Canadian Petroleum Product Market Outlook Fall 2007

Oil Division
November 2007

Natural Resources Canada
Ressources naturelles Canada
Canada

Overview

Heading into the 2007-2008 winter heating season, Canadian consumers can expect petroleum product prices to remain fairly stable. While last year product prices trended downwards in the fall due to lower crude oil prices and a lighter hurricane season than anticipated, this year Canadian prices have remained somewhat stable despite crude oil prices reaching record highs in the U.S. The rapid appreciation of the Canadian dollar led to a relative decrease in domestic crude oil and petroleum product prices for some periods of the year when prices were rising south of the border. Increasing demand and high refinery utilization rates continue to encourage refiners to invest in new capacity.

Highlights

- After increasing substantially in late winter and early spring, Canadian average gasoline prices remained stable throughout the summer months with the price of regular gasoline averaging $0.99 per litre in October. In the same month, fuel oil and diesel averaged $0.86 and $1.01 respectively.

- Canadian petroleum product prices have been partially shielded from significant increases in crude oil prices because of the rapid appreciation of the Canadian dollar relative to the United States dollar.

- In contrast to a decline in 2006, demand for petroleum products has increased substantially over the first eight months of 2007 indicating that higher prices are having less of an effect on Canadian consumers. This is due in part to increased gasoline demand which is more income than price sensitive.

- Increasingly tight capacity and higher refining margins have created incentive for investment in capacity expansion across North America. Numerous companies have announced plans to expand existing facilities or construct new refineries in Canada in order to meet domestic demand and expand the petroleum product export market.

- Refinery maintenance turnarounds planned for this fall are nearing completion and refinery production is expected to return to full capacity by mid-December.

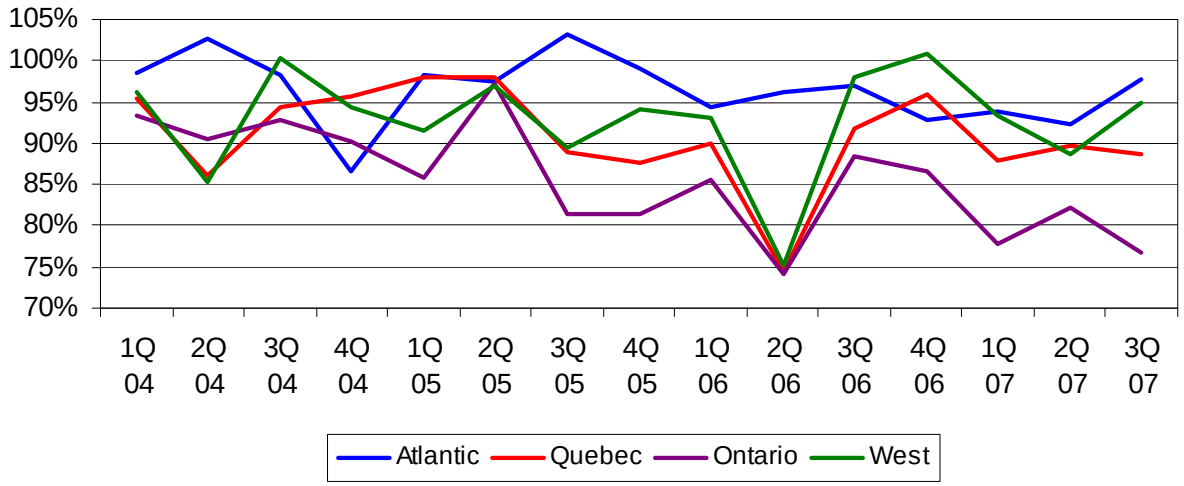
- Refiners are currently focused on distillate production and inventories are expected to build as facilities return to full production capacity. Refiners have indicated that barring any unforeseen refinery closures, they will be long in distillate across the country this winter.

- Provincial introduction of renewable energy to the transportation fuel mix in the form of ethanol has added another level of complexity to the petroleum product distribution network, and could have implication for fuel availability in some regions.

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 capacity[1]. Essentially, the industry is operating at full capacity, with deviations relating to unplanned shutdowns and extended refinery maintenance turnarounds. As the refining infrastructure ages and becomes more complex due to increasingly stringent regulations aimed at protecting health and the environment, unplanned shutdowns are becoming more common. In addition, due to the geographically disperse nature of the country and the limited number of refineries in some regions, a single refinery outage can lead to a significant decrease in local supply. These two factors have led regional utilization rates to be less uniform than in the past. Figure 1 illustrates the regional variations.

Figure 1: Refinery Utilization Rates



Source: National Energy Board

The dip in Ontario refinery utilization rates during February and March of 2007 demonstrated in Figure 1 can be attributed to the temporary closure of Imperial Oil's Nanticoke refinery, reinforcing the fact that a single outage can have a considerable impact on utilization rates. Following that dip, low utilization rates in Ontario up until the third quarter of 2007 are due to a number of refineries undergoing routine maintenance. Once this work is completed and refineries are back online, rates should once again increase.

Over the past decade, numerous proposed regulations required significant investment and construction on the part of refiners and blenders. This resulted in significant downtime for many refineries and terminal locations across Canada. The introduction of ultra low sulphur diesel (ULSD) and associated downtime for the addition of new equipment in the second quarter of 2006 is an example of the drop in utilization rates resulting from planned maintenance. Due to the fact that Irving Oil made the required modifications to its refinery in Saint John, New Brunswick to produce

[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 this number also takes 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.

ULSD prior to 2006, Atlantic Canada's utilization rates did not drop during the second quarter of 2006. It is likely that dips such as this will continue as new regulations aimed at protecting the environment result in downtime and increasingly complex refineries.

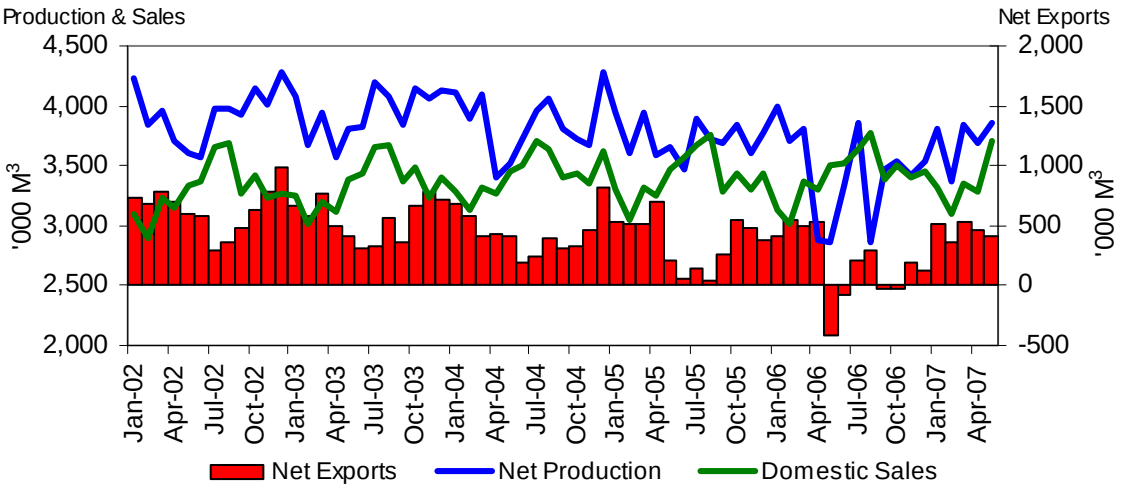
Regular maintenance turnarounds and other more extensive refinery upgrade projects are again ongoing this fall. As regularly scheduled maintenance turnarounds are planned well in advance, refiners arrange alternative sources of supply to supplement their reduced rates of production during shutdown. Although no supply problems are anticipated as a result of this year's shutdowns, markets are more vulnerable to short-term price spikes as flexibility in the system to respond to unplanned events is significantly reduced during these periods.

These projects are nearing completion and refinery production is expected to return to full capacity by mid-December. Through the fall refiners are focused on distillate production and begin building heating oil inventories for the winter season. As facilities complete their fall maintenance programs and return to full production, inventories are expected to build.

Canadian Petroleum Product Supply and Demand

Figure 2 depicts the relationship between Canadian production of gasoline and domestic sales. The graph clearly illustrates the seasonal nature of gasoline consumption and the fact that production is substantially higher than consumption (although this gap is shrinking). Canada also exports significant volumes of gasoline, primarily to the U.S. eastern seaboard from Atlantic Canadian refineries (the trend is similar for diesel fuel). With growing demand, there is a need for growth in refining capacity or increased imports.

Figure 2: Gasoline Supply vs. Demand



Source: Statistics Canada

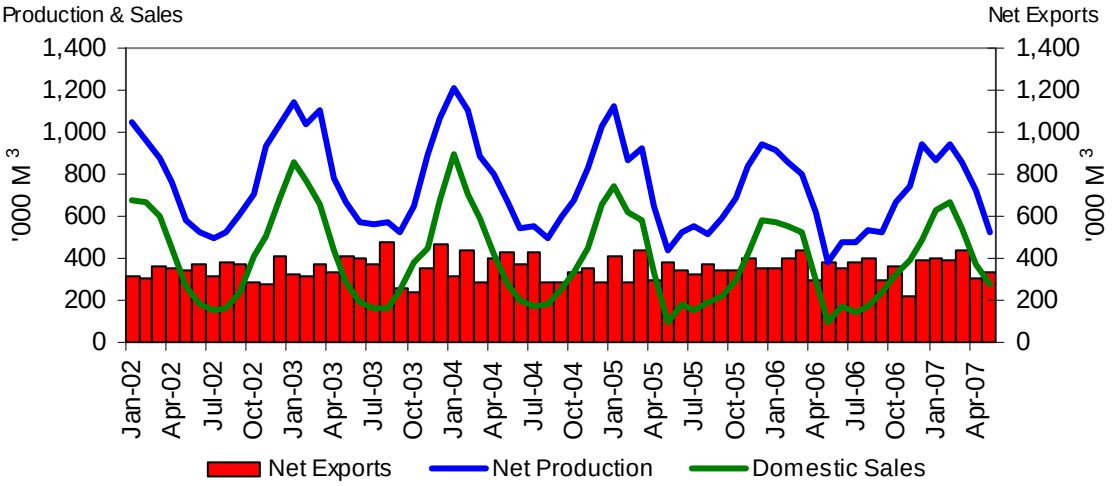
In 2006, in spite of an increase of about 6% in gasoline prices, Canadians consumed 41 billion litres of gasoline, virtually unchanged from 2005. Given these higher prices, one would have expected demand to decline. Based on preliminary figures, in the first eight months of 2007, gasoline demand increased by 3.0% compared to the same period in 2006. While it would seem that high pump prices

have helped to curb demand, Canadians have increased consumption as prices have stabilized. This is due in part to increased gasoline demand which is more income than price sensitive.

Diesel prices remained virtually unchanged in 2006 with demand reaching approximately 26 billion litres per year. During the same period, diesel fuel consumption increased by close to 3.8%, reflecting the increased demand for this product in Western Canada and Ontario.

Figure 3 depicts the relationship between Canadian production of fuel oil and domestic sales. Due to a series of abnormally warm winters and increased use of alternative energy sources, Canada's consumption of fuel oil has decreased significantly. In fact, during the winter of 2005/2006 (October to March) Canadians consumed 2.9 billion litres of fuel oil - 24% below the 3.9 billion litres consumed during the winter of 2002/2003. During the winter of 2006/2007, Canadians consumed approximately 3 billion litres of fuel oil. With Environment Canada forecasting normal or below-normal temperatures for much of Eastern Canada this winter, fuel oil sales will likely increase. As fuel oil use is directly related to temperature, colder or warmer than anticipated winter weather can significantly influence heating oil consumption, and prices.

Figure 3: Fuel Oil Supply vs. Demand



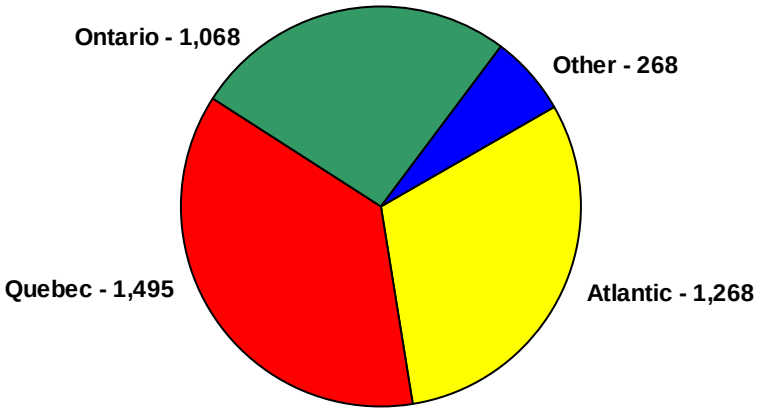
Source: Statistics Canada

As of 2005, only 10% of Canadian homes were heated using oil. Heating oil sales are concentrated in Eastern Canada, with Atlantic Canada accounting for about 30% of domestic sales, Quebec at 37%, Ontario at 26% and the rest of Canada at 6%. Figure 4 shows the volume of fuel oil consumed by region in Canada.

Although Atlantic Canada accounts for only 30% of Canadian sales, it has the greatest dependence on oil for heating, with just over half of all homes using fuel oil to meet at least a portion of their heating needs. Prince Edward Island is by far the most dependent with close to 85% of all households using heating oil. Despite the small percentage of households in Quebec and Ontario that use heating oil to meet their space heating needs, heating oil sales in these provinces represent two thirds of Canada's fuel oil consumption due to the size of these markets.

In Western Canada, natural gas is the fuel of choice for home heating. Only minimal volumes of fuel oil are consumed on the prairies and fuel oil accounts for only 6% of the home heating market in British Columbia.

Figure 4: Fuel Oil Consumption by Region (millions of litres) - 2006

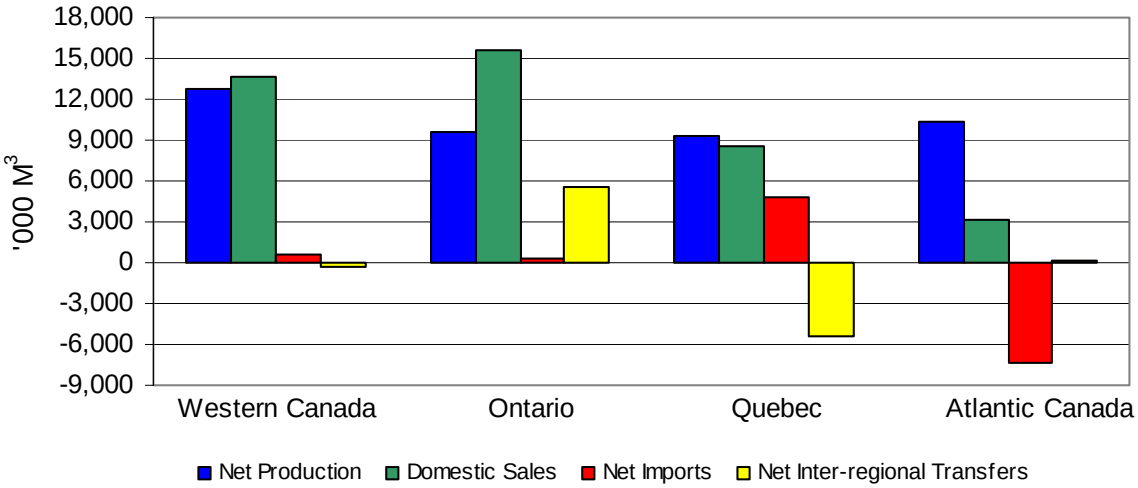


Source: Statistics Canada

Regional Market Situation

Canada has four distinct supply/demand regions for petroleum products: Western Canada, Ontario, Quebec and Atlantic Canada. At times, product imports and exports play a significant role in balancing supply and demand in each of these regions. Typically these regions operate independently of each other, and there is very little change in the mix of production, sales, imports and exports year over year. The introduction of bio-fuels through provincial or federal regulation will have a considerable impact on the distribution of products between, and within these regions. Figure 5 and 6 show the regional supply and demand for gasoline and middle distillate in Canada.

Figure 5: Regional Gasoline Supply/Demand Balance - 2006



Source: Statistics Canada

Refineries in Atlantic Canada produce a surplus of petroleum products. In fact, net exports from Atlantic Canada represent more than half of their production and almost three quarters 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 net exporter of petroleum products, companies in Atlantic Canada are looking to significantly expand the region's production capacity to capitalize on growing product demand in the very large Northeast United States market.

Although Figure 5 shows that Quebec is a significant net importer of gasoline, it is important to note that Quebec refineries produce more than sufficient product to meet the province's needs. Most of the imports into Quebec either flow directly through to Ontario or replace domestic production that is sold into Ontario. Because Quebec is self-sufficient in petroleum product production and has well established infrastructure to import product, the Quebec market remains well supplied.

Following the closure of Petro-Canada's Oakville refinery in March 2005, Ontario has become a large net importer of petroleum products. During normal times, Ontario is short of both gasoline and diesel fuel. Last year, transfers from other provinces together with imports, accounted for more than 37% of gasoline sales and 43% of distillate sales. Most of this product comes from Quebec via the Trans-Northern Pipeline. As this is the case, unexpected interruptions of this pipeline can cause significant supply problems in southern Ontario.

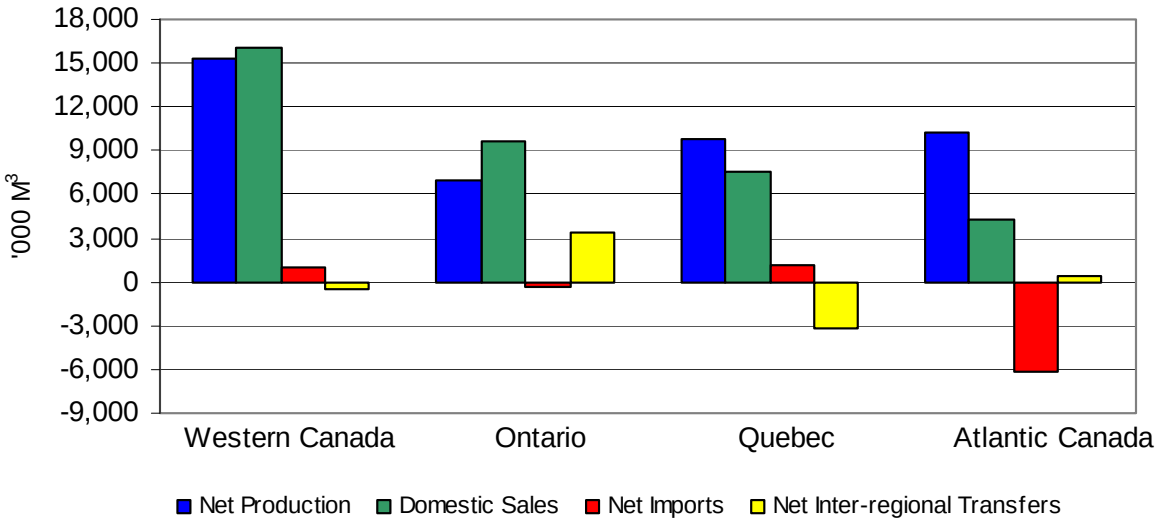
In February 2007, southern Ontario experienced a supply shortage unprecedented in Canadian history. Several factors affected the supply and transportation of petroleum products into this region. The primary constraint to supply was the closure of Imperial Oil's Nanticoke refinery as a result of a fire. The winter closure of the St. Lawrence Seaway between December and March restricted the industry's options for importing replacement product. Industry relied primarily on inventory draw-downs to satisfy demand.

Ontario refiners have indicated that they normally do not have significant problems obtaining sufficient gasoline imports to meet Canadian specifications. 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.

In 2007, Ontario passed a law requiring 5% ethanol content in the gasoline pool. While this transition was smooth at the retail level and resulted in little inconvenience to consumers, refining companies and ethanol producers alike have had varying degrees of difficulty adhering to the targets, resulting in some station closures over the course of the summer.

Transportation of ethanol has proven to be the biggest hurdle for industry in the Ontario region as there is very little domestic production. Many companies are importing ethanol, and as it cannot be transported through pipelines, due to contamination issues, most of this product is being moved by truck or rail. With increasing demand for both rail and trucking (rail capacity in Canada is currently oversold), obtaining transportation has proven difficult or impossible in some instances. Infrastructure issues will continue to be a major concern across the country as biofuels become a larger part of the energy mix.

Figure 6: Regional Middle Distillate Supply/Demand Balance - 2006



Source: Statistics Canada

In Western Canada, the supply and demand for petroleum products remains very tight. Refineries have been operating at, or 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. 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 have been playing an increasingly significant role in balancing supply and demand. Shrinking net exports in this region over the last decade reinforce the fact that Western Canadian supply is becoming increasingly tight.

Refinery capacity additions have not kept pace with the growth in fuel demand that has accompanied the rapid economic growth in the region (particularly in the mining and oilsands sectors). Typically, Western Canadian refineries operate at full capacity to meet normal product demand. This said, refiners have indicated that barring any unforeseen problems, Western Canada will remain well supplied this winter.

In recent years, the Trans-Mountain Pipeline system, which transports crude oil and petroleum products from Edmonton into British Columbia, has been operating at near capacity. Increased crude oil exports by Canadian oil producers have reduced the line space available for refined petroleum products.

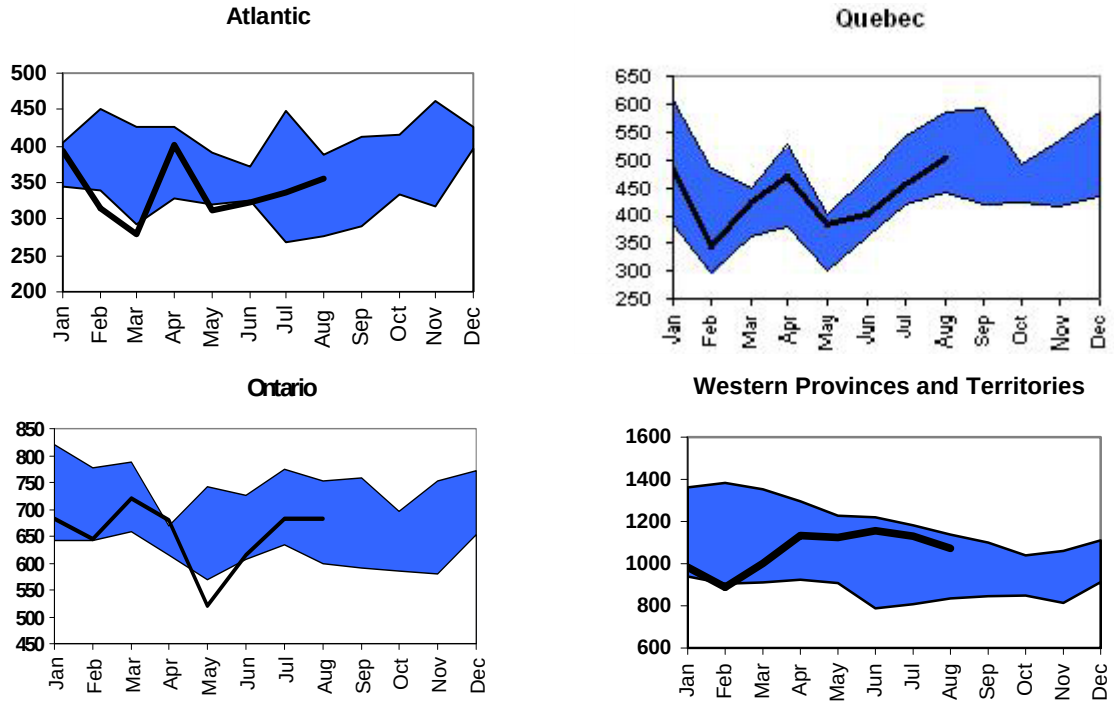
Inventory Levels

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 7 shows regional distillate (fuel oil, diesel and kerosene) inventories for 2007 as well as the historical 5-year high-low range. As these products have similar properties and can be interchanged with little modification, they are typically grouped together for analysis purposes. Fuel oil inventories are difficult to manage because demand for the products is so weather dependant. Stocks are built up in the fall in anticipation of a normal winter. If winter weather is warmer than expected, companies can be left with excess product, which they must carry throughout the summer. Similarly, with a colder than normal winter, inventory levels will be drawn down below desired levels. Assuming that winter 2007-2008 is not significantly colder than projected, petroleum refiners have indicated that fuel oil and distillate stocks will be sufficient to cover demand.

While inventory levels in the United States have a significant impact on petroleum product prices across North America, in Canada, inventories play a more important role in balancing supply and have a marginal effect on regional prices.

Figure 7: Canadian Middle Distillate Inventory Levels for 2007 and Historical 5-Year High-Low Range ('000 M^3)

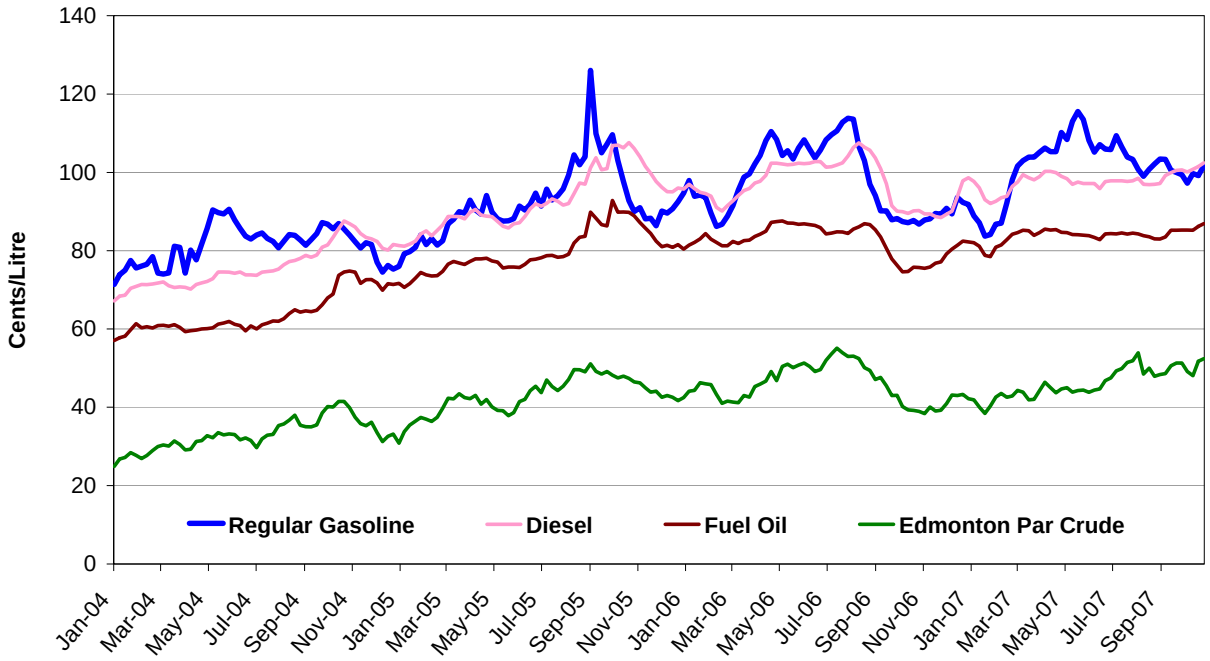


Source: Statistics Canada

Petroleum Product Prices

Canadian average gasoline prices have fallen from a high of about $1.16 per litre in late May to $1.02 per litre by the end of October, a decline of $0.14 per litre. While gasoline prices spiked in early spring, distillate prices have managed to remain fairly stable this year, fluctuating by only a few cents per litre. Canadian diesel fuel and fuel oil averaged approximately $1.01 and $0.86 per litre respectively, in October. Figure 8 compares the price of gasoline, crude oil, diesel and fuel oil.

Figure 8: Gasoline, Diesel, Fuel Oil and Crude Oil Price Comparison



Source: Natural Resources Canada

According to the United States Energy Information Administration's (EIA) *Short-term Energy and Winter Fuels Outlook* released October 2007, retail gasoline and diesel prices in the United States are expected to average $2.83 US per gallon (74.8 US¢/l) and $2.96 US per gallon (78.2 US¢/l) in 2008.

At the retail level, U.S. heating oil prices are expected to average $2.88 per gallon (0.76 US¢/l) for the 2007-2008 heating season (October to March), about $0.40 US per gallon higher than last year. Some analysts are forecasting a much more substantial price increase due the prediction of colder than average temperatures in the U.S. northeast. During the 2006-2007 heating season, Canadian fuel oil prices averaged $0.80 per litre. Assuming current market conditions continue, Canadian fuel oil prices will follow U.S. trends and can be expected to be slightly higher (5 to 10 ¢/l) than last winter.

Consumers should be aware that fuel oil price forecasts could change significantly if temperatures this winter are colder than expected. Colder than normal winter weather could quickly deplete product inventories and lead to higher consumer prices.

As petroleum product prices in Canada are heavily influenced by wholesale prices at New York Harbour, price movements in the United States have a strong influence on Canadian prices. Although crude costs have not increased substantially in Canadian dollar terms, the price Canadian refiners can obtain for their product has also fallen, as Canadian wholesale prices must compete with neighbouring U.S. wholesale prices. As the Canadian dollar has appreciated, this has reduced the netback to Canadian refiners. Therefore, due to the competition in the North American gasoline market, Canadian gasoline consumers have benefited from lower product prices resulting from the stronger Canadian dollar. As long as the Canadian dollar remains strong relative to the United States dollar, Canadians will be somewhat shielded from the effects of the increased cost of crude when filling up their fuel tanks this winter.

Although the EIA is projecting a significant increase in fuel oil prices in the United States for 2008, the strong Canadian dollar should help dampen the effect on Canadian fuel oil consumers. For more information on fuel prices visit Natural Resources Canada's (NRCan) Fuel Focus website at www.fuelfocus.nrcan.gc.ca.

The Cost of Heating a Home with Oil

Table 1 illustrates, for several different types of homes and for both low and medium efficiency furnaces, the average cost of heating a home for a range of fuel oil prices. These heating costs are national averages, based on average temperature and degree-day calculations. Costs in specific centers will vary. Many factors can influence a homeowner's annual heating costs. Even with stable fuel prices, a consumer's annual heating bill can fluctuate significantly depending on the weather, the desired indoor temperature, whether a programmable thermostat is used and the general age and condition of the house, particularly the insulation. Table 1 assumes that all these other factors remain constant and that only the fuel price changes.

Table 1: Impact of Rising Fuel Oil Prices on Annual Heating Costs
Estimated Average Heating Costs

	Fuel Price				
House Type	**70 ¢/l**	**80 ¢/l***	**90 ¢/l**	**100 ¢/l**	**110 ¢/l**
Townhouse					
Low-efficiency furnace	$1,080	$1,230	$1,530	$2,000	$2,450
Mid-efficiency furnace	$ 930	$1,060	$1,320	$1,720	$2,120
Old Detached					
Low-efficiency furnace	$2,740	$3,130	$3,940	$5,120	$6,320
Mid-efficiency furnace	$2,350	$2,690	$3,370	$4,370	$5,390
New Detached					
Low-efficiency furnace	$1,960	$2,240	$2,800	$3,630	$4,470
Mid-efficiency furnace	$1,680	$1,920	$2,400	$3,120	$3,850

Townhouse, inside unit - approximately 93 m^2 (1,000 square feet)
Old Detached House built in 1989 or earlier - approximately 186 m^2 (2,000 square feet)
New Detached House built in 1990 or later - approximately 186 m^2 (2,000 square feet)
*Average Canadian retail fuel oil price for the 2006-2007 heating season (October to March)
Calculated based on NRCan's OEE publication: Heating with Oil

Even though prices are the main factor in increased heating costs when heating with oil, other variables also come into play. As home heating is weather dependent, an unusually cold winter would result in increased fuel oil consumption, adding a further burden on homeowners. On the other hand, a milder winter could help offset the impact of rising prices as was seen in 2005/2006.

Although there are few options for heating oil users to reduce heating bills in the short-term, as Table 1 indicates, at 80¢/L, an upgrade from a low-efficient to a mid-efficient oil furnace, might reduce costs by as much as $450 annually in an older detached home, which in the short term, is not sufficient to cover the costs of the new upgrade – but in the long term could result in significant savings. While switching to other energy sources such as electricity or natural gas has proven to be a viable option for some homeowners, these alternatives are either not available or not economical for many others.

In some areas of the country, Canadian companies have started to sell home heating oil with a biofuel component. Although these products are not currently price competitive (but close), as the technology progresses, alternatives such as these will become more economical if crude oil prices remain relatively high.

Perhaps the easiest and most effective way for Canadians to decrease their fuel bill is to turn down the temperature inside their homes and use a programmable thermostat to keep consumption down when there is no one around.

Summary

Although there is no immediate shortage of crude oil or petroleum products, as global demand for petroleum continues to grow, prices for these commodities are likely to remain volatile. They are likely to continue to reach record highs in response to geopolitical events in oil producing countries, decreasing inventories, refinery disruptions and weather related events. On the other hand, prices are likely to decrease during periods when traders feel there is a level of stability in the market.

Looking forward, alternative fuels such as ethanol and biodiesel will no doubt displace some petroleum products. Nevertheless, the single, most important thing that Canadians can do to ensure a stable energy supply and lower the impact that energy prices have is to consume less. For more information on how to reduce your energy consumption please visit NRCan's Office of Energy Efficiency website at: http://www.oee.nrcan.gc.ca.