



# Refining Margins in British Columbia

Examining the Renewable and Low Carbon Fuel  
Regulation Requirement in the Context of  
Refinery Net-Revenues

Michael Wolinetz, Navius Research Inc.

February 2015

Phone: 778-970-0355

Email: [Michael@NaviusResearch.com](mailto:Michael@NaviusResearch.com)

[www.NaviusResearch.com](http://www.NaviusResearch.com)

# Introduction and Summary

This report is Navius Research's second installment in a series of analyses exploring British Columbia's (BC) Renewable and Low Carbon Fuel Regulation Requirement (RLCFRR). In our first report, we provided an overview of how the regulation works, its impact on greenhouse gas emissions, as well as its acceptance by the citizens of BC. In this document, we explain how analysing the net-revenue for petroleum refining (i.e. the refinery margin) in BC provides insights into the economic impact of the RLCFRR. Specifically, we discuss:

- The relative impact of the RLCFRR on the viability of petroleum refining for the BC market
- The cost impact of the RLCFRR relative to the cost impact of higher than average refinery margins on consumers
- The potential for the RLCFRR to improve the competition in the market for transportation energy, resulting in lower energy cost for consumers

In our analysis, we found that:

- Since 2010, refinery margins in British Columbia have risen well above the Canadian average and are well above margins in other global markets.
- This change is the result of a decoupling of crude oil input costs from fuel prices, driven by the discount on crude oil in Alberta relative to the rest North America and the world.
- The rising margins are also a consequence of most fuel production being concentrated amongst very few firms. Even without collusion, this situation can result low competition for market share, higher margins and higher fuel prices.
- The rising margin indicates a period of increasing profitability for fuel providers in BC, without any significant benefit to consumers. Meanwhile, even if the RLCFRR had a negative impact on refiners, it was swamped by the effect of discounted Albertan crude oil.
- Higher than average refining margins have cost BC consumers roughly \$2.7 billion since 2010. In contrast, the cost impact of the RLCFRR is likely 30 times smaller.

- Furthermore, the RLCFRR increased the supply of transportation energy during a period when pipeline capacity and refinery outages were pushing fuel prices higher. This could have resulted in additional savings not quantified in the costs estimates noted above.
- Finally, the RLCFRR is supporting the development of new sources of cost-competitive transportation energy. With greater supply from a greater number of suppliers, refiners would have greater competition in supplying transportation energy, resulting in lower refinery margins and lower fuel prices.

# What are refinery margins?

A refinery margin is the revenue associated with refining petroleum, expressed as a value per volume (e.g. \$/L), net of the cost of the crude oil input. The simplest refining margin calculation is based on subtracting the relevant crude oil cost from the wholesale price of gasoline in the refiner's market. More advanced calculations account for the relative proportion of refined products from each barrel and refinery configurations; there is no universal measure. Therefore, actual refinery margins are a function of both the non-crude cost of refining as well as the wholesale price of the finished refined products. Costs include energy costs, operating and maintenance costs and capital costs. Like most goods, the wholesale price of refined products is a function of their supply and demand within regional, continental and global markets.

Because calculated refinery margins must cover costs, they are not an absolute indicator of profits. A high refining margin does not necessarily mean a refinery is highly profitable. For example, complex refineries have more flexibility to convert crude oil into the most valuable slate of products. However, that flexibility comes at a cost. A complex refinery requires a greater initial investment and will require a higher return on its activities to make that investment viable.

Nonetheless, a comparison of refining margins between regions and over time provides a good indication of the *relative* profitability of refining in a given market:

- If the margin is rising, it generally means profits are rising;
- Similarly, if the margin in one region rises much more rapidly than in other regions, or is much higher for similarly complex refinery configurations, it generally means refining is a more profitable industry in that region.

## Trends in refinery margins in BC, Canada, and the world

To provide further context to a discussion of the RLCFRR's impact on fuel providers and consumers, we have analyzed the trend in refining margins in BC (i.e. the margins of refineries that provide fuel to British Columbia). Both the RLCFRR and the refinery margin affect refiner revenues and fuel prices. But in general, the margins and the operation of the oil market in general have a much greater impact than the regulation. Our analysis indicates that between 2010 and the end of 2014, petroleum refining for British Columbia:

- Experienced a decoupling of crude oil input costs from fuel prices, driven by the discount on crude oil in Alberta relative to the rest of North America and the world
- Consequently became more profitable and was likely more profitable than the refining sector anywhere else in North America or the world

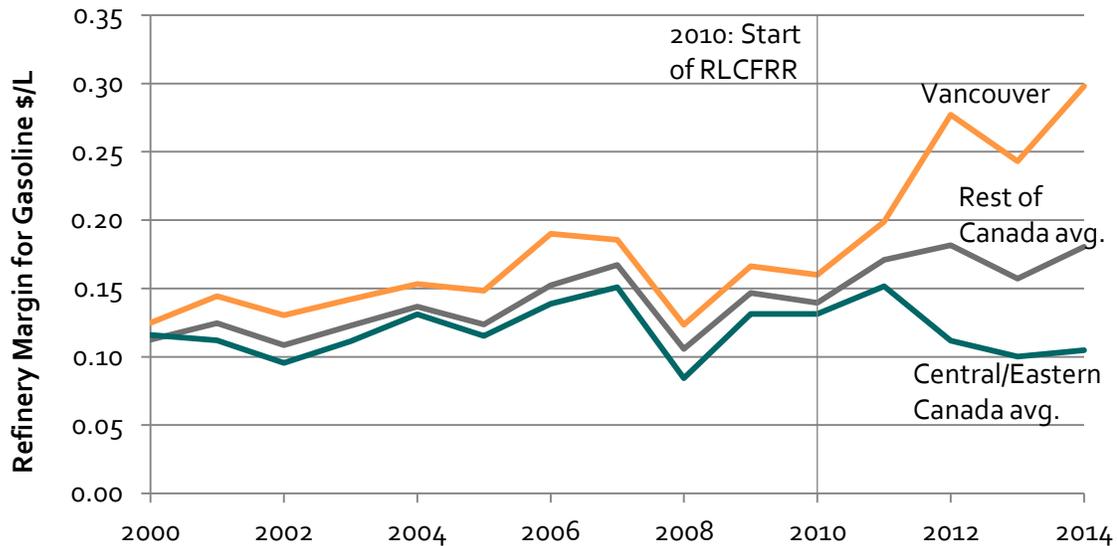
Our assessment of the trend in refining margins in BC is based on monthly estimates of the margins for refineries supplying the Vancouver market, produced by the Kent Group Ltd.; this data is also used by Natural Resources Canada for their fuel market reporting. Figure 1 shows the refining margin for gasoline in Vancouver relative to an average of other Canadian representative markets (Calgary, Regina, Winnipeg, Toronto, Montreal, Saint John, Halifax and St. John's) and an average of central/eastern markets (Toronto and east. Note that some Ontario refiners have access to lower cost Albertan and mid-continent crude which brings up this average somewhat).

**Prior to the year 2010, there was a narrow and relatively consistent spread in refining margins across Canada.** Margins were higher in western Canada because this region was an area of net crude oil supply. The cost of crude oil in this region was less than in areas of net demand (e.g. Eastern Canada), with the discount reflecting the cost of transporting the oil to major trading hubs. North America generally has an integrated price for petroleum products because refineries can ship their products to higher priced markets and, because of the necessary cost and lead time, it is difficult for a new refinery to begin production and undercut local prices.

**Since 2010, the same year the RLCFRR came into effect, refinery margins in western Canada increased relative to the Canadian average. This trend was most pronounced in British Columbia.** Between the start of 2010 and the end of 2014, Vancouver had the highest refinery margins in all of Canada for 40% of the time.

**The rising margin in British Columbia indicates rising profitability.** Since 2010, we know of no major refinery re-configurations that would affect refining costs. Therefore, changes in refining costs are limited to the cost of crude oil which is netted out of the refining margin. Consequently, a higher margin means greater profits.

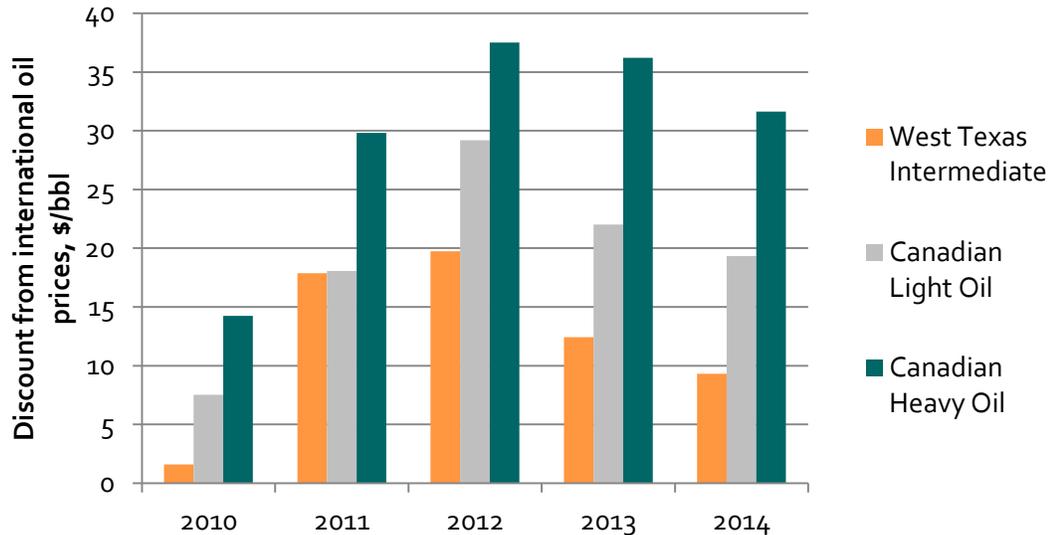
Figure 1: Annual average refinery margins for gasoline in Vancouver relative to rest of Canada



Source: Margin data is from the Kent Group Ltd. (<http://kentreports.com/wpps.aspx>). The Costs are real 2014 CAD. The representative markets included in the data are: Vancouver, Calgary, Regina, Winnipeg, Toronto, Montreal, Saint John, and St. John's. The "rest of Canada average" excludes Vancouver. The Central/Eastern Canada average includes Toronto, Montreal, Saint John, and St. John's.

**Rising profits can be attributed to a discount in the "landlocked" crude oil available to the western refineries.** This oil, produced in Alberta and the US Midwest, is available in these markets at a lower cost relative to crude oils that have better access to international markets. Figure 2 shows the discount of West Texas Intermediate crude oil (a North America price benchmark) relative to internationally traded light crude oil grew significantly between 2010 and 2014, peaking in 2012. Oil from Canada saw a steeper discount due to even larger export constraints from Alberta. This is especially true for heavy oil and bitumen since the market for these commodities is limited to upgraders and refineries capable of processing that grade of crude oil.

Figure 2: The price discount of “landlocked” oil relative to international oil



Source: NRCAN selected monthly prices ([www.nrcan.gc.ca/energy/fuel-prices/crude/4927](http://www.nrcan.gc.ca/energy/fuel-prices/crude/4927)). Costs are real 2014 CAD. The international oil price benchmark is light sweet oil priced in Montreal. Canadian oil is priced in Alberta and the West Texas Intermediate is priced in Chicago.

**A reduction in crude oil costs relative to other jurisdictions does not translate into lower retail costs**, as explained in a Natural Resources Canada analysis of the situation in 2013:

*"...wholesale gasoline prices remained at similar levels in all selected centres, reflecting the integrated nature of the continental gasoline market.....Canadian wholesale prices of refined products are largely determined by wholesale prices in adjacent U.S. regions which are in turn predominantly tied to international product markets."<sup>1</sup>*

In summary, when the crude oil input cost to a Canadian refinery declines, the windfall goes to the refinery rather than consumers.

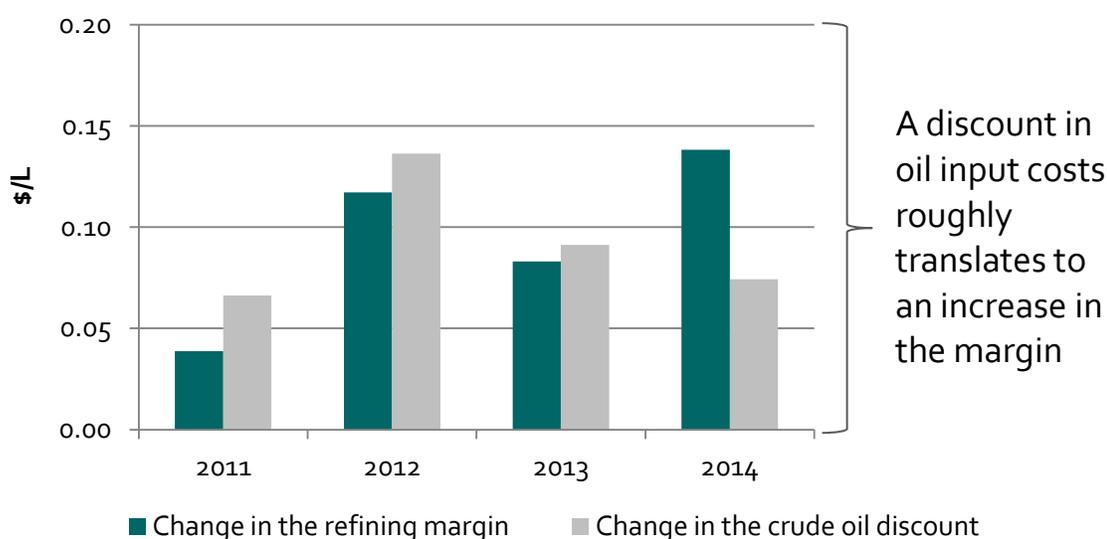
Additionally, the refining sector in Canada is an oligopoly, meaning there are too few entities supplying fuel for it to be sold in a fully competitive market. Based on operating capacity, about 70% of Canadian petroleum fuel production is controlled by four firms. That figure for BC is somewhere between 80% and 90%, indicating a near monopoly.<sup>2</sup> In contrast, that ratio for the US sector is less than 45%.<sup>3</sup> Because of the

<sup>1</sup> Natural Resource Canada (NRCAN), 2013, *Fuel Focus: Understanding Gasoline Markets in Canada and Economic Drivers Influencing Prices, 2012 Annual Review*

cost and lead time required to build a new refinery, there are rarely new suppliers entering the refining market. Even without collusion, the situation in Canada and BC can result low competition for market share and higher fuel prices.

Further evidence of this situation is the relationship between the refinery margin for gasoline in Vancouver and the spread in the international/Canadian light oil price from 2010 to the end of 2014 (Figure 3). The variation in the oil price discount can account for 56% of the variation in the refining margin over this period.

**Figure 3: The change in the Vancouver refining margin relative to the discount of the input crude**



The change in the refining margin is calculated using the data shown in Figure 1. The change in the crude oil discount is the spread between the Canadian light oil and the international light oil price (landed in Montreal) shown in Figure 2.

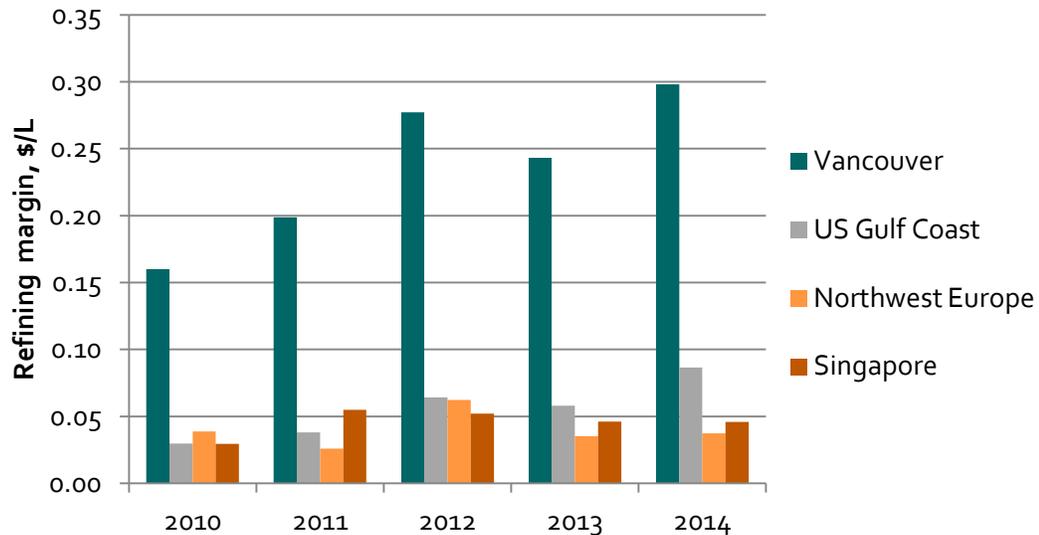
**Furthermore, petroleum refining in British Columbia appears to be more profitable than in most other markets in the world.** Refining margins in Vancouver, which reflect margins in western Canada and the US Midwest, were more than three times higher than in Europe, Asia and the US Gulf Coast (Figure 4).

The specific circumstance of each refinery will mean that its margin will differ from the archetypical estimates used in this analysis. For example, the Chevron refinery in Burnaby has stated that competition for pipeline capacity has forced it to source approximately 18% of its crude oil from rail deliveries rather than through the

<sup>3</sup> US Energy Information Agency, 2014, Today in Energy: 2014 U.S. petroleum refinery update-- capacity edges up, ownership shifts. [www.eia.gov/todayinenergy/detail.cfm?id=16911](http://www.eia.gov/todayinenergy/detail.cfm?id=16911)

Transmountain Pipeline.<sup>4</sup> However, we estimate that this situation would reduce the margin for that specific refinery by 5 to 10%, leaving it well above average.

Figure 4: Refining margin in Vancouver relative to other global markets



Source: The International Energy Agency Monthly Global Indicator Refining Margins ([www.iea.org/media/omrreports/MHM.xls](http://www.iea.org/media/omrreports/MHM.xls)). The refining margin for Vancouver is the same as shown in Figure 1. The refining margins shown here are for moderately complex refinery archetypes: they use cracking to increase the yield of gasoline and diesel, but they do not have coking equipment.

## Evaluating the RLCFRR in the context of BC refining margins

Because the implementation of the RLCFRR coincidentally occurred at the same time as this increase in refining margins, we can make some informed statements about the cost of the regulation to refineries and to consumers:

**Any costs or savings resulting from the RLCFRR are small when compared with the premium that BC consumers paid due to higher margins.**

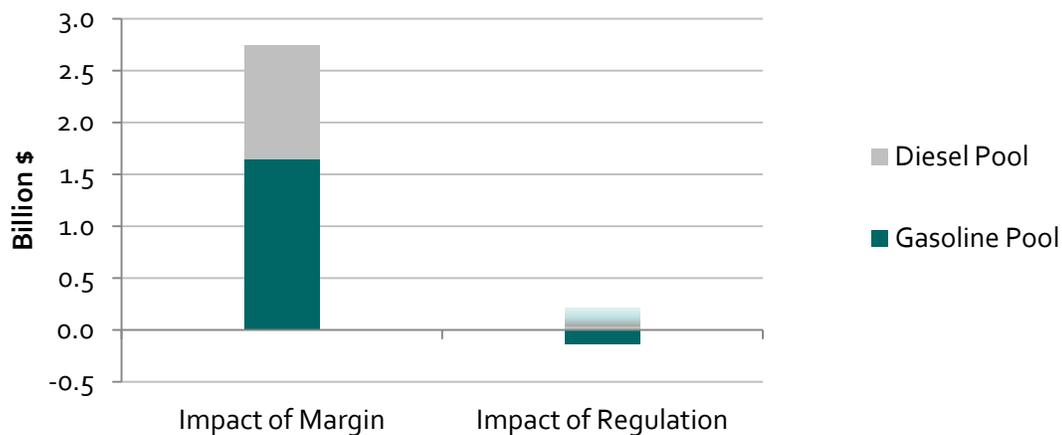
Between 2010 and the end of 2014, consumers paid a premium of \$2.7 billion for gasoline and diesel because of refining margins that are higher than the Canadian average. This premium corresponds to a cost of \$1,500 per household over that period, or a markup of roughly 7 cents for each litre of fuel.

---

<sup>4</sup> For example in Bennett, 2013, *NEB Rejects Chevron Refinery's Request for Priority Status to Get More Oil*, Business in Vancouver, [www.biv.com/article/2013/7/neb-rejects-chevron-refinerys-request-for-priority/](http://www.biv.com/article/2013/7/neb-rejects-chevron-refinerys-request-for-priority/)

While the net cost impact resulting from RLCFRR is uncertain, it is undoubtedly much smaller than the cost of high refining margins. The alternative fuels required by the RLCFRR have been at times more and less costly. The cost impacts likely ranged between a net savings of \$60 million to a net cost of \$80 million over that period (+/- 3% of the refinery margin cost impact). This total is comprised of a savings of \$130 million, resulting from blending ethanol with gasoline, and a cost of \$68 to \$211 million, resulting from blending biodiesel and renewable diesel with petroleum diesel (Figure 5).

Figure 5: Refinery margin cost relative to the cost/benefit of the RLCFRR



The cost are real 2014 CAD. The impact of the refining margins is derived from the difference between the monthly refining margin data from the Kent Group Ltd. (<http://kentreports.com/wpps.aspx>) for Vancouver and the average for Calgary, Regina, Winnipeg, Toronto, Saint John and St. John's. Fuel consumption used to determine expenditures is from Statistics Canada CANSIM 134-0004, monthly domestic motor gasoline and diesel fuel oil sales. The biofuel cost impacts are estimated based on the relative wholesale prices of the biofuels compared to the petroleum fuel, and based on US trade clearing exchanges. The range of the estimate comes primarily from the uncertainty in the cost of renewable diesel imported to BC.

**The RLCFRR mitigated tight supplies of petroleum fuels in BC over the past two years, potentially resulting in a cost savings not quantified here.** The BC market has an additional factor that further increases the price of fuel. Typically, gasoline and diesel prices in nearby Canadian and American cities roughly mirror each other. However, NRCAN reported recently that in 2013 and 2014, the wholesale price of gasoline was consistently higher (8%) in Vancouver than it was in Seattle due to tight supplies. The reduced supply, which would have affected a significant volume of BC gasoline, was caused by a shortage of crude oil transportation capacity into Vancouver as well as refinery outages for maintenance.<sup>5</sup> Similarly, diesel fuel prices in western

<sup>5</sup> Natural Resource Canada (NRCAN), 2014, *Fuel Focus: Understanding Gasoline Markets in Canada and Economic Drivers Influencing Prices, 2013 Annual Review*

Canada have also been significantly above gasoline prices, a situation again attributable to tight supplies.

From 2013 to 2014, renewable and low carbon fuel accounted for roughly 6% of transportation energy consumption.<sup>6</sup> The simple economics of supply and demand mean that without that additional energy supply, supplies of petroleum fuels would have been even tighter, resulting in higher gasoline and diesel prices.

**If refineries did bear an additional cost due to the RLCFRR, it did little to dampen their profitability from 2010 to the present.** Despite any possible costs to refiners for compliance with the RLCFRR, refinery margins in BC rose to well above the Canadian average and well above what is typical around the world. Any negative impact of RLCFRR on the viability of fuel providers in BC was swamped by the growing spread between their crude input costs and product prices.

**The RLCFRR is supporting a market for alternative transportation energy, which can mitigate higher refinery margins in the future. The emergence of firms supplying cost-competitive alternative fuels will increase the fuel supply and increase the number of entities competing to supply transportation energy. Consequently, there will be increased energy supply in a more competitive market, reducing the opportunity for windfall profits at the expense of consumers.**

The recent spread between the price of “landlocked” crude oils in North America and the price of oil on the international market creates pressure to export crude oil from the west coast of Canada. Oil for export generally uses the same transportation infrastructure as does oil and refined petroleum products for domestic consumption in BC. Therefore, the price spread reduces the capacity available for importing fuel into BC. This in turn results in higher refinery margins since it is difficult to undercut the price by shipping additional supply into the market.

Petroleum fuels are a mature product, so over time, the market should produce more fossil fuel transportation infrastructure to alleviate this problem. However, public acceptance of fossil fuel transportation infrastructure – particularly crude oil transport – is an ongoing challenge to its development. This opposition increases the likelihood that the spread in oil prices will continue and BC may be entering a prolonged period of higher than average fuel prices. As well, more fossil fuel infrastructure would not break

---

Natural Resource Canada (NRCAN), 2015, *Fuel Focus: Understanding Gasoline Markets in Canada and Economic Drivers Influencing Prices, 2013 Annual Review*

<sup>6</sup> Based on the volumes supplied under the RLCFRR in 2011 and 2012, BC Ministry of Energy and Mines, 2014, *Renewable and Low Carbon Fuel Requirements Regulation Summary for 2012*

the oligopoly in the refining market and there would still be less than ideal competition amongst fuel providers.

Another solution is to increase the number of cost-competitive substitutes for petroleum fuels. More options for transportation energy would make the market for existing fuels more competitive. With more substitutes, consumer demand for gasoline and diesel would be more responsive to price. In order to maintain market share, refiners would have to reduce their margins, with prices following downward. However, sources of alternative energy for transportation must become mature technologies for this broader market to be fully realized.

A technology neutral policy like the RLCFRR will push the most viable sources of alternative energy through the growing pains experienced by any new technology. By creating a niche market for alternative transportation energy, the regulation:

- Ensures the real and perceived risks associated with new technologies are addressed (e.g. warranty on vehicles, fuel certification).
- Creates a market that is large enough to benefiting from economies of scale.
- Limits the uncertainty associated with new technologies, thereby reducing the cost of capital required for investment, producing a lower cost of production.

Under the RLCFRR, fuel suppliers in BC are already incorporating alternatives (e.g., biodiesel, ethanol) into the fuel supply, relieving pressures on tight gasoline and diesel supplies and moderating prices. This trend will continue as the the next generation of alternative fuels enters the market. The future holds the possibility of de-coupling BC from high margins and oil price shocks as its fuel supply broadens across regionally produced energy derived from multiple commodities.