





# Forecast commentary

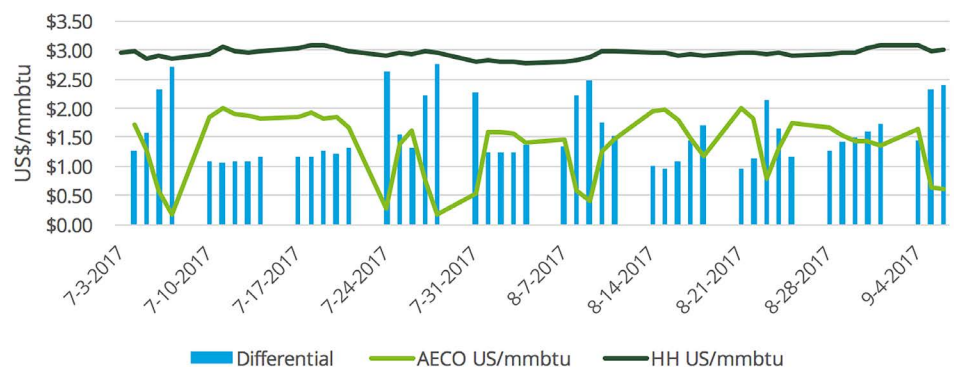
Fragility is the quality of things that are vulnerable to volatility.

— Nassim Nicholas Taleb, scientist

Recent headlines have been dominated by hurricanes and their impact on people, infrastructure and even oil prices. However, the most volatile commodity this summer season has been natural gas, specifically the AECO benchmark. It is typical to have fluctuations in AECO and BC Station 2 pricing during the summer which is the season of plant maintenance, pipeline shut-ins, and other projects that limit the capacity of Canadian producers to get natural gas to market.

This year has been no exception, with frequent and dramatic drops in price over the past three months. Meanwhile, Henry Hub has not been subject to the same volatility, so the differential with AECO has fluctuated significantly. Although the differential spiked to above US\$2.50/mmbtu at times, it has consistently come back to around US\$1.00-1.50/mmbtu. Nevertheless, this differential is higher than historically seen due to Canadian natural gas becoming increasingly stranded.

## North American natural gas prices



Source: Daily Oil Bulletin, Bank of Canada

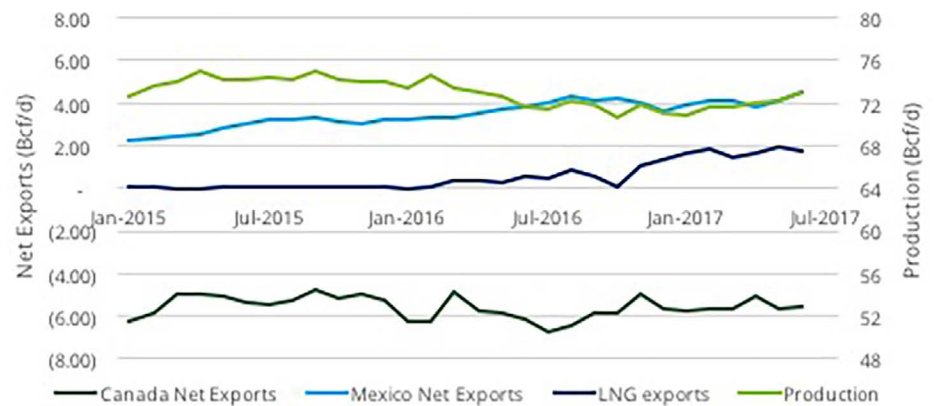


In general, natural gas production in the United States (U.S.) and Canada has been steady over the past two years, with the most notable fluctuation in the U.S. occurring in early 2016 when production peaked before temporarily falling approximately five per cent in early 2017. Natural gas production in Mexico, however, has decreased by 17 per cent over the past two years, during which time U.S. exports to Mexico increased by nearly 50 per cent. This shows that the demand for natural gas in Mexico, driven by power generation, has had to be satisfied through imports rather than domestic production, opening a growing market for U.S. natural gas that is not easily accessible by Canada.

This, in turn, has helped to buoy prices at Henry Hub to be satisfied through imports rather than domestic production, opening a growing market for U.S. natural gas that is not easily accessible by Canada. This, in turn, has helped to buoy prices at Henry Hub.

The U.S. has increased both imports and exports from Canada over the past two years while total pipeline exports have increased by approximately 40 per cent. Over the same period, LNG exports from the U.S. have grown from near zero to approximately 2 Bcf/d.

**Natural gas production/net exports from the United States**



Source: EIA

While the U.S. has growing options to sell its gas, including to Mexico and on the LNG market, Canada has only two options: domestic consumption and exports to the U.S. This lack of market choice leads to volatility and depressed prices in Canada, as the ability of U.S. producers to quickly increase gas production to meet the growing export market means Canadian plays struggle to compete. This trend is expected to continue even as several additional U.S. LNG projects are completed over the next few years.

Canadian West Coast LNG projects remain at a standstill, with another project – the Pacific Northwest LNG project – being cancelled during the last quarter due to low gas prices and increased project costs. Currently, only a handful of projects remain on the docket, with minimal activity slated to occur in 2017 and 2018. The future of the industry in British Columbia remains unclear under the new provincial government and because of weak natural gas prices.

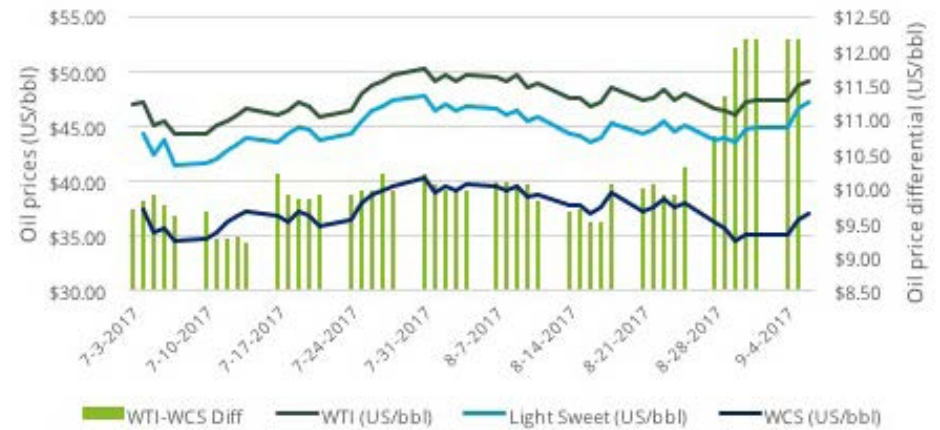
Out of almost 20 proposed projects on the West Coast, the Woodfibre LNG in Squamish is the only LNG project to receive a positive investment decision so far. Pending permitting decisions, construction of the facility could begin in late 2017 with first gas in 2020. Meanwhile, the U.S. continues to overshadow Canadian opportunities as multiple LNG projects advance on all three coasts.

Deloitte has long believed that natural gas prices will be buoyed in the future by the ongoing switch from coal to natural gas for power generation. There is the possibility for producers to contract directly to power plants as this becomes more prevalent, but a significant obstacle to this business model is that the infrastructure required to transport natural gas from a processing facility to a power plant is almost fully in the hands of mid-stream companies, not producers.

In this price forecast, Deloitte expects AECO to be C\$2.00/Mcf in 2017 assuming an elevated differential to Henry Hub of US\$1.50/Mcf. We expect this differential to narrow in the long term to US\$0.90/Mcf and have forecast Henry Hub to be US\$3.10/Mcf for the remainder of 2017.



### Natural gas production/net exports from the United States



Source: Daily Oil Bulletin

On the crude oil side, the main story this quarter has been the impact of severe hurricanes which temporarily shut down several refineries and petrochemical plants off the Gulf Coast and resulted in the evacuation of hundreds of thousands of people. This has had a negative impact on demand for crude oil, resulting in lower prices, but the effects are expected to be temporary as refineries come back online and people return to their homes.

All benchmarks took a tumble while refineries were shut-in, but the WCS heavy differential increased and has stayed high, even after light prices have begun to recover because that differential is vulnerable to different market constraints than light oil. For example, the crisis in Venezuela could impact the WCS differential in a positive way because Venezuela is one of the major foreign sources of heavy oil to Gulf Coast refineries. Over the past two years, Venezuelan production has declined by 17 per cent but its exports to the U.S. have remained relatively stagnant, indicating that Venezuela is limiting its domestic supply to continue to meet commitments to refiners in the United States.

This may not be sustainable, however, and if Venezuela pulls back on its exports to the U.S., greater demand would be created for Canadian heavy oil, dropping the WCS differential to the benefit of oil sands producers.

On the other hand, increased light oil production in the U.S. means the demand for light oil refining capacity has increased. U.S. refineries are looking to diversify their range of crude slates to respond to the increase in domestic light oil production, potentially leading to a lower demand for heavy oil. If this switch materializes and the U.S. demand for Canadian heavy oil decreases, we may encounter an increase in the WCS heavy oil differential in the long term. Accounting for these two opposing forces, Deloitte has forecast WCS to be C\$45.50/bbl for the remainder of 2017 and US\$50.00/bbl for WTI in 2017.

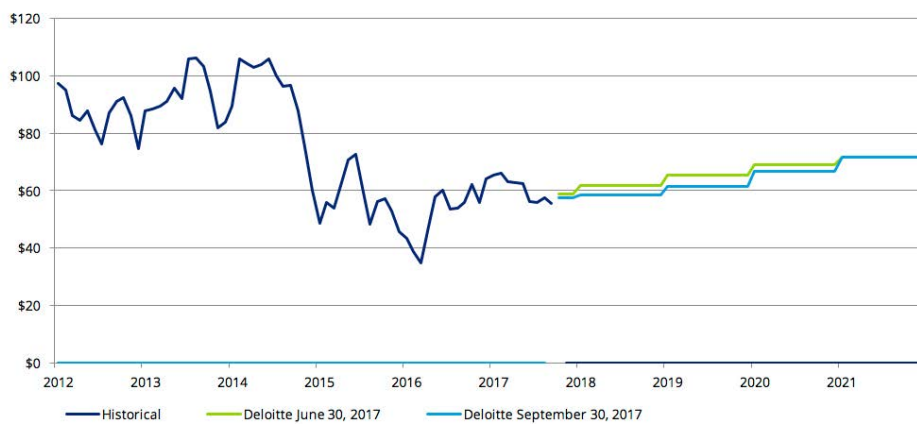




# Canadian domestic price forecast

## Crude oil price and market demand forecast

### Edmonton par (real \$)



### Forecast comments

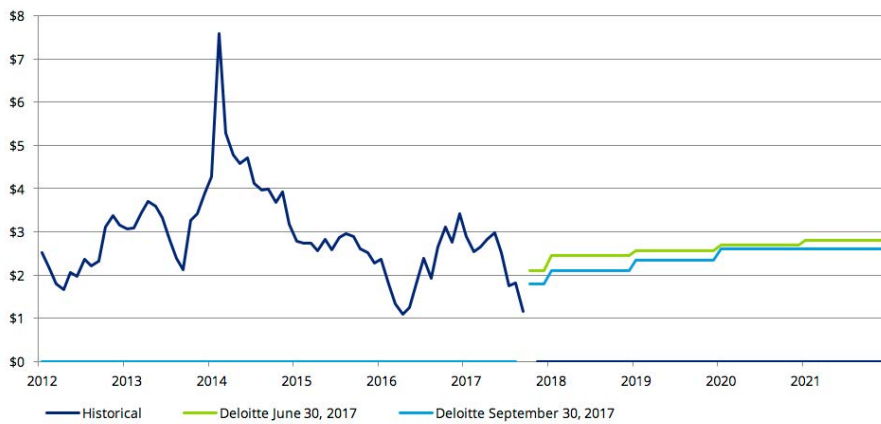
- Edmonton Par is forecast as a differential to WTI. This differential is based on Canadian Light Sweet Oil Index Futures which began trading in January 2014.
- The Edmonton crude oil price is used as the basis for the remaining Canadian crude reference points. Offsets are based on five-year historical averages with recent years weighted more heavily in the determination.

Year	WTI Cushing, OK (40 API) US\$/bbl Real	WTI Cushing, OK (40 API) US\$/bbl Current	Edmonton City Gate (40 API) C\$/bbl Real	Edmonton City Gate (40 API) C\$/bbl Current	WCS Hardisty (20.5 API) C\$/bbl Current	Heavy Oil Hardisty (12 API) C\$/bbl Current	Cost Inflation Rate	CAD to USD Exchange Rate
<b>Historical</b>								
2014	\$96.15	\$93.26	\$96.91	\$94.00	\$81.06	\$73.70	1.9%	0.906
2015	\$49.96	\$48.69	\$58.49	\$57.00	\$44.80	\$39.63	1.1%	0.783
2016	\$43.79	\$43.15	\$52.98	\$52.22	\$38.90	\$34.08	1.4%	0.755
<b>2017</b>								
9 Mths H	\$49.20	\$49.20	\$60.46	\$60.46	\$48.84	\$44.21	1.6%	0.766
3 Mths F	\$50.00	\$50.00	\$57.50	\$57.50	\$45.50	\$44.50	0.0%	0.800
Avg.	\$49.40	\$49.40	\$59.72	\$59.72	\$48.01	\$44.28	-	0.775
<b>Forecast</b>								
2017	\$50.00	\$50.00	\$57.50	\$57.50	\$45.50	\$44.50	0.0%	0.800
2018	\$52.00	\$53.05	\$58.55	\$59.70	\$44.40	\$41.35	2.0%	0.820
2019	\$55.00	\$57.20	\$61.45	\$63.95	\$48.35	\$45.20	2.0%	0.830
2020	\$60.00	\$63.65	\$66.65	\$70.75	\$54.80	\$51.65	2.0%	0.840
2021	\$65.00	\$70.35	\$71.75	\$77.65	\$61.45	\$58.20	2.0%	0.850
2022	\$70.00	\$77.30	\$77.65	\$85.75	\$69.15	\$65.85	2.0%	0.850
2023	\$70.00	\$78.85	\$77.65	\$87.45	\$70.55	\$67.20	2.0%	0.850
2024	\$70.00	\$80.40	\$77.65	\$89.20	\$71.95	\$68.50	2.0%	0.850



## Natural gas price and market demand forecast

### AECO natural gas (real \$)



### Forecast comments

- The AECO natural gas price is forecast based on historical differentials to Henry Hub and future contracts traded on the NGX based in Calgary.

Year	AB Ref. Avg. Price C\$/Mcf Current	AB AECO Avg. Price C\$/Mcf Real	AB AECO Avg. Price C\$/Mcf Current	BC Direct Station 2 Sales C\$/Mcf Current	NYMEX Henry Hub US\$/Mcf Real	NYMEX Henry Hub US\$/Mcf Current
<b>Historical</b>						
2014	\$4.22	\$4.64	\$4.50	\$4.16	\$4.53	\$4.39
2015	\$2.56	\$2.76	\$2.69	\$1.81	\$2.70	\$2.63
2016	\$1.93	\$2.19	\$2.16	\$1.75	\$2.55	\$2.52
<b>2017</b>						
9 Mths H	\$2.26	\$2.35	\$2.35	\$1.88	\$3.01	\$3.01
3 Mths F	\$1.80	\$2.00	\$2.00	\$1.60	\$3.10	\$3.10
Avg.	\$2.15	\$2.26	\$2.26	\$1.81	\$3.03	\$3.03
<b>Forecast</b>						
2017	\$1.80	\$2.00	\$2.00	\$1.60	\$3.10	\$3.10
2018	\$2.15	\$2.30	\$2.35	\$1.95	\$3.15	\$3.20
2019	\$2.45	\$2.55	\$2.65	\$2.25	\$3.20	\$3.35
2020	\$2.75	\$2.80	\$2.95	\$2.55	\$3.25	\$3.45
2021	\$2.80	\$2.80	\$3.05	\$2.60	\$3.30	\$3.55
2022	\$3.05	\$2.95	\$3.25	\$2.80	\$3.40	\$3.75
2023	\$3.25	\$3.10	\$3.50	\$3.05	\$3.55	\$4.00
2024	\$3.60	\$3.35	\$3.85	\$3.40	\$3.75	\$4.30

# International price forecast

## Crude oil price and market demand forecast

Year	Av. WTI Spot	Brent Spot (38.3 API with 0.37% sulphur content)	Gulf Coast ASC	Avg. OPEC Basket	Nigerian Bonny Light (33.4 API FOB)	Mexico Maya (21.8 API FOB)	Russia Urals (31.7 API FOB)
	US\$/bbl Real	US\$/bbl Real	US\$/bbl Real	US\$/bbl Real	US\$/bbl Real	US\$/bbl Real	US\$/bbl Real
<b>Forecast</b>							
2017	\$50.00	\$53.00	\$44.50	\$51.25	\$53.50	\$45.50	\$52.00
2018	\$52.00	\$53.00	\$46.50	\$51.25	\$53.50	\$45.50	\$52.00
2019	\$55.00	\$56.00	\$49.50	\$54.25	\$56.50	\$48.50	\$55.00
2020	\$60.00	\$61.00	\$54.50	\$59.25	\$61.50	\$53.50	\$60.00
2021	\$65.00	\$66.00	\$59.50	\$64.25	\$66.50	\$58.50	\$65.00
2022	\$70.00	\$71.00	\$64.50	\$69.25	\$71.50	\$63.50	\$70.00
2023	\$70.00	\$71.00	\$64.50	\$69.25	\$71.50	\$63.50	\$70.00
2024	\$70.00	\$71.00	\$64.50	\$69.25	\$71.50	\$63.50	\$70.00

- International crude quality reference points for OPEC Basket, Venezuelan, Nigerian, UAE, Mexican, Chinese, Russian, and Indonesian crudes are now based on Brent in US dollars. For the purposes of this forecast Brent is receiving a premium to WTI on the world markets.
- Current forecasts for other Crude Oil

reference points are based on historical trends to the WTI price.

- Brent, United Kingdom crude is based on 38.3°API with 0.37 per cent sulphur content. Brent blend is a light sweet North Sea crude oil that serves as an international benchmark grade.
- United States Gulf Coast Argus Sour

Crude Index (ASCI) is a blend of offshore Gulf Coast oil from Mars, Poseidon, and Southern Green Canyon.

- OPEC Basket represents the current grouping of crude oil prices from the OPEC member countries.
- Russia Urals 31.7°API is the FOB delivered price to the Mediterranean destinations.

## Natural gas price and market demand forecast

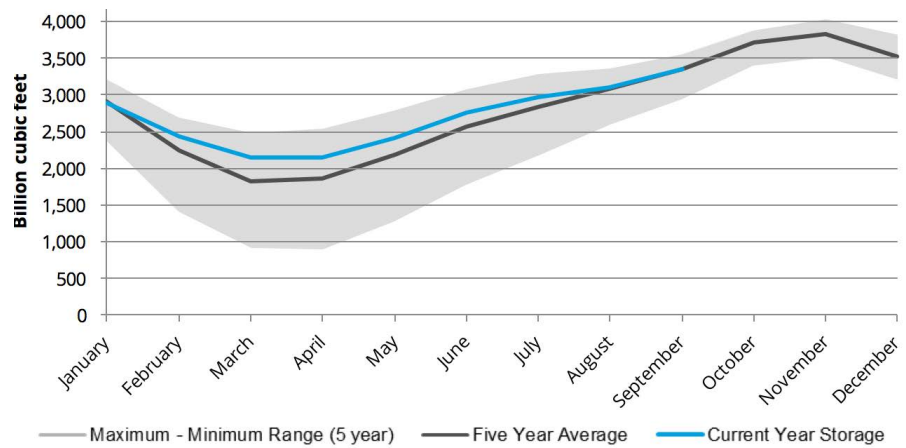
Year	USD to GBP Exchange	USD to EUR Exchange	NYMEX Henry Hub	Permian Waha	San Juan Ignacio	Rocky Mountain Opal	UK NBP	India Domestic Gas
	Rate	Rate	US\$/Mcf Real	US\$/Mcf Real	US\$/Mcf Real	US\$/Mcf Real	US\$/Mcf Real	US\$/Mcf Real
<b>Forecast</b>								
2017	1.30	1.20	\$3.10	\$2.75	\$2.80	\$2.80	\$5.80	\$2.90
2018	1.30	1.20	\$3.15	\$2.80	\$2.85	\$2.85	\$5.85	\$3.20
2019	1.30	1.20	\$3.20	\$2.85	\$2.90	\$2.90	\$5.90	\$3.25
2020	1.30	1.20	\$3.25	\$2.90	\$2.95	\$2.95	\$5.95	\$3.30
2021	1.30	1.20	\$3.30	\$2.95	\$3.00	\$3.00	\$6.00	\$3.35
2022	1.30	1.20	\$3.40	\$3.05	\$3.10	\$3.10	\$6.10	\$3.40
2023	1.30	1.20	\$3.55	\$3.20	\$3.25	\$3.25	\$6.25	\$3.50
2024	1.30	1.20	\$3.75	\$3.40	\$3.45	\$3.45	\$6.45	\$3.65

# Global trends

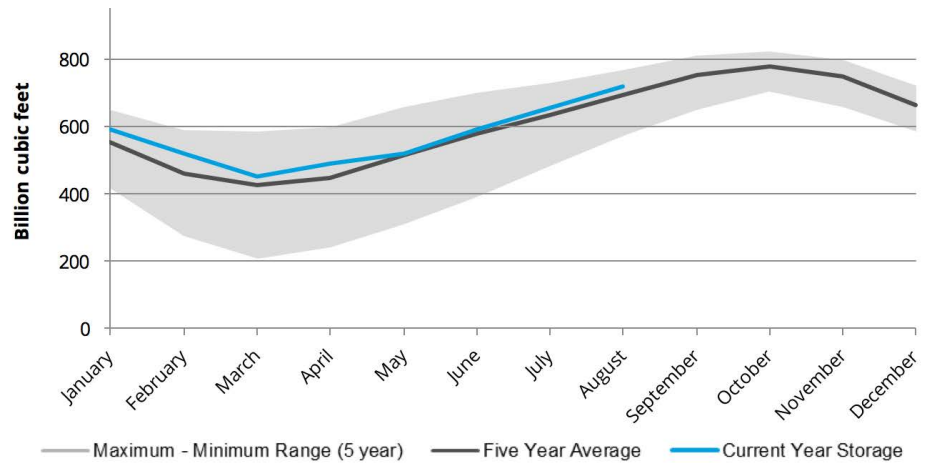
## Storage

- The United States natural gas storage levels are now in line with the five year average. Storage draws have been larger this year due to higher demand and increased exports. Demand has softened over the last month, but exports remain higher than this time last year.
- Canadian natural gas storage remains above the five year average, as growth in production has offset growth in demand.

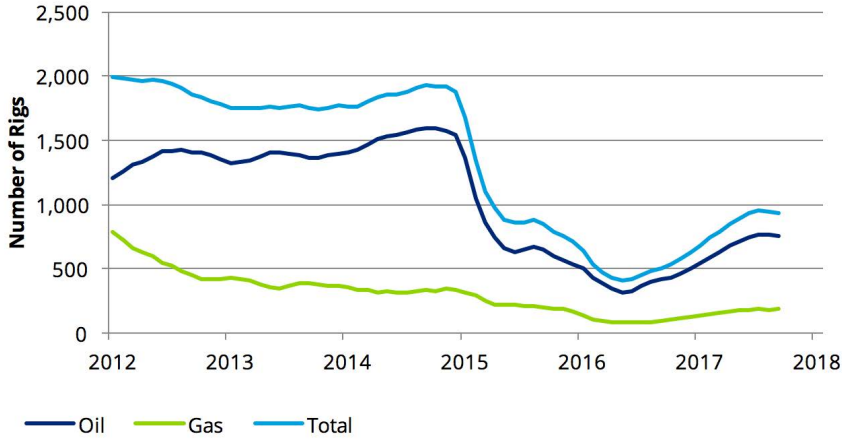
**US Natural Gas Storage**



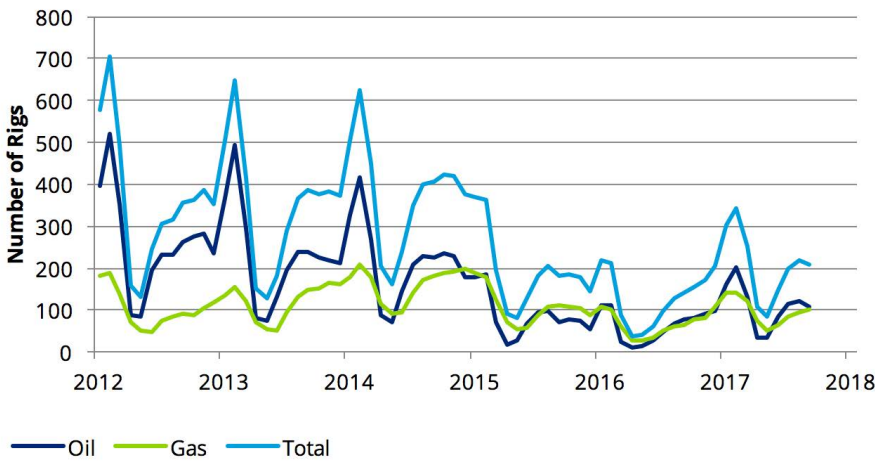
**Canada Natural Gas Storage**



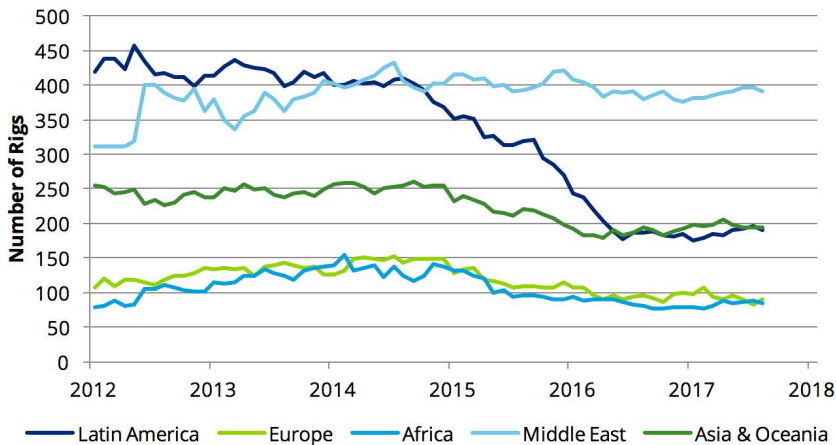
### United States Rig Counts



### Canada Rig Counts



### International



## Rigs

### United States

- United States oil rig counts have shown signs of leveling off after significant growth throughout the year. Drilling increases in the Permian basin drove the majority of this growth. The recent hurricanes and refinery shut-ins have affected this area and therefore, rig counts may begin increasing again in the coming months.

### Canada

- Canadian rigs are up nearly 70 percent from this time last year. This growth has come from increases in both oil and gas drilling. Rig counts are expected to continue to grow throughout the winter as drilling season begins.

### International

- Rig counts have levelled off or have been slightly increasing in most regions of the world. North America currently makes up approximately 55 percent of the world's active rigs, significantly less than the historic norm of 60-70 percent seen over the last 40 years.

# Canadian domestic price tables

Year	Crude Oil Pricing				WCS 20.5 Deg. AP Hardisty I			
	Price Inflation	Cost Inflation	CAD to USD Exchange	WTI at Cushing Oklahoma		WTI at Cushing Oklahoma	Edmonton City Gate	Edmonton City Gate
	Rate	Rate	Rate	US\$/bbl Real		US\$/bbl Current	C\$/bbl Real	C\$/bbl Current
<b>Historical</b>								
2007	2.5%	2.5%	1.008	\$92.45	\$88.04	\$89.73	\$85.46	\$55.50
2008	2.4%	2.4%	0.943	\$102.31	\$99.57	\$105.62	\$102.80	\$82.95
2009	0.3%	0.3%	0.880	\$62.95	\$61.65	\$67.49	\$66.10	\$58.66
2010	1.8%	1.8%	0.971	\$83.24	\$79.40	\$81.58	\$77.80	\$67.22
2011	2.9%	2.9%	1.012	\$99.24	\$94.88	\$99.92	\$95.54	\$77.12
2012	1.5%	1.5%	1.001	\$96.47	\$94.11	\$88.74	\$86.57	\$73.10
2013	0.9%	0.9%	0.972	\$100.76	\$97.91	\$96.08	\$93.36	\$74.97
2014	1.9%	1.9%	0.906	\$96.15	\$93.26	\$96.91	\$94.00	\$81.06
2015	1.1%	1.1%	0.783	\$49.96	\$48.69	\$58.49	\$57.00	\$44.80
2016	1.4%	1.4%	0.755	\$43.79	\$43.15	\$52.98	\$52.22	\$38.90
<b>2017</b>								
9 Mths H	1.6%	1.6%	0.766	\$49.20	\$49.20	\$60.46	\$60.46	\$48.84
3 Mths F	0.0%	0.0%	0.800	\$50.00	\$50.00	\$57.50	\$57.50	\$45.50
Avg.	N/A	N/A	0.775	\$49.40	\$49.40	\$59.72	\$59.72	\$48.01
<b>Forecast</b>								
2017	0.0%	0.0%	0.800	\$50.00	\$50.00	\$57.50	\$57.50	\$45.50
2018	2.0%	2.0%	0.820	\$52.00	\$53.05	\$58.55	\$59.70	\$44.40
2019	2.0%	2.0%	0.830	\$55.00	\$57.20	\$61.45	\$63.95	\$48.35
2020	2.0%	2.0%	0.840	\$60.00	\$63.65	\$66.65	\$70.75	\$54.80
2021	2.0%	2.0%	0.850	\$65.00	\$70.35	\$71.75	\$77.65	\$61.45
2022	2.0%	2.0%	0.850	\$70.00	\$77.30	\$77.65	\$85.75	\$69.15
2023	2.0%	2.0%	0.850	\$70.00	\$78.85	\$77.65	\$87.45	\$70.55
2024	2.0%	2.0%	0.850	\$70.00	\$80.40	\$77.65	\$89.20	\$71.95
2025	2.0%	2.0%	0.850	\$70.00	\$82.00	\$77.65	\$91.00	\$73.40
2026	2.0%	2.0%	0.850	\$70.00	\$83.65	\$77.65	\$92.80	\$74.85
2027	2.0%	2.0%	0.850	\$70.00	\$85.35	\$77.65	\$94.65	\$76.35
2028	2.0%	2.0%	0.850	\$70.00	\$87.05	\$77.65	\$96.55	\$77.90
2029	2.0%	2.0%	0.850	\$70.00	\$88.80	\$77.65	\$98.50	\$79.45
2030	2.0%	2.0%	0.850	\$70.00	\$90.55	\$77.65	\$100.45	\$81.05
2031	2.0%	2.0%	0.850	\$70.00	\$92.35	\$77.65	\$102.45	\$82.65
2032	2.0%	2.0%	0.850	\$70.00	\$94.20	\$77.65	\$104.50	\$84.30
2033	2.0%	2.0%	0.850	\$70.00	\$96.10	\$77.65	\$106.60	\$86.00
2034	2.0%	2.0%	0.850	\$70.00	\$98.00	\$77.65	\$108.75	\$87.75
2035	2.0%	2.0%	0.850	\$70.00	\$100.00	\$77.65	\$110.90	\$89.50
2036	2.0%	2.0%	0.850	\$70.00	\$102.00	\$77.65	\$113.10	\$91.25
2036+	2.0%	2.0%	0.850	0.0%	2.0%	0.0%	2.0%	2.0%

## Notes:

- All prices are in Canadian dollars except WTI and NYMEX gas which are in U.S. dollars
- Edmonton city gate prices based on historical light oil par prices posted by the government of Alberta and Net Energy differential futures (40 Deg. API < 0.5% Sulphur)
- Natural Gas Liquid prices are forecasted at Edmonton therefore an additional transportation cost must be included to plant gate sales point
- 1 Mcf is equivalent to 1 mmbtu
- **Real prices listed in 2017 dollars with no escalation considered**
- **Alberta gas prices, except AECO, include an average cost of service to the plant gate**
- **NGL prices have been switched from a mix reference to a spec reference**

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Price Forecast September 30, 2017 | Canadian domestic price tables

Year	Natural Gas Liquids Pricing Edmonton Par Prices				Natural Gas Pricing						Sulphur
	Ethane	Propane	Butane	Pentanes + Condensate	Alberta Reference Avg. Price	Alberta AECO Avg. Price	Alberta AECO Avg. Price	B.C. Direct Stn. 2 Sales	NYMEX Henry Hub	NYMEX Henry Hub	Alberta Plant Gate
	C\$/bbl Current	C\$/bbl Current	C\$/bbl Current I	C\$/bbl Current	C\$/mcf Current	C\$/mcf Real	C\$/mcf Current	C\$/mcf Current	US\$/Mcf Real	US\$/Mcf Current	C\$/bbl Current
<b>Historical</b>											
2007	\$16.12	\$56.33	\$69.86	\$92.06	\$5.48	\$6.16	\$5.87	\$5.59	\$7.10	\$6.76	\$87.57
2008	\$22.59	\$56.96	\$83.54	\$109.77	\$7.88	\$8.38	\$8.16	\$8.20	\$9.11	\$8.86	\$303.83
2009	\$11.61	\$34.62	\$56.21	\$69.49	\$3.85	\$4.04	\$3.96	\$4.17	\$4.03	\$3.95	(\$5.08)
2010	\$11.53	\$45.19	\$68.79	\$84.02	\$3.76	\$4.20	\$4.01	\$4.01	\$4.60	\$4.39	\$56.94
2011	\$10.30	\$52.41	\$86.98	\$105.24	\$3.46	\$3.80	\$3.63	\$3.34	\$4.18	\$4.00	\$101.60
2012	\$6.73	\$30.80	\$75.47	\$99.67	\$2.25	\$2.45	\$2.39	\$2.29	\$2.82	\$2.75	\$126.81
2013	\$8.68	\$38.54	\$77.44	\$103.52	\$2.98	\$3.27	\$3.17	\$3.11	\$3.84	\$3.73	\$62.17
2014	\$12.46	\$42.93	\$59.43	\$101.47	\$4.22	\$4.64	\$4.50	\$4.16	\$4.53	\$4.39	\$88.99
2015	\$7.49	\$5.35	\$33.70	\$55.15	\$2.56	\$2.76	\$2.69	\$1.81	\$2.70	\$2.63	\$107.45
2016	\$6.04	\$8.71	\$31.45	\$52.43	\$1.93	\$2.19	\$2.16	\$1.75	\$2.55	\$2.52	\$45.40
<b>2017</b>											
9 Mths H	\$6.54	\$21.88	\$38.39	\$61.47	\$2.26	\$2.35	\$2.35	\$1.88	\$3.01	\$3.01	\$36.56
3 Mths F	\$5.60	\$20.15	\$34.50	\$57.50	\$1.80	\$2.00	\$2.00	\$1.60	\$3.10	\$3.10	\$35.00
Avg.	\$6.31	\$21.45	\$37.42	\$60.48	\$2.15	\$2.26	\$2.26	\$1.81	\$3.03	\$3.03	\$36.17
<b>Forecast</b>											
2017	\$5.60	\$20.15	\$34.50	\$57.50	\$1.80	\$2.00	\$2.00	\$1.60	\$3.10	\$3.10	\$35.00
2018	\$6.60	\$20.90	\$35.85	\$59.70	\$2.15	\$2.30	\$2.35	\$1.95	\$3.15	\$3.20	\$35.70
2019	\$7.45	\$22.35	\$38.35	\$63.95	\$2.45	\$2.55	\$2.65	\$2.25	\$3.20	\$3.35	\$36.40
2020	\$8.35	\$24.80	\$42.45	\$70.75	\$2.75	\$2.80	\$2.95	\$2.55	\$3.25	\$3.45	\$37.15
2021	\$8.50	\$27.15	\$46.60	\$77.65	\$2.80	\$2.80	\$3.05	\$2.60	\$3.30	\$3.55	\$37.90
2022	\$9.10	\$30.05	\$51.45	\$85.75	\$3.05	\$2.95	\$3.25	\$2.80	\$3.40	\$3.75	\$38.65
2023	\$9.80	\$30.65	\$52.50	\$87.45	\$3.25	\$3.10	\$3.50	\$3.05	\$3.55	\$4.00	\$39.40
2024	\$10.80	\$31.25	\$53.55	\$89.20	\$3.60	\$3.35	\$3.85	\$3.40	\$3.75	\$4.30	\$40.20
2025	\$11.65	\$31.85	\$54.60	\$91.00	\$3.95	\$3.55	\$4.15	\$3.70	\$3.90	\$4.55	\$41.00
2026	\$12.05	\$32.50	\$55.70	\$92.80	\$4.05	\$3.60	\$4.30	\$3.80	\$3.95	\$4.70	\$41.85
2027	\$12.45	\$33.15	\$56.80	\$94.65	\$4.20	\$3.65	\$4.45	\$3.95	\$4.00	\$4.90	\$42.65
2028	\$12.70	\$33.80	\$57.95	\$96.55	\$4.30	\$3.65	\$4.55	\$4.05	\$4.00	\$4.95	\$43.50
2029	\$12.95	\$34.50	\$59.10	\$98.50	\$4.40	\$3.65	\$4.65	\$4.10	\$4.00	\$5.05	\$44.40
2030	\$13.20	\$35.20	\$60.30	\$100.45	\$4.45	\$3.65	\$4.70	\$4.20	\$4.00	\$5.15	\$45.30
2031	\$13.45	\$35.90	\$61.50	\$102.45	\$4.55	\$3.65	\$4.80	\$4.30	\$4.00	\$5.30	\$46.20
2032	\$13.75	\$36.60	\$62.70	\$104.50	\$4.65	\$3.65	\$4.90	\$4.35	\$4.00	\$5.40	\$47.10
2033	\$14.00	\$37.35	\$63.95	\$106.60	\$4.75	\$3.65	\$5.00	\$4.45	\$4.00	\$5.50	\$48.05
2034	\$14.30	\$38.10	\$65.25	\$108.75	\$4.85	\$3.65	\$5.10	\$4.55	\$4.00	\$5.60	\$49.00
2035	\$14.55	\$38.85	\$66.55	\$110.90	\$4.95	\$3.65	\$5.20	\$4.65	\$4.00	\$5.70	\$50.00
2036	\$14.85	\$39.65	\$67.90	\$113.10	\$5.05	\$3.65	\$5.30	\$4.75	\$4.00	\$5.85	\$51.00
2036+	2.0%	2.0%	2.0%	2.0%	2.0%	0.0%	2.0%	2.0%	0.0%	2.0%	2.0%

**Notes:**

- All prices are in Canadian dollars except WTI and NYMEX gas which are in U.S. dollars
- Edmonton city gate prices based on historical light oil par prices posted by the government of Alberta and Net Energy differential futures (40 Deg. API < 0.5% Sulphur)
- Natural Gas Liquid prices are forecasted at Edmonton therefore an additional transportation cost must be included to plant gate sales point
- 1 Mcf is equivalent to 1 mmbtu
- **Real prices listed in 2017 dollars with no escalation considered**
- **Alberta gas prices, except AECO, include an average cost of service to the plant gate**
- **NGL prices have been switched from a mix reference to a spec reference**

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## Additional Crude Reference Prices

Years	Crude oil pricing			Natural gas pricing
	Lt. Sour 35 Deg. API Cromer, SK	MSO 31 Deg. API Hardisty	Synbit (AWB) 70% Bitumen 30% Cond. 21 Deg. API	Ontario Dawn Reference Point
	C\$/bbl Current	C\$/bbl Current	C\$/bbl Current	C\$/mcf Current
<b>Historical</b>				
2007	\$76.71	\$67.81	\$56.78	\$6.86
2008	\$95.28	\$92.40	\$84.08	\$9.88
2009	\$64.04	\$63.76	\$58.92	\$4.80
2010	\$76.40	\$72.32	\$67.64	\$4.79
2011	\$92.13	\$83.39	\$80.29	\$4.34
2012	\$84.27	\$77.53	\$74.75	\$3.11
2013	\$91.76	\$82.65	\$76.90	\$4.13
2014	\$92.91	\$89.39	\$82.03	\$5.76
2015	\$55.46	\$54.70	\$44.28	\$3.72
2016	\$51.37	\$48.29	\$39.58	\$3.46
<b>2017</b>				
9 Mths H	\$59.64	\$57.11	\$49.38	\$4.01
3 Mths F	\$56.50	\$53.50	\$48.40	\$3.90
Avg.	\$58.86	\$56.21	\$49.14	\$3.98
<b>Forecast</b>				
2017	\$56.50	\$53.50	\$48.40	\$3.90
2018	\$58.70	\$55.65	\$46.85	\$4.20
2019	\$62.90	\$59.75	\$50.80	\$4.25
2020	\$69.65	\$66.50	\$57.35	\$4.35
2021	\$76.60	\$73.35	\$64.05	\$4.50
2022	\$84.65	\$81.30	\$71.80	\$4.70
2023	\$86.30	\$82.95	\$73.25	\$5.00
2024	\$88.05	\$84.60	\$74.70	\$5.35
2025	\$89.80	\$86.30	\$76.20	\$5.70
2026	\$91.60	\$88.00	\$77.75	\$5.85
2027	\$93.45	\$89.80	\$79.30	\$6.05
2028	\$95.30	\$91.55	\$80.90	\$6.15
2029	\$97.20	\$93.40	\$82.50	\$6.30
2030	\$99.15	\$95.25	\$84.15	\$6.40
2031	\$101.15	\$97.20	\$85.85	\$6.55
2032	\$103.15	\$99.10	\$87.55	\$6.65
2033	\$105.20	\$101.10	\$89.30	\$6.80
2034	\$107.35	\$103.15	\$91.10	\$6.95
2035	\$109.50	\$105.20	\$92.90	\$7.05
2036	\$111.65	\$107.30	\$94.75	\$7.20
2036+	2.0%	2.0%	2.0%	2.0%

**Notes:**

- All prices are in Canadian dollars except WTI and NYMEX gas which are in U.S. dollars
- Edmonton city gate prices based on historical light oil par prices posted by the government of Alberta and Net Energy differential futures (40 Deg. API < 0.5% Sulphur)
- Natural Gas Liquid prices are forecasted at Edmonton therefore an additional transportation cost must be included to plant gate sales point
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# International price tables

Crude Oil Pricing																	
Year	Average WTI Spot	Alaskan North Slope	California Kern River	Louisiana Heavy Sweet	Louisiana Light Sweet	MARS Blend	Wyoming Sweet	Brent Spot	Gulf Coast Argus Sour Crude Index ASCI	Average OPEC Basket	Venezuelan Merly	Nigerian Bonny Light	Arabia UAE Dubai Feth	Mexico Maya	Russia Urals	Indonesia Minas	
	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	US\$/bbl	
	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	Real	
Forecast																	
2017	\$50.00	\$42.00	\$46.00	\$49.00	\$48.00	\$44.50	\$46.50	\$53.00	\$44.50	\$51.25	\$46.00	\$53.50	\$52.25	\$45.50	\$52.00	\$48.75	
2018	\$52.00	\$44.00	\$48.00	\$51.00	\$50.00	\$46.50	\$48.50	\$53.00	\$46.50	\$51.25	\$46.00	\$53.50	\$52.25	\$45.50	\$52.00	\$48.75	
2019	\$55.00	\$47.00	\$51.00	\$54.00	\$53.00	\$49.50	\$51.50	\$56.00	\$49.50	\$54.25	\$49.00	\$56.50	\$55.25	\$48.50	\$55.00	\$51.75	
2020	\$60.00	\$52.00	\$56.00	\$59.00	\$58.00	\$54.50	\$56.50	\$61.00	\$54.50	\$59.25	\$54.00	\$61.50	\$60.25	\$53.50	\$60.00	\$56.75	
2021	\$65.00	\$57.00	\$61.00	\$64.00	\$63.00	\$59.50	\$61.50	\$66.00	\$59.50	\$64.25	\$59.00	\$66.50	\$65.25	\$58.50	\$65.00	\$61.75	
2022	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2023	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2024	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2025	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2026	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2027	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2028	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2029	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2030	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2031	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2032	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2033	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2034	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2035	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2036	\$70.00	\$62.00	\$66.00	\$69.00	\$68.00	\$64.50	\$66.50	\$71.00	\$64.50	\$69.25	\$64.00	\$71.50	\$70.25	\$63.50	\$70.00	\$66.75	
2036+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	

**Notes:**

- Venezuelan Merly replaced BCF-17 in the OPEC basket March 1, 2009.

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Year			Natural Gas pricing						Ethanol
	USD to GBP	USD to EUR	NYMEX Henry Hub	Permian Waha	San Juan Ignacio	Rocky Mtn. Opal	UK NBP	India Domestic Gas	US CBOT Ethanol
	Exchange rate	Exchange rate	US\$/Mcf Real	US\$/Mcf Real	US\$/Mcf Real	US\$/Mcf Real	US\$/gal. Real	US\$/Mcf Real	US\$/bbl Real
<b>Forecast</b>									
2017	1.300	1.200	\$3.10	\$2.75	\$2.80	\$2.80	\$5.80	\$2.90	\$1.50
2018	1.300	1.200	\$3.15	\$2.80	\$2.85	\$2.85	\$5.85	\$3.20	\$1.55
2019	1.300	1.200	\$3.20	\$2.85	\$2.90	\$2.90	\$5.90	\$3.25	\$1.55
2020	1.300	1.200	\$3.25	\$2.90	\$2.95	\$2.95	\$5.95	\$3.30	\$1.60
2021	1.300	1.200	\$3.30	\$2.95	\$3.00	\$3.00	\$6.00	\$3.35	\$1.60
2022	1.300	1.200	\$3.40	\$3.05	\$3.10	\$3.10	\$6.10	\$3.40	\$1.65
2023	1.300	1.200	\$3.55	\$3.20	\$3.25	\$3.25	\$6.25	\$3.50	\$1.70
2024	1.300	1.200	\$3.75	\$3.40	\$3.45	\$3.45	\$6.45	\$3.65	\$1.70
2025	1.300	1.200	\$3.90	\$3.55	\$3.60	\$3.60	\$6.60	\$3.85	\$1.75
2026	1.300	1.200	\$3.95	\$3.60	\$3.65	\$3.65	\$6.65	\$4.00	\$1.80
2027	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.05	\$1.85
2028	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$1.85
2029	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$1.90
2030	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$1.95
2031	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$2.00
2032	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$2.00
2033	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$2.05
2034	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$2.10
2035	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$2.15
2036	1.300	1.200	\$4.00	\$3.65	\$3.70	\$3.70	\$6.70	\$4.10	\$2.20
2036+	1.300	1.200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00%

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# Pricing philosophy

Price forecasting takes into account many variables that can influence future prices. Our experience tells us that we must continually review the forecasting tools we use to predict where oil and gas prices are heading. However, one constant influence on oil and gas pricing is the geo-political landscape. This impact is most accurately reflected in the financial industry's futures market for commodities, a main influence when Deloitte creates its price forecast. In other words, Deloitte looks to both the futures and the past when we create our forecasts.

This pricing philosophy challenges conventional thinking. The traditional view is based on the mean-reversion view of commodities presented by economists. Following this model, industry forecasts from 2000 to 2006 reflected a drop in prices over the long term from the current prices of the day – even though the futures market indicated otherwise. While the mean-reversion approach definitely has some merit, history has tended to reflect

that the futures market is a more accurate barometer.

## Client focus

At Deloitte, we believe it is part of our role to help our clients in both the oil and gas sector and the investment community make better long-term business decisions by providing them with the most accurate and realistic information. We understand that sound analysis of changing trends can influence decisions on mergers, acquisitions, divestitures and investments. One way we ensure our price forecasts are as accurate as possible, given the continuing impact of near-term volatility, is to review our pricing assumptions on a quarterly basis.

## Our process

In preparing the price forecast, Deloitte considers the current monthly trends, the actual price and trends for the year-to-date and the prior year actual prices. The base forecast for both oil and gas is based on New York Mercantile Exchange (NYMEX)

futures in U.S. dollars.

Crude oil and natural gas forecasts are based on yearly variable factors, weighted to a higher percent for the current data and then reflect a higher percent to prior year historical data for the later years. Gas prices have been determined independently from oil prices, but still reflect the current competitive nature of the two fuels and historical oil-to-gas ratios for the latter years of the gas forecast.

Deloitte prepares our price and market forecasts based on information we collect from numerous government agencies, industry publications, oil refineries, natural gas marketers and industry trends. Inflation forecasts and exchange rates are also an integral part of the forecast.

These forecasts are Deloitte's best estimate of how the future will look, and while they are considered reasonable, changing market conditions or additional information may require alteration from the indicated effective date.





# Glossary

Some of the words, phrases and acronyms we use frequently when talking about pricing are listed below:

AECO	Alberta Energy Company - historical name of a virtual trading hub on the NGX system	LLB	Lloydminster Blend Crude Oil
ANS	Alaska North Slope	LNG	Liquefied Natural Gas
ASCI	Argus Sour Crude Oil	MESC	Middle East Sour Crude
AWB	Access Western Blend - Canadian condensate/bitumen mix	MSO	Mixed Sour Crude Oil
BR	Bow River Crude Oil	MSW	Canadian Light Sweet
CAPP	Canadian Association of Petroleum Producers	NEB	Canadian National Energy Board
CBOT	Chicago Board Of Trade	NIT	Nova Inventory Transfer
CGA	Canadian Gas Association	NYMEX	New York Mercantile Exchange
DCQ	Daily Contract Quantity	OECD	Organization of Economic Cooperation and Development
EIA	Energy Information Administration	OPEC	Organization of Petroleum Exporting Countries
FERC	US Federal Energy Regulatory Commission	PADD	Petroleum Administration Defense District
FOB	Free on Board (shipper term)	USGC	US Gulf Coast
IEA	International Energy Administration	USWC	US West Coast
		WCS	Western Canada Select Crude Oil
		WTI	West Texas Intermediate
		WTS	West Texas Sour

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