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Southern Bruce County Expansion of Natural Gas Assessment of Economic and Environmental Benefits

A Report Prepared by
Elenchus Research Associates Inc.

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EXECUTIVE SUMMARY

The estimated **direct energy cost savings** for potential customers is shown in Table 1.

Table 1: Estimated Annual Savings by Sector, Southern Bruce County

	Savings by Sector (Mature system – 2015)		
SECTOR	Gas vol. (10^3 m^3)	1 Year Savings	Total Saving (First 10 Years)
Residential	7,828	$9,106,025	$70,000,000
Commercial	4,012	$4,506,257	$30,000,000
MUSH	1,393	$1,056,867	$10,000,000
Industrial	33,560	$12,297,392	$95,000,000
Total	**46,793**	**$26,966,542**	**>$200,000,000**

The **environmental benefit** for Ontario (and beyond) in terms of the reduced carbon footprint resulting from the conversion to natural gas from other energy sources is shown in Table 2.

Table 2: Annual Emissions Savings

	Equivalent Gas Vol (m^3)	CO2 Emissions (kg per m^3 Equivalent)	Current Emissions (kg)	Emissions Using Gas (kg)	Emissions Saved (kg)
Sector					
Propane	8,536	2.24	19,120	16,474	2,646
Oil	2,190	2.63	5,760	4,227	1,533
Forced air electricity	835	0.00	0	0	0
Baseboard electric	1,810	0.00	0	0	0
Boiler - oil	14,444	3.05	44,054	27,877	16,177
CNG/Other	18,978	0.00	0	0	0
Total	46,793		68,934	48,578	20,356

With respect to the estimated **indirect economic benefits** to the communities, significant additional survey research would be required to quantify their value. Nevertheless, it is evident that the region is not on a level playing field in attracting when industry and residential/commercial developers to invest in Southern Bruce County. When alternate locations are being considered, nearby municipalities that enjoy the benefits of natural gas service is a more attractive option. The extension of natural gas service to Southern Bruce County would level the playing field given the strong preference for industry and homeowners for access to natural gas. While there is significant nuclear and wind electricity generation capacity in the area, those facilities deliver power to the provincial grid and consequently their proximity does not provide an offsetting competition advantage for attracting industry and families to Southern Bruce County.

By removing this disadvantage that is impeding growth in Southern Bruce County, it is reasonable to anticipate that in addition to the economic stimulus that would result from the project itself, there would be further stimulus resulting from the increased attractiveness of Southern Bruce County as a place to locate new industrial plants and to invest in residential and commercial development. Southern Bruce country is currently lagging the growth that is being enjoyed by nearby communities that are relatively more attractive since both most households and industries in Ontario expect natural gas to be available wherever they locate.

1 INTRODUCTION

Elenchus Research Associates Inc. was asked to conduct a high level assessment of the benefits that can be expected as a result of extending natural gas service to Southern Bruce County. This assessment addresses three categories of benefits:

1. **The direct energy cost savings for potential customers:** This section is based on the load forecast that is included in The Business Case for Expansion of Natural Gas Distribution in Southern Bruce County, dated August 21, 2014 ("The Business Case"). The load forecast included in The Business Case relied on a survey of all potential large volume customers, including the municipalities, universities/colleges, schools and hospitals ("MUSH") sector and a telephone survey of potential commercial and residential customers. The expected cost saving is calculated by energy type to derive the estimated annual savings by customer sector (residential, commercial, MUSH and industrial). This assessment appears in **Section 2** of this report.
2. **The environmental benefit for Ontario (and beyond) in terms of the reduced carbon footprint resulting from the conversion to natural gas from other energy sources:** The carbon footprint benefits have also been determined on the basis of the load forecast contained in The Business Case as described above. The carbon saving is determined by energy type. This assessment appears in **Section 3**.
3. **The indirect benefits to the communities:** Staff of the municipalities in Southern Bruce County were contacted to obtain available information pertaining to the extent to which the absence of natural gas has been an impediment to residential/ commercial development and to industry locating in the region. It was noted, however, that it is unusual for municipalities to be informed of development decisions not to locate in their region. Nevertheless, the region is acutely aware that it is not on a level playing field when industry and developers are making decisions on where to invest when there are nearby municipalities that enjoy the benefits of natural gas service. It was also noted that while there is significant nuclear and wind electricity generation capacity in the area, those facilities deliver power to the provincial grid and consequently do not provide an offsetting competition advantage for locating in Southern Bruce County. This assessment appears in **Section 4**.

Elenchus has also prepared a detailed analysis of the expected future cost of alternate energy types as a basis for the economic assessment of the potential cost savings that would result from the extension of natural gas service to Southern Bruce County. This information is provided in **Section 5**.

2 POTENTIAL CUSTOMER SAVINGS

The savings that energy users can realize by using natural gas compared to other energy alternatives are significant.

Section 2.1 provides a detailed assessment of the savings that are typically enjoyed by small volume customers based on a report prepared by the Canadian Gas Association ("CGA"). **Section 2.2** provides the estimated savings for customers using natural gas relative to the primary alternative fuels, based on recent analysis of the past 8 years that was prepared by Union Gas. **Section 2.3** applies the estimated differences in fuel prices to the estimated conversion volumes as determined for *The Business Case*.

2.1 HEATING MARKET STRUCTURE

According to a report prepared by the Canadian Gas Association[1] energy purchases account for 6 to 9 per cent of consumer spending, the majority (60 per cent) of which is for motor vehicle fuel. But when it comes to heating, natural gas is the most significant component of consumer energy spending. Just over 56 per cent of winter space heating and year-round water heating in Canadian homes and commercial businesses is fuelled by natural gas. This is over twice the share provided by electricity, and five times the share provided by heating oil. Regions that do not rely on natural gas for the majority of their space and water heating are usually those areas where natural gas service is not yet available.

Despite being the major heating source, natural gas remains one of the smaller components of energy spending for Canadian homes and businesses. Only 8 per cent of energy spending goes to natural gas while close to 26 per cent goes to electricity costs. For consumers, being able to buy over half of their heating needs with less than a tenth of their energy spending illustrates the significant financial benefit that natural gas energy provides.

The affordability of natural gas is enhanced by the high level of efficiency and reliability of natural gas. Gas fired furnaces can be 95 to 98 per cent efficient and water heating efficiency can reach close to 85 per cent. Moreover, as a "piped-in" fuel, natural gas energy is available on-demand with little chance of any interruption in service. In many cases when other forms of energy are cut off due to weather, natural gas systems remain in operation. This reliability is important since space and water heating account for 48 per cent of household energy use.

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[1] http://www.cga.ca/wp-content/uploads/2011/02/CGA_bulletin_Pre-Heating_-EN.pdf

The CGA also notes that one reason that natural gas is so affordable is the fact that natural gas is a commodity that is traded in the open market and its price is determined by competitive market forces of supply and demand. With natural gas in such abundant supply in North America this dynamic has driven natural gas costs to very low levels and these savings are passed along to consumers. The recent boom in shale gas is expected to limit future increases in the cost of natural gas in North America. Further technological innovation is expected to put further downward pressure on the market price of natural gas in the coming decades.

In the case of heating oil, the lack of abundant domestic supply of crude oil and domestic refining capacity means that home heating oil prices are, at times, driven by global geo-political forces. A similar story exists for propane option, where the lack of an abundant domestic supply and the fact that propane prices are tied to global oil prices means forces well beyond the base supply and demand picture affect the affordability and delivered cost of this fuel.

RESIDENTIAL NATURAL GAS PRICES

Affordability is one of the main driving forces that lead customers to prefer natural gas as their winter heating choice. An examination of last year's residential space and water heating costs shows that an average household in Canada using natural gas saved as much as $3,000 over other options.

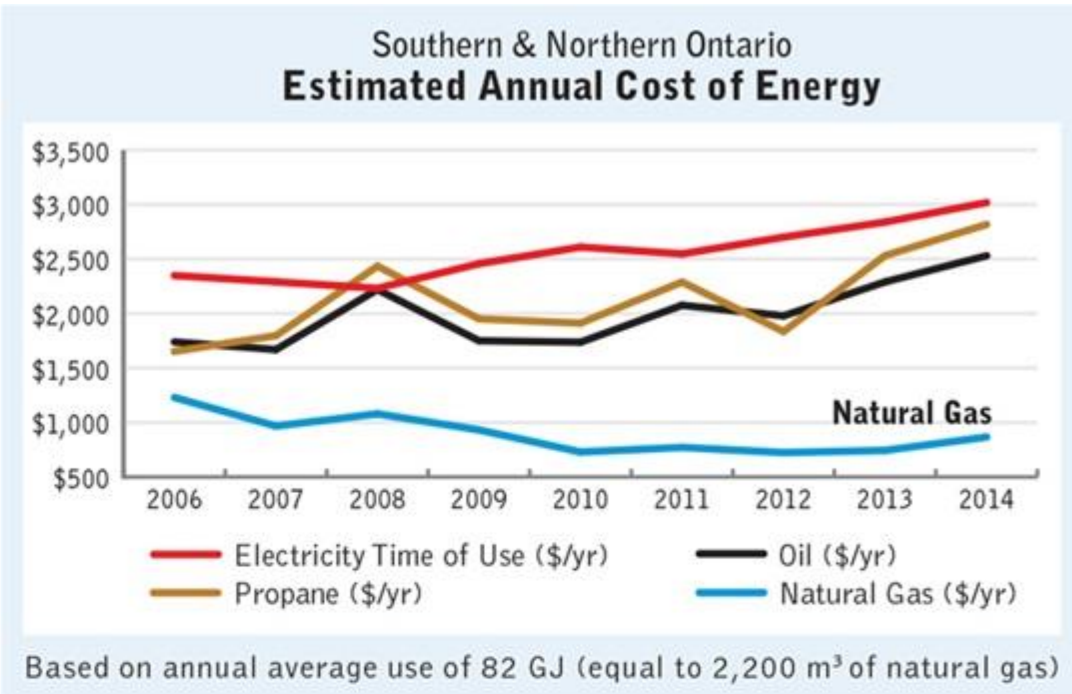
These savings derive directly from the pricing picture for natural gas in the North American marketplace. The persistent and growing gap between the costs for natural gas as compared to almost every other energy commodity is becoming one of the most tangible and enduring characteristics of the North American energy market. This gap is expected to continue, driven by the ever growing abundance of natural gas.

As mentioned, natural gas costs are directly tied to their market dynamics. Gas utilities in Ontario are regulated by the Ontario Energy Board and are required to update their gas costs regularly and quickly pass along savings to consumers without added mark-up or margin. An abundant supply of natural gas that can be produced at a low cost will continue to result in low prices.

As of October 2014, the average residential natural gas commodity cost charged in Canada was around $5.10 per MMBtu (18.6 cents per cubic metre). This is up slightly from one year ago, but well below price levels of other energy products such as home heating oil, propane and electricity. On a heat content basis, natural gas has been the lowest cost heating option for almost two decades. For Canadian homes and businesses this means the benefits of having natural gas as a primary energy source will continue for the foreseeable future.

2.2 HISTORICAL SAVINGS USING NATURAL GAS

The graph below prepared by Union Gas shows the annual cost of energy for various alternate fuels for residential customers as compared to natural gas over the last 8 years.



*Based on fuel rates as of January, 2014.

Natural Gas $0.2304 per m^3;
Electricity $0.1308 per kWh;
Fuel Oil $1.1018 per Litre;
Propane $0.8534 per Litre

Assumptions to create the cost comparison were based on a standard home located in the Union Gas service area with 4 people per household. Cost comparison does not include monthly fixed charges.

Source: https://www.uniongas.com/residential/products-services/switch-to-natural-gas

2.3 ESTIMATED SAVINGS FOR THE SOUTH BRUCE COUNTY PROJECT

Elenchus has calculated the savings that customers in Southern Bruce County would realize as a result of extension of natural gas service to the area. The savings are based on the volumetric forecast contained in The Business Case and recent fuel prices.[2] Future changes in the relative cost of alternate fuel types will change the magnitude of the savings. Based on the our assessment of future energy prices (see **Section 5**, below), it appears reasonable to anticipate that the future savings from access to natural gas is more likely to increase than decrease over the next 25 years.

It is forecast that the customers converting from other fuels to natural gas comparing today's prices would save about $19 million per year. Using the forecast of prices in 2025, this annual saving would rise to about $27 million per year. 2025 is deemed to be an appropriate reference to reflect the time required to construct the required natural gas distribution system and reach full saturation for customers connecting to a new distribution system, which is typical 5-7 years.

The calculation of the annual savings once the new natural gas distribution system has reached maturity, as described in The Business Case, is shown in the table below.

Table 1: Estimated Annual Savings by Sector, Southern Bruce County

	Savings by Sector (2025)	
SECTOR	**Gas vol. (10^3 m^3)**	**Savings**
Residential	7,828	$9,106,025
Commercial	4,012	$4,506,257
MUSH	1,393	$1,056,867
Industrial	33,560	$12,297,392
Total	**46,793**	**$26,966,542**

2 Recent unit prices used in analysis are as follows:
Natural Gas – ranging from $0.35 - $0.38 per m^3 depending on size of customer
Electricity - $0.1713 per kWh
Heating Oil - $1.09 per Litre
Propane – ranging from $0.50 - $0.84 per Litre depending on size of customer

Forecasted unit prices for each of the alternate fuels were determined by using the current unit prices and forecasting each commodity price based on the annual average percent change in the price forecasts in Section 5. Our price projections incorporate the Energy Information Administration's ("EIA") short term forecast. The underlying fundamental relationships between the 4 fuels (natural gas, propane, fuel oil and electricity) are expected to continue through the time frame of the Southern Bruce County project.

Based on this projection the total savings over a ten year period commencing with the initial extension of natural gas distribution to Southern Bruce County would be in excess of $200 million.

3 ENVIRONMENTAL BENEFITS OF NATURAL GAS

Natural gas is the cleanest burning conventional fuel, with less than half of the CO_2 emissions of coal and oil. Natural gas also produces significantly lower emissions of nitrogen oxides - a pre-cursor to smog - and particulate matter than coal and oil.

According to information provided by Encana,[3] some of the environmental benefits of using natural gas are:

- natural gas produces 25 percent less CO_2 emissions than oil and 50 percent less CO_2 emissions than coal;
- particulates from natural gas production are 90 percent lower than oil and 99 percent lower than coal combustion;
- natural gas does not contribute significantly to smog formation because it emits low levels of nitrogen oxides, and virtually no particulates when used as a transportation fuel; and
- in comparison to oil and coal, natural gas releases very small amounts of sulphur dioxide and nitrogen oxides, and lower levels of carbon dioxide, carbon monoxide, and other reactive hydrocarbons throughout the combustion process.

A shift towards renewable energy is a viable solution to cut carbon emissions - however, Ontario's demand for electricity is too high to be supported entirely by renewable energy sources. Replacing natural gas as the fuel used in homes and businesses for space and water heating as a replacement for oil and wood will directly reduce the production of greenhouse gases and other emissions. Furthermore, using natural gas for space and water heating in homes and other buildings is far more efficient than natural gas fired generation of electricity which must then be transmitted consumers with 5 – 10% transmission and distribution losses plus further inefficiencies when electricity is used for space and water heating. Natural gas is the marginal fuel for electricity production during high demand hours in Ontario; hence, conversion to gas from electricity for space and water heating will reduce the comparatively inefficient dependence on natural gas fired electricity.

Natural gas, the cleanest fossil fuel, is a highly efficient form of energy. It is composed chiefly of methane; the simple chemical composition of natural gas is a molecule of one carbon atom and four hydrogen atoms (CH_4). When methane is burned completely, the principal products of combustion are carbon dioxide and water vapor.

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[3] http://www.encana.com/natural-gas/environment.html

The American Gas Association reports that natural gas' advantages over other fuels include the following[4]:

- it has fewer impurities,
- it is less chemically complex, and
- its combustion generally results in less pollution.

In most applications, using natural gas produces less carbon dioxide (CO_2), which is the primary greenhouse gas; sulfur dioxide, which is the primary precursor of acid rain; nitrogen oxides, which is the primary precursor of smog; and particulate matter, which can affect health and visibility; than oil or coal. Technological progress has facilitated ever-cleaner energy production for all fuels, although the inherent cleanliness of gas means that environmental controls on gas equipment, if required, tend to be far less expensive than those for other fuels.

Converting from existing energy althernatives to natural gas would result in significant reductions in emissions. Based on load forecast contained in The Case Study, the reduction in CO_2 emissions alone each year are summarized in the chart below.

Table 2: Annual Emissions Savings

	Equivalent Gas Vol (m^3)	**CO2 Emissions (kg per m^3 Equivalent)**	**Current Emissions (kg)**	**Emissions Using Gas (kg)**	**Emissions Saved (kg)**
Sector					
Propane	8,536	2.24	19,120	16,474	2,646
Oil	2,190	2.63	5,760	4,227	1,533
Forced air electricity	835	0.00	0	0	0
Baseboard electric	1,810	0.00	0	0	0
Boiler - oil	14,444	3.05	44,054	27,877	16,177
CNG/Other	18,978	0.00	0	0	0
Total	**46,793**		**68,934**	**48,578**	**20,356**

4 https://www.aga.org/environmental-benefits-natural-gas

4 ECONOMIC BENEFITS

South Bruce County is one of the few areas of the province that does not have access to natural gas service. This has had important economic consequences for the region. In the residential sector space and water heating costs are much higher than in other areas of the province reducing income available for expenditures in other areas and generally lowering the living standard of households in the area. In the commercial and industrial sectors it has raised operating costs creating a competitive disadvantage to doing business in the region.

According to recent census data, population growth in Bruce County was less than other areas of the Province and less than the province of Ontario as a whole. From 2001 to 2006, the population of Bruce County grew by only 1.2%. Over the same period, the population of Kincardine specifically was flat with 0.0% growth. The community of Chesley grew by 0.2%, Paisley declined by 4.2% and Lucknow declined by 4.9%. By comparison, Port Elgin, a nearby town to the north of Kincardine, which is served by natural gas, grew by 9.8% over the same period. Population growth in Ontario as a whole was 5.7%.[5]

According to Mark Lefebrve, the Director for the Centre of Municipal Studies, population growth is a key driver of overall economic growth. It is generally recognized that economic growth is the sum of three components:

- productivity growth,
- growth in the capital stock and
- labour force growth

The latter is driven directly by population growth. If you take Canada for example, potential economic growth has been hovering around 2.5 per cent in recent years and the contribution to growth of the three components can be roughly distributed in the following way: 1 per cent from productivity, 0.5 per cent from the capital stock and another 1 per cent from labour force growth.

In addition, Mr. Lebebrve states that economic growth fuels government revenue growth, which offers any government some room to manoeuvre on the spending front. This applies to local governments as well, since communities with stronger population growth generate the largest increases in the residential property tax base, increasing the budget available to the local authorities. At the same time, stronger population

5 http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CSD&Code1=3541024&Geo2=CD&Code2=3541&Data=Count&SearchText=kincardine&SearchType=Begins&SearchPR=35&B1=All&Custom=&TABID=1

growth boosts municipal government expenditures which is further stimulus to the local economy. As well, communities with stronger economic growth tend to show the largest increase in property values, which also boost the potential revenue stream of a local government.[6]

According to Canada's Department of Finance, population aging is expected to lead to lower growth in output and income with the following implications.[7]

- Through slower economic growth, population aging is expected to reduce the growth rate of government revenues, thereby limiting the capacity of governments to continue to finance growth in public expenditures at rates as high as in the past.
- At the same time, population aging will affect public finances by putting upward pressure on public expenditures, notably for age-related programs such as health care and elderly benefits.
- Fiscal pressures from population aging will occur against a backdrop of elevated public indebtedness among many advanced economies.

In the absence of an influx of new and younger households, an area such as Southern Bruce County will tend to experience an aging population. It follows therefore that the communities in South Bruce County need a growing population and increased economic activity in order to sustain their vibrant and fiscally sound communities.

An expansion of the natural gas network into the area would eliminate an important disadvantage faced by area residents and allow commercial and industrial operations to compete on an equal footing to competitors in other parts of Canada and the U.S.

It is estimated that the capital costs for transmission, distribution and services for this project would be in the order of $70 million (the Northern Cross proposal). The costs under the Union proposal would be close to $100 million. This is a significant investment in the province and the costs would be spread throughout various sectors including pipeline manufacturing costs and related pipeline infrastructure spending as well as the costs of installation of the project. Some of the economic benefits would accrue to the South Bruce County area where the construction takes place.

In addition, there would be private investment required to convert customers from their existing fuel equipment to natural gas. It is estimated that the cost of the conversions would exceed $22 million. Much of the conversion work undertaken would be provided by local services and labour providers in the area where the conversions take place.

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[6] http://www.conferenceboard.ca/economics/hot_eco_topics/default/13-02-28/why_population_growth_matters_so_much_to_canada_s_cities.aspx

[7] http://www.fin.gc.ca/pub/eficap-rebvpc/report-rapport-eng.asp

5 Price Forecast

5.1 Summary

North American and Canadian energy prices have been very volatile over the past 6 months due to a dramatic reduction in North American and international crude prices. The geopolitical forces, as well as, excess crude and natural gas supply driven by shale production and new technologies will continue to pressure all Canadian energy prices. Many forecasters hold the view that crude prices will remain in this new low range for 18-24 months prior to rising to **revised** forecasted prices. Natural gas prices have and will continue to respond to these dramatically lower oil prices.

The natural gas alternative is more attractive compared to propane, heating oil and electricity for numerous reasons:

- Economic
- Environmental - physical appearance of oil and propane storage facilities and risks of underground storage leakage
- Environmental emissions from fuel oil
- Maintenance and operating costs
- System efficiency

Ontario has recently acknowledged that it is reconsidering implementing some form of carbon program. If this were to occur, all 4 fuels would be impacted. Natural gas costs would increase due to the carbon program (see **Figure 2** in the Appendix). The other fuels' carbon costs would be greater than natural gas (Heating Oil, ("HO"), emits 6.9 times more emissions than natural gas ("NG")) and therefore natural gas would be the favoured fuel. Based on these factors, natural gas provides the highest overall value compared to the other fuels.

Natural gas prices in Ontario are projected to stabilize with modest price increases over the forecast period. Natural gas on an energy equivalent basis is and will continue to be the most economic alternative when compared to propane, heating oil and electricity.

Elenchus has completed an analysis of various energy price forecasts for the period 2015 – 2025 and beyond. The forecast cost of NG is projected to be lower than the heating oil, propane and electricity forecasts. At a high level the United States ("US") East North Central zone is a reasonable comparator for the long run **trends** of propane, HO and NG prices. **Figure 1** shows the historical prices (2011-2014), as well as, the US

Energy Information Administration's ("EIA") long term forecast to 2040[8] for delivered average fuel prices in the US East North Central zone. The forecasts include **only part** of the impact of the recent and projected drop in crude prices. All fuels (heating oil, propane, electricity and NG) have responded to these price reductions to some extent. It is reasonable to assume, that they will continue to respond, over the intermediate term, to these price pressures and that the historical price relationships will sustain over the longer term.

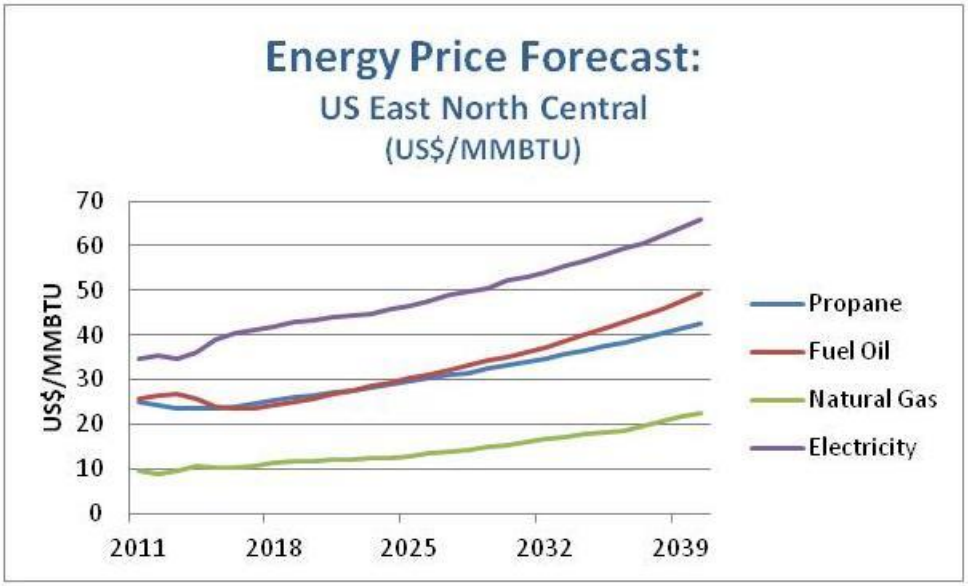

Figure 1

Ontario is forecasted to have similar trends to the US East North Central zone but with the electricity price being higher than the US East North Central prices. **Figure 2** shows the forecasted Ontario **delivered** energy prices (taxes included) for all 4 fuels. Natural gas prices are based on Union Gas's January, 2015 rates[9].

[8] EIA 2014 Long Term Outlook May, 2014; http://www.eia.gov/forecasts/aeo/

[9] Union Gas January 2015 rates Southwestern Ontario; https://www.uniongas.com/residential/rates/current-rates

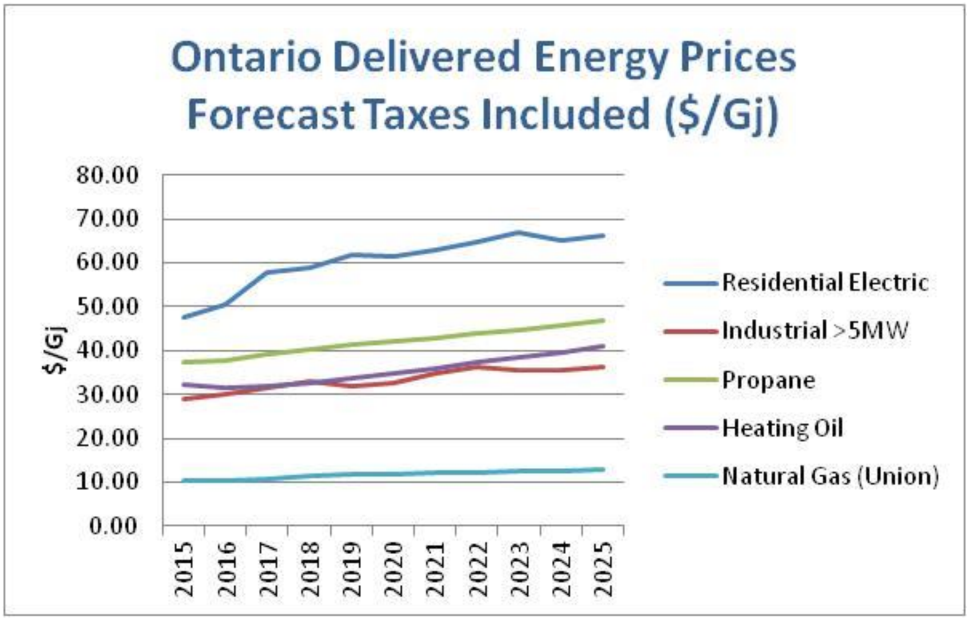

Figure 2

To develop the long term forecast all Ontario NG, propane and HO commodity prices were calculated based on each fuels commodity price on January 23, 2015 and then adding the annual average per cent change from the EIA US East North Central forecast for each year. Electricity prices have been forecasted using the OPA's long term energy price forecast. Each fuel price forecast is dealt with in more detail in the respective sections below.

Ontario electricity prices have had a more muted response to the crude price collapse primarily due to the manner in which the historical Ontario Power Authority contracts are priced and incorporated into the retail electricity price. The most significant impact on Ontario electricity prices will occur during peak periods when natural gas generation is being dispatched. Natural gas is forecasted to have a substantially lower price compared to the other 3 fuels throughout the forecast period.

5.2 Fuel Prices

5.2.1 Crude Oil Historical Prices and Forecast

In 2008 West Texas Intermediate ("WTI") crude oil prices rose above $140 US/bbl. For contextual purposes **Figures 3, 4** and **5** how the historical WTI crude prices. Recent dramatic price reductions have been driven by increased North American supply, new technology and geopolitical factors. WTI crude prices fell below the $60 technical support level in December 2014. On January 26, 2015 the March 2015 WTI crude contract fell further and closed at $45.15. Many forecasters are projecting continued low crude prices for the next 18-24 months. These most recent reductions have not as yet been fully factored into the Nation Energy Board's nor the EIA's long term forecasts. EIA has produced short term forecasts updates that incorporate part of the impact.

WTI Crude Oil (WTI) New York Mercantile Exchange **12/1/2004 - 11/1/2014** (Daily) as of Thu Nov 27 11:07:54 EST 2014 Source BMO

Figure 3

http://www.marketoracle.co.uk/Article48434.html **Figure 4**

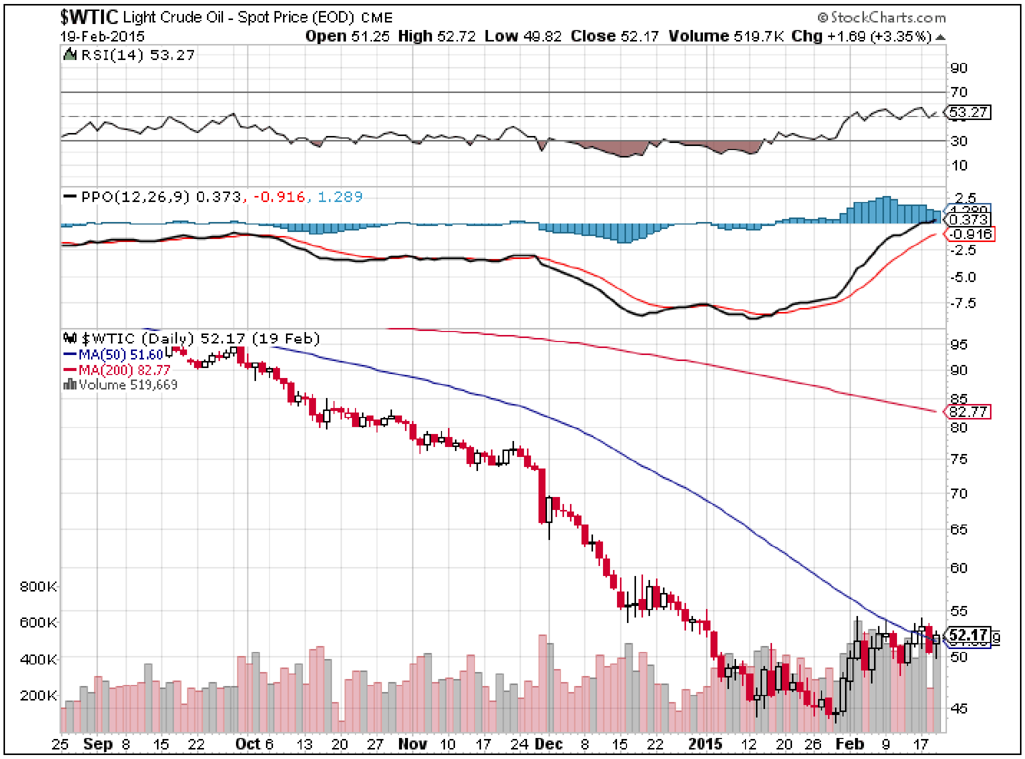

Figure 5[10]

For crude, propane and natural gas Elenchus used the most recent posted Ontario commodity prices as the starting point for its forecast. The EIA US East North Central long term price forecasts annual average percent changes were calculated for NG, propane and HO. These percent changes were then applied to the commodity prices to generate the long term forecast for NG, propane and HO.

Canada's exchange rate will be largely driven by energy pricing. Note that since Elenchus used the above methodology starting with Ontario based commodity prices the forecast did not have to be further adjusted to reflect changes in the US/Canadian exchange rate. As shown in **Figure 6** Toronto Dominion Bank ("TD") on January 23, 2015 is forecasting a further reduction in WTI prices. TD predicts the U.S. benchmark price will average US$47 in 2015 and US$65 in 2016, down from its December forecast of US$68 in 2015 and US$80 next year.

[10] http://www.cmegroup.com/trading/energy/crude-oil/light-sweet-crude.html

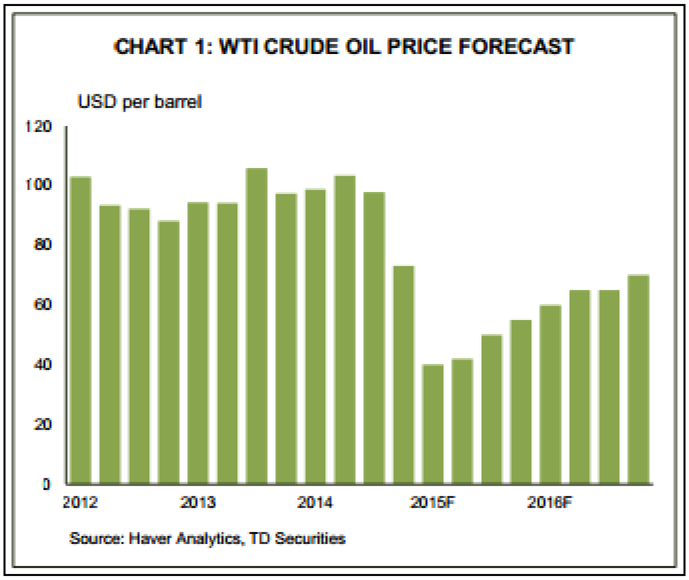

Figure 6[11]

5.2.2 Ontario Natural Gas: Prices and Forecast

The Ontario energy market continues to be in transition due to a number of factors: the dramatic growth in shale gas production, proposed Energy East project, proposed new pipelines, and rapid and significant growth of gas fired power generation combined with a Dawn Daily index price. The basis differential from Henry Hub to Ontario has been volatile due to historical pipeline constraints combined with significant growth driven by new gas fired generation. These pipeline issues are being addressed and by the time Bruce is built the debottlenecking around the GTA and new pipelines to Ontario will have been completed by 2018. In addition, significant decontracting on TransCanada's system has resulted in TransCanada proposing to convert one of it's mainlines to deliver crude oil to eastern Canada. If this project (Energy East) proceeds NG basis differentials from AECO (the Alberta Border pricing point) to Dawn (the main Ontario pricing point near Sarnia, Ontario) will be impacted, as well as, price volatility, tariffs and contract terms and conditions.

Recent analysis by Bentek and Platts shows the increase of 33 Bcf/d takeaway capacity (**Figure 7**) for shale gas enhancing overall deliverability in the northeast markets in conjunction with a very rapid and large increase in shale gas processing and production capability (**Figure 8**).

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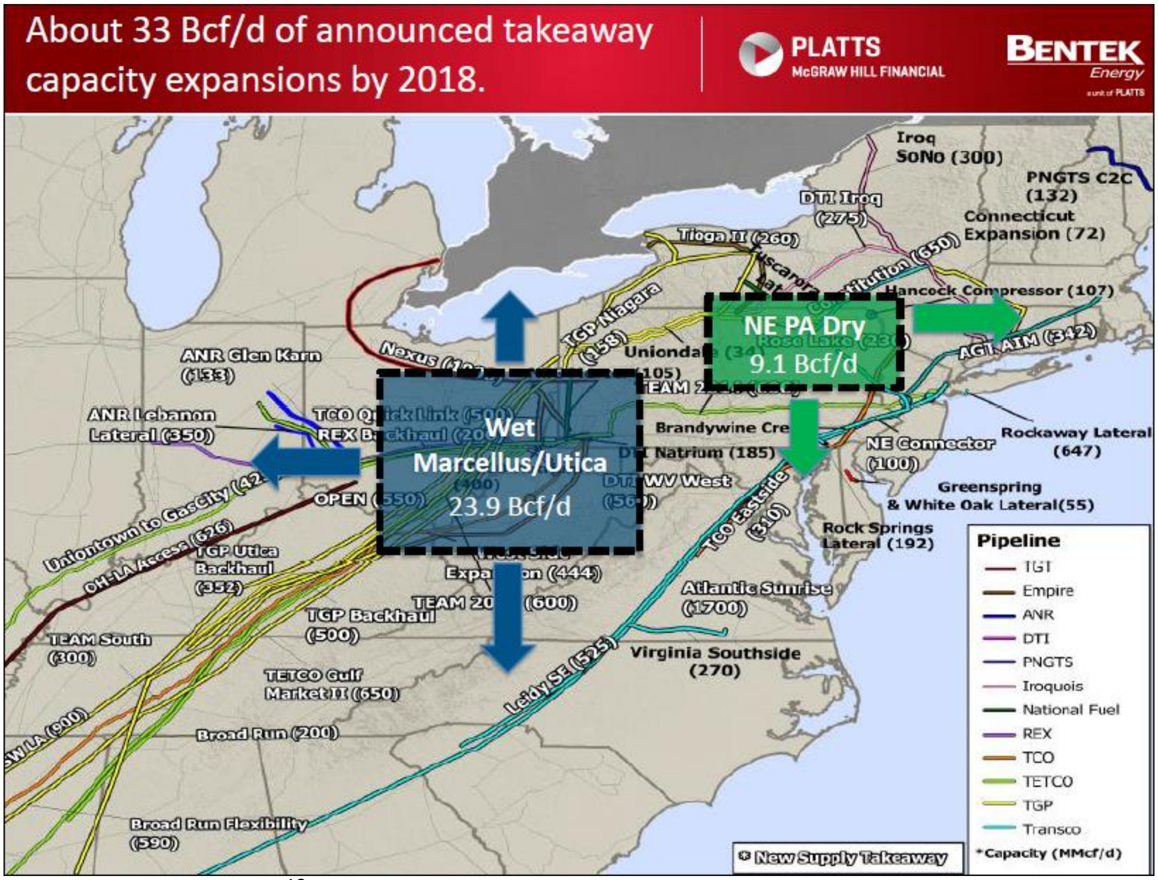
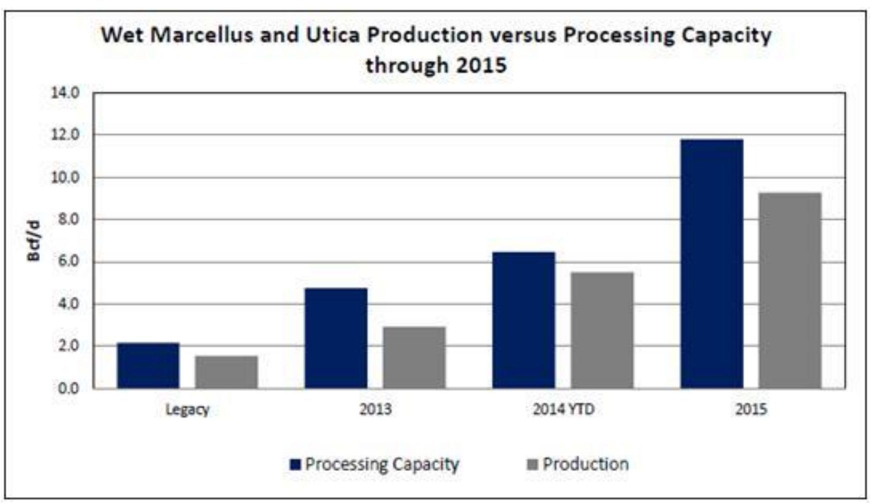
[11] **Observation TD Economics | www.td.com/economics;** January 23, 2015, pg 1



Source: Bentek/Platts[12]

Figure 7



Source: Bentek/Platts[13]

Figure 8

[12] Uncorking Northeast Supply: New Expansions Relieve Constraints; Sami Yahya - Energy Analyst, Bentek Energy; November 18, 2014

[13] ibid

- Northeast added 3.1 Bcf/d of takeaway expansions in 2014, pushes record production highs
- New Northeast expansions off to a slow start, continue filling up, impacting basis.
- Northeast production will likely break 19 Bcf/d by year-end.
- Northeast will add 4.9 Bcf/d of takeaway expansion in 2015 and will have adequate processing capacity.

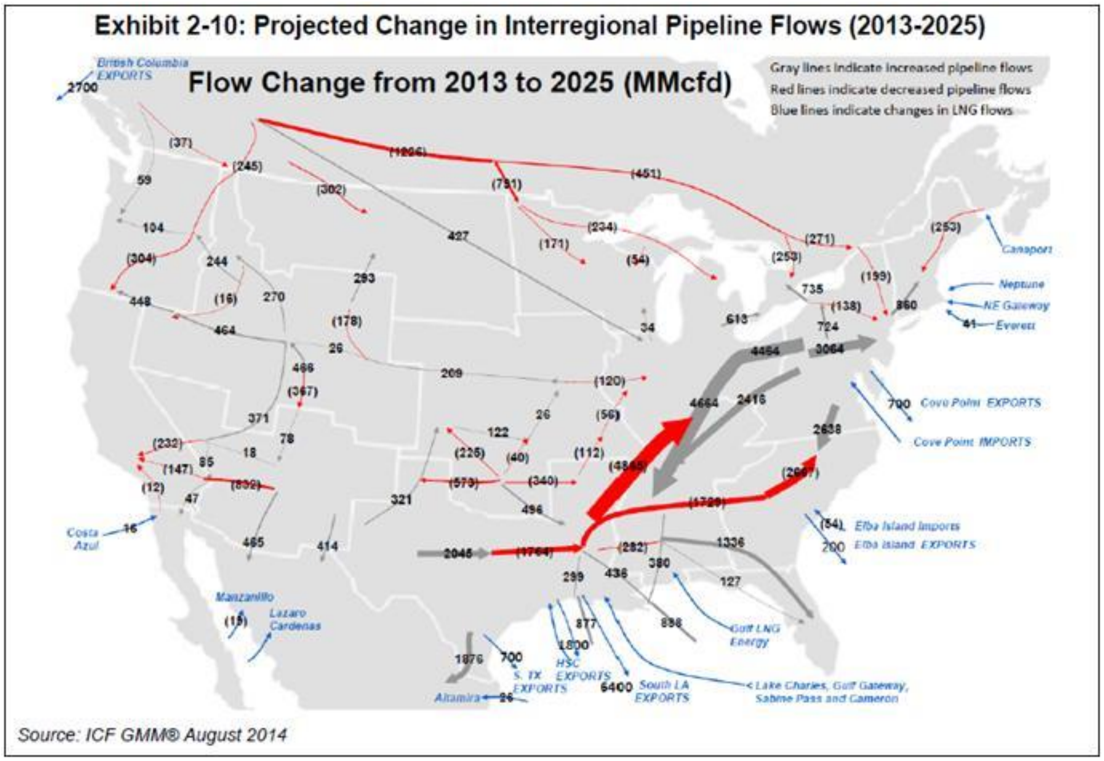


Figure 9

Figure 9 shows ICF's[14] projected North American flow changes to 2025. There is a reduction (253 MMcfd) of flow from the TransCanada system Alberta (AECO) into Ontario and a very substantial increase (1348 MMcfd) in flows into Ontario from shale regions. These changes will result in more supply availability options for Ontario and less basis and price volatility once the rest of the debottlenecking in Ontario is

[14] ICF International provides a number of energy related services. ICF utilizes Integrated Planning Model and their proprietary Gas Market Model to project market impacts that include all supply and demand factors in the North American energy markets. ICF's recent projects include north American studies with focus on strategic regions such as Ontario, the US northeast Natural Gas Transmission Analysis which was an assessment of New England's gas supply capabilities in 2012 (Phase I) and is currently conducting a follow-up study (Phase II) for ISO New England.

completed. **Figures 10 and 11** show ICF's forecasted increase in capacity on Union's Dawn to Parkway system for the average and peak days respectively.

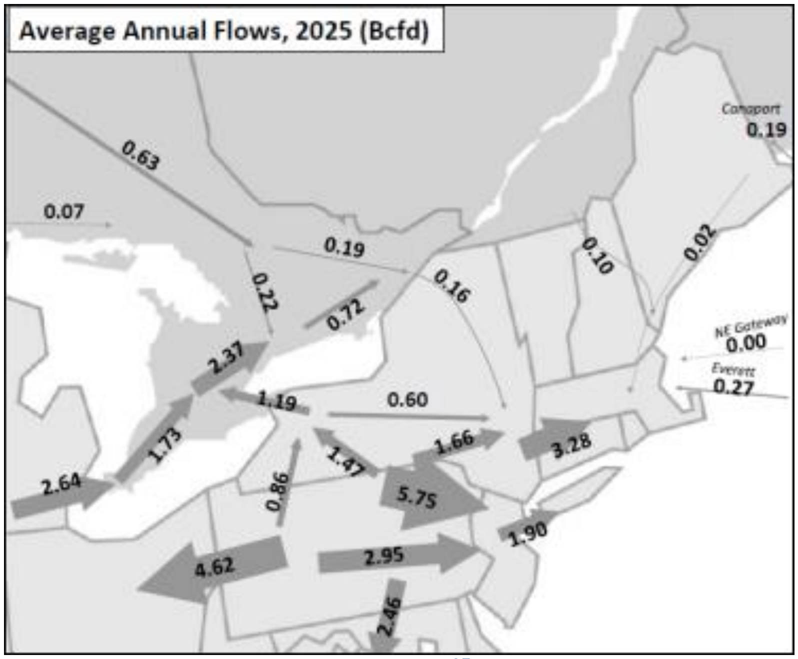


Figure 10[15]

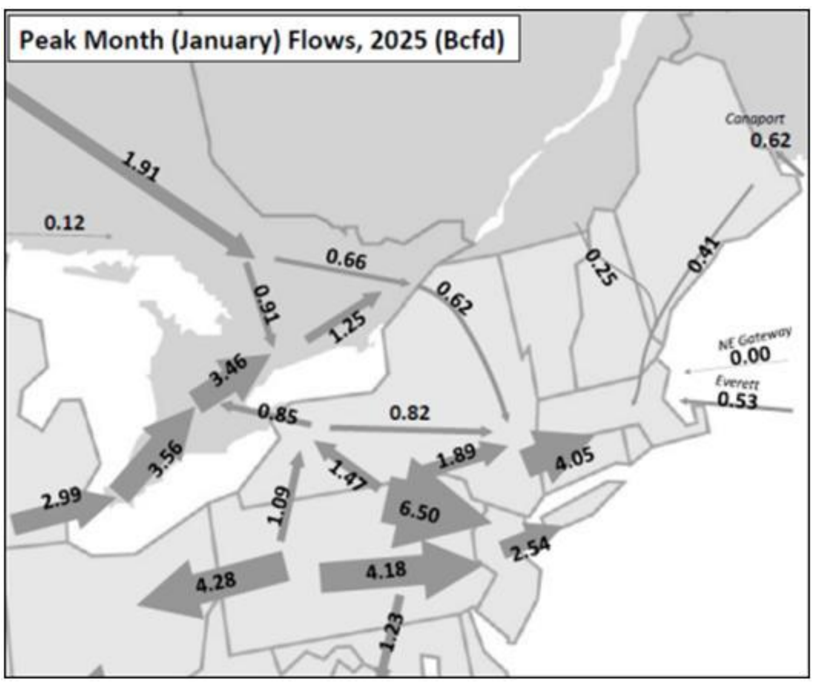


Figure 11[16]

15 ICF Future Trends: Assessing Ontario Natural Gas Market Requirements Through 2020 Prepared for: Union Gas Limited November 25, 2014; slide 8

5.2.3 Henry Hub Natural Gas Pricing

Figure 12 shows the historical Henry Hub (Henry Hub terminal in Louisiana) gas prices from 1999 to December 2014. Prices peaked in 2005.

Henry Hub Natural Gas Spot Price

(US$/MMBTU)

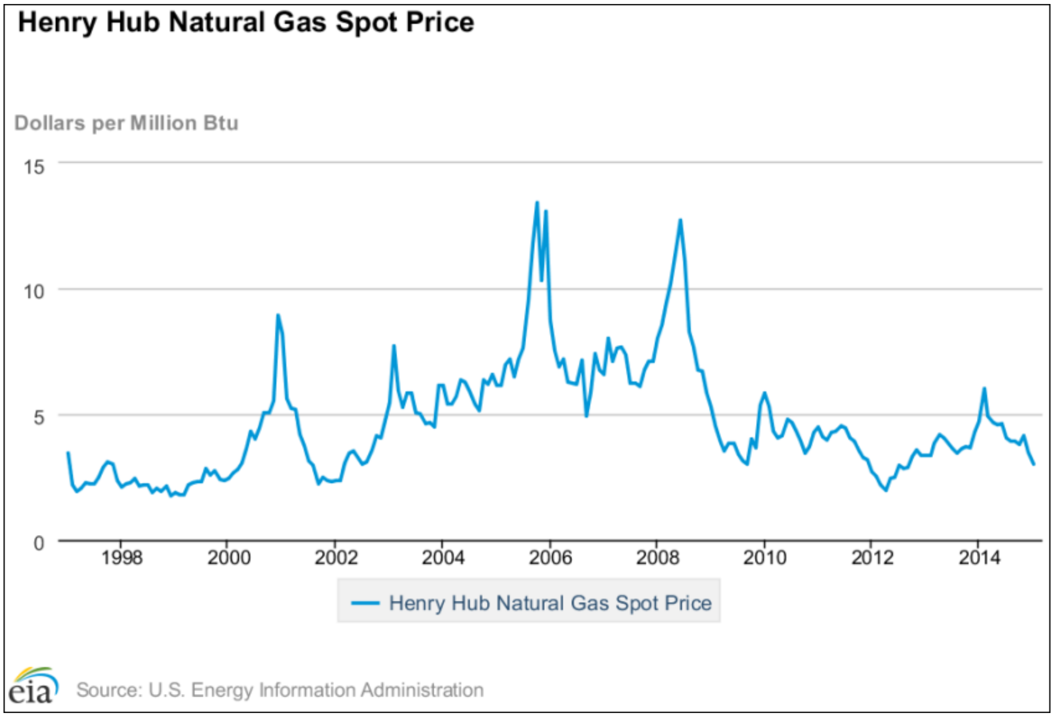


Figure 12[17]

Figure 13 shows the most recent trading statistics for the CME natural gas contract[18] as at February 19, 2015. It shows the recent dramatic reduction in price even during the winter heating season. The graph shows the recent slight rebound due to the extreme cold weather.

[16] Ibid slide 30

[17] US EIA February 23. 2014; http://www.eia.gov/dnav/ng/hist/rngwhhdm.htm

[18] http://www.cmegroup.com/trading/energy/natural-gas/natural-gas_quotes_settlements_futures.html and StockCharts http://stockcharts.com/h-sc/ui?s=$natgas

Figure 13

Figure 14 shows ICF's November 2014 forecast[19] for Henry Hub natural gas prices.

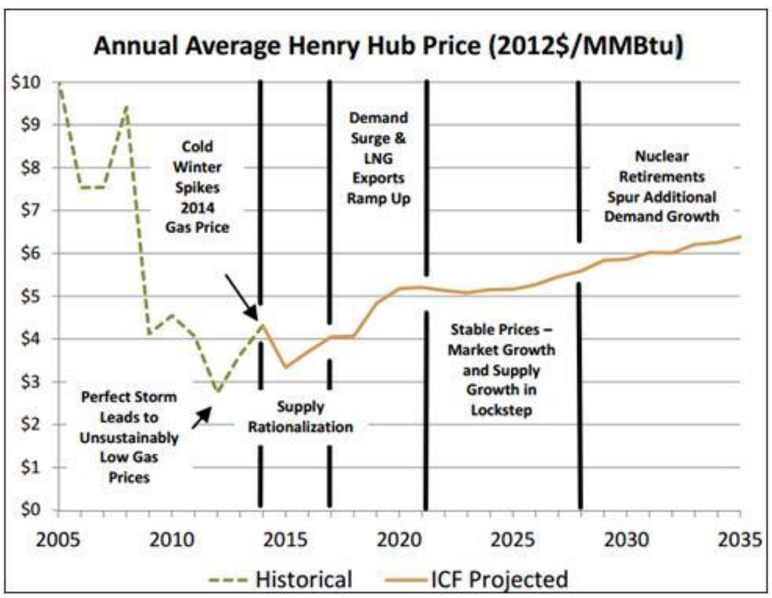


Figure 14[20]
Source: ICF Study

[19] Ibid slide 3

[20] Ibid slide 17

Figure 15 shows the EIA's[21] most recent 2014 Henry Hub forecast to 2039 for the Reference case compared to high and low growth scenarios in 2012 US$/MMBTU.

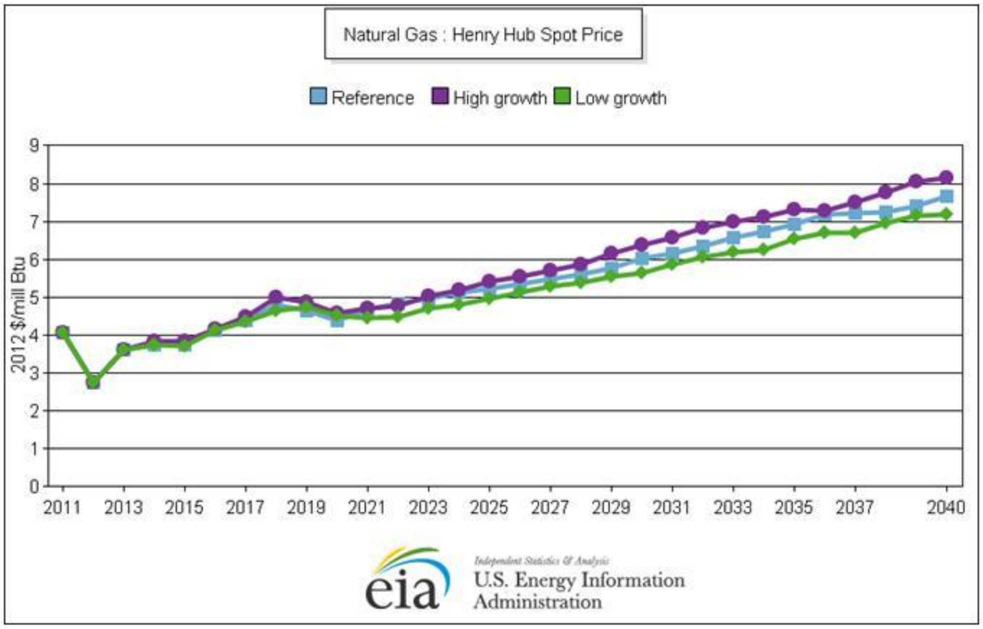


Figure 15

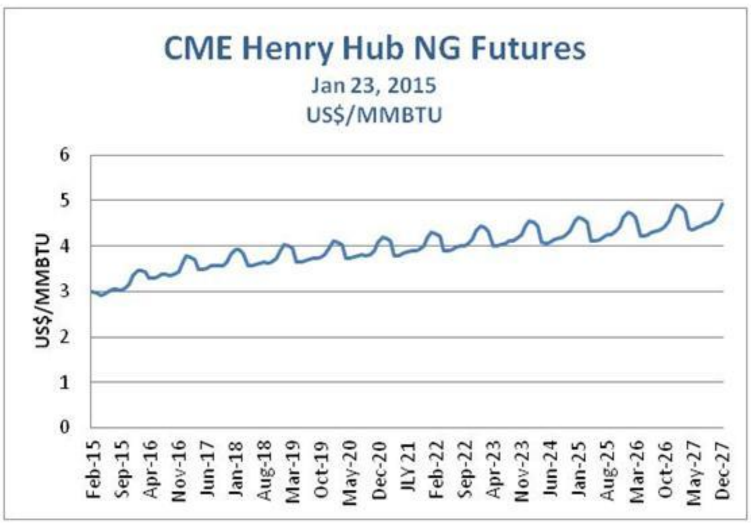


Figure 16

Both ICF and EIA show Henry Hub prices in the $3-5/MMBTU range through to 2025. In addition the CME Henry Hub Futures contract[22] also shows a gradual rise from $3-5/MMBTU as shown in **Figure 16**. In May of 2014 (prior to the dramatic reduction in

[21] EIA 2014 Long Term Outlook May, 2014; http://www.eia.gov/forecasts/aeo/

[22] CME Henry Hub Future Settlements on January 23, 2015
http://www.cmegroup.com/trading/energy/natural-gas/natural-gas_quotes_settlements_futures.html

energy prices) the National Energy Board forecasted Henry Hub prices to rise from $3.73 US/MMBTU to $4.15 in 2014, $4.25 in 2015 and $4.35 in 2016.

5.2.4 UNION GAS PRICING

Ontario NG prices have fallen along with the drop in crude prices. ICF's most recent Henry Hub to Dawn basis forecast for the period 2015-2025 is $0.25 US/MMBTU. The current CME February basis is trading at 0.186 US$/MMBTU.

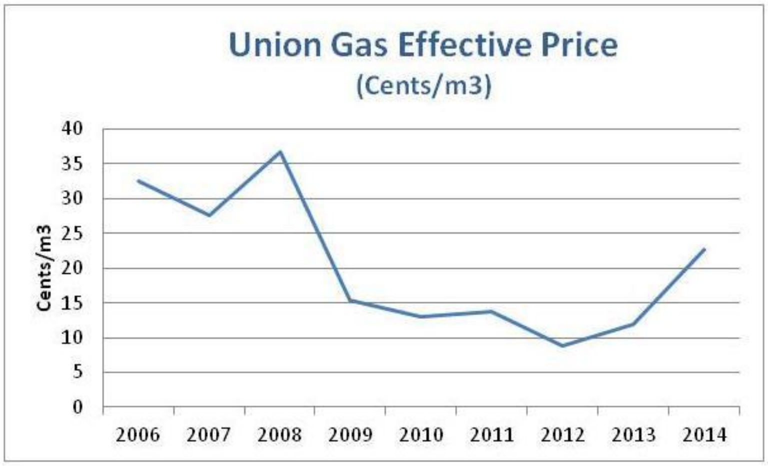


Figure 17[23]

Figure 17 shows Union's historical effective gas commodity price for Union's south franchise area.

For 2015 Union Gas has forecasted a landed reference price of $5.716/Gj (21.866 cents/m^3) based on a NYMEX price of US$3.917/MMBTU and an exchange rate of 1.14. It is probable that the effective landed price at the end of 2015 will fall to reflect the current Henry Hub pricing. Given the Henry Hub forecasts and the projected reduction in basis it is probable that Union's landed reference price could remain range bounded in the $4.50-5.50 Cdn/Gj from 2015 to 2025.

5.2.5 PROPANE: HISTORICAL AND FORECAST PRICES

The main pricing point for propane is Mont Belvieu Texas. **Figure 18** shows the historical prices for propane at Mont Belvieu with prices peaking at about $1.85US/gallon in 2008. Propane prices have fallen to below $0.50 US/gallon.

[23] OEB Energy Quarterly, July-September 2014; pg 5

Propane Spot Price

Mont Belvieu, TX FOB (US$ per gallon)

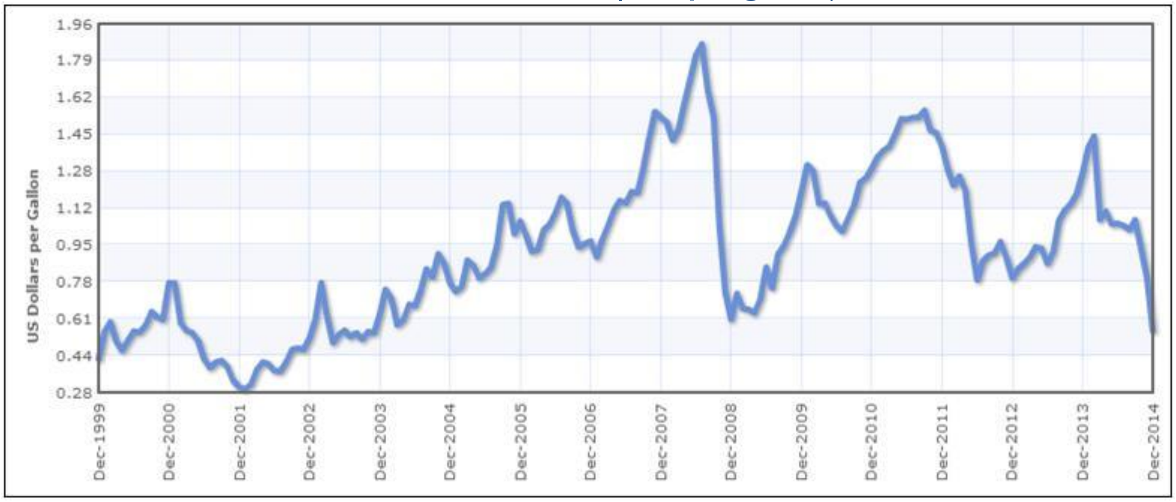


Figure 18

Source: US Energy Information Administration January 20, 2015

Figure 19 shows the historical Canadian propane prices for Edmonton, Sarnia, Mont Belvieu and Conway. The Sarnia rack propane prices historically have had a reasonable correlation to Mont Belvieu prices.

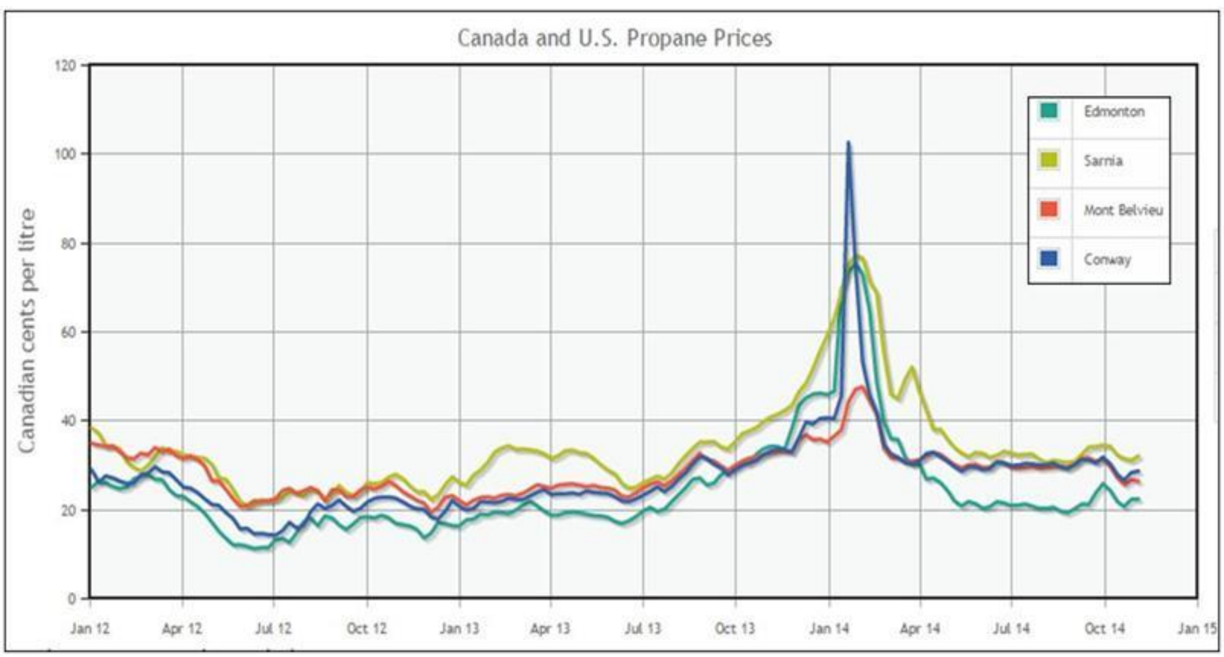


Figure 19[24]

[24] The Canadian Propane Market's Recovery from the Polar Vortex, 20/11/2014

Forecasted costs for propane fuel are close to residual fuel and both are at a premium to natural gas.

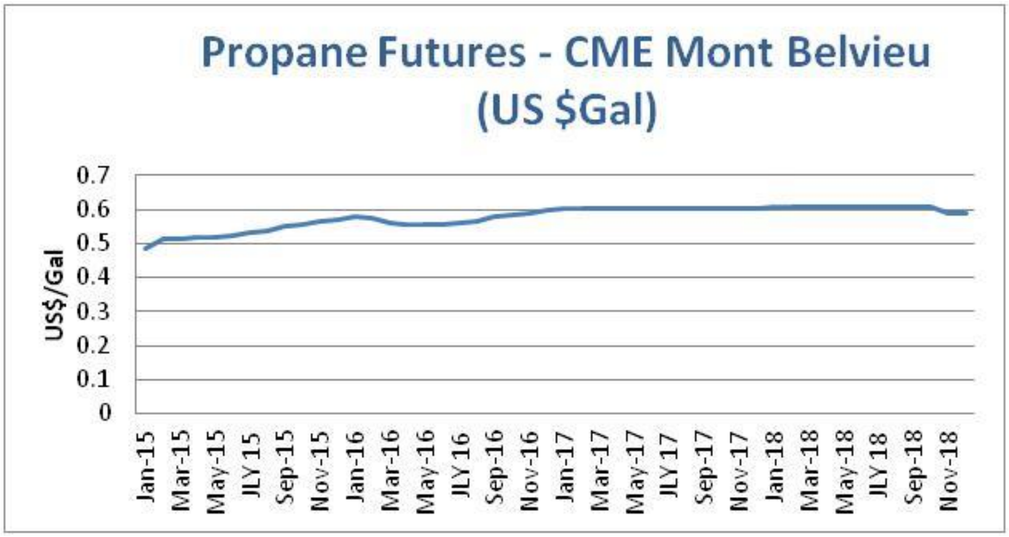
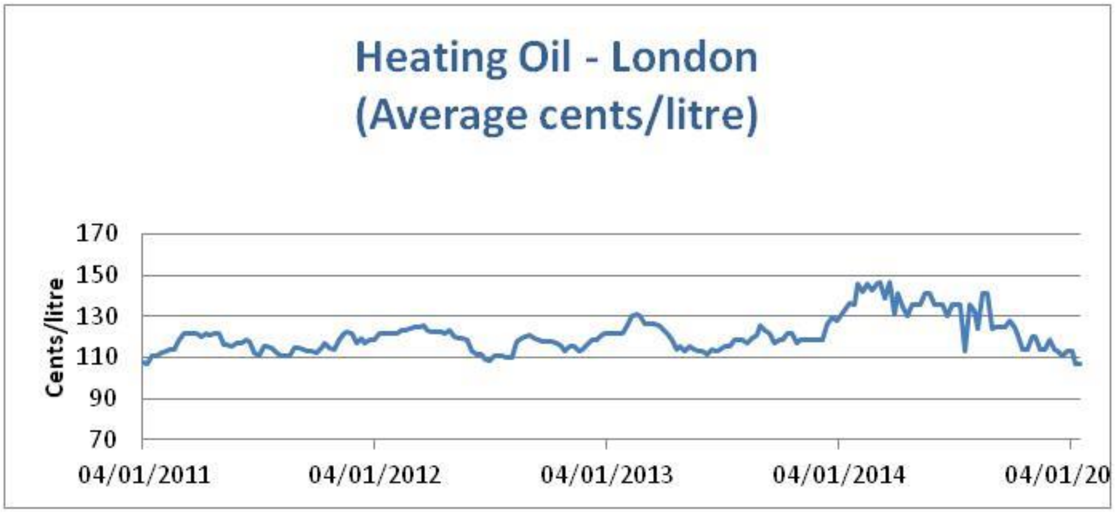


Figure 20

CME propane futures[25] on January 23, 2015 are shown in **Figure 20** (Mont Belvieu) in US$/Gal. On December 2, 2014 Mont Belvieu was $0.659 US/Gal. Over the past year Sarnia wholesale price was on average about $20.19 Cdn/Gj. The most recent Sarnia propane price was used as the initial price for the Elenchus propane forecast. To develop the long term propane commodity price forecast prices were calculated based on the propane commodity price on January 23, 2015 and then adding the annual average per cent change from the EIA US East North Central propane forecast for each year in the forecast.

[25] CME quotes http://www.cmegroup.com/trading/energy/petrochemicals/mont-belvieu-propane-5-decimals-swap_quotes_settlements_futures.html?venue=F#tradeDate=02/17/2015

5.2.6 Heating Oil Historical Prices



Source: CANSIM

Figure 21

Figure 21 shows the historical heating oil prices for London, Ontario. The most recent London HO price was used as the initial price for the Elenchus propane forecast. To develop the long term HO commodity price forecast prices were calculated based on the HO commodity price on January 23, 2015 and then adding the annual average per cent change from the EIA US East North Central HO forecast for each year in the forecast.

5.2.7 Electricity Forecast Prices

Ontario's electricity market has and continues to be under significant price pressures due to a number of factors including: feed in tariff contracts for wind solar and biomass, coal phase out and long term energy agreements that are premium priced. **Figure 22** shows the Ontario electricity price inclusive of the Global Adjustment ("GA"). GA accounts for the differences between the market price and the rates paid to regulated and contracted generators and conservation and demand management programs.

Ontario HOEP + GA
(Cents/kWh)

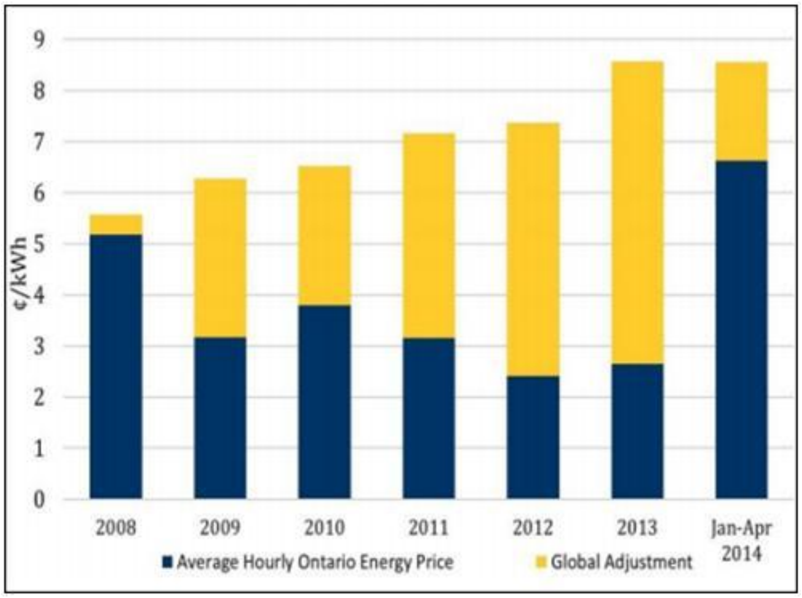


Figure 22

Source: IESO Understanding Global Adjustment, June 2014

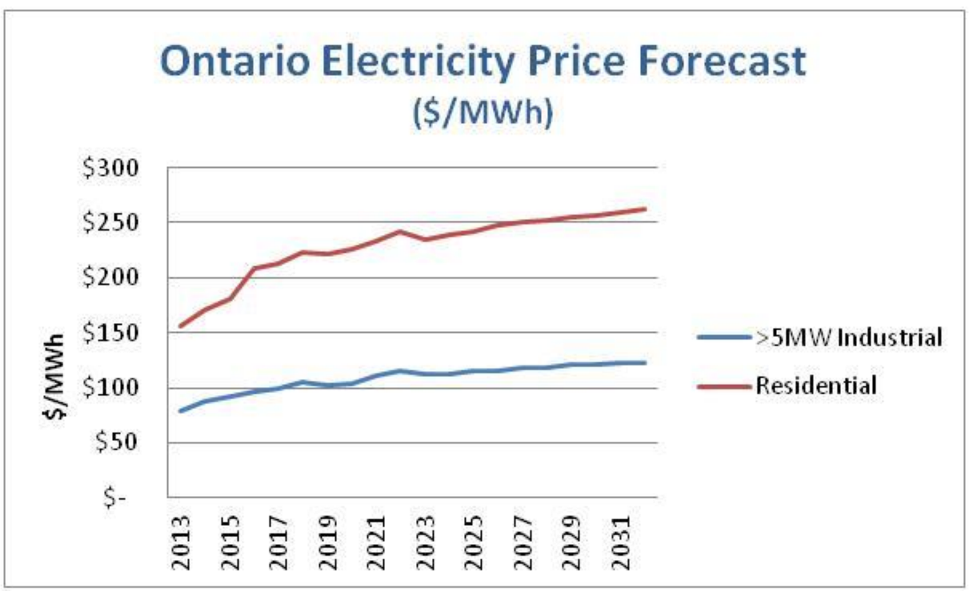


Figure 23

Although the province has introduced some changes and is proposing and considering a number of further changes (i.e. capacity market, storage, dispatch changes for wind and solar and operating agreements with Quebec Hydro) it is likely that Ontario electricity prices will continue to bear premiums given the size and long term nature of the Ontario Power Authority contracts. **Figure 23** shows the OPA's Long Term Energy Plan forecast[26] for delivered electricity for residential and industrial customers. The residential price includes HST and the Ontario Clean Energy Benefit ("OCEB").

5.3 COMPARATIVE ENERGY PRICES

Comparative 25 year EIA forecasts for the US East North Central residential fuel prices[27] are shown in **Figure 24**.

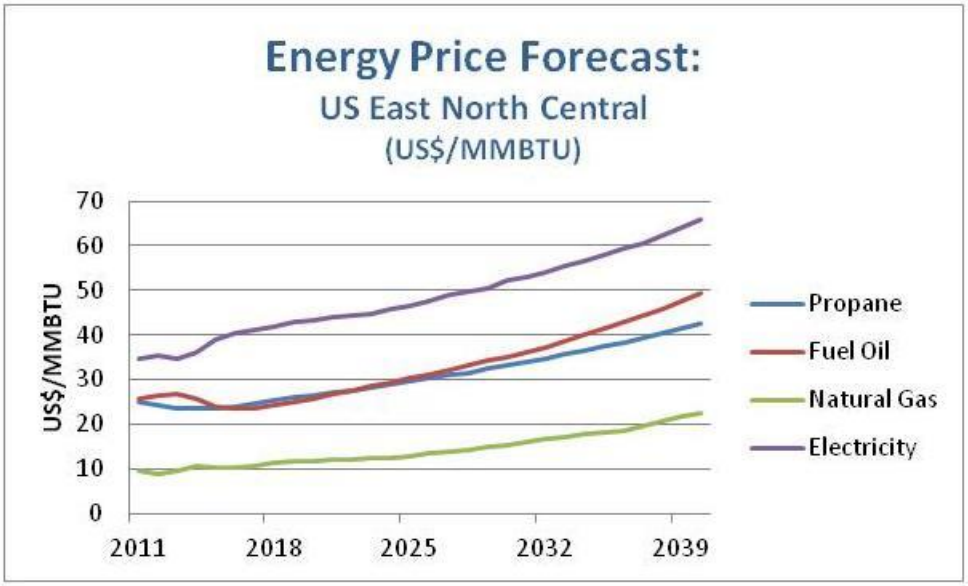


Figure 24

Natural gas is forecasted to have a substantially lower price compared to the other 3 fuels throughout the forecast period. Similar trends are forecasted for these fuels in Ontario but with the electricity price being higher than the US East North Central prices. **Figure 25** shows Elenchus's forecasted southwestern Ontario delivered energy prices taxes included for all 4 fuels. Natural gas prices are based on Union Gas's January, 2015 rates.

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[26] Ontario Power Authority Long Term Energy Plan http://www.powerauthority.on.ca/power-planning/long-term-energy-plan-2013 Module 4

[27] EIA 2014 Long Term Outlook May, 2014; http://www.eia.gov/forecasts/aeo/

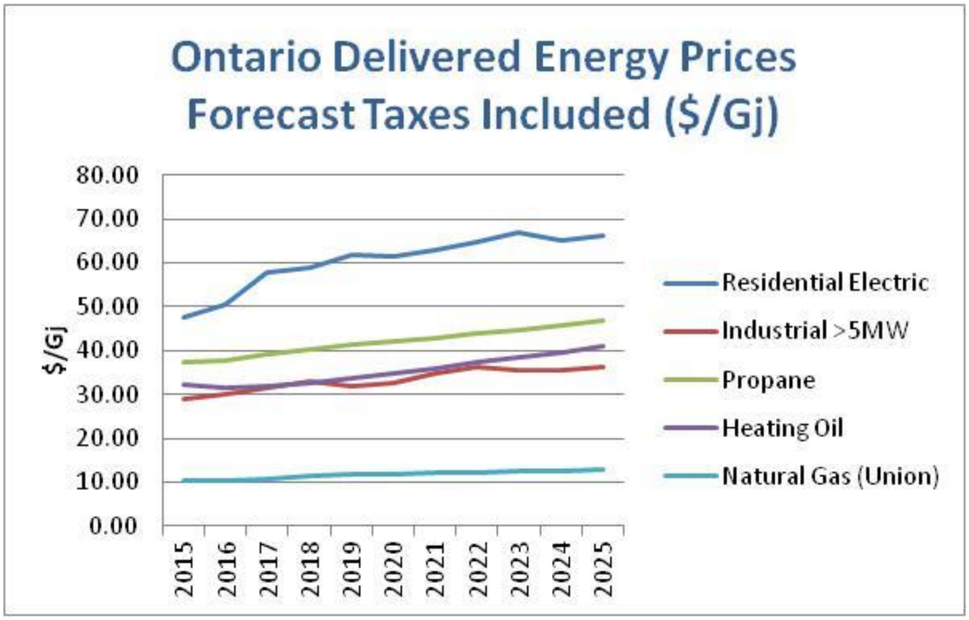


Figure 25

5.4 FORECAST NOTES

Forecasts of energy prices especially in the current context are subject to variance from actual due to the factors identified in this report. In particular, the following key issues could impact the forecasts in this report.

1. Addition of new storage and pipelines to serve Ontario and the Kincardine area should storage be developed near Bruce's proposed distribution system
2. Exchange rates influenced by oil prices resulting from the various proposed Canadian projects to serve the United States
3. Continued and sustained drop in world oil prices
4. LNG exports
5. Carbon programs and pricing

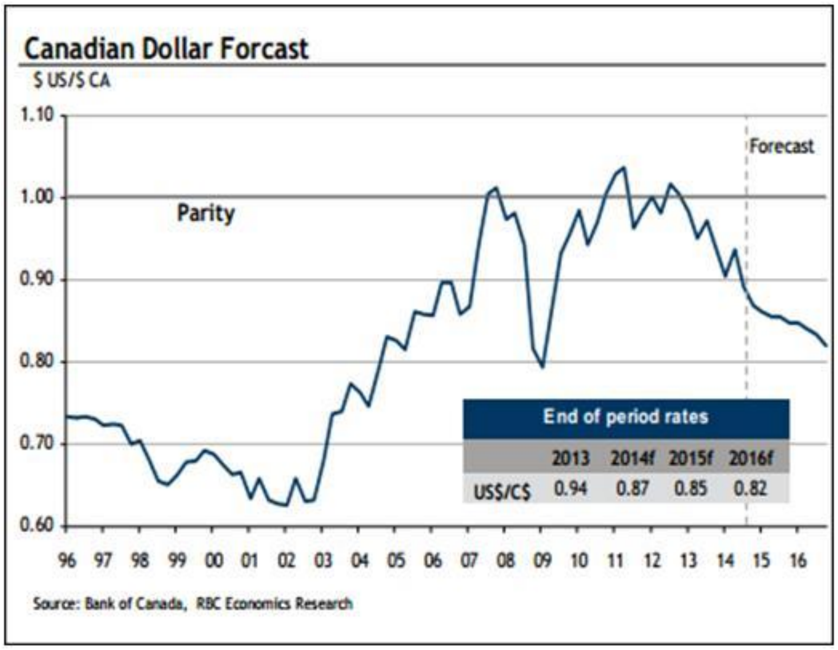
5.5 PRICE FORECAST CONCLUSION

The NEB and ICF are projecting Ontario NG prices to stabilize with modest price increases over the 15 year forecast period. Natural gas on an energy equivalent basis is the most economic alternative when compared to propane, heating oil and electricity.

Recent and projected reductions in international and North American crude prices will tend to dampen all energy prices including NG.

APPENDIX TO PRICE FORECAST

Canada US Exchange Rate Forecast



End of period rates				
	2013	2014f	2015f	2016f
US$/C$	0.94	0.87	0.85	0.82

Figure 1[28]

Figure 1 shows RBC's most recent exchange rate forecast showing a downward decline to 0.82 for 2015. This is a reduction from 0.94 in 2013. (Note January 26, 2015 rate is 0.804). This exchange rate reduction has been driven largely by energy pricing.

Emissions Issues

Carbon programs could significantly impact future natural gas prices. **Figure 2** shows the impact of a $10 and $25/tonne carbon charge compared to the reference case for the United States East North Central market. Ontario has recently acknowledged that it is reconsidering implementing some form of carbon program. If this occurs all 4 fuels will be impacted. Natural gas costs would increase due to the carbon program as shown in **Figure 2**. The other fuels' carbon costs would be greater than natural gas and therefore natural gas would be the more favoured fuel.

[28] RBC ECONOMIC AND FINANCIAL MARKET OUTLOOK, December 2014, pg 5

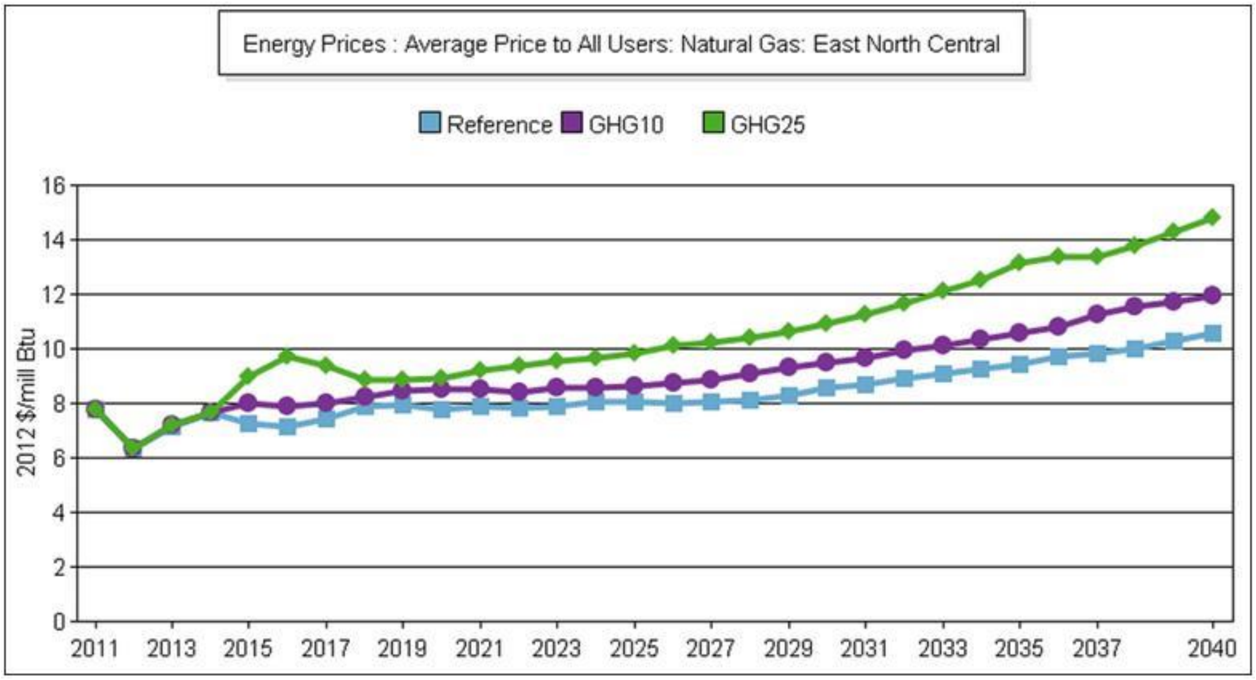


Figure 2

Source: EIA

Natural gas has lower emissions than fuel oils

Example:

- 22,300 # CO_2/1000 Gal #2
- 25,000 # CO_2/1000 Gal #6
- 116.8 # CO_2 per MMBTU Natural Gas

Example:

- 50,000 Gallons #2 Oil 557 Tons of CO_2 from #2 Oil
- 392 Tons of CO_2 from equivalent Natural Gas

Reduction of 165 Tons CO_2 with Natural Gas

Emissions Example: 50,000 Gallons of #2 oil compared to other fuels

Emissions Gas versus Oil (Tons) Emissions	Uncontrolled			
(Pounds)	Nat. Gas	#2 Oil	#4 Oil	#6 Oil
Part	20.20	100.00	347.97	555.91
PM10	20.20	54.00	223.69	361.34
SOx	4.04	7180.00	7456.45	7347.26
NOx	942.55	1000.00	994.19	2547.92
VOC	18.85	17.00	16.90	52.35
CO	235.64	250.00	248.55	231.63
Lead	0.00	0.02	0.02	0.19
Total #s	1,241	8,601	9,288	11,097