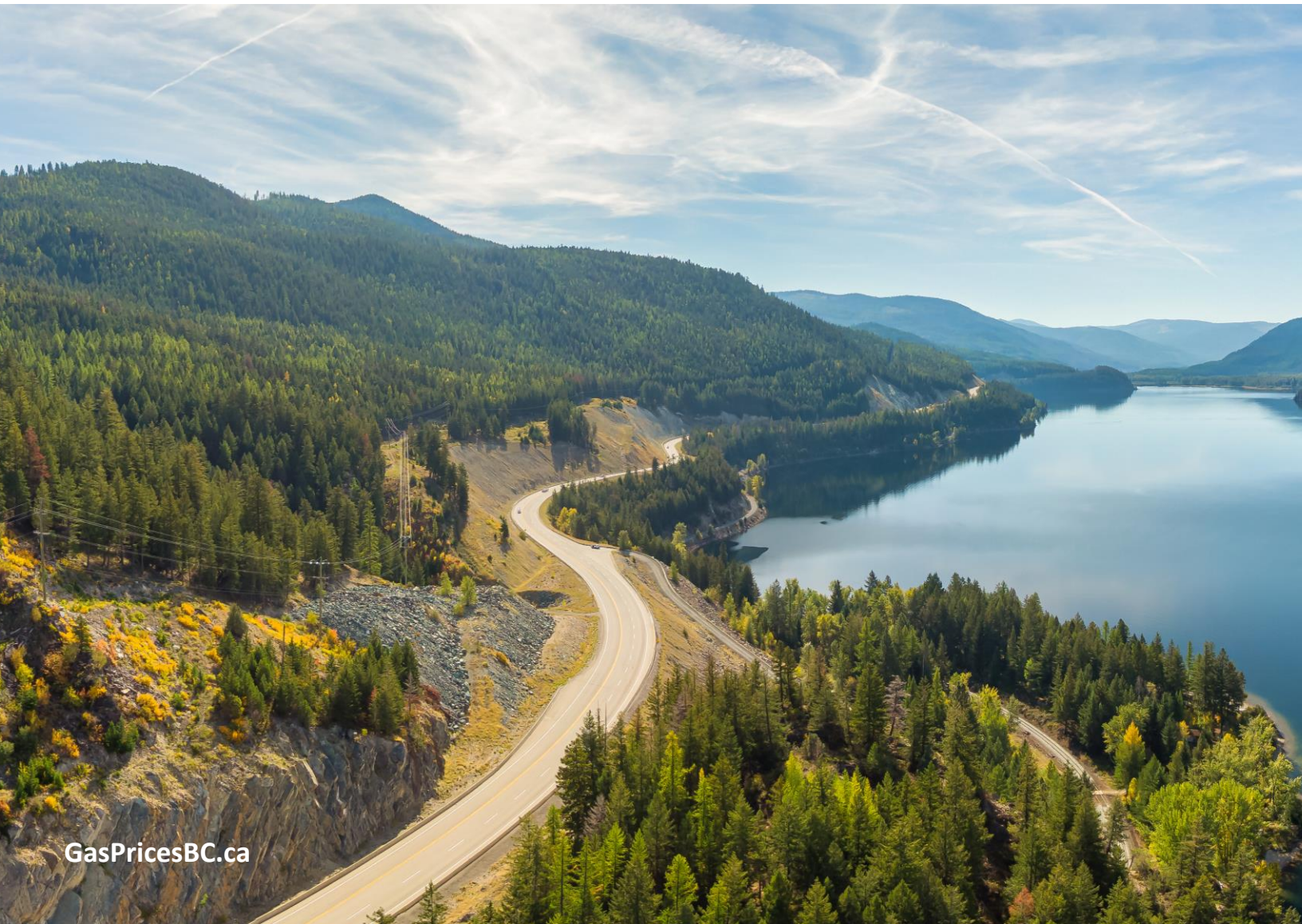
bcuc
British Columbia
Utilities Commission

BC's Fuel Price
Transparency Act

BCUC Staff Report: Retail Fuel Market

March 2024



Background

In 2019, the British Columbia Utilities Commission (BCUC) conducted a Gasoline and Diesel Prices Inquiry to investigate elevated fuel prices in British Columbia (BC). It found that there was an unexplained difference of approximately 13 cents-per-litre (¢/L) in the wholesale price of gasoline between Metro Vancouver and the U.S. Pacific Northwest, and a BC wide average difference of 10 ¢/L, which was not explained by differences in the cost of producing and delivering the product.

After the Inquiry, the BC government established the *Fuel Price Transparency Act* (FPT Act). As Administrator of the FPT Act, the BCUC is responsible for collecting and publishing information about gasoline and diesel fuel activities in BC, in an effort to promote competitiveness and public confidence in the competitiveness of the fuel market. The BCUC monitors the BC fuel industry by:

- collecting monthly reports on fuel imports, fuel purchased on the wholesale fuel market, fuel that is supplied to retail gas stations, and costs to purchase credits to comply with BC-specific low carbon fuel standards,
- collecting annual reports on terminal and tank storage data, and
- requesting fuel information and required records from fuel companies operating in BC on an ad hoc basis.

About this Report

In December 2023, BCUC staff issued a report providing an update on the unexplained difference between the retail price of gasoline in BC and elsewhere in Western Canada (BCUC Staff Report). In the report, BCUC staff divided the province into three regions: Vancouver area, Victoria area, and the rest of BC. BCUC staff found that the unexplained price difference had decreased significantly across all three regions since 2019 and recommended that the BCUC continue to monitor BC's fuel market.

Since the introduction of the FPT Act, BCUC staff have also continued their data collection activities and conducted analysis to take a more detailed look at local factors that may be influencing prices in municipalities within each of these three regions.

The BCUC has undertaken several data exploration projects regarding fuel prices in select BC cities (such as Vancouver, Powell River, Revelstoke, and Squamish), collecting data from public sources and directly from retail stations.

In 2023, BCUC staff leveraged lessons from these previous projects, and requested additional information from a selection of 15 cities located across the province in which retail stations had high, low, and average retail prices and margins for regular gasoline in the period from 2019–2022.

The data gathered has enabled BCUC staff to develop an improved understanding of how retail gasoline prices are set in BC.

In this report, BCUC staff:

- Provide an overview of the province's retail fuel market.
- Describe the data collection process and analysis undertaken.
- Discuss the local factors that appear to be contributing to differences in retail margins across the province.

Observations and Next Steps

Analyzing the data collected from retail stations over the four-year period, BCUC staff observed that:

- BC's retail fuel market appeared to be operating in a manner consistent with an effectively functioning market.
- There were lower retail margins per litre in areas where retail stations must compete for business by frequently changing their prices and where additional services like 24-hour operations or a car wash are offered.
- Retail margins follow similar patterns in cities that share similar characteristics, such as cities in high volume markets; cities on the border of higher fuel tax regions; cities close to the Alberta border; and rural or isolated markets.

In a report issued in December 2023, BCUC staff found that for the same 2019 to 2022 period, the unexplained price difference between retail gasoline sold in BC and elsewhere in Western Canada had decreased significantly across the province. This decrease occurred during the period of the FPT Act's implementation and monitoring of BC fuel prices.

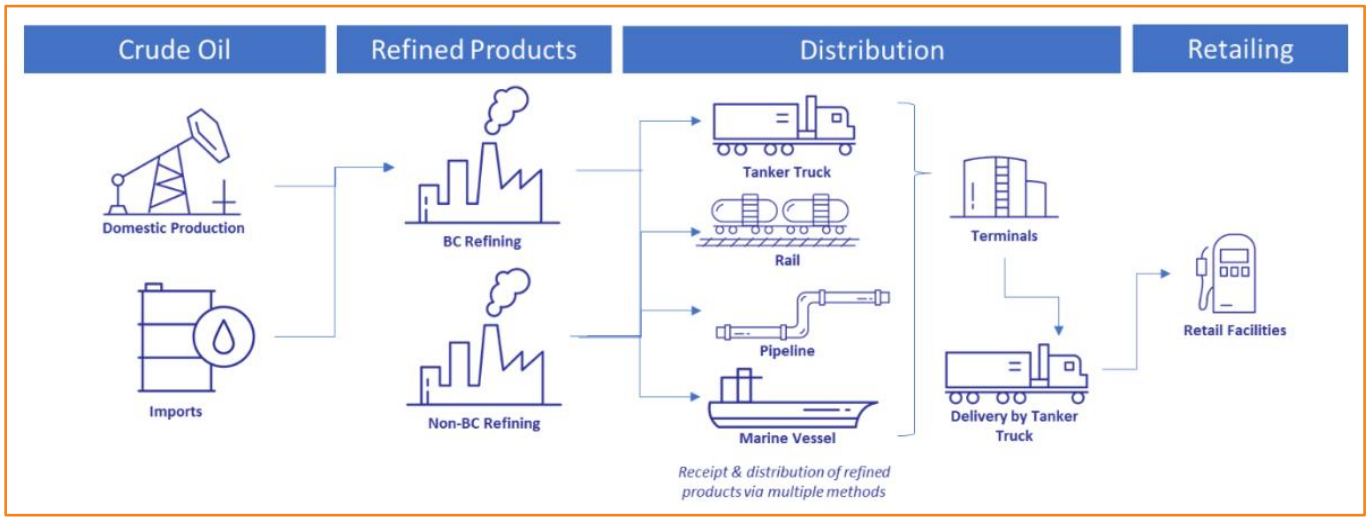
Since the FPT Act's implementation in 2020, there has been notable improvement in transparency in the BC fuel market.

BCUC staff recommend continued monitoring of BC's fuel market by the BCUC to ensure ongoing oversight of market behaviours. Should pricing behaviours change and fuel price transparency erode, the BCUC will examine available options and report to the BC government at that time.

BC's Retail Fuel Market

Each day, roughly 31 million litres of refined petroleum products are consumed in BC. Nearly two-thirds of these products are road-use fuels, as BC consumers use 13.5 million litres of gasoline and 6.5 million litres of diesel in their vehicles each day.[1] The fuel supply chain in BC spans from crude oil production to refined products to distribution of fuel to retail stations (Figure 1).

Figure 1: Refined Products Supply Chain

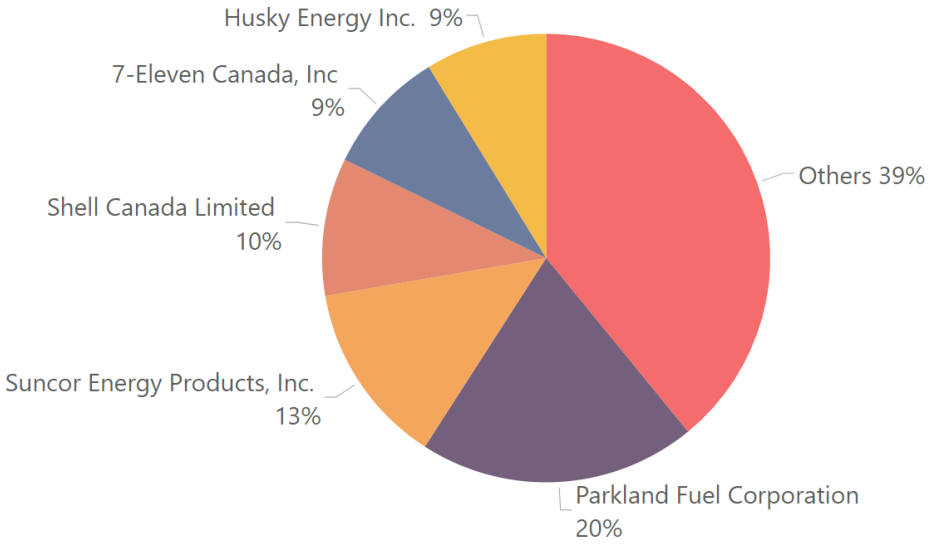


There are roughly 1,400 retail stations in BC.[2] Nearly 90% of these retail stations operate under 29 different brands. Branded retail stations are typically associated with a primary retail fuel marketer. Out of the roughly 25 fuel marketers, the five largest supply fuel to over 60% of the retail stations in BC (Figure 2).

These fuel marketers include integrated-refiner marketers (who own fuel refineries, wholesale fuel distribution networks, and retail stations), and non-integrated marketers (who only own wholesale fuel distribution networks and retail stations).

[1] BCUC Inquiry into Gasoline and Diesel Prices in BC Final Report, p. 33.
[2] As reported in BCUC's 2022 Retail Pilot report.

Figure 2: Percentage of BC Retail Stations supplied by Fuel Marketer[3]



Pump prices may be set by fuel marketers or by individual retail station owners. Retail stations where a fuel marketer sets the pump price are referred to as "marketer-controlled" retail stations. Retail stations that are not marketer-controlled are often referred to as "independents".

Independent retail stations may still use a particular brand of fuel; however, they do not maintain as close of a relationship with their fuel supplier(s), and therefore are able to set their own pump prices.

BC's retail fuel market is comprised of roughly half marketer-controlled and half independent stations.

Retail Station Selection Process for Detailed Study

The retail stations selected for our data collection and analysis in this report included both new cities and towns, as well as locations from the BCUC's Exploration Project #3, for an overall geographic representation of retail stations across BC (Figure 3). The BCUC used publicly available data to estimate the locations with low, average, and high retail gasoline prices and margins per litre. A total of 15 municipalities were selected randomly from each pricing and margin category, representing 12 Regional Districts across BC (Table 1).

[3] Kalibrate: National Retail Petroleum Site Census 2020.

Figure 3: Selected Cities and Towns in BC

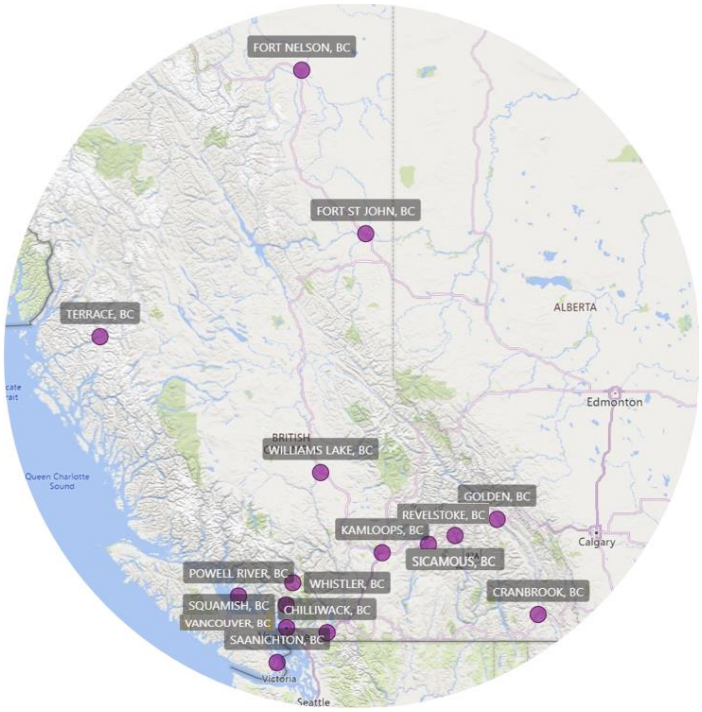


Table 1: Selected Cities and Towns in BC by Region

Regional District	City/Town
Capital	Saanichton
Cariboo	Williams Lake
Columbia Shuswap	Golden, Revelstoke, Sicamous
East Kootenay	Cranbrook
Fraser Valley	Chilliwack
Kitimat–Stikine	Terrace
Metro Vancouver	City of Vancouver
Northern Rockies	Fort Nelson
Peace River	Fort St. John
Qathet	Powell River
Squamish–Lillooet	Squamish, Whistler
Thompson–Nicola	Kamloops

Data Collected and Time Period

Every retail station (more than 200) within each of those municipalities was sent a request for data on their purchases and sales of regular gasoline from 2019 to 2022. Specifically, data was requested for volumes, purchase and sale prices, transportation costs, and fuel suppliers, among other information.

The data collected was used to analyze volume and retail margin trends, fuel suppliers, and geographic differences across BC over the four-year period.

Overall, statistically significant information (i.e., information with a confidence interval of over 90%) was received for the City of Vancouver, Cranbrook, Golden, Kamloops, Saanichton, Sicamous, Terrace, and Whistler markets. Where partial submissions were received, BCUC staff were able to estimate and interpolate the data. The analysis presented in the next section includes fuel data from all 15 municipalities.

Analyzing Retail Station Data

Retail Margin per Litre and Influencing Factors

The costs of doing business and the opportunity for retail stations to earn a profit from their activities are included in the retail price of gasoline at the pump. This portion of the pump price is referred to as the "retail margin". Retail margins and profits are different, because costs like labour, rent/property taxes, etc. are also included in margins.

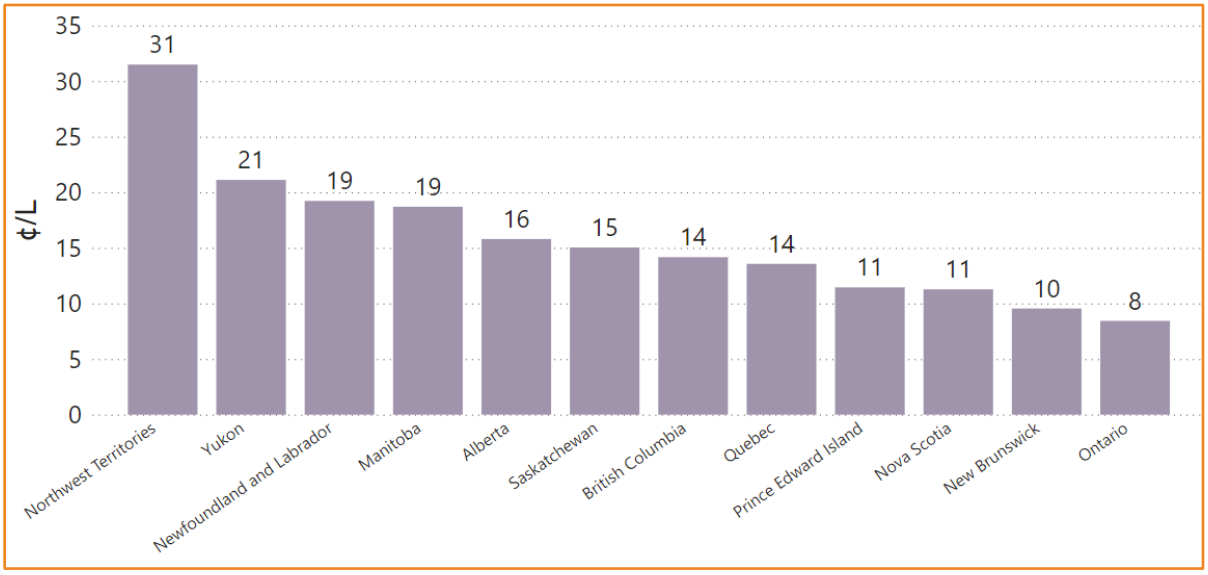
Retail margin is the difference between the sales price at the pump, excluding taxes and transportation costs, minus the price the retail fuel station paid for the fuel.

BCUC staff observed that retail stations across the 15 selected municipalities experienced similar trends in the retail margin per litre. However, the retail margin in local markets can vary from the overall average due to unique characteristics inherent to those geographic locations. BC-wide and regional factors are discussed below.

BC-wide Trends in Margin per Litre

In 2022, BC's retail stations, on average, had a lower margin than retail stations in other provinces in Western Canada (Alberta, Saskatchewan, and Manitoba), and about the same amount as in Quebec. Figure 4 shows how BC's retail margin compared to the rest of Canada in 2022.

Figure 4: Retail Margin by Canadian Province in 2022[4]



In most of the selected municipalities, except Williams Lake and Squamish, the average retail margin per litre embedded in the pump price of gasoline in 2022 was higher than in 2019. In 2020, the retail

[4] Data sourced from Kalibrate.

margin per litre decreased as demand for gasoline also decreased as a result of disruptions from the COVID-19 pandemic. In 2021, the retail margin, as with the average gasoline sales volume, increased relative to 2020 but remained below 2019 levels. This trend continued into 2022, at which point margins and volumes exceeded pre-pandemic levels.

2022 was an abnormal year, as the Russian invasion of Ukraine disrupted energy markets. Crude oil prices soared in response to the conflict, and the pump price for gasoline increased in tandem. Given the magnitude of the market reaction, BCUC staff investigated the effect the invasion had on retail fuel margins in BC. We found that while retail prices increased in February and March, so did the cost of fuel supplied to retail stations, largely offsetting the increased revenues in the immediate aftermath of the invasion.

At the same time as the disruption in the global energy market, consumer price inflation drove up the price of goods and services in BC and across Canada. Retail stations, along with consumers, were paying more for the same labour, supplies, and other necessary products than they were the year before. When the margin per litre of gasoline was adjusted for the increase in inflation using BC's consumer price index, BCUC staff found that the margin per litre followed a downward trend from 2019 to 2021 but increased in 2022.

When the change in BC's average retail margin from 2019 to 2022 was compared to similar fuel markets in Alberta, Saskatchewan, and Manitoba, BCUC staff observed that the retail margin in the rest of Western Canada rose by a much greater extent. By 2022, retail margins in BC had fallen below those in the rest of Western Canada (Figure 5).

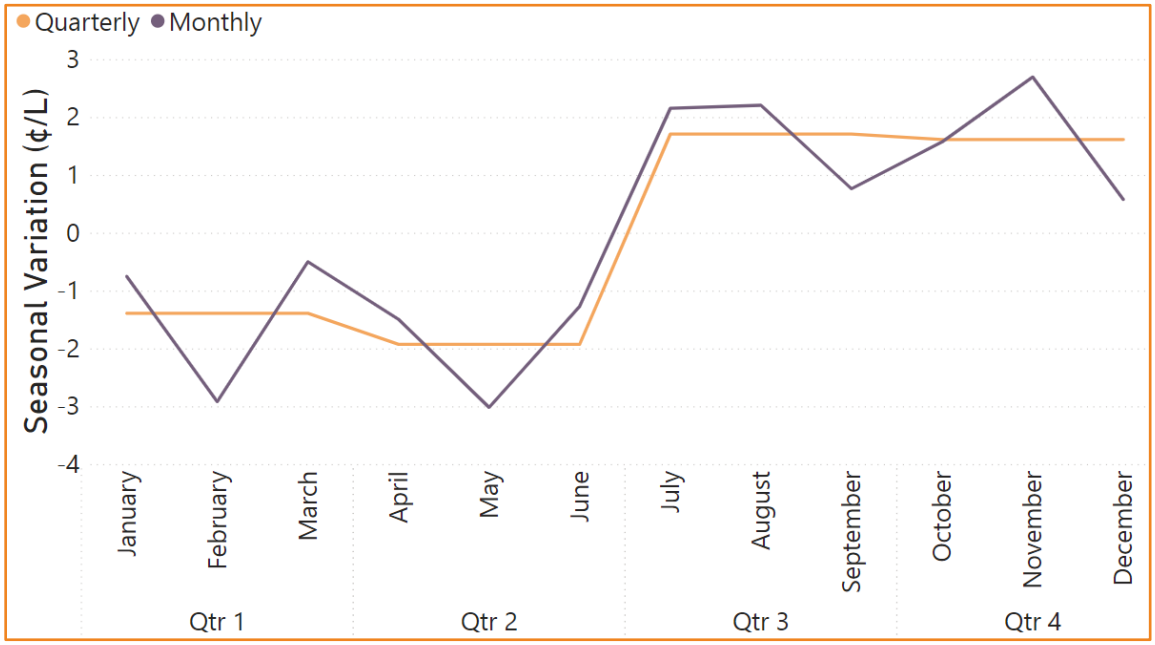
Figure 5: Change in Margin per Litre in BC versus Rest of Western Canada[5]

	Average Retail Margin		
Region	**2019**	**2022**	**Percentage Change**
British Columbia	**9.4¢/L**	**14.2¢/L**	**52%**
Western Canada	**6.5¢/L**	**16.0¢/L**	**144%**

Beyond yearly trends, seasonal variations in BC's retail gasoline margins were also observed. A time series model was applied to the average retail margin using the four years of data. This time series analysis enabled BCUC staff to break down the retail margin into long-term trend, seasonal variation, and random noise components. The results in the seasonal variation component revealed a quarterly pattern (Figure 6).

[5] Data sourced from Kalibrate.

Figure 6: Seasonal Variation in Retail Margin



The data indicates that the retail fuel industry experiences its lowest margin per litre of gasoline from January through June, and its highest from July through December.

These seasonal changes correspond with patterns in seasonal demand for gasoline by BC's drivers (i.e., the traditional summer "driving season"), and the switch between the selling of winter and summer gasoline. This switch is important because summer gasoline is blended with alkylates and different oxygenates to prevent excessive evaporation when outside temperatures rise. Refineries briefly shut down every year before they begin processing the summer blend to prepare for the change in product and to conduct planned maintenance on their equipment. This in turn can cause the supply of gasoline to decrease.

The seasonal pattern observed is consistent with an effectively functioning market. Higher demand and lower supply lead to higher prices (or specifically, a higher retail margin per litre of gasoline).

Retail Margin per Litre of Gasoline by Municipality

To identify factors that influence the retail margin per litre of gasoline in BC, a multiple linear regression model was applied to the dataset. The model was used to analyze whether changes to key retail station or market characteristics correlate with changes to retail margins.

Each factor discussed in this section does not, by itself, explain retail margin differences. Rather, it is in combination that these factors appear to influence the size of a retail margin.

Multiple linear regression is a statistical technique that uses several explanatory variables to predict the outcome of a response variable.

The explanatory variables selected for the model were:

- the degree of price volatility;
- the presence of a "big box" retailer[6];
- the distance to the closest wholesale fuel terminal;
- if the station had a convenience store;
- if the station had a car wash;
- the volume of gasoline sold;
- whether the station was open 24 hours;
- the proximity of the station to a highway;
- the land value of the station[7]; and
- the percentage of local market share controlled by a fuel marketer.

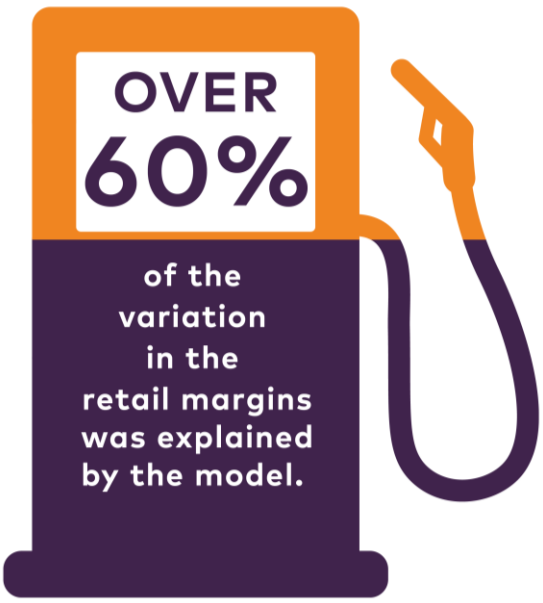
These characteristics were chosen because it was hypothesized that they were the most likely to have an influence over retail margins. For example, one might expect that an increase in the volume of gasoline sold may reduce margins because the retailer can recover more of their fixed costs over a large volume of fuel.

The multiple linear regression analysis signaled that whether a retail station is open 24 hours, if there is a car wash, and the relative degree of pump price volatility were key factors impacting a retail station's margin per litre of gasoline.

Specifically, the model indicates that if there are more 24-hour retail stations in a municipality, it will lead to a decrease in margin per litre for that municipality. Similarly, if more retail stations offer a car wash as an additional service, this leads to a decrease in margin per litre. These two factors signal that retailers who offer longer hours and additional services to attract customers may have additional sources of revenue to support lower, more competitive fuel margins.

For price volatility, when pump prices change frequently, the market is said to have high volatility. When there are relatively stable prices, the market is said to have low volatility. Price volatility is generally indicative of competitive price behaviour. BCUC staff's model demonstrated that the relationship between price volatility and the margin per litre was negative, meaning an increase in price volatility resulted in a decrease in retail margins.

As an example, Vancouver had the lowest relative margin per litre in the sample and the highest price volatility. While Golden and Cranbrook had higher margins per litre and lower price volatility.



[6] Big box retailer means a retailer whose primary offering is non-petroleum in nature, and whose fuel sites are often anchored by a large chain-store.
[7] Retail station's 2021 land values were retrieved from the BC Assessment website.

The accuracy of the margin predictions is critical in establishing the strength of the relationship between these combined factors and the resulting retail margin. The retail station characteristics that were studied explain over 60% of the variation in the retail margin across the 15 municipalities in our dataset, demonstrating that the factors in our model are sufficient to explain most of the variation in retail margins.

Several factors may contribute to the remaining unexplained variation in retail margins for the 15 municipalities in our dataset. This includes the existence of one or more key drivers that have yet to be identified or the presence of a large amount of randomness in the margins that cannot be predicted or explained by linear regression.

It is important to note that the BCUC staff analysis above focused on the entirety of the fuel data collected. There are also local factors that may drive variations in retail margins. For example, land values seemed to be a significant factor in the variation in retail margins for retail stations within Vancouver. However, this same factor did not appear to explain margin variations in Golden, for instance.

To further explore location-specific reasons for margin variation, BCUC staff examined retail margins in each municipality to determine if they followed similar patterns compared to those in other municipalities. We also considered whether certain groups of municipalities displayed similar trends in their retail margins due to shared characteristics that might explain the retail margin variance for that group. BCUC staff used principal component analysis to support this work.[8]

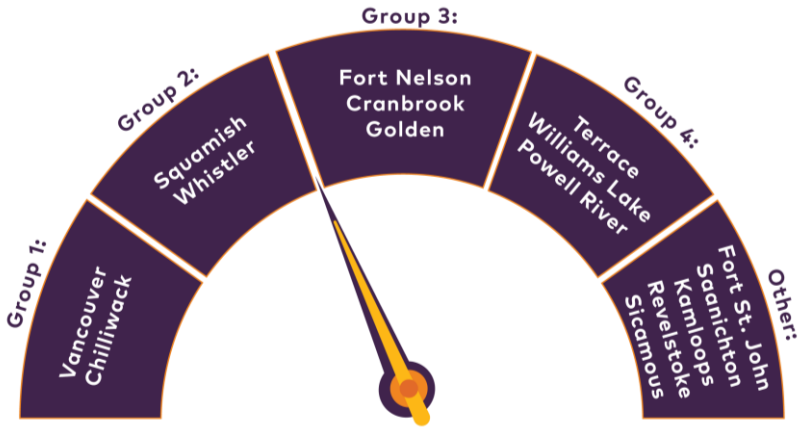
Principal component analysis demonstrated that retail margins for various municipalities in the dataset behaved similarly and, therefore, were clustered within groups. This suggests that one of the most important factors determining retail margins is the relative cost of doing business in the grouped locations.

> **Principal component analysis** takes a set of possibly related variables (i.e., retail margins in 15 BC municipalities) and identifies several different and unrelated components that together capture the total variation in the original variables.

The principal component analysis produced several clusters of municipalities that had similarities in the behaviour of their margins per litre. These groups are shown in Figure 7 and discussed below.

[8] Principal component analysis computes the time series (i.e., a series of values over time) that best explains the variance of retail margins in each municipality over time. It then finds the next best time series that explains the second most amount of variance. Municipalities may form into 'clusters' based on this plotting. This indicates similarities in the way the clustered variables are explained by each component.

Figure 7: Municipality Clusters by Principal Component Analysis of Retail Margin



Group 1: The first cluster of municipalities produced by the principal component analysis was comprised of Vancouver and Chilliwack. Retail margins in these cities had the lowest amount of variation of all municipalities examined. The lower variation signals that retail prices tracked more closely to the cost of wholesale fuel for retailers in these cities. Moreover, retail stations in these cities are presumed to primarily source their fuel from terminals in Vancouver, and thus have similar costs of supply.

Group 2: Margins at retail stations in Whistler and Squamish also demonstrated similar behaviour patterns. Retail stations in these municipalities typically source their fuel from the same terminals as retail stations in Metro Vancouver, but they do not collect the regional motor fuel tax that applies in Metro Vancouver. Unlike Chilliwack, which is also situated close to the boundary of a higher regional tax market, these municipalities did not track the wholesale price of gasoline as closely and exhibited lower price volatility.

BCUC staff's interpretation of the margin data is that the geographic proximity of Whistler and Squamish to Metro Vancouver resulted in these retailers forming a single larger market. Retail stations outside of the regional tax boundaries (i.e., those in Whistler and Squamish) competed with stations within the higher tax jurisdiction, rather than just with the stations within their own local area. A consequence of these market characteristics is lower price volatility (i.e., 'stickier prices') in the smaller adjacent communities and a unique clustering of these communities in the principal component analysis. It is important to note that operating costs (e.g., labour, licensing and permitting fees) may also influence differences in the retail margins.

Group 3: The next grouping of municipalities that showed similar margin behaviour to one another was Cranbrook, Golden, and Fort Nelson. These are smaller municipalities, where the margin per litre may be influenced by proximity to Alberta. BCUC staff's assessment is that access to lower-priced wholesale fuel, sourced from Alberta, allowed retail stations in this grouping to earn higher margins per litre compared to retailers that obtained fuel from more expensive BC-sources.

Group 4: The principal component analysis also identified that retail margins in Terrace, Williams Lake, and Powell River displayed comparable behaviour. Retail stations in these municipalities sold lower volumes of gasoline and displayed higher than average retail margins. Terrace, Williams Lake, and Powell River are each remote regions of BC, with populations of less than 20,000 people.[9] Previous BCUC investigations concluded that retail stations in remote areas may have more asymmetrical pricing due to lower levels of competition or less frequent fuel resupply. The clustering observed in this expanded data analysis continues to support this interpretation.

Other: Retail margin behaviours in the remaining municipalities examined seemed unique, as these did not cluster with others in the principal component analysis.

Fort St. John is a municipality along the BC-Alberta border, but unlike the other border communities in Group 3 of our dataset, its margins followed behaviour that was more similar to that of the smaller, remote communities in Group 4. What made the Fort St. John market distinct from either grouping was that its retail margins appeared to have been harder hit by the COVID-19 pandemic and took longer to recover to pre-pandemic levels.

Saanichton is the only municipality in the dataset located on Vancouver Island. Retail stations in Saanichton compete with stations located nearby in the large Victoria-area market. It was also the market with the highest proportion of stations that have car washes, which correlates with lower retail margins.

Kamloops is unique in that it has its own major fuel terminal and is the only municipality in the analysis, besides Vancouver, to have direct access to BC's only pipeline that imports fuel from Alberta. Because retailers have direct access to fuel infrastructure and terminal operators publicly publish wholesale prices, retail prices in Kamloops may track more closely with the wholesale price of fuel than other municipalities. Further, Kamloops stations sold some of the highest average volumes of gasoline, which in turn may mean stations there required a lower margin per litre of gasoline sold to recover their fixed costs. The diversity of these factors may explain why Kamloops did not cluster with other municipalities in the principal component analysis.

Sicamous is located on Highway 1 between Kamloops and the BC-Alberta border. As a result, retail stations in Sicamous can source their fuel from both the terminal in Kamloops and Alberta. BCUC staff observed that retail stations in this market charged a similar pump price to that of neighbouring municipalities, however, differences in the cost of fuel supplies may have driven a difference in the behaviour of their retail margins compared to those in Group 3 and Kamloops. Additionally, Sicamous has a higher-than-average proportion of retail stations that operate 24 hours-a-day compared to other municipalities in the dataset, which our model predicted would result in lower retail margins. Together, these market dynamics may explain why Sicamous was not grouped into a cluster in our principal component analysis.

[9] As per BC government population estimates in 2021.

Finally, Revelstoke also did not cluster with the other municipalities examined, as retail margins in Revelstoke did not appear to follow the same overall market trends during the study period, and the COVID-19 pandemic in particular. BCUC staff's assessment is that differences in trends in the volume of gasoline sold, the service offerings available at retail stations, and the mix of independent versus marketer-controlled stations in the municipality may be contributing to the pattern of margins observed during the study period.

Next Steps

In analyzing the data collected from select retail stations for the 2019 to 2022 period, BCUC staff observed that BC's retail fuel market appeared to be operating in a manner consistent with an effectively functioning market. The majority of variation in the retail margin per litre of gasoline in BC appears to be explained by BCUC staff's analytical models.

In a report issued in December 2023, BCUC staff found that for the same 2019 to 2022 period, the unexplained price difference between gasoline sold in BC and elsewhere in Western Canada had decreased significantly across the province. This decrease occurred during the period of the FPT Act's implementation and monitoring of BC fuel prices.

Transparency in the BC fuel market has improved since the implementation of the FPT Act. BCUC staff recommend that the BCUC continue to monitor BC's fuel market by:

- regularly collecting wholesale fuel data,
- conducting ad hoc reviews in situations where there are significant price events and/or sustained above-average margins in the retail fuel industry, and
- collecting information from the BC fuel market at all levels of the supply chain in response to any future events that have a significant impact on the price that BC drivers pay at the pump, in order to promote competitiveness and public confidence in the competitiveness of the fuel market.

If the BC fuel market is found to deviate from market-driven processes and if fuel price transparency diminishes, the BCUC will examine options and report to the BC government at that time.

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