

PARKLAND FUEL CORPORATION UNDERTAKING NO. 3

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Requestor: Commissioner Doehler

Witness: Dr. Kahwaty

Question: What kind of regulatory mechanism would have the potential to smooth volatility of retail gasoline prices, while ensuring adequate supply and an absence of shortages?

Response:

Introduction

Retail markets for gasoline and diesel exhibit several characteristics that are relatively unique for repeat-purchase consumer products. One such characteristic is the extent of the volatility of the prices in these markets. There are several sources of this price volatility. One of these sources is the underlying volatility of crude oil prices. As detailed in Figure 34 of my expert report, since the start of 2015, the value of the crude oil feedstock component of retail regular gasoline prices has varied between 16.9 cents in Q1 2016 and 49.3 cents in Q2 2018.¹ Oil prices regularly react to world events.² As discussed in my expert report and testimony, retail prices also react to events such as unplanned refinery outages.³

There is an additional source of retail price volatility in some markets for gasoline and diesel. This volatility results from cyclical pricing patterns whereby competing retailers undercut each other's pricing, driving down prices over time. When very low prices have been achieved, they then "reset" at higher levels, and the process repeats. The economics literature refers to such pricing patterns as "Edgeworth cycles", and I refer to

¹ Expert Report of Henry J. Kahwaty, Ph.D., An Inquiry into Gasoline and Diesel Prices in British Columbia Project No. 1599007, June 27, 2019, p. 84, available at https://www.bcuc.com/Documents/Proceedings/2019/DOC_54405_C5-2-Parkland-Evidence.pdf.

² For example, oil prices jumped 5 percent following the recent U.S. military's shooting down of an Iranian drone. Resnick-Ault, Jessica, "UPDATE 8-Oil jumps 5% on Iran tension, potential U.S. fed rate cut," Reuters, June 20, 2019, available at <https://af.reuters.com/article/commoditiesNews/idAFL4N23R1B1>.

³ Expert Report of Henry J. Kahwaty, Ph.D., An Inquiry into Gasoline and Diesel Prices in British Columbia Project No. 1599007, June 27, 2019, pp. 89-90, available at https://www.bcuc.com/Documents/Proceedings/2019/DOC_54405_C5-2-Parkland-Evidence.pdf; The Markets for Gasoline and Diesel in British Columbia – Dr. Henry K. Kahwaty, An Inquiry into Gasoline and Diesel Prices in British Columbia Project No. 1599007, July 17, 2019, Slide 19, available at https://www.bcuc.com/Documents/Proceedings/2019/DOC_54619_C5-9-Parkland-OralWorkshop-DrKahwatySlides.pdf.

them here simply as “price cycles”. A description of price cycles from the economics literature is:

In many Canadian cities, retail gasoline prices follow a high-frequency, asymmetric price cycle. Publicly available weekly price series show the cycle begins with a large and sudden increase in retail prices followed by many small price decreases over subsequent periods. Once mark-ups are sufficiently small, prices jump back up and the cycle begins anew.⁴

Prices that cycle may decrease all the way to wholesale cost. The asymmetric pattern of occasional, sudden large price increases followed by numerous small price decreases often occurs because a single firm “leads” the market upwards and then others attempt to win market share by reducing prices. Such price cycles have been observed in numerous countries around the world, although even within a given country such as Canada or the United States, not all cities will exhibit cycling.⁵

The regulation addressed in this undertaking would be designed to dampen or eliminate price cycling and may involve, for example, attempting to regulate the retail margin added to wholesale prices at the average of the retail margin over the cycle, eliminating the high and low prices during the price cycle and also the associated high and low retail margins during the price cycle.

Such regulation has the potential to generate both benefits and costs.

Regulatory Framework

The following principles should guide any contemplated regulation designed to reduce or eliminate retail price volatility due to price cycles:

1. Given that the wholesale prices for gasoline and diesel are derived from well-functioning markets, any contemplated regulation should (at most) operate on retail prices and/or retail margins only. British Columbia has a diversity of wholesale supply sources, and the goal of the regulation is not to affect wholesale prices but rather to remove or limit additional volatility in retail prices derived from movements in retail margins over the price cycle, not to dampen or eliminate volatility in wholesale prices or caused by changes in these wholesale prices. By regulating the retail component of the final consumer’s price and not

⁴ Noel, Michael D., “Edgeworth Price Cycles: Evidence from the Toronto Retail Gasoline Market”, *The Journal of Industrial Economics*, Volume 55, Number 1, March 2007, pp. 69-92.

⁵ Noel (2007) finds empirical evidence from Toronto as to the amplitude and frequency of Edgeworth Cycles. In his high-frequency dataset, he finds that the duration of cycles is around a week and that the amplitude of the cycle is around 8 percent of the price. Other studies, e.g., in Perth, Australia, have found cycles that are biweekly. See Noel, Michael D., “Edgeworth Price Cycles”, in Durlauf, S. and N. Blume ed. *The New Palgrave Dictionary of Economics*, 2011, London: Macmillan, for a review of some early empirical studies on Edgeworth Cycling.

the wholesale component, the contemplated regulatory framework should not generate supply shortages due to insufficient wholesale supply.

2. Given the diversity of British Columbia retail locations in terms of capital and operating costs (e.g., operating in high cost areas like Vancouver and lower-cost areas elsewhere) and in higher-volume and lower volume locations (e.g., urban v. rural, commuter routes on major roads v. less traveled roadways), retail prices or margins should not be uniform. Uniform pricing or margins would generate incentives for exit if margins are too low to support retail operations in a given area or region, resulting in underserved geographies, or entry in excess of what would be experienced in a competitive market if margins are too high in an area or region. Either would result in retail market distortions that would harm market participants (e.g., consumers are harmed if exit is induced and their retail alternatives are more difficult to access than would be the case in a competitive environment). Although uniform pricing may be the norm in some regulated industries (e.g., historically telephone rates were homogenised across rural and urban locations, and the postal service used postage-stamp rates that did not vary with actual costs of delivering post), in those contexts there usually is a monopoly service provider. In the retail gasoline market, prices serve as signals for entry and exit by firms making independent business decisions, so incorrect prices will have greater distortive consequences. Cross subsidization of different groups of consumers is much more difficult to support where consumers are served by multiple downstream entities that compete with each other than when all are served by a single, regulated service provider.

Such a regulatory framework could involve, for example, setting retail prices at one of several levels above an average of local rack prices, where the specific retail margins used to determine retailer prices vary based on the retailer's characteristics. The principle of avoiding wholesale market regulation is to limit the market distortions such regulation would induce, and though some retail market distortions are inevitable, the principle of avoiding "one-size-fits-all" retail regulation is to minimize the effects of retail market distortions as well.

Price control regulation typically occurs in settings where a single provider has a natural monopoly, for example, the electricity transmission and distribution industry.⁶ An unregulated profit-maximizing monopolist may charge prices that are substantially higher than marginal costs resulting in substantially reduced consumer and total surplus. Neither the retail nor wholesale gasoline/diesel markets in British Columbia are monopolies, and as detailed in my expert report and testimony, the retail market in British Columbia being contemplated for regulatory intervention is competitive. Regulating prices and other competitively-sensitive decisions made by businesses operating in competitive markets is difficult and risks causing substantial market distortions that are not concerns in the context of other markets subject to economic regulation.

⁶ Steiner, Faye, "Regulation, Industry Structure and Performance in the Electricity Supply Industry," Economics Department Working Papers No. 238, Organisation for Economic Co-operation and Development, April 20, 2000, p. 10.

Potential Benefits

The retail prices of gasoline and diesel are relatively volatile compared with the prices for many other consumer products. Price volatility induces uncertainty and exposes consumers to risk. Consumers are generally risk averse and would prefer, all else equal, to avoid risks. This is why consumers purchase insurance even when it is not legally required for them to do so. Insurance involves up-front payments by consumers in exchange for payments from insurance companies if one or more adverse events occur. Though the purchase of insurance reduces the consumer's resources available to purchase other products, it smooths the consumer's expected net resources over time by also increasing the consumer's resources if an adverse event occurs.

Implementing price controls to reduce gasoline and diesel price volatility would benefit consumers, but the extent to which this benefit is valued by consumers is uncertain. Economists measure the value of a product or service to a consumer by the consumer's willingness to pay for it. I am aware of no information regarding consumer's willingness to pay for reductions in gasoline and diesel price variability. Is reduced price variability worth a cent per litre to consumers, on average? Is it worth 5 cents? More? Is it worth only 0.1 cent, or perhaps even less? Regulation that is costly but only generates small benefits to consumers is not likely to, on net, enhance economic performance or the overall economic well-being of British Columbia. I note that consumer willingness to pay for reduced gasoline and diesel retail price volatility is not likely to be large when consumers have low-cost strategies to avoid the price volatility, such as purchasing from retailers that pursue low-price strategies or making purchases when prices are low even if their vehicle's tank is not "on empty". Price cycles can be thought of as reflecting a dispersion of prices over time, and substituting purchases at one point of time when prices are lower for purchases made at other times helps consumers to avoid making high-priced purchases.

Potential Costs and Other Adverse Effects

As I discussed in my June 27, 2019, report, gasoline and diesel price controls are used in the Atlantic Provinces. These price controls do typically reduce the short-run (intra-day and short-run day-to-day) variation in prices. However, price controls also impose costs on consumers, the market, and the overall economy. This section outlines some of the costs and disadvantages associated with gasoline and diesel price regulation.

Elimination of Low-price Suppliers

In order to eliminate price cycling, regulation may require setting retail prices as opposed to setting price ceilings and price floors and allowing the retailer to select a price between the two. If a price ceiling and a price floor are established, price cycling could still occur, though actual prices may cycle in a narrower range. Setting prices would eliminate competition in the market from retailers like Costco that typically have relatively low gasoline prices in an effort to encourage consumers to visit the site and purchase in-store merchandise. Its strategy would appeal to very price sensitive

customers, and to customers that value the convenience of one-stop shopping for fuel, groceries, and possibly other items too. Even if a price range is allowed, however, setting a price ceiling and a price floor may be sufficient to cause retailers to abandon such a strategy. For example, Nova Scotia sets both price ceilings and price floors, and Costco does not sell gasoline at its locations in Nova Scotia.⁷ Costco typically sells gasoline at or near wholesale prices to maintain a reputation for providing low-cost fuel and encourage consumer traffic in its stores. Press reports indicate that when Costco enters into the retailing of gasoline in a new geographic area, local prices for gasoline decline.⁸ Regulation has the potential to lessen or eliminate the use of Costco's business strategy in British Columbia, which would harm consumers that purchase gasoline at Costco locations, and hamper the ability of others to adopt a strategy like Costco's. If Costco's presence in the market tends to reduce the level of prices, its withdrawal from the market would tend to raise prices for customers of other gasoline and diesel retailers as well. The loss of a low-priced gasoline option, and equally importantly, the loss of variety that could result from inhibiting the strategies of retailers such as Costco, are costly to consumers.

Some retailers may not actually price in a cyclical manner. Even though regulation may lead retailers to abandon the use of business models like Costco's, Costco itself, for example, does not typically cycle its prices with the rest of the local retail market. Instead, its low-price strategy is more stable, and it prices "outside" of the cycle itself. Therefore, even if the goal of the regulation is to reduce or eliminate price cycling, it may have the unintended consequence of eliminating or inhibiting competition from firms that offer prices that are both *predictable and always low* and therefore removing low- and stable-prices gasoline and diesel from the retail marketplace.

Focal Points for Coordinated Pricing

Price ceilings may serve as "focal points" for firms to tacitly collude to set higher prices. If regulatory authorities set a price ceiling, retailers will have an incentive to set their "default" price at the ceiling. One of the difficulties firms have when engaging in coordinated conduct is agreeing on the price that should be charged. Having a target price makes it easier for firms to coordinate their pricing because the barrier of selecting the target price is removed or at least lessened. Instead, pricing can coalesce around the implicitly-agreed upon ceiling price.

⁷ Costco does not have any locations on Prince Edward Island. However, this is not necessarily due to the presence of gasoline and diesel price controls, but rather Costco may have decided, for example, that the Prince Edward Island market is not large enough to justify opening a store in the province.

⁸ See, for example, Moriarty, Rick, "Gas Price War Started by Costco Pushing Prices Down in Syracuse Suburb," *Syracuse.com*, November 17, 2014, available at https://www.syracuse.com/news/2014/11/gas_price_war_started_by_costco_pushing_prices_down_in_syracuse_suburb.html; Cairme, Reid, "Maui Costco Gas Opens at Low \$3.99," *Mauinow.com*, July 12, 2012, available at <https://mauinow.com/2012/07/12/maui-costco-gas-opens-at-low-3-99/>.

I discussed in my June 27, 2019, report that empirical research indicates price controls in Canada have led to higher average prices for gasoline.⁹ Coordinated pricing enabled by the regulation may be a reason for such a finding, as may a general diminution in competition caused by changes in the business strategies pursued by individual firms as a result of the regulation.

Fewer but Larger Price Changes

Regulated retail prices that change on a daily basis may still appear volatile, even if those changes are caused solely by wholesale price changes. Gasoline and diesel price regulation in Eastern Canada has not permitted daily retail price changes. Instead, regulators have typically set prices for specific intervals and only allowed changes weekly or bi-weekly. Therefore, instead of allowing retail prices to adjust to wholesale market forces gradually as wholesale markets evolve over time, retail prices remain constant for a period and then, when change occurs, cumulated effects are realized together. What would have been the market price but-for the price control may become substantially different over time from the price set by the regulators. Hence, when regulators set a new price, it may be substantially different from the previous price. As a recent example, on June 28, 2019, a new regulated price went into effect in Nova Scotia. This new price resulted in a one day 6.5 cent average price increase for gasoline in the province. On the same day the average price of gasoline in Vancouver increased only 1.3 cents. Similarly, on July 2, 2019, a new regulated price went into effect in Prince Edward Island that resulted in a one day 8.0 cent average price increase for gasoline in the province. On the same day the average price of gasoline in Vancouver increased only 2.6 cents.¹⁰

I have analyzed the variation in prices when average prices changed in Nova Scotia, Prince Edward Island, and British Columbia between July 1, 2016, and July 22, 2019, and the variability in price changes is higher in both Nova Scotia and Prince Edward Island than it is in British Columbia. The standard deviation in price changes in British Columbia during this period was 0.72 percent compared with 1.25 percent and 1.17 percent for Nova Scotia and Prince Edward Island respectively. This is not surprising given that prices in British Columbia are reacting to wholesale market forces in real-time, while regulators in Nova Scotia and Prince Edward Island must attempt to mimic what would be the market price either on a weekly (Nova Scotia) or bi-weekly (Prince Edward Island) basis. Hence, regulators are perpetually playing catch-up.

Price cycling involves a pattern of “day-to-day” volatility. Regulation replaces this volatility with potentially larger but less frequent price changes. Even if these changes are driven solely by factors such as the prices of crude oil and wholesale market conditions, the price changes in the regulated environment may appear to consumers to be large and sudden.

⁹ Expert Report of Henry J. Kahwaty, Ph.D., An Inquiry into Gasoline and Diesel Prices in British Columbia Project No. 1599007, June 27, 2019, ¶ 154, available at https://www.bcuc.com/Documents/Proceedings/2019/DOC_54405_C5-2-Parkland-Evidence.pdf.

¹⁰ Prices retrieved from the Kent Group, See The Kent Group Ltd. – Petroleum Price Data, available at <https://charting.kentgrouppltd.com/>.

Loss of Ability to Take Advantage of Price Cycles

Price-sensitive consumers may gain significantly from the presence of price cycles if they can optimize their purchases to coincide with the trough of these cycles and therefore make purchases when retail margins are very low. Noel (2012) notes that in Australia prices tend to increase on Wednesday and Thursday with some regularity, suggesting that consumers can make purchases earlier in the week to take advantage of prices in the lower portion of the cycle. Noel also points out that price cycles increase the spread of prices across points in time but compress them across gasoline stations at different locations. The implication is that for consumers who can anticipate the cycle and time purchases accordingly, the “search costs” or costs of shopping around for deals are lower.¹¹

If lower income consumers place an enhanced value on their ability to make gasoline or diesel purchases at low points in the price cycle, then removing this option may have a disproportionate negative impact on lower income consumers. Consumers likely vary in the degree to which they are prepared to tolerate price volatility. There is a trade-off between the opportunity to purchase at lower prices and enhanced price certainty. If lower income consumers are willing to tolerate greater volatility in exchange for the opportunity to make some or all their purchases at the trough of the cycle, forcing them to purchase at the cycle average price might make them worse off and reduce their consumption.¹² This would have regressive consequences because it would raise the average purchase prices for lower-income consumers.

Loss of Enhanced Competition Brought About by Price Cycles

Empirical evidence contrasts markets with price cycles to markets with “stable” equilibrium pricing. Thus, some studies such as Noel (2002) and Doyle et al. (2010) find that in cities in the U.S. and Canada, average mark-ups were either lower after cycling started relative to before cycling started or were lower, all else equal, in cities with cycling than in cities that did not have cycles.¹³ Zimmerman, Yun and Taylor (2013) find that average gasoline prices in U.S. Midwest cities where cycles began to emerge

¹¹ Noel, Michael D., “Edgeworth Price Cycles and Intertemporal Price Discrimination”, *Energy Economics*, Volume 34, Number 4, 2012, pp. 942-954. Noel cites to evidence compiled by the Australian Competition and Consumer Commission that appears to show Australian consumers do buy fuel more often on days that they think prices are going to be lower. In Eastern Australian markets, 83% of consumers thought that there were price cycles and 75% correctly stated that these cycles were weekly; 59% of consumers (and 69% of all those who were aware of cycling) said that they bought more often on days when they thought that prices were lower.

¹² In this context, it is worth noting the parallel made by Noel (2012) between price discrimination and price cycles. While price cycles are not price discrimination per se, they do broaden the (temporal) menu of prices that consumers face. Just as price discrimination can sometimes open up markets that would not be served under uniform pricing, so too might price cycles enable or increase participation in the market by certain consumer groups.

¹³ Noel Michael D., “Edgeworth Price Cycles”, in Durlauf, S. and N. Blume ed. *The New Palgrave Dictionary of Economics*, 2011, London: Macmillan.

decreased by 0.75 cents to 1 cent per gallon (U.S. cents).¹⁴ As such, though consumers may prefer to avoid volatility, they gain an implicit price advantage from price cycling, and that advantage partially or fully offsets (or may actually be larger than and more than offset) the adverse consumer impacts caused by the volatility.

Atkinson, Eckert and West (2014) study the effects of a refinery fire in Nanticoke in 2007 on price cycling in several Ontario cities.¹⁵ They find that the price cycles collapsed after the refinery fire and did not re-emerge afterward. They argue that there is a clear causal relationship between the refinery fire and the collapse of price cycles.¹⁶ Noel (2015) then uses this refinery fire as a natural experiment through which he establishes the causal effect of cycling on prices—finding that cycling reduced prices by an average of 1.06 to 1.31 Canadian cents per litre.¹⁷

Administrative Costs Associated with Price Regulation

Creating and maintaining a price control regulatory body or function inside the BCUC would require the expenditure of taxpayer resources and impose burdens on private parties. I have not analyzed the magnitude of these public and private costs, but such costs would need to be considered in any cost-benefit analysis associated with establishing a price control regulatory regime in British Columbia.

Regulation May Increase Average Prices

Regulation may result in increased prices for other reasons as well. For example, regulatory policy, limits on pricing or other aspects of competitive strategy, or business uncertainty may act to discourage the building of new gas stations in an area. Barriers to entry generally inhibit competition.

Business uncertainty can be generated or enhanced by regulation in these markets. For example, it can be difficult to make a business “whole” when imposing regulation in an otherwise competitive environment. In a typical regulated industry like electricity transmission and distribution where the regulated entity is a monopoly, regulatory errors (e.g., prices that unexpectedly are insufficient to cover certain fixed costs) can be made

¹⁴ Zimmerman, Paul .R., John M. Yun and Christopher T. Taylor, “Edgeworth Price Cycles in Gasoline: Evidence from the U.S.”, *Review of Industrial Organization*, Volume 42, Number 3, 2013, p. 316.

¹⁵ Atkinson, B., A. Eckert and D.S. West, “Daily Price Cycles and Constant Margins: Recent Events in Canadian Gasoline Retailing”, *Energy Journal*, Volume 35, Number 3, 2014, pp. 60-62.

¹⁶ It is important to note that cycles do not invariably emerge in gasoline markets, and once an event such a refinery fire disrupts pricing patterns, cycling may not re-establish itself. This is consistent with the economic theory behind cycling: that a cycling pattern is one of the equilibria that may emerge in the market, but by no means the only one.

¹⁷ Noel, Michael D., “Do Edgeworth Price Cycles Lead to Higher or Lower Prices?”. *International Journal of Industrial Organization*, Volume 42, Number 3, 2015, pp. 92-93. Noel notes that a limitation of previous studies contrasting prices and mark-ups in cities with or without cycling was the presence of confounding factors (e.g., the expansion of independents) and the difficulties of econometrically controlling for such factors. Noel claims that the natural experiment associated with the Nanticoke fire which had a clear causal link with the cessation of price cycles provides for a causal interpretation of the difference between prices and margins pre- and post-fire.

up in future pricing decisions. This may not be possible in a competitive retail environment where granting future flexibility to increase prices may lead to consumers making future purchases from a rival and therefore not actually making the supplier “whole” over time.

Concluding Comments

Policies that reduce price volatility have the potential to soften rather than intensify price competition. The net impact of a market intervention, therefore, may be to raise average prices relative to the level achieved with price cycling. This negative net impact of intervention may be especially pronounced if it is the case that some appreciable fraction of consumers can exploit price cycles to their advantage.

Price volatility is a “risk” that consumers face, and in return they receive a “reward” in the form of lower average prices and greater opportunities to shop around for low prices. Consumers may be willing to tradeoff some of the rewards of lower prices in return for a more riskless distribution of prices for gasoline and diesel, but absent knowledge of the magnitude of this tradeoff, there is no obvious justification to impose regulation that potentially raises average prices.

Price cycling is not evidence of a lack of competition but rather indicates robust competition in the market. The rationale for the regulation of gasoline and diesel retail price volatility is, in essence, that competition is not delivering the outcomes that consumers want—*i.e.*, there is too much retail price volatility and consumers want to be protected against such volatility. Across the rest of the modern economy, public policy emphasizes the importance of protecting and promoting competition to deliver superior market outcomes. It is difficult to see what makes gasoline and diesel retailing a special case that merits different treatment than the rest of the economy, particularly given the extent of competition in gasoline and diesel retailing. Given the real dangers that intervention can raise prices or result in other adverse outcomes, it would be important to understand consumer preferences in this area to a much greater extent. Would consumers that were knowledgeable about the risk/reward trade-offs involved be willing to pay to reduce price uncertainty caused by retail margin variations over time, and, if so, how much would they be willing to pay? Intervention in the market should only be based on systematic evidence regarding consumers’ actual preferences. Even if such evidence was available, however, it may be difficult to devise appropriate regulatory responses. For example, consumers may be highly heterogeneous in terms of their willingness to pay to remove price uncertainty, and this means that regulation may well have differential effects on different groups of consumers. In this case, it may be difficult to weigh the interests of these groups to develop a regulatory mechanism that makes consumers better off in aggregate.

Finally, retail price regulation of the cost-plus variety (commonly used in utility regulation) that adds a competitive retail margin to actual or estimated wholesale costs is a standard approach in regulatory economics and is very familiar to the BCUC. It would, however, face challenges being applied to a competitive market like gasoline retailing that it would not face in a more typical monopoly environment. In particular, the retail margin needs to be selected in a way that does not or only minimally distorts retail

competition, which means it may need to differ by retail location. Retail market distortions, however, may be large, particularly if business strategies that were previously employed are no longer economically viable after the imposition of regulation. Furthermore, standard regulatory tools that allow for smoothing variations over time may be difficult to implement when customers have options and can patronize alternative retail locations if pricing, amenities, or other differentiating factors at one location make it less attractive than alternatives.