

Petroleum Product Market Outlook

Oil Division
Natural Resources Canada

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The petroleum product supply available to consumers in Canada is determined mainly by domestic refinery production, inventories, and the efficiency of the infrastructure in place to deliver products to where they are needed. At this time, there are a number of challenges facing the industry that could have a significant impact on petroleum product markets this summer.

Natural Resources Canada officials work closely with industry to identify risks and challenges facing the market. This report incorporates information provided by the Canadian refining industry with internal analysis of Canadian petroleum product markets from NRCan's Oil Division.

Overview

Heading into the 2007 summer driving season, petroleum product prices are already well above levels experienced last spring, in fact they are the highest they have ever been heading into the summer. Due to geopolitical concerns in certain regions of the globe, the challenges facing some jurisdictions related to the introduction of new regulations affecting fuel specifications, and tight North American inventories, petroleum product prices are expected to remain high and volatile throughout the summer.

As was witnessed in southern Ontario in February, refinery incidents and rail and truck issues have the potential to cause short-term supply imbalances. Although at times supply issues can bring challenges, the petroleum industry is making every effort to ensure that adequate supplies of gasoline and diesel fuel are available to consumers year round.

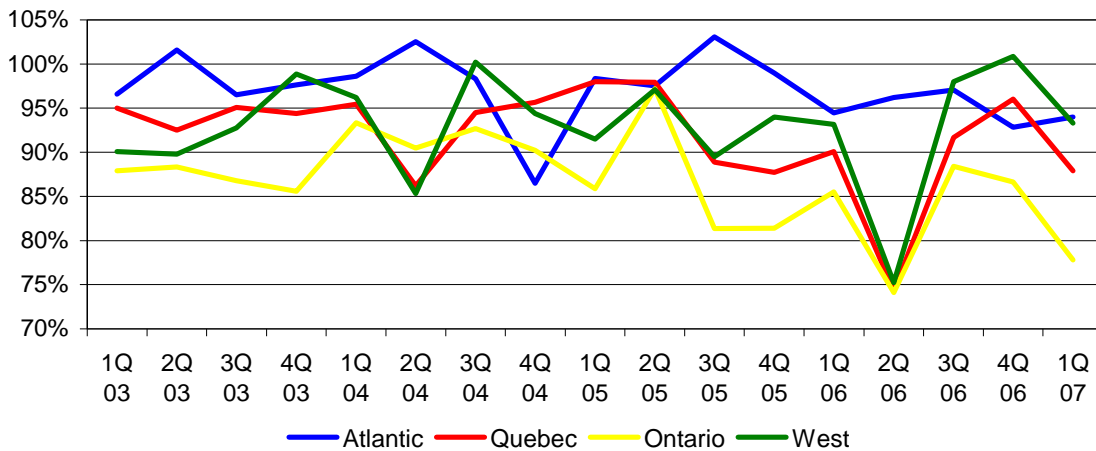
Highlights

- Petroleum product prices in Canada have been exceptionally high this past year due to high world crude oil prices, refinery capacity constraints and resilient consumer demand. Despite higher prices, demand for petroleum products remains strong.
- Strong economic growth is driving the consumption of diesel, primarily through the agricultural, transportation and construction sectors. Over the last few years, this has led to higher annual growth in diesel fuel demand compared to more moderate growth in gasoline demand. This has resulted in a convergence in the price of gasoline and diesel.
- The Canadian refining industry is operating at maximum capacity. The lack of spare capacity has reduced the flexibility of the market, making it more vulnerable to unexpected supply disruptions and substantially increasing the volatility of petroleum product prices. This was especially evident when a number of refineries had production problems this winter.
- Many refinery turnarounds have been postponed due to logistics reasons. The successful and timely completion of these maintenance turnarounds will be an important factor in ensuring adequate inventory levels ahead of, and throughout the summer driving season.
- This summer, Canadian gasoline and diesel fuel prices are expected to remain high all across Canada and will be vulnerable to upward pressures. A combination of high crude oil prices, the tight North American supply situation and continued challenges associated with meeting new fuel specifications are expected to result in prices similar to those of last summer.

Refinery Utilization Rates

Based on weekly crude oil runs, as reported to the National Energy Board, the Canadian refining industry has been consistently operating at more than 90% of capacity¹. Essentially, the industry is operating at full capacity, with deviations relating to unplanned shutdowns and extended refinery maintenance turnarounds. Figure 1 illustrates the regional variations.

Figure 1
Refinery Utilization Rates



Source: National Energy Board

High utilization rates across North America have reduced the flexibility of the refining system to respond to unexpected supply disruptions and substantially increased the volatility of petroleum product prices. This became evident in southern Ontario in early February as refiners struggled to maintain supply to this region and is illustrated in Figure 1 where Ontario's refinery utilization is much lower in the first quarter of 2007 than other regions of the country, due to the fire at Nanticoke. The second quarter 2006 drop in utilization rates can be attributed to the implementation of ultra low sulphur diesel (ULSD). At this time, many refineries were shut down while maintenance was

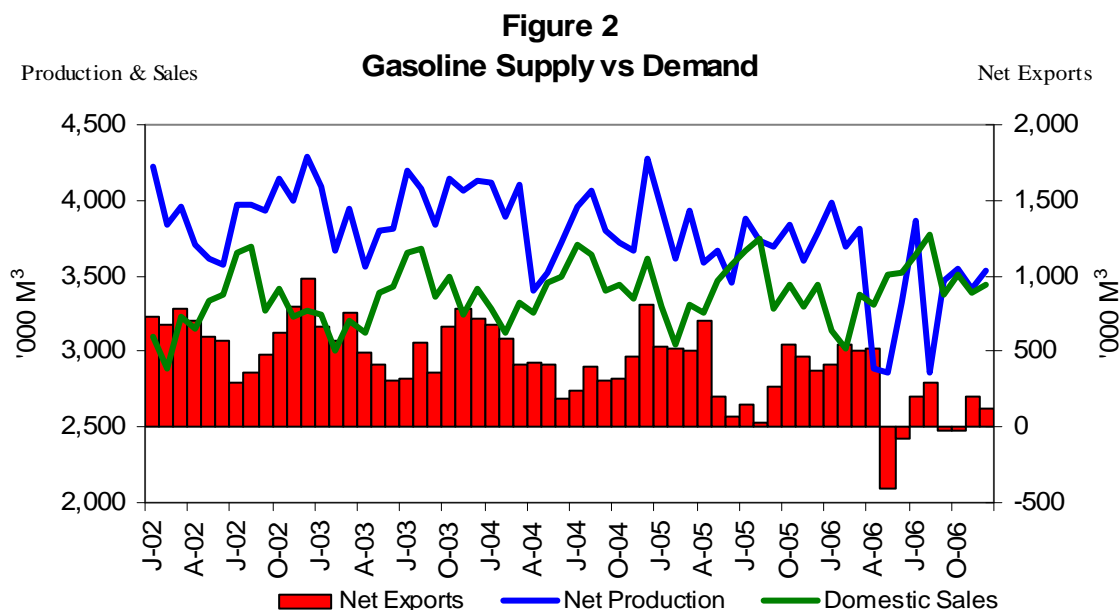
¹ Due to regularly scheduled maintenance shutdowns and other short-term unplanned events that reduce utilization, 95% is considered to be the optimum refinery utilization rate. However, because utilization rates also take into account normal refinery maintenance turnarounds, by delaying normal maintenance schedules, it is sometimes possible to achieve a utilization rate greater than 100% for a short period of time.

performed and new equipment installed to enable the production of diesel with sulphur levels below 15ppm.

Canadian refiners have the ability to switch some production between gasoline and middle distillates (heating oil and diesel fuel). During the summer driving season they maximize gasoline production and during the heating season they maximize distillate production. In preparation for the summer driving season, refiners are maximizing gasoline production with little ability to further increase supplies.

Gasoline and Diesel Fuel Supply and Demand

Figure 2 depicts the relationship between Canadian production of gasoline and domestic sales. The graph illustrates the seasonal nature of gasoline demand and the fact that production is substantially higher than consumption. Canada also exports significant volumes of gasoline, primarily to the U.S. eastern seaboard from Atlantic Canadian refineries. The situation is very similar for diesel fuel. The introduction of ULSD in 2006 required many refineries to shut-down operations for longer than normally required for summer and fall maintenance. This, along with tight North American product supply, caused Canada to be a net importer of gasoline for a number of months in 2006.



Source: Statistics Canada Catalogue no. 45-004-XIE

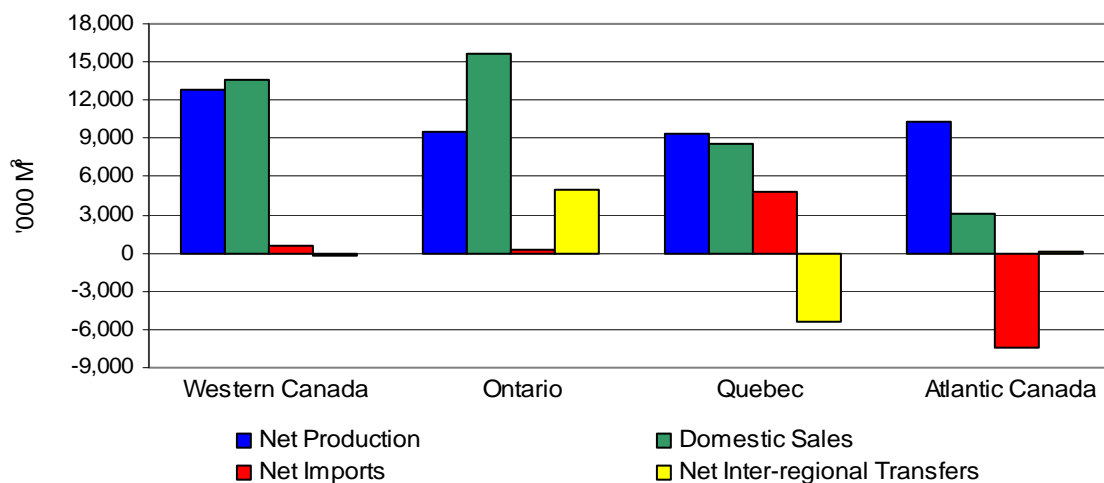
In 2006, in spite of an increase of about 6% in gasoline prices, Canadians consumed 41 billion litres of gasoline, virtually unchanged from 2005. Given these higher prices, one would have expected demand to decline. Higher prices are expected to continue in 2007. Whether demand will continue to be resistant to these prices is uncertain. However, positive demand growth is still anticipated.

Last year, diesel fuel sales also saw little change, staying at the 2005 level of approximately 26 billion litres. Although growth in 2006 was minimal (less than 1%), it is expected that the demand for diesel fuel will continue to outpace that of other fuels. Despite higher prices in 2005, diesel demand grew by 4.2%, reflecting the strong growth in the Canadian economy and a growing proportion of diesel powered vehicles in the fleet. Demand for diesel fuel is expected to continue to grow in 2007 as retail consumers (non-commercial) start to take notice of the efficiency and durability of diesel engines.

Canada has four distinct supply/demand regions for petroleum products: Atlantic Canada, Quebec, Ontario and Western Canada. At times, product imports and exports play a significant role in balancing supply and demand in each of these regions.

Refineries in Atlantic Canada produce a surplus of petroleum products. In fact, net exports from Atlantic Canada represent more than 65% of their production and over 70% of Canada's exports of petroleum products. Atlantic Canadian refiners have been very successful in marketing their ultra-low sulphur products into the United States, with some cargoes reaching destinations as far away as California. Despite being a large exporter of petroleum products, Atlantic Canada also has good access to imports. Domestic refiners must compete with supplies from the northeastern United States and Europe.

Figure 3
2006 Regional Gasoline Supply/Demand Balance



Source: Statistics Canada Catalogue no. 45-004-XIE

The Quebec and Ontario markets are becoming increasingly integrated with significant Quebec production being transported to Toronto via the TransNorthern pipeline. Quebec also serves as a gateway to Ontario for imported product from offshore. Although Figure 3 indicates that Quebec is a large net importer, much of that product is ultimately consumed in Ontario.

Since March 2005, Ontario has become a large net importer of petroleum products. During normal times, Ontario is short both gasoline and diesel fuel. Last year, imports and transfers from other provinces (mainly Quebec), accounted for more than 35% of gasoline sales and 30% of distillate sales. Most of this product comes from Quebec via the Trans-Northern Pipeline. Atlantic Canada on the other hand, continues to produce in excess of demand, and exports a significant volume of product to the U.S. Northeast.

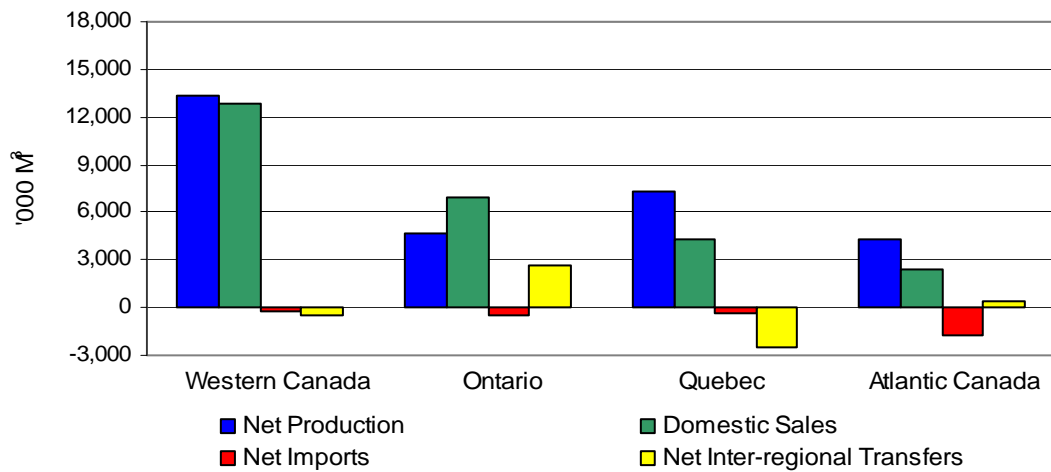
With the Oakville refinery now closed and Trans-Northern Pipeline utilized at full capacity, the Ontario market remains vulnerable to short-term price spikes in the event of an unplanned refinery shutdown. Differing fuel specifications between Ontario and adjacent U.S. markets have compounded the problems as gasoline imports must be arranged in advance. Any unplanned refinery shutdowns require significant price

increases to encourage the re-routing of supplies destined for NY Harbour (during the summer months when the Seaway is open) or to encourage specialty blending by refiners in adjacent U.S. states.

In February 2007, southern Ontario experienced a supply shortage unprecedented in Canadian history. Several factors affected the supply and transportation of petroleum products into this region. The primary constraint to supply was the closure of Imperial Oil's Nanticoke refinery as a result of a fire. Due to the nature of the fire, it was necessary to shut down the entire refinery. This incident came on the heels of another fire at Imperial Oil's Sarnia refinery in December 2006, which had already constrained diesel supply. As Imperial is the single largest refiner in southern Ontario, this resulted in a significant supply shortfall. The winter closure of the St. Lawrence Seaway between December and March restricted the industry's options for importing replacement product. The CN rail strike further complicated this situation by limiting the ability to rail product from other regions and delayed the regular imports from Quebec into the Ontario market. While trucking product was an option, the rail strike also increased the demand for trucks in order to ship goods normally moved by rail. This also limited the industry's ability to move product to market. As the petroleum product market is heavily integrated, the supply shortage resulted in the closure of a number of retail and commercial refueling sites across many brands. Industry made alternate supply arrangements, but relied primarily on inventory draw-downs to satisfy demand given the on-going tight market conditions in Ontario and the limited import options available to industry. It will take some time to rebuild inventories to historical levels.

Ontario refiners have indicated that they normally do not have significant problems obtaining sufficient gasoline imports, which can be blended to meet Canadian specifications on request. However, this takes some advance notification and is more expensive. To date, industry inventories have been sufficient to fill the gap between the occurrence of an unplanned refinery shutdown and the receipt of imported product. Although retail outlet closures in several Ontario markets inconvenienced some consumers, there was always sufficient supply to meet essential demand.

**Figure 4
2006 Regional Diesel Supply/Demand Balance**



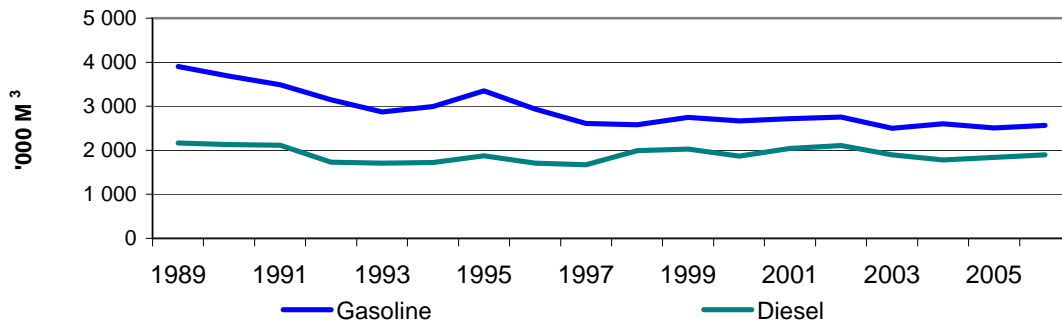
Source: Statistics Canada Catalogue no. 45-004-XIE

In Western Canada, the supply and demand for petroleum products continues to be very tight. Refineries have been operating at near full capacity for several years and because much of Western Canada is landlocked, there is limited access to supplies from other regions. Often the industry imports diesel and jet fuel into the Vancouver market from refineries in Washington State (also a very tight market). This permits the Edmonton refiners, who normally supply a substantial volume of product into the Vancouver market, to free up additional volumes for the prairies. Although the volumes of petroleum product imports and exports are not very large, they play a significant role in balancing supply and demand in this region. The CN rail strike also created supply problems in the West where a number of markets are entirely dependent on rail for petroleum delivery.

Gasoline and Diesel Fuel Inventory Levels

Over the last decade refiners have been rationalizing their operations in order to reduce costs and improve rates of return. A key element of this process has been the reduction of inventory levels to the minimum required to maintain normal operations. Under this just-in-time inventory philosophy, inventory levels have declined substantially for most products.

Figure 5
Annual Average Canadian Petroleum Product Inventories



Source: Statistics Canada Catalogue no. 57-601-XIE

Although diesel inventories have remained relatively stable, gasoline inventories have seen a drop in recent years. Canadian refiners have indicated that inventory levels for gasoline and diesel fuel appear adequate heading into the summer driving season; refiners usually build inventories in the months leading up to peak demand periods.

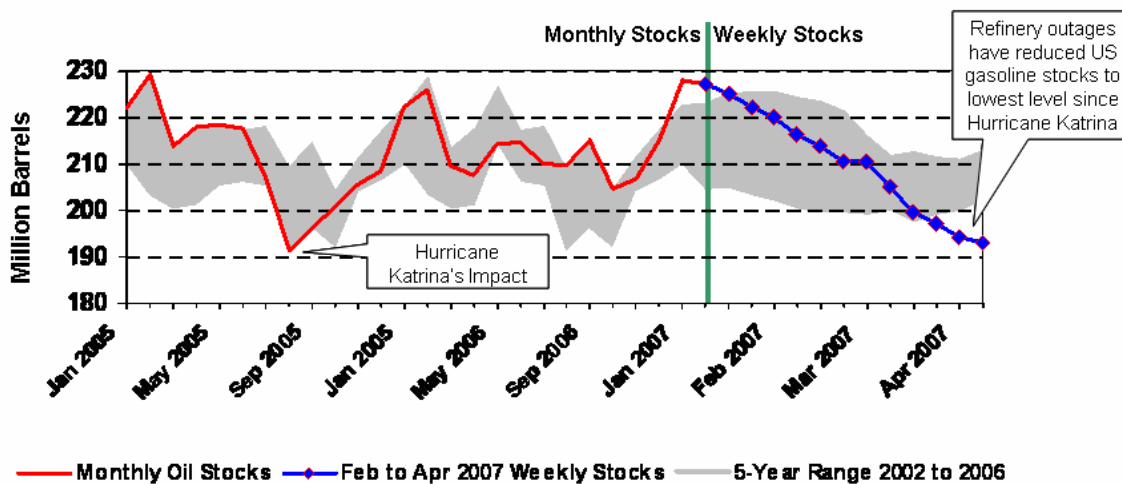
As is normal for this time of year, many companies are performing seasonal maintenance on their refineries. These turnarounds are typically planned well in advance, and as such, companies build inventories to levels that can meet demand throughout the shutdown period. Typically, a turnaround will last anywhere from 1-4 weeks and do not always affect the entire refinery's operations. The unplanned refinery outages in southern Ontario early this year gave some companies the opportunity to perform scheduled maintenance earlier than anticipated, eliminating the need for maintenance later on in the year. On the other hand, some refineries, that continued to operate throughout this period, have decided to delay their turnarounds in order to build inventories that were drawn down throughout February and March. That said, there are a number of refineries that are, and will be, performing maintenance over the next several months.

Refiners have arranged for alternate supply during these shutdowns, but large inventory drawdowns could be necessary if shutdowns last longer than anticipated or if problems arise during re-start.

The Role of U.S. Gasoline Inventories on North American Prices

While Canadian inventory levels determine the adequacy of supply in Canadian markets, it is US inventory levels that drive prices across all of North America. U.S. gasoline stocks fell for 12 consecutive weeks between early February and early May (Figure 6). Unanticipated refinery problems, in the U.S. and other countries have reduced the supply of gasoline. In addition, U.S. gasoline supplies have been reduced by lower levels of imports from Europe. In April 2007, U.S. gasoline stocks reached their lowest level since September 2005, following Hurricane Katrina. U.S. gasoline supplies are well below the 5-year historical range (2002-2006) for this time of year.

Figure 6
U.S. Gasoline Stocks (Million Barrels)



Source: Energy Information Administration

With summer approaching, the demand for gasoline is expected to grow. Traditionally, gasoline inventories increase at this time of year in anticipation of the peak driving season. In most years, the Memorial Day weekend in the U.S. marks the beginning of the peak demand for gasoline. However, this year, demand has been showing signs of increasing sooner. Since North American governments decided to advance daylight savings time (in an effort to reduce energy consumption), it seems that demand for transportation fuels has increased. Although there is no hard evidence to link this

increase to the time change, many analysts believe that the additional hours of daylight have increased travel in the evenings.

News of the recent declines in stock levels, combined with the earlier than usual up-tick in gasoline demand, has market analysts speculating about possible gasoline shortages this summer. This has sent speculators and traders scurrying to the market to secure contracts for summer delivery. This trader activity has driven up wholesale prices of gasoline across North America and, subsequently, prices at the pump. Prices are likely to remain high until inventory levels begin to build or analysts are comfortable that there will be enough gasoline to meet summer demand.

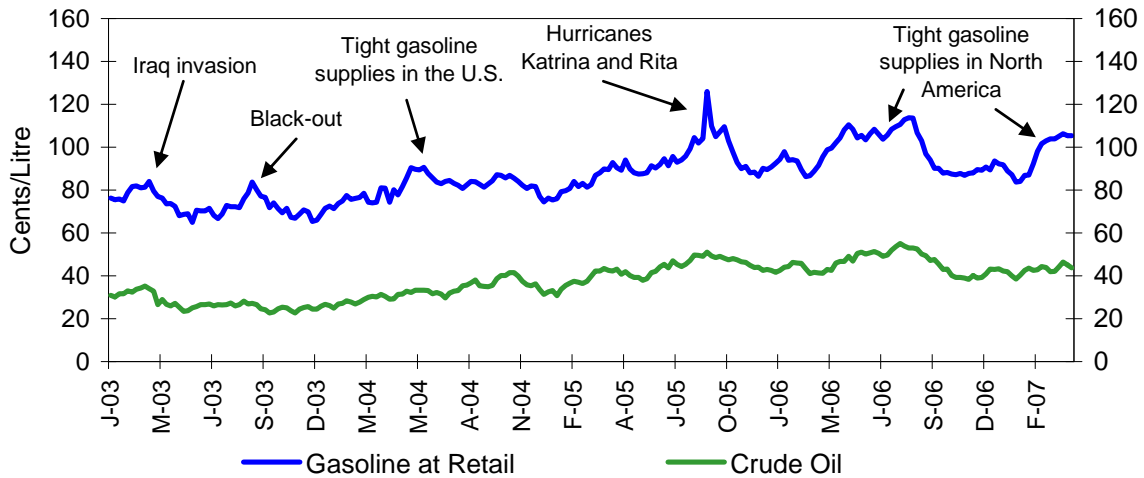
Petroleum Product Prices

Crude oil prices have proven to be quite volatile as of late, reacting to even the smallest of geopolitical events. Although crude prices receded late in 2006 and early 2007, they have again started to gain momentum and appear to be staying above U.S. \$60 per barrel. Geopolitical concerns and production problems in oil producing countries are expected to contribute to high crude oil prices for the foreseeable future.

In addition to this upward pressure from crude oil, gasoline prices are experiencing pressures of their own. The Canadian average gasoline price in April was 105.5 cents per litre. This compares to an average price in April of last year of 106.0 cents per litre. Figure 7 provides a graph of recent crude oil and gasoline price trends in Canada.

The seasonal increase in gasoline demand, April through September, traditionally results in higher gasoline prices during the summer. However as noted in the previous sections, this year, a number of supply issues across North America have had a significant impact on the price of gasoline at New York Harbour. As Canadian wholesalers base their rack price on New York Harbour, this has had a significant impact on Canadian retail prices.

Figure 7
Crude Oil and Gasoline Prices - A Timeline



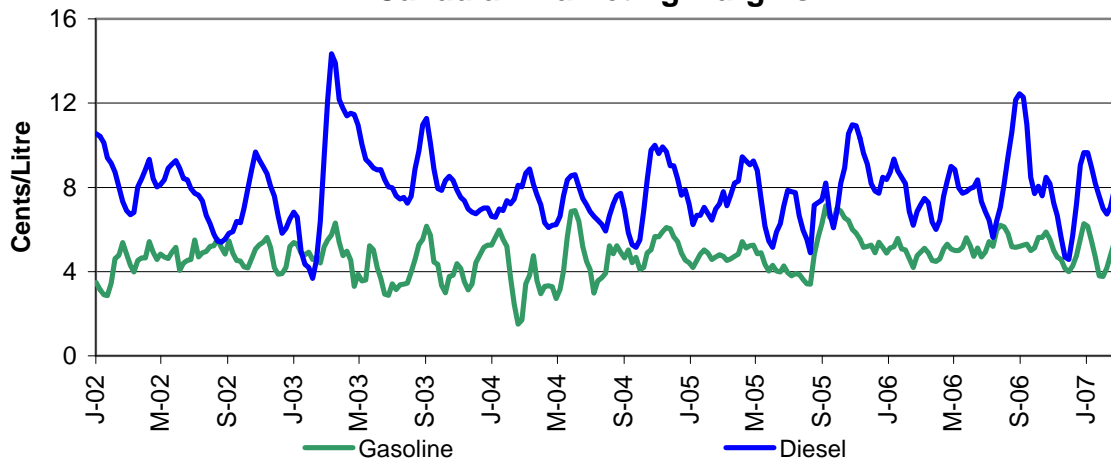
Source: Natural Resources Canada

Finally, strong demand from developed and emerging economies like China and India, for oil and refined products continues to put upward pressure on prices.

In April 2007, crude oil costs and consumption taxes represented about 74% of the retail price of gasoline. The remaining portion corresponded to industry margins. These margins cover the costs of producing and distributing gasoline as well as provide a profit for the refiner and retailer.

Traditionally, there is a 5-6 cent/litre difference between the peak summer prices and lower winter prices, all other components being equal, which reflects the strong up-take in demand during the summer driving season and the higher costs associated with producing summer grade gasoline. This year, the price of gasoline has increased earlier in the spring than typically, which again, can be attributed to a tight supply situation across North America. The seasonality of refining and marketing margins is reflected in Figures 8 and 9.

**Figure 8
Canadian Marketing Margins**



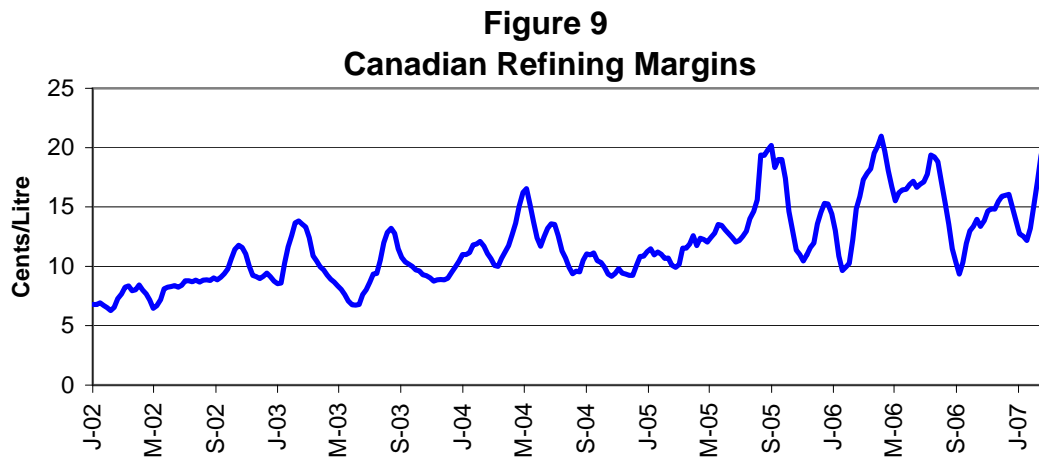
Source: Natural Resources Canada

Ignoring the seasonal fluctuations, marketing margins have been flat over the past several years. As gasoline retailing is extremely competitive, these margins are expected to remain at current levels for quite some time.

On the other hand, refining margins have seen a gradual increase over the past five years. Recent environmental and fuel quality regulations coupled with aging equipment have forced refining companies to invest billions of dollars to upgrade their existing facilities. As the environment becomes more of a concern both nationally and internationally, and refiners invest in capacity expansion, it is expected that high refining margins will be a long-term reality. The main driver of increased volatility in refining margins seen over the past few years is the tight North American supply of petroleum products and unplanned refinery downtime. Increased consumption and fears that a hurricane season such as the one experienced in 2005 will repeat itself have helped to increase the price of gasoline on North American markets heading into the summer.

A refining margin which takes into account the revenue from multiple product streams shows a better picture of industry revenues than one that is only representative of gasoline. On average, for every 5 litres of crude oil, Canadian refiners produce about 3 litres of gasoline and 2 litres of distillate. For this reason, figure 8 uses a weighted

average representation of Canadian gasoline and diesel production to calculate refining margins – known to industry as a 5:3:2 crack spread.



Source: Natural Resources Canada

According to the U.S. Energy Information Administration's *Short-term Energy Outlook* (STO) released in April 2007, U.S. gasoline prices are expected to average \$2.81 U.S. per gallon this summer, down from last summer's average of \$2.84 U.S. per gallon. It can be expected that these prices will be reflected in the price of gasoline in Canada.

Diesel fuel prices in Canada rose to 98.4 cents per litre in April 2007 from 99.2 cents per litre for the same period in 2006. According to the STO, U.S. retail diesel fuel prices are expected to average \$2.88 per gallon over the summer. Prior to 2005, gasoline typically sold at a premium to diesel in both Canada and the United States. Growth in world demand for distillate, particularly in China and Europe, has pushed the price for diesel fuel up enough that at times it surpasses that of gasoline.

Historically, Canadian gasoline prices have been higher than diesel prices at the retail level due in large part to the preferential tax treatment for diesel². However, strong demand growth for diesel fuel vis-à-vis other petroleum products has put significant upward pressure on distillate prices so that diesel fuel often sells for a higher retail price

² The federal excise tax on gasoline is 10 cents per litre compared to only 4 cents per litre for diesel fuel, giving diesel a comparative price advantage at the retail level.

than gasoline, despite the difference in tax treatment. Given the current challenges and increased costs associated with producing ULSD, diesel prices are likely to exceed gasoline prices at some point this summer.

The Cost of Operating a Vehicle

Table 1 shows, for a variety of car types, the increased fuel cost for consumers over the course of a year. Estimates of fuel consumption and fuel cost are based on a driving distance of 20,000 km annually, with a mix of 55% city and 45% highway driving. The base case, using gasoline prices of 98 ¢/L (the 2006 Canadian annual average) shows the annual fuel cost for a variety of vehicles. The remaining columns indicate the increased/decreased fuel costs for a number of price scenarios.

As illustrated by the table, an increase in annual average prices to \$1.20/L could add as much as \$660 to annual fuel costs for a vehicle. If April 2007 prices were to prevail for the rest of the year, annual vehicle operating expenses could increase by between \$60 and \$220 over 2006, depending on the type of vehicle driven.

Table 1
The Impact of rising Gasoline Prices on Annual Fuel Costs

		Avg. Fuel Economy* litres/100 km	Change in Average Annual Fuel Costs from 2006			
			2005	2006	\$1.10	\$1.20
Hybrid	Toyota Prius	4.1	-\$40	\$800	\$100	\$180
Subcompact	Pontiac Wave	7.6	-\$80	\$1,490	\$180	\$330
Compact	Ford Focus	7.4	-\$70	\$1,450	\$180	\$330
Mid-size	Honda Accord	7.9	-\$80	\$1,550	\$190	\$350
Full-size	Chrysler 300 AWD	11.7	-\$120	\$2,290	\$280	\$510
Van	Dodge Grand Caravan	10.9	-\$110	\$2,140	\$260	\$480
SUV	BMW X5	13.3	-\$130	\$2,610	\$320	\$590
Pickup Truck	Nissan Titan 4x4	14.9	-\$150	\$2,920	\$360	\$660

Source: NRCan's Fuel Consumption Guide 2007

*55% city, 45% highway

**Average retail price for regular unleaded gasoline in 2005

Although higher prices have seemed to stabilize the demand for petroleum products (at least for the short-term), Canadian consumption has not seen any significant decrease. A recent Statistics Canada report showed that although consumers lowered their use of energy from home heating due to the mild winter, the only concession drivers have made due to higher prices has been a gradual shift in consumption from premium to regular grade gasoline. In terms of vehicle preference, it seems that increasing prices have not affected consumer choice as trucks continue to gain popularity, accounting for 48% of all new vehicle sales in Canada last year.

Conclusion

This spring, petroleum product prices have increased earlier than is typical. This has led many analysts to believe that prices this summer may be inflated. Persistently high crude oil prices, new fuel specifications, the tight North American supply situation and increased demand are all expected to contribute to high prices this season.

As always, the Canadian petroleum industry is working hard to ensure that adequate supplies of gasoline and diesel fuel will be available to consumers this summer. Nonetheless, markets continue to be vulnerable to an unanticipated supply interruption such as an unplanned refinery closure or supply distribution problems.