Deloitte.

Price forecast

Resource Evaluation & Advisory

June 30, 2019

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Forecast commentary

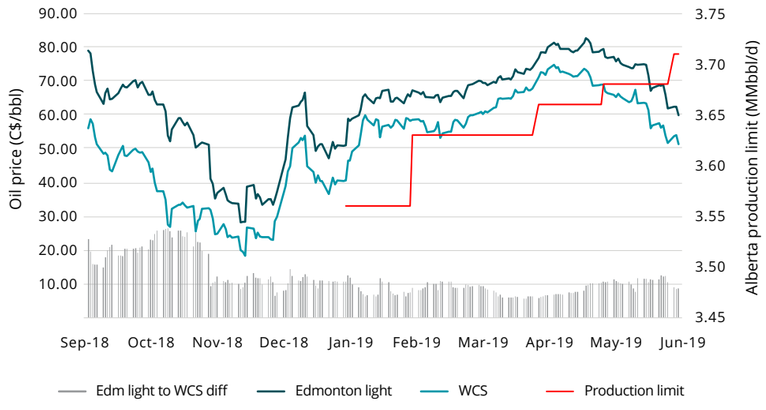
Optimism fades in oil markets

Oil prices witnessed declines through Q2 2019 as the risk of oversupply rose despite escalating geopolitical tensions. Concerns regarding this increased supply and limited global demand growth have led to depressed prices and an overall bearish view of the industry.

In an effort to decrease oil inventory volumes and boost prices, Saudi Arabia announced plans to extend OPEC cuts beyond June 2019. In the United States (US), WTI prices fell as domestic production volumes flooded the market and US crude oil stockpiles unexpectedly increased from Q1 levels by approximately five percent.

Canadian oil prices continue to avoid pre-curtailment values but have decreased since the beginning of the year as differentials to WTI widened, in the spring. The provincial government expects that Alberta crude production will have averaged 3.71 MMbbl/day in June 2019, a five-percent decrease from the average production rates in Q4 2018. The short-term effects of the Alberta government's imposed crude production curtailments materialized throughout Q1 2019 as producers began to see higher crude prices, and royalty payments flowed as a result. The government has recently indicated that extending the curtailments may be necessary due to Line 3 delays, but it has signaled it may want to allow the differential to balance at a point that enables economics for crude by rail.

Canadian oil prices with Alberta curtailments



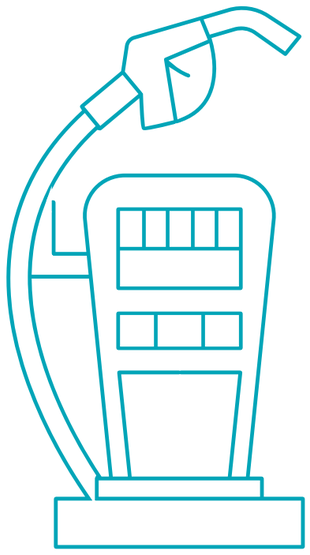
Source: DOB, Government of Alberta

Major integrated oil and gas companies have expressed irritation with the curtailments, as they were affected by increased feed stock prices for their refining business units. In addition, capital budgets have trended downward as industry uncertainty about future government intervention and regulation continued to affect sentiment toward investment in Canadian energy projects.

Crude-by-rail volumes faltered toward the end of Q1 2019, the differential between light and heavy crude narrowed, and heavy crude transportation to US refineries became uneconomical for most companies. Volumes transported by rail fell by almost 50 percent between January and March 2019, with sudden heavy-crude price spikes creating a logistical issue for many companies trying to move crude to US markets. As Canadian crude pipeline projects continue to be delayed, and the heavy-to-light differential widens, crude-by-rail volumes are expected to ramp up for the remainder of the year. Western Canadian energy markets remain uncertain, as it's not clear how the new Alberta provincial government will proceed with both crude production curtailments and rail car contracts.

The decision made by the federal government on June 18 to approve the Trans Mountain Pipeline project without further regulatory conditions was a positive step for the Canadian energy industry. Expectations are that construction will begin by the end of 2019, but no official timeline has been released. This approval acknowledges that the continued development of the oil and gas industry will be required, to enable Canada to invest in lower carbon emission project. The government has stated that profits from the pipeline operations and ultimate sale are to be earmarked for investment in green industries.

Trans Mountain will allow crude oil producers to optimize their existing assets and move forward with some potential development projects as capacity becomes more readily available. The increased access to tidewater creates additional market access for Canadian crude producers, and could provide stability for Canadian oil prices, which are almost solely dependent on US demand. The project will take time, and is only one of many that the industry would like to see realized. However, Western Canadian producers are hoping it is a catalyst for more positive news.

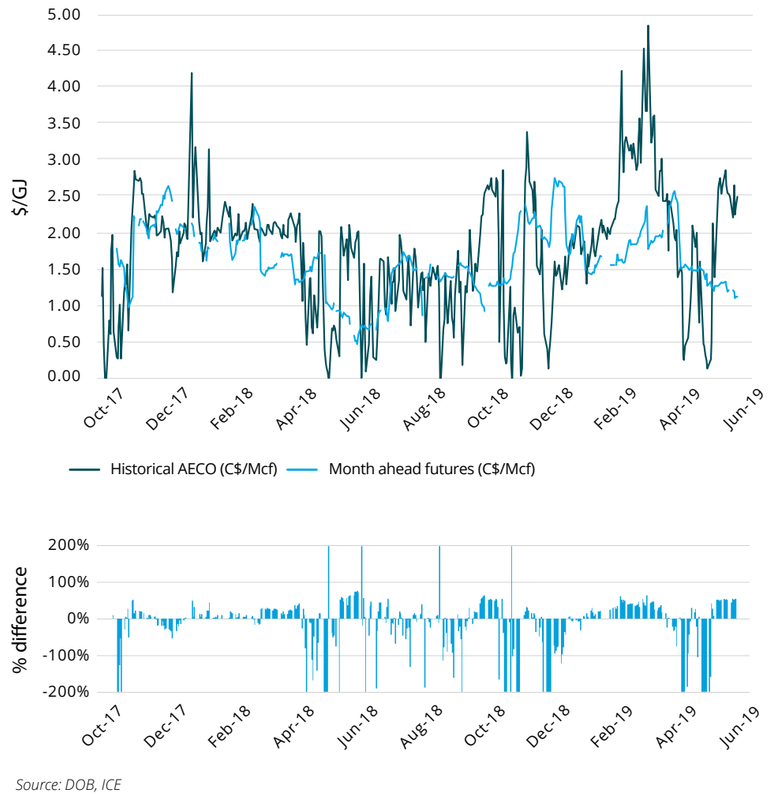


On the gas front

Canadian natural gas prices have fallen from Q1's cold-weather highs and are expected to remain low as we head into the summer months. Western Canadian natural gas production is on trend to decline from 2018 volumes as producers continued to delay capital spending due to commodity price environments and focus investment on higher liquid opportunities.

Futures curves have been showing low AECO natural gas prices for the remainder of 2019. Historically, AECO prices have outperformed market expectations, as actual prices tend to be higher than forecast futures. April saw a large downturn in AECO pricing but the rebound in May resulted in an overall Q2 premium of 14 percent over forecast futures.

Historical AECO vs month ahead future settlements



Source: DOB, ICE

The Canadian natural gas market is expected to remain volatile as long as there are few egress options other than US markets, which are producing at record highs. Canadian natural gas futures will continue to be depressed and subject to pipeline constraints and seasonal activity. The Liquefied Natural Gas (LNG) market worldwide is fast reconfiguring itself in the face of new realities as mentioned in Andrew Botterill's recent blog, Betting big: LNG trends in Canada. On the heels of the Canadian Federal Government investing in the LNG Canada project, Andrew highlights that long-term projects in Canada could provide the stability that the sector is looking for and the potential for Canada to be a leading LNG exporter.

The Canadian natural gas market is expected to remain volatile as long as there are few egress options other than US markets, which are producing at record highs.

Price forecast | Forecast commentary

State of upstream oil and gas analytics

In response to challenging market conditions since 2014, the upstream oil and gas sector has adopted digital methods to gain business insight and intelligence and to capitalize on under-used data. Digital initiatives have led to great efficiency and productivity improvements in the exploration and production sector, but the upstream oil and gas industry is seen as being slow to adopt machine learning and artificial intelligence (AI).

Other industries have successfully adopted innovative machine learning techniques to optimize and solve such problems as:

- Translation errors: neural machine translation has reduced translation errors by 60 percent
- Employee health and wellness challenges: facial recognition can detect emotional patterns and prescribe wellness plans
- Slowness of manual data entry: natural language processing is enabling the automation of research and data collection

In comparison, successful upstream oil and gas applications of machine learning and AI have largely been directed toward preventative maintenance and logistics optimization. The state of subsurface machine learning technology is limited and commercial applications have not yet materialized. As the table below indicates, the industry is working to implement analytics in several areas in the near future as well as exploring the feasibility of a couple other innovations.

Area of development	Innovation	Status of development
Exploration/subsurface	Cognitive neural network for seismic interpretation	Near-term implementation
Drilling/completions	Discrete fracture modelling	
Production/maintenance	Optimized EOR selection	
	Predictive and preventative maintenance	
	Continuous reservoir surveillance (tracers)	Researching
	AI-enhanced artificial lift	
Data	Smart cleansing of data	Near-term implementation
Machine learning	Neural networks	

Price forecast | State of upstream oil and gas analytics

Recent discussion about subsurface analytics has revolved around industry collaboration and creating an environment where the sector can realize the transformation seen in other industries. Only recently have participants begun to realize that the lack of progress in subsurface advancement is largely due to a lack of organizational readiness. The cross-functional discipline integration required for success is extremely hard to accomplish in traditional upstream exploration and production organizational structures.

A dedicated technology and analytics office, including both data science and traditional geoscience and engineering expertise, is necessary to break through the fear of change and allow the sector to begin realizing benefits.

A greater commitment to integrated data science, geoscience, and engineering is going to be required to catch up with the successes enjoyed in other industries. Aligning those disciplines will result in significant opportunities to create value with subsurface data.

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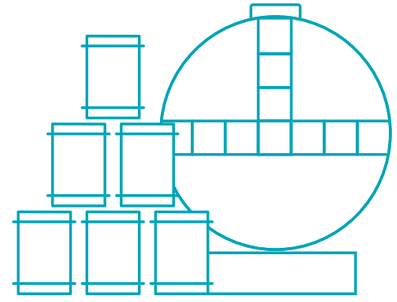


Economic outlook

Contribution by Craig Alexander, Chief Economist

The global economy has entered a period of slower economic growth. This development has heightened financial market volatility, but market sentiment may be excessively negative. Some of the moderation in world growth reflects a cooling to more sustainable rates in countries with tight labour markets. There have also been company- or industry-specific issues that have been large enough to show up in macro indicators, such as the challenges in Germany's auto sector related to emission tests and the grounding of Boeing 737 planes. These developments are unlikely to trigger a turn in the global business cycle, but there is an insidious headwind on growth: the rise of nationalism and protectionism.

Political developments related to BREXIT and the global tariff war created by US efforts to renegotiate the terms of its trade are weighing on the world economy. At this point, they have not derailed the economic expansion. Indeed, the tariffs implemented so far have only led international bodies–such as the International Monetary Fund, World Bank, and Organization of Economic Co-operation and Development–to shave 0.2 to 0.3 percentage points off their estimates of world real GDP growth. Nevertheless, financial markets are anxious about a possible further intensification of the political risks. One byproduct is the inversion of the US yield curve, which is often a recession signal. In reaction to the risks, central banks around the world are signaling their readiness to ease monetary policy if necessary.

Deloitte Economic Advisory continues to believe that the most likely scenario is for continued economic growth, albeit at a modest pace both globally and in Canada. The Canadian economy is expected to expand by a modest 1.4 percent this year and 1.7 percent next year. This is subpar, but it should be enough to keep the Bank of Canada from cutting rates and result in the Canadian dollar averaging in the 73 to 75 US cent range. Debt-laden Canadian consumers will have their wallets open, but they will spend moderately. Housing markets are likely to be generally flat, but they won't be the drag on growth that has characterized the last year. Canada needs a rotation in drivers of growth toward exports and investment; these areas should be supportive rather than booming. Financial market pessimism and slowing growth in global demand has limited commodity prices. If the base case forecast is correct and financial opinion has been too negative, commodity prices should post modest gains in late 2019 and into 2020.

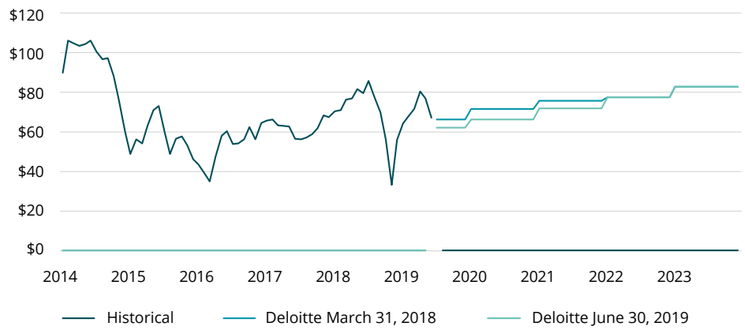
The slowing in global and Canadian growth does make the economies more vulnerable to economic shocks. And, one shouldn't forget that the economies are in the late stages of a business cycle. Being mindful of the risks to the outlook is particularly important at this stage. Regrettably, the biggest economic risks are political in nature, making them difficult to forecast.

The Canadian economy is expected to expand by a modest 1.4 percent this year and 1.7 percent next year.

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)	WTI Cushing, OK (40 API)	Edmonton City Gate (40 API)	Edmonton City Gate (40 API)	WCS Hardisty (20.5 API)	Heavy Oil Hardisty (12 API)	Cost Inflation	CAD to USD Exchange
	US$/bbl	US$/bbl	C$/bbl	C$/bbl	C$/bbl	C$/bbl		
	Real	Current	Real	Current	Current	Current	Rate	Rate
Historical								
2016	$45.53	$43.15	$55.09	$52.22	$38.90	$34.08	1.4%	0.755
2017	$52.91	$50.88	$64.35	$61.88	$50.53	$45.01	1.6%	0.771
2018	$66.44	$64.94	$70.70	$69.10	$49.68	$45.34	2.3%	0.772
2019								
6 Mths H	$57.22	$57.22	$70.90	$70.90	$61.65	$58.77	1.8%	0.749
6 Mths F	$55.00	$55.00	$61.85	$61.85	$53.95	$48.95	0.0%	0.760
Avg.	$56.11	$56.11	$66.37	$66.37	$57.80	$53.86	-	0.755
Forecast								
2019	$55.00	$55.00	$61.85	$61.85	$53.95	$48.95	0.0%	0.760
2020	$58.00	$59.15	$65.80	$67.10	$55.05	$49.95	2.0%	0.760
2021	$61.00	$63.45	$71.45	$74.35	$59.45	$54.25	2.0%	0.770
2022	$65.00	$69.00	$77.20	$81.95	$64.45	$59.15	2.0%	0.790
2023	$70.00	$75.75	$82.50	$89.30	$71.70	$66.30	2.0%	0.800
2024	$70.00	$77.30	$82.50	$91.10	$73.15	$67.60	2.0%	0.800
2025	$70.00	$78.85	$82.50	$92.90	$74.60	$69.00	2.0%	0.800
2026	$70.00	$80.40	$82.50	$94.75	$76.10	$70.35	2.0%	0.800

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	AB AECO Avg. Price	AB AECO Avg. Price	BC Direct Station 2 Sales	NYMEX Henry Hub	NYMEX Henry Hub
	C$/Mcf	C$/Mcf	C$/Mcf	C$/Mcf	US$/Mcf	US$/Mcf
	Current	Real	Current	Current	Real	Current
Historical						
2016	$1.93	$2.28	$2.16	$1.75	$2.65	$2.52
2017	$2.13	$2.28	$2.19	$1.56	$3.10	$2.99
2018	$1.36	$1.57	$1.54	$1.26	$3.24	$3.17
2019						
6 Mths H	$1.60	$1.88	$1.88	$0.96	$2.76	$2.76
6 Mths F	$1.25	$1.50	$1.50	$1.10	$2.65	$2.65
Avg.	$1.43	$1.69	$1.69	$1.03	$2.70	$2.70
Forecast						
2019	$1.25	$1.50	$1.50	$1.10	$2.65	$2.65
2020	$1.65	$1.85	$1.90	$1.50	$2.85	$2.90
2021	$1.90	$2.10	$2.20	$1.75	$3.05	$3.15
2022	$2.25	$2.35	$2.50	$2.05	$3.15	$3.35
2023	$2.65	$2.70	$2.90	$2.50	$3.30	$3.55
2024	$3.00	$2.95	$3.25	$2.80	$3.50	$3.85
2025	$3.30	$3.20	$3.60	$3.15	$3.50	$3.95
2026	$3.40	$3.20	$3.70	$3.20	$3.50	$4.00

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$/bbl	US$/bbl	US$/bbl	US$/bbl	US$/bbl	US$/bbl	US$/bbl
	Real	Real	Real	Real	Real	Real	Real
Forecast							
2019	$55.00	$63.00	$53.50	$61.75	$63.75	$56.00	$62.25
2020	$58.00	$65.00	$56.50	$63.75	$65.75	$57.00	$64.25
2021	$61.00	$66.00	$59.50	$64.75	$66.75	$57.00	$65.25
2022	$65.00	$67.00	$63.50	$65.75	$67.75	$58.00	$66.25
2023	$70.00	$72.00	$68.50	$70.75	$72.75	$63.00	$71.25
2024	$70.00	$72.00	$68.50	$70.75	$72.75	$63.00	$71.25
2025	$70.00	$72.00	$68.50	$70.75	$72.75	$63.00	$71.25
2026	$70.00	$72.00	$68.50	$70.75	$72.75	$63.00	$71.25

- 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
			US$/Mcf	US$/Mcf	US$/Mcf	US$/Mcf	US$/Mcf	US$/Mcf
	Rate	Rate	Real	Real	Real	Real	Real	Real
Forecast								
2019	1.28	1.15	$2.65	$1.15	$2.15	$2.15	$5.65	$3.65
2020	1.28	1.15	$2.85	$1.85	$2.35	$2.35	$5.85	$2.90
2021	1.28	1.15	$3.05	$2.05	$2.55	$2.55	$6.05	$3.10
2022	1.28	1.15	$3.15	$2.15	$2.65	$2.65	$6.15	$3.25
2023	1.28	1.15	$3.30	$2.30	$2.80	$2.80	$6.30	$3.35
2024	1.28	1.15	$3.50	$2.50	$3.00	$3.00	$6.50	$3.45
2025	1.28	1.15	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60
2026	1.28	1.15	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60

Global trends

Storage

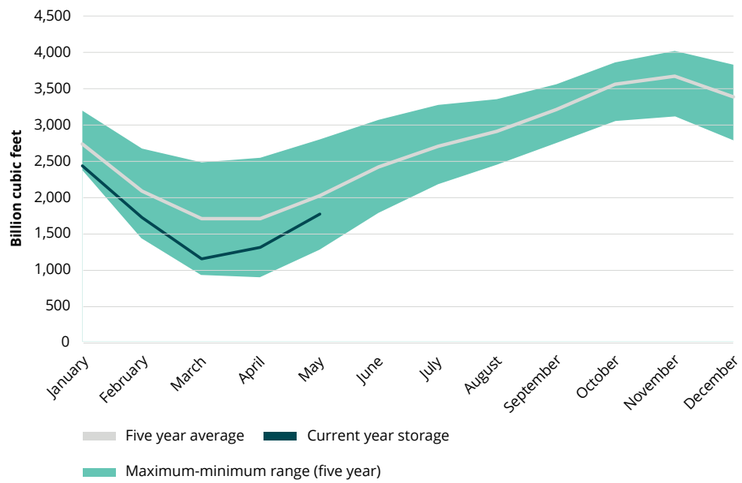
United States

- Natural gas storage in the United States continues to remain below the five year average after a colder than usual winter for much of the continent. With production continuing to grow, storage levels have begun to rise closer to the historical mean.

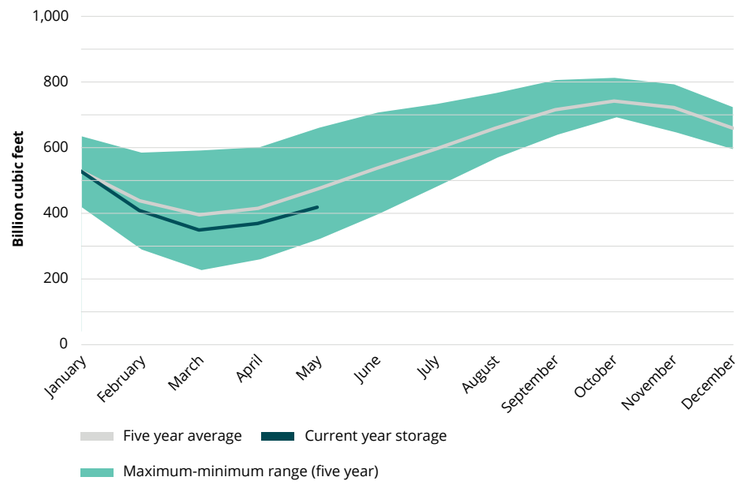
Canada

- Canadian natural gas storage has begun to drop below the five year average. Production growth has slowed due to continued low prices, while demand growth continues to be strong.

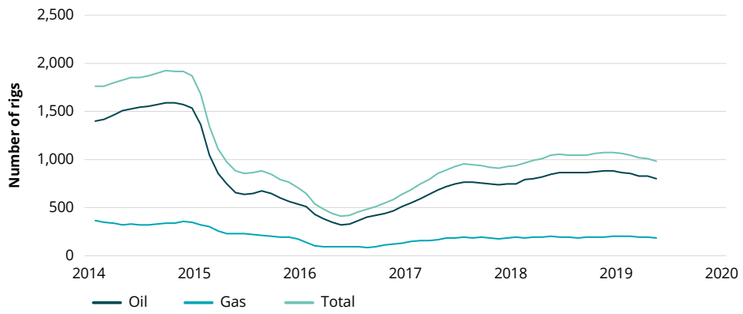
US natural gas storage



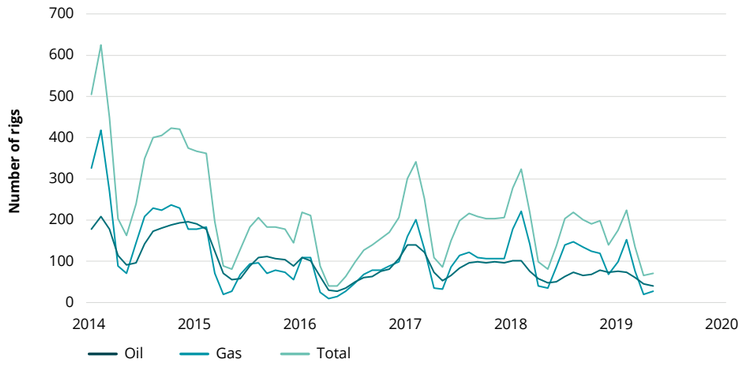
Canada natural gas storage



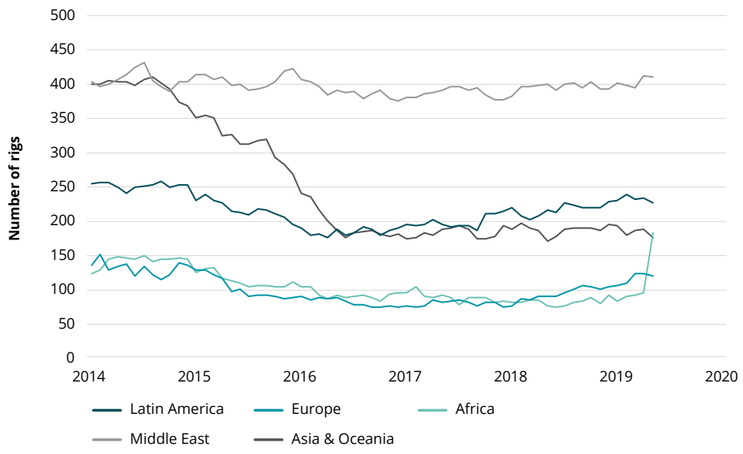
US rig counts



Canada rig counts



International rig counts



Rigs

United States

- Rig counts in the United States have dropped again over the last quarter. With both WTI and Henry Hub weakening over the last quarter, this trend is likely to continue in the coming months.

Canada

- Canadian rigs counts for both oil and gas bottomed out at the lowest rates seen since 2016. Weak gas prices and the possibility of extensions to the oil production curtailments threaten to keep rig counts low for the rest of 2019.

International

- International rig counts continue to remain steady in most regions. The European count saw a large increase in May 2019 due to the decision by Baker Hughes to begin including Ukrainian rigs in their data. This added approximately 85 rigs to the total that were not previously included.

Canadian domestic price tables

Year	Crude Oil Pricing							
	Price Inflation	Cost Inflation	CAD to USD Exchange	WTI at Cushing Oklahoma	WTI at Cushing Oklahoma	Edmonton City Gate	Edmonton City Gate	WCS 20.5 Deg. API Hardisty
				US$/bbl	US$/bbl	C$/bbl	C$/bbl	C$/bbl
	Rate	Rate	Rate	Real	Current	Real	Current	Current
Historical								
2009	0.3%	0.3%	0.880	$72.30	$61.65	$77.51	$66.10	$58.66
2010	1.8%	1.8%	0.971	$92.82	$79.40	$90.96	$77.80	$67.22
2011	2.9%	2.9%	1.012	$108.98	$94.88	$109.73	$95.54	$77.12
2012	1.5%	1.5%	1.001	$104.94	$94.11	$96.53	$86.57	$73.10
2013	0.9%	0.9%	0.972	$107.51	$97.91	$102.52	$93.36	$74.97
2014	1.9%	1.9%	0.906	$101.45	$93.26	$102.25	$94.00	$81.06
2015	1.1%	1.1%	0.783	$51.95	$48.69	$60.82	$57.00	$44.80
2016	1.4%	1.4%	0.755	$45.53	$43.15	$55.09	$52.22	$38.90
2017	1.6%	1.6%	0.771	$52.91	$50.88	$64.35	$61.88	$50.53
2018	2.3%	2.3%	0.772	$66.44	$64.94	$70.70	$69.10	$49.68
2019								
6 Mths H	1.8%	1.8%	0.749	$57.22	$57.22	$70.90	$70.90	$61.65
6 Mths F	0.0%	0.0%	0.760	$55.00	$55.00	$61.85	$61.85	$53.95
Avg.	N/A	N/A	0.755	$56.11	$56.11	$66.37	$66.37	$57.80
Forecast								
2019	0.0%	0.0%	0.760	$55.00	$55.00	$61.85	$61.85	$53.95
2020	2.0%	2.0%	0.760	$58.00	$59.15	$65.80	$67.10	$55.05
2021	2.0%	2.0%	0.770	$61.00	$63.45	$71.45	$74.35	$59.45
2022	2.0%	2.0%	0.790	$65.00	$69.00	$77.20	$81.95	$64.45
2023	2.0%	2.0%	0.800	$70.00	$75.75	$82.50	$89.30	$71.70
2024	2.0%	2.0%	0.800	$70.00	$77.30	$82.50	$91.10	$73.15
2025	2.0%	2.0%	0.800	$70.00	$78.85	$82.50	$92.90	$74.60
2026	2.0%	2.0%	0.800	$70.00	$80.40	$82.50	$94.75	$76.10
2027	2.0%	2.0%	0.800	$70.00	$82.00	$82.50	$96.65	$77.60
2028	2.0%	2.0%	0.800	$70.00	$83.65	$82.50	$98.60	$79.15
2029	2.0%	2.0%	0.800	$70.00	$85.35	$82.50	$100.55	$80.75
2030	2.0%	2.0%	0.800	$70.00	$87.05	$82.50	$102.60	$82.35
2031	2.0%	2.0%	0.800	$70.00	$88.80	$82.50	$104.65	$84.00
2032	2.0%	2.0%	0.800	$70.00	$90.55	$82.50	$106.70	$85.70
2033	2.0%	2.0%	0.800	$70.00	$92.35	$82.50	$108.85	$87.40
2034	2.0%	2.0%	0.800	$70.00	$94.20	$82.50	$111.05	$89.15
2035	2.0%	2.0%	0.800	$70.00	$96.10	$82.50	$113.25	$90.95
2036	2.0%	2.0%	0.800	$70.00	$98.00	$82.50	$115.50	$92.75
2037	2.0%	2.0%	0.800	$70.00	$100.00	$82.50	$117.85	$94.60
2038	2.0%	2.0%	0.800	$70.00	$102.00	$82.50	$120.20	$96.50
2038+	2.0%	2.0%	0.800	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 US 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)
- Real prices listed in 2019 dollars with no escalation considered

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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$/bbl	C$/bbl	C$/bb	C$/bbl	C$/mcf	C$/mcf	C$/mcf	C$/mcf	US$/Mcf	US$/Mcf	C$/lt
	Current	Current	Current	Current	Current	Real	Current	Current	Real	Current	Current
Historical											
2009	$11.61	$34.62	$56.21	$69.49	$3.85	$4.64	$3.96	$4.17	$4.63	$3.95	($5.08)
2010	$11.53	$45.19	$68.79	$84.02	$3.76	$4.69	$4.01	$4.01	$5.13	$4.39	$56.94
2011	$10.30	$52.41	$86.98	$105.24	$3.46	$4.17	$3.63	$3.34	$4.59	$4.00	$101.60
2012	$6.73	$30.80	$75.47	$99.67	$2.25	$2.66	$2.39	$2.29	$3.07	$2.75	$126.81
2013	$8.68	$38.54	$77.44	$103.52	$2.98	$3.48	$3.17	$3.11	$4.09	$3.73	$62.17
2014	$12.46	$42.93	$59.43	$101.47	$4.22	$4.90	$4.50	$4.16	$4.78	$4.39	$88.99
2015	$7.49	$5.35	$33.70	$55.15	$2.56	$2.87	$2.69	$1.81	$2.81	$2.63	$107.45
2016	$6.04	$8.71	$31.45	$52.43	$1.93	$2.28	$2.16	$1.75	$2.65	$2.52	$45.40
2017	$6.11	$27.92	$40.98	$63.65	$2.13	$2.28	$2.19	$1.56	$3.10	$2.99	$41.85
2018	$6.90	$29.76	$46.17	$75.74	$1.36	$1.57	$1.54	$1.26	$3.24	$3.17	$89.25
2019											
6 Mths H	$7.58	$19.67	$25.50	$68.74	$1.60	$1.88	$1.88	$0.96	$2.76	$2.76	$67.48
6 Mths F	$5.20	$21.65	$27.85	$61.85	$1.25	$1.50	$1.50	$1.10	$2.65	$2.65	$75.00
Avg.	$6.39	$20.66	$26.68	$65.30	$1.43	$1.69	$1.69	$1.03	$2.70	$2.70	$71.24
Forecast											
2019	$5.20	$21.65	$27.85	$61.85	$1.25	$1.50	$1.50	$1.10	$2.65	$2.65	$75.00
2020	$5.30	$30.20	$36.90	$67.10	$1.65	$1.85	$1.90	$1.50	$2.85	$2.90	$76.50
2021	$6.15	$33.45	$48.35	$74.35	$1.90	$2.10	$2.20	$1.75	$3.05	$3.15	$78.05
2022	$7.00	$36.90	$53.25	$81.95	$2.25	$2.35	$2.50	$2.05	$3.15	$3.35	$79.60
2023	$8.15	$40.20	$58.05	$89.30	$2.65	$2.70	$2.90	$2.50	$3.30	$3.55	$81.20
2024	$9.10	$41.00	$59.25	$91.10	$3.00	$2.95	$3.25	$2.80	$3.50	$3.85	$82.80
2025	$10.10	$41.85	$60.40	$92.90	$3.30	$3.20	$3.60	$3.15	$3.50	$3.95	$84.45
2026	$10.30	$42.65	$61.65	$94.75	$3.40	$3.20	$3.70	$3.20	$3.50	$4.00	$86.15
2027	$10.50	$43.55	$62.85	$96.65	$3.45	$3.20	$3.75	$3.30	$3.50	$4.10	$87.85
2028	$10.70	$44.40	$64.10	$98.60	$3.55	$3.20	$3.80	$3.35	$3.50	$4.20	$89.65
2029	$10.90	$45.30	$65.40	$100.55	$3.60	$3.20	$3.90	$3.40	$3.50	$4.25	$91.40
2030	$11.15	$46.20	$66.70	$102.60	$3.65	$3.20	$4.00	$3.50	$3.50	$4.35	$93.25
2031	$11.35	$47.10	$68.05	$104.65	$3.75	$3.20	$4.05	$3.55	$3.50	$4.45	$95.10
2032	$11.60	$48.05	$69.40	$106.70	$3.80	$3.20	$4.15	$3.60	$3.50	$4.55	$97.00
2033	$11.80	$49.00	$70.80	$108.85	$3.90	$3.20	$4.20	$3.70	$3.50	$4.60	$98.95
2034	$12.05	$50.00	$72.20	$111.05	$3.95	$3.20	$4.30	$3.75	$3.50	$4.70	$100.95
2035	$12.30	$51.00	$73.65	$113.25	$4.05	$3.20	$4.40	$3.85	$3.50	$4.80	$102.95
2036	$12.55	$52.00	$75.10	$115.50	$4.15	$3.20	$4.50	$3.90	$3.50	$4.90	$105.00
2037	$12.80	$53.05	$76.65	$117.85	$4.20	$3.20	$4.55	$4.00	$3.50	$5.00	$107.10
2038	$13.05	$54.10	$78.15	$120.20	$4.30	$3.20	$4.65	$4.10	$3.50	$5.10	$109.25
2038+	2.0%	2.0%	2.0%	2.0%	2.0%	0.0%	2.0%	2.0%	0.0%	2.0%	2.0%

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- 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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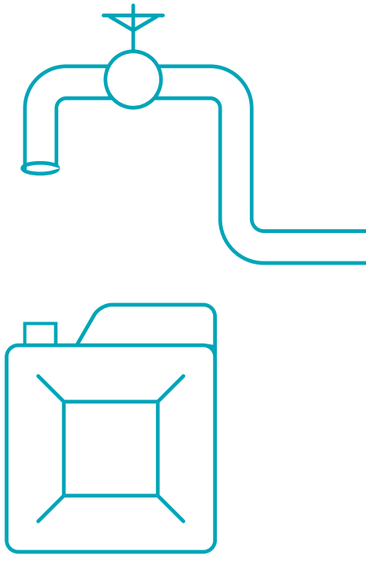
Additional crude reference prices

Year	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$/bbl	C$/bbl	C$/bbl	C$/mcf
	Current	Current	Current	Current
Historical				
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
2017	$62.06	$58.16	$50.60	$3.97
2018	$73.06	$62.82	$54.46	$4.07
2019				
6 Mths H	$70.94	$66.22	$58.53	$3.56
6 Mths F	$62.85	$56.85	$52.80	$3.45
Avg.	$66.89	$61.54	$55.67	$3.51
Forecast				
2019	$62.85	$56.85	$52.80	$3.45
2020	$68.15	$62.00	$55.10	$3.75
2021	$75.40	$69.15	$60.30	$4.05
2022	$83.00	$76.60	$66.00	$4.20
2023	$90.40	$83.90	$73.25	$4.45
2024	$92.20	$85.55	$74.70	$4.80
2025	$94.05	$87.30	$76.20	$4.90
2026	$95.90	$89.00	$77.70	$5.00
2027	$97.85	$90.80	$79.25	$5.10
2028	$99.80	$92.60	$80.85	$5.20
2029	$101.80	$94.45	$82.45	$5.30
2030	$103.80	$96.35	$84.10	$5.40
2031	$105.90	$98.30	$85.80	$5.50
2032	$108.00	$100.25	$87.50	$5.65
2033	$110.20	$102.25	$89.25	$5.75
2034	$112.40	$104.30	$91.05	$5.85
2035	$114.65	$106.40	$92.85	$5.95
2036	$116.90	$108.50	$94.75	$6.10
2037	$119.25	$110.70	$96.60	$6.20
2038	$121.65	$112.90	$98.55	$6.35
2038+	2.0%	2.0%	2.0%	2.0%



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International price tables

Year	Crude Oil Pricing															
	Average WTI Spot	Alaskan North Slope	California Midway-Sunset	Louisiana Heavy Sweet	Louisiana Light Sweet	MARS Blend	Wyoming Sweet	Brent Spot	Gulf Coast Argus Sour Crude Index ASCI	Average OPEC Basket	Venezuelan Merey	Nigerian Bonny Light	Arabia UAE Dubai Feteh	Mexico Maya	Russia Urals	Indonesia Minas
	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real	US$/bbl Real
Forecast																
2019	$55.00	$52.50	$56.50	$57.00	$56.00	$53.50	$51.50	$63.00	$53.50	$61.75	$53.00	$63.75	$61.30	$56.00	$62.25	$56.00
2020	$58.00	$55.50	$59.50	$60.00	$59.00	$56.50	$54.50	$65.00	$56.50	$63.75	$56.00	$65.75	$63.30	$57.00	$64.25	$58.00
2021	$61.00	$58.50	$62.50	$63.00	$62.00	$59.50	$57.50	$66.00	$59.50	$64.75	$58.00	$66.75	$64.30	$57.00	$65.25	$59.00
2022	$65.00	$62.50	$66.50	$67.00	$66.00	$63.50	$61.50	$67.00	$63.50	$65.75	$59.00	$67.75	$65.30	$58.00	$66.25	$60.00
2023	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2024	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2025	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2026	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2027	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2028	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2029	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2030	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2031	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2032	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2033	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2034	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2035	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2036	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2037	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2038	$70.00	$67.50	$71.50	$72.00	$71.00	$68.50	$66.50	$72.00	$68.50	$70.75	$64.00	$72.75	$70.30	$63.00	$71.25	$65.00
2038+	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%

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$/Mcf Real	US$/Mcf Real	US$/gal Real
Forecast									
2019	1.280	1.150	$2.65	$1.15	$2.15	$2.15	$5.65	$3.65	$1.25
2020	1.280	1.150	$2.85	$1.85	$2.35	$2.35	$5.85	$2.90	$1.25
2021	1.280	1.150	$3.05	$2.05	$2.55	$2.55	$6.05	$3.10	$1.25
2022	1.280	1.150	$3.15	$2.15	$2.65	$2.65	$6.15	$3.25	$1.25
2023	1.280	1.150	$3.30	$2.30	$2.80	$2.80	$6.30	$3.35	$1.25
2024	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.45	$1.25
2025	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2026	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2027	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2028	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2029	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2030	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2031	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2032	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2033	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2034	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2035	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2036	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2037	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2038	1.280	1.150	$3.50	$2.50	$3.00	$3.00	$6.50	$3.60	$1.25
2038+	1.280	1.150	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Notes:

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

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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.

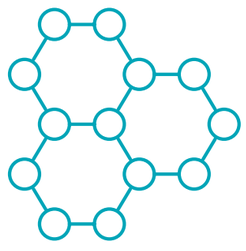
Deloitte prepares our price and market forecasts based on information we collect from numerous government agencies, industry publications, oil refineries, natural gas marketers and industry trends. Inflation forecasts and exchange rates are also an integral part of the forecast.

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



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