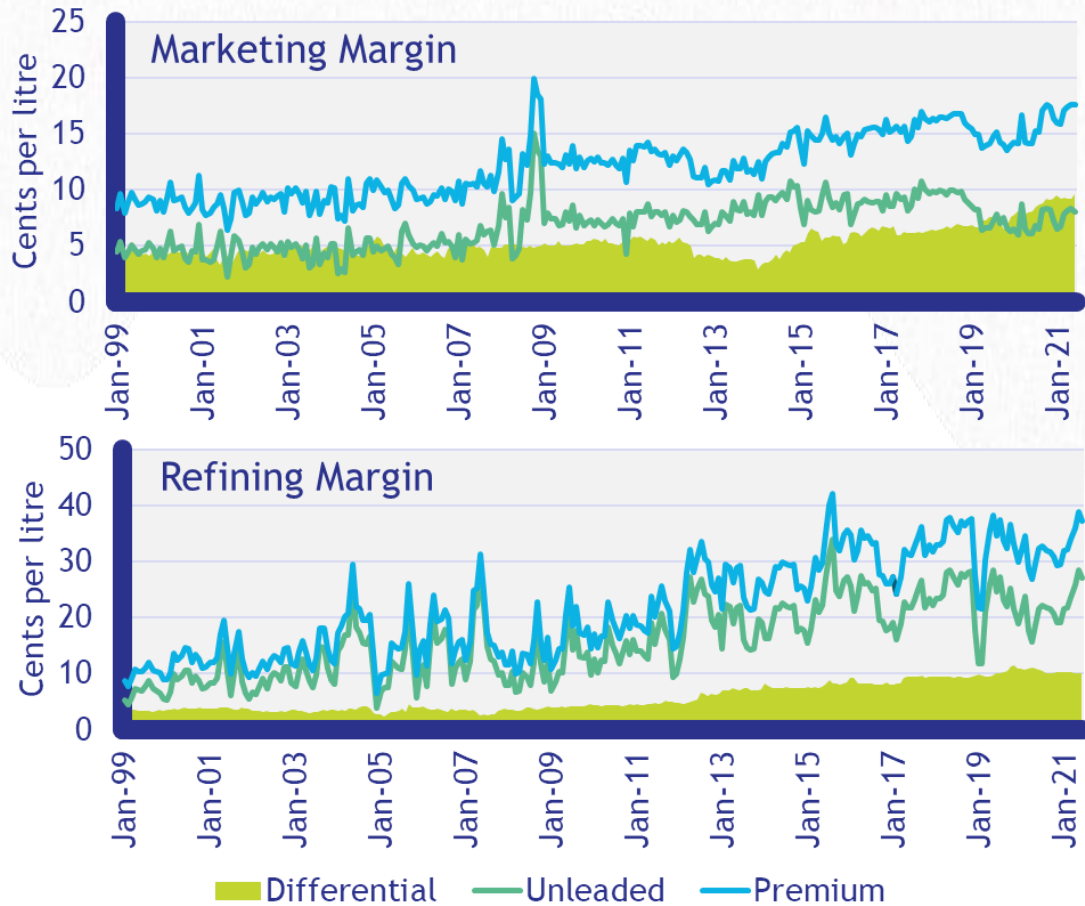
Figure 5 shows refining margins have increased since 1999 for both unleaded and premium fuels, and that for the higher octane fuel, premium, refining margin growth has outpaced that of unleaded. This is likely a consequence of higher production costs for the fuel upon stricter environmental standards and possibly due to the uniqueness of the demand for premium fuel - it may not be as price-sensitive compared to 87 octane.

Although not as profound, both gasoline and premium fuel marketing margins have also increased over the same timeframe. And like refining margins, the differential between unleaded and premium marketing margins has also increased. While it is not clear the cause of this rising difference between the two fuels, it may have to do with economies of scale. The purchasing discount to fuel suppliers/marketers for the more expensive fuel may be less due to a smaller proportion of the fuel being sold at gas stations.



Figure 5:

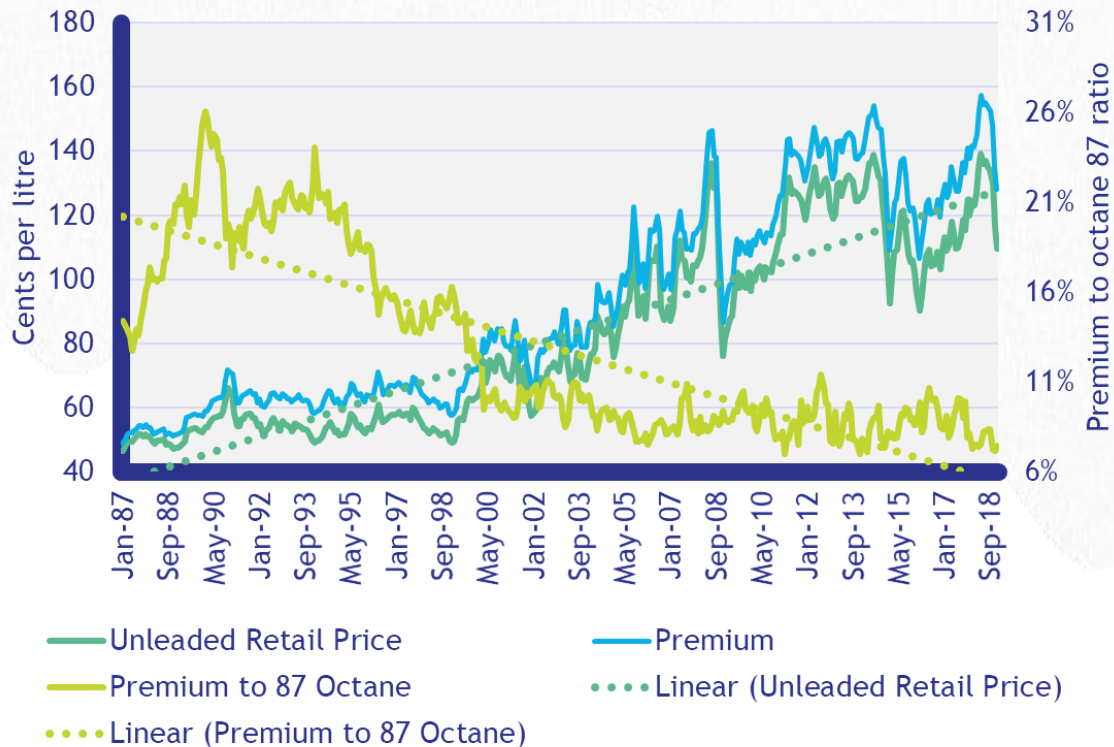
Canadian premium and unleaded marketing and refining margins, 1999-2021



In recent years, automakers have invested significantly in the internal combustion engine in an attempt to increase fuel efficiency to lower emissions upon stricter environmental requirements. The result has been a decrease in average engine size. To maintain consumer standards for performance, many auto-makers have increased the use of turbochargers which boost the power in smaller engines. The U.S. Office of Energy Efficiency and Renewable Energy reports that in the year 2000, only one percent of vehicles produced were equipped with turbochargers. In 2019, this was estimated to have grown to 34 percent of all light-duty vehicles produced. Similar trends would be observed in Canada. Although the use of premium fuel will provide optimal performance and fuel efficiency in these types of vehicles, it is not mandatory. Consumers have a choice, and the data shows most Canadian consumers are choosing 87 octane, foregoing the benefits of premium fuel in these types of vehicles.



Figure 6:
Premium to gasoline consumption ratio versus retail pump prices, 1987-2018



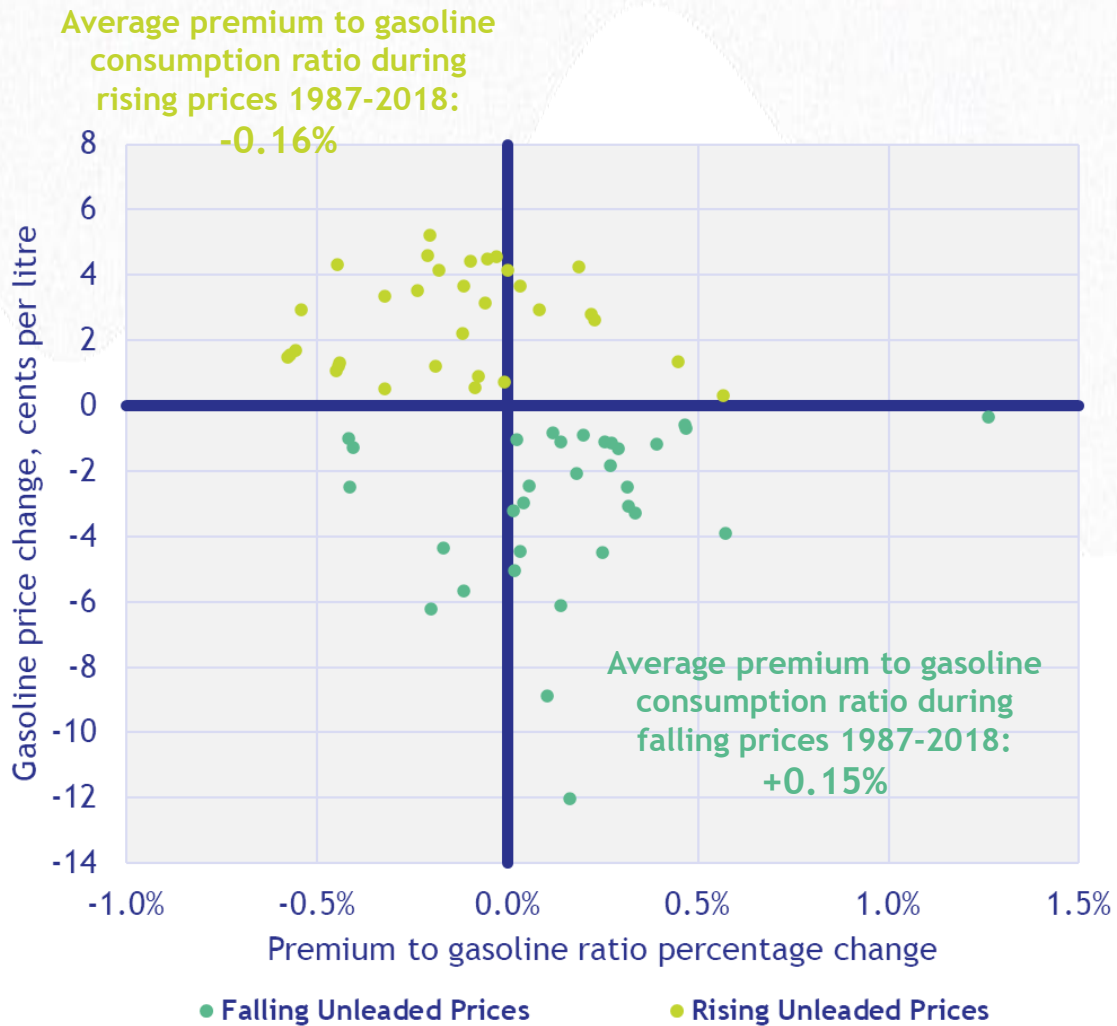
Source: Statistics Canada, Table #25-10-0044-01, Kalibrate

Figure 6 shows that between 1987 and 2018, retail pump prices have increased while the premium to gasoline ratio, as displayed as a percentage, has decreased. In 1987, the differential between 87 octane fuel and premium averaged 2.7 cents per litre, while so far in 2021, the differential was 22.3 cents per litre. Most of the differential in prices is attributable to higher refining margins and higher marketing margins between the two fuels.

While much of the decrease in premium fuel use in the late 1980s and 1990s may have been attributable to increased computerization of ignition systems in cars, thus negating the need for premium fuel to stabilize ignition spark, the increase in turbocharged engines in the last twenty years, which has a discernable benefit to using premium fuel, have seen little or no uptake in the fuel's use. Perhaps this is because the fuel is not mandatory in modern engines, giving consumers a level of choice that higher fuel prices may have influenced.



Figure 7:
Average annual gasoline price change versus premium to gasoline ratio
percentage change, 1987-2018




Source: Statistics Canada, Table #25-10-0044-01, Kalibrate

Figure 7 measures the elasticity in demand for premium fuel when prices were rising versus when prices were falling. Between 1987 and 2018, when pump prices were rising, the average ratio of premium to gasoline fuel consumption decreased by 0.16 percent. While during times of falling prices, the average proportion of premium to gasoline fuel consumption rose 0.15 percent. As a result, it appears that changes in pump prices influence consumers' choices in fuel grade consumption. The data also indicates that this price elasticity in premium consumption was more pronounced in the late 1980s and 1990s and has since decreased in the decades following.

So what does this mean for automakers and future premium fuel price trends? As most internal combustion engines today can operate using 87 octane, and the pump price differential to higher octane fuels is likely to remain enlarged compared to past years, it is unlikely we will see an uptake in premium fuel consumption. Additionally, the Canadian Government recently announced a ban on the sale of new gasoline vehicles starting in 2035, a trend occurring in other parts of the world as well. Therefore, it is unlikely that automakers will be willing to invest much into the research and development of gas-powered vehicles in the near future that may increase the demand for higher octane fuels.

This report is also available in French

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About Kalibrate

Kalibrate's decision-making software empowers fuel and convenience retailers across the globe with the market intelligence, micro-local data, and precision pricing and planning tools they need to gain real competitive advantage. For over 25 years, Kalibrate has been the chosen decision-making partner of 300+ fuel and convenience retailers in over 70 countries. The firm is headquartered in Manchester UK, with local offices in the USA, Canada, India, China, Australia, and Japan.

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