



## Energy, oil, and gas price forecast

Energy costs are stretching price elasticity and energy affordability

December 31, 2022



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# Forecast commentary

Volatile prices seem to have been a consistent theme over the past few years for various reasons; this year's are due in large part to geopolitical forces as the war in Ukraine grinds on, and unrest grows in China and Iran.

**Global crude oil prices** slid in recent months amid looming fears of a global recession and rising interest rates, which have been hiked around the world in an effort to dampen consumer spending. Prices rallied at the beginning of December as China shifted away from its zero-COVID-19 policy, which indicated demand recovery from the world's largest crude consumer was on the horizon. Nonetheless, supply is forecast to decrease for the remainder of the year, after reaching a 2022 high of 101.7 MMbbl/d in October<sup>1</sup> on the back of continued OPEC+ cuts, a European Union (EU) ban on Russian crude, and declining global crude inventories. Supply/demand tension has resulted in oil prices hovering 30% lower than their June peaks. These volatile cycles are expected to continue through the winter as the sector aims to balance supply and demand with ongoing geopolitical uncertainty.

Adding to price uncertainty is the move by EU members, in coordination with the G7 and Australia, to impose a US\$60/bbl price cap on seaborne Russian crude. It prohibits EU countries, G7 members, and Australia from insuring, shipping, or trading Russian crude unless the oil is

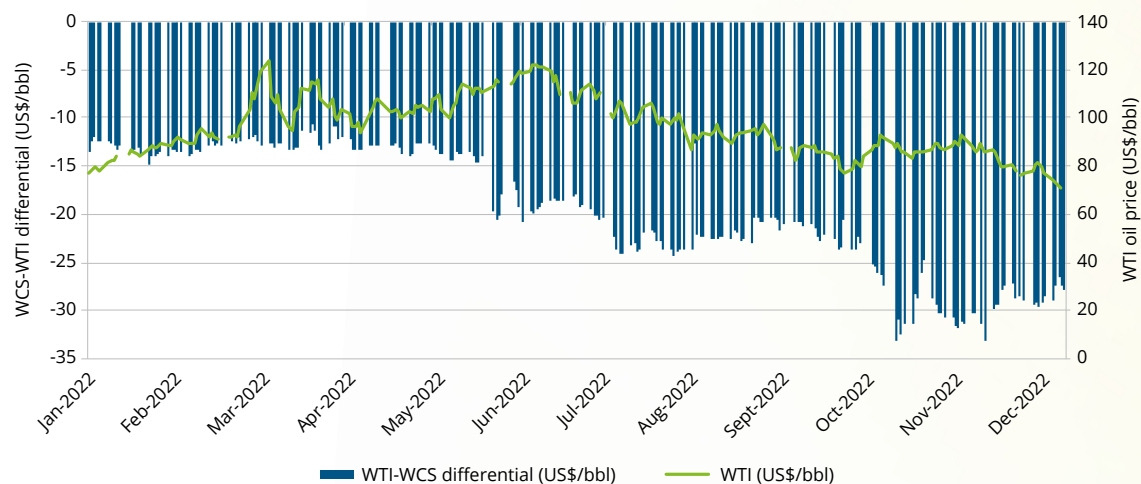
sold at or below the price cap. A large portion of tankers are owned and operated by G7 countries, signalling that non-compliance with the price cap will result in a lack of shipping accessibility. This measure is intended to still allow Russian supply to enter the market but without substantially benefiting Russian coffers. The \$60/bbl is higher than the current price at which Russia is selling Ural crude and as such is expected to provide enough incentive to continue production; setting it below market prices may lead the nation to threaten to shut in production. The plan includes a stipulation to review the price cap every two months to determine its relation to current market prices.<sup>2</sup>

With G7 nations hosting the world's primary shipping companies and insurance firms, it would be difficult for third-party countries to circumvent the price cap when moving their crude oil abroad. Any country paying above the price cap would be restricted from accessing insurance for their shipments. This dilemma was seen in Turkish ports in early December, as tankers sat idle awaiting confirmation from buyers that crude was purchased at or below the price cap. The port issues have been remediated but may occur again as countries scramble to comply. The price cap effectively targets nations such as China, India, and Turkey, which will become the main customers of Russian crude with the European Union no longer importing seaborne Russian crude.

Russia, the world's second-largest oil exporter, has stated it will not sell to countries that have accepted the cap and that it may reduce production, resulting in disturbances to global supply. Anticipation looms as to how China and India will react to the price cap and, if they do accept to adhere to it, the effect their compliance will have on Russian finances.

Similar to global oil indices, Canadian prices—primarily of heavy oil—have also slid in recent weeks. **Canadian heavy oil differentials** began the year averaging US\$13/bbl through to the end of May, outperforming historical averages and showing narrow differentials. However, differentials between Western Canadian Select (WCS) and West Texas Intermediate (WTI) have increased consistently since June due to a combination of factors.

### Canadian heavy oil differential



Source: Daily Oil Bulletin

The most significant factor is the United States' release of 180 million barrels of oil from its strategic petroleum reserve (SPR) to mitigate the impact for consumers of high gasoline prices. These SPR volumes were sold to refiners in the United States,<sup>3</sup> negating the need for Canadian oil volumes to fulfill refined product demand. Another impact on the demand for Canadian heavy oil were some minor US increases in imports from Mexico, which supplies heavier Mexican Maya oil to the Gulf Coast region. In addition, the high energy cost associated with refining has lowered demand for heavier Canadian crude to some extent as refiners sourced light oil, when possible, in order to manage input costs and refining margins.

These combined forces widened the heavy oil differential to greater than US\$25/bbl during the last quarter of 2022. The SPR release is a temporary measure, indicating differentials should narrow in 2023; however, the higher cost to refiners will persist, reducing the value of Canadian heavy oil. On top of these market forces, the Keystone pipeline had a leak in December and was shut in. Until the pipeline is fully back in service, we expect to see even wider differentials than the last half of 2022.

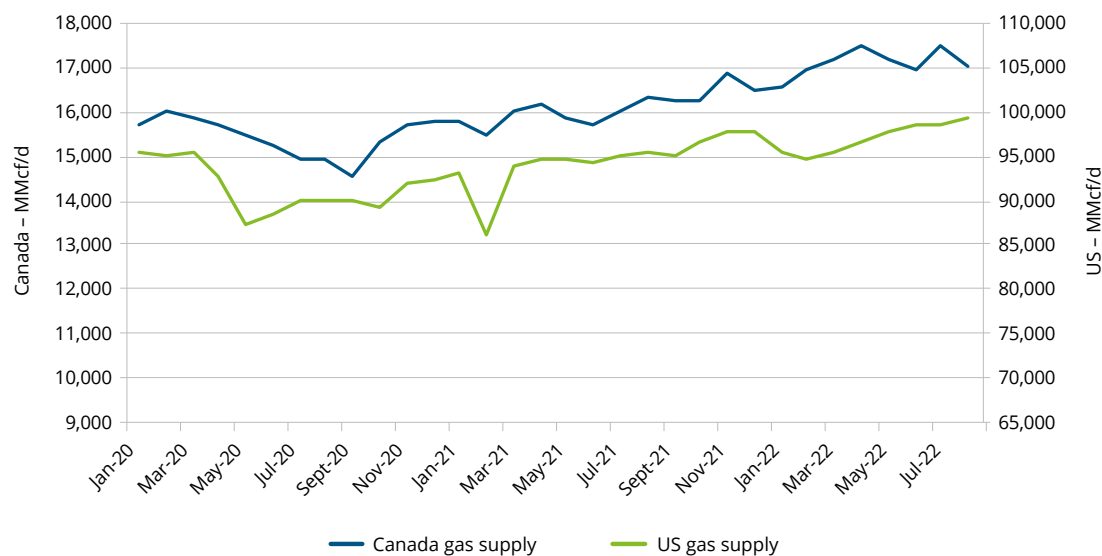
## Natural gas

Henry Hub prices started the year below US\$4/mmbtu and peaked at just under US\$10/mmbtu in the summer before settling this fall between US\$5 and US\$6/mmbtu. During some of the most volatile periods, prices dropped by 40% before climbing 75%, all within a span of three months—the daily prices for Henry Hub for that time quite literally resemble a roller coaster. In Canada, the highs have been almost as high, reaching just under C\$9/mmbtu in the spring, but the lows were quite a bit worse, with prices dropping into negative territory in the fall during pipeline

maintenance periods. They have settled in the latter part of the year between C\$5 and C\$7/mmbtu, territory that has been out of reach for several years.

**Natural gas production in Canada** has been steadily growing since late 2020, but the higher prices in 2022 have not produced the spike in supply that one might have expected. Similarly, in the United States, production has been steadily trending upward, but no major shifts have occurred in this higher-price environment; in fact, the level of supply growth in 2022 has been less than in 2021.

## Natural gas production



Sources: Energy Information Administration, Canadian Energy Regulator



The lack of momentum in gas drilling and associated production reflects the lack of certainty about future prices. Gas prices are still very much influenced by the regional forces affecting weather and storage levels. Throughout much of 2022, storage in both the United States and Canada had been trailing the five-year average, but levels have now reached the five-year average in the United States and have almost reached that point in Canada. The abundance of supply that can be brought to market and seasonally average storage levels mean that prices in North America will not likely reach elevated levels for long, if at all. However, the inflationary pressure on household heating costs is likely to continue as significant increases in supply don't look likely, given that producers will likely continue to align production to demand and be prudent with additional development.

The impact of global forces, though, is undeniable: the increase in prices in the spring was due to the expectation that natural gas from North America would be needed in Europe. When a fire took the Freeport LNG facility in Texas offline in June and left the United States without as much ability to supply the global natural gas need, prices tumbled from approximately US\$9/mmbtu to just under US\$6/mmbtu in a three-week period. The Freeport facility is expected to return to full service by March, which could

bolster prices in the shoulder season but won't do much to support global needs during the coldest months of the year.

Particular attention is being paid this year to EU storage levels, with concern over having enough supply to power Europe through the winter. Storage levels hit 90% in October,<sup>4</sup> which is on par with the five-year average and even exceeds the pre-winter storage targets that were set. However, the IEA (International Energy Administration) warned in a late-October article<sup>5</sup> that if the Russian gas supply to Europe is completely cut off, EU storage volumes could drop below the thresholds required to maintain reservoir pressure, and therefore accessibility, by January—that's this month. Russia's indefinite shutdown of the Nord Stream 1 pipeline and other actions it's taken have choked natural gas flows to Europe, so that by November the supply was below 20% of what was flowing at the same time last year.<sup>6</sup> While gas prices have softened across the continent over the past couple months, we expect them to continue to be very high throughout the winter.

With the continued geopolitical uncertainty, the first quarter of 2023 is likely to be just as volatile as the past few quarters but with the added anxiety of a cold winter in full swing.



## Endnotes

- <sup>1</sup> IEA Oil Market Report, "[Oil Market Report—November 2022](#)," November 2022.
- <sup>2</sup> European Council/Council of the European Union, "[Russian oil: EU agrees on level of price cap](#)," press release, December 3, 2022.
- <sup>3</sup> US Department of Energy, "[DOE Announces Final Contract Awards From President Biden's Emergency Release From the Strategic Petroleum Reserve](#)," press release, November 3, 2022.
- <sup>4</sup> Bozorgmehr Sharafedin and Nina Chestney, [EU gas storage levels](#), *Reuters*, *last accessed* December 12, 2022.
- <sup>5</sup> IEA, "[Even with gas storage at 90%, the European Union would face heightened risk of supply disruptions if there is a complete Russian cut-off](#)," October 26, 2022.
- <sup>6</sup> Stuart Elliott, "[Russian pipeline gas flows to Europe slip further in November](#)," S&P Global Commodity Insights, Dec. 6, 2022.



# Energy costs are stretching price elasticity and energy affordability

As the winter months creep ever closer into the foreground, so do the pressing concerns around energy security and costs, with many forecasts pointing to a dark and cold winter for many countries. Increased energy costs are contributing to skyrocketing inflation, putting jobs and affordability for households at tremendous risk.<sup>1</sup> For businesses, similar inflationary pressures are leading to greater uncertainty, raising risks for supply chains and investment. According to the Organisation for Economic Cooperation and Development (OECD), overall inflation rates are sitting at just over 7% for G7 nations.<sup>2</sup> In contrast, core inflation, which takes into account only food and energy costs, sits closer to 15%.

Unfortunately, there's little relief in sight. Businesses and their supply chains are stretching price elasticity to weather the economic challenges. The rate and pace of the energy transition, which could expand inflationary pressures further, is adding to tensions. As countries look to expand their power generation through electrification and the construction of renewable sources of infrastructure, factors such as energy density and the resiliency of supply chains will drive energy costs up.

## **Energy density and cost**

While the energy transition aims to lower carbon emissions, the existing alternatives are less efficient than the sources they're replacing. It comes down to energy density: renewable energy sources (such as solar

and wind) have lower energy densities compared to traditional energy sources (such as gas and nuclear), meaning they require more raw materials to produce the same amount of energy.<sup>3</sup> The net result is that it costs more to produce the same amount of energy from less-dense sources, which adds to inflationary pressures and energy cost concerns. Findings by the IEA as reported by the World Nuclear Association<sup>4</sup> show that "electricity from wind and solar typically increases the quantities of materials requiring extraction, processing, and handling by a factor of at least 10."

Inflationary pressures caused by rising energy costs and shortages threaten to exacerbate the supply chain disruptions that have been upsetting economies the last couple of years. Production could slow as companies work to keep costs under control, which in turn could magnify pressures by disrupting a healthy supply-demand balance. If that happens, it could trigger yet more supply chain shortages, further impacting overall GDP and, potentially, job security.

Furthermore, energy elasticity and energy affordability flow through most, if not all, operational costs to varying degrees. Energy costs go beyond heating our homes, powering our computers, and driving us to where we need to be—they're woven into the things we buy, the food we eat, and the materials we use, as these all require energy to produce.

The current environment of high inflation and energy pressure have businesses grappling with operations planning. It's essential for them to have a view of demand fluctuations in order to effectively plan and identify any pivots that may become necessary. Just how demand will unfold and how the economy will evolve over the next six to 24 months will impact the profitability of companies and industries. As noted in Deloitte's September 2022 [Economic outlook](#), high energy costs are perpetuating inflation,

costs for medicine have risen as high as 160% in the European Union because of the energy crisis, leading pharmaceutical companies to warn they may shutter the production of generic drugs.<sup>8</sup>

Meanwhile, in the United Kingdom, a budget that sent the pound nose-diving earlier this fall led to Prime Minister Liz Truss stepping down after only 44 days in office. For Rishi Sunak, her successor, energy security and affordability top the agenda: the same week that gas prices

Just how demand will unfold and how the economy will evolve over the next six to 24 months will impact the profitability of companies and industries.

taking money out of households and business balance sheets and, ultimately, leading to weaker demand prospects.

When households cut back on spending, the demand drops for goods and services, and companies respond by delaying planned investments and/or laying off staff, thereby creating a negative feedback loop. This is what is currently unfolding in Europe, where rising energy costs are contributing to decreased employment, production shut-ins, and companies relocating to save costs.<sup>5</sup>

#### **Impact on policy**

In Germany, the economy is forecasted to contract in 2023 due to rising electricity prices.<sup>6</sup> In response, the government is looking to subsidize energy costs through an electricity price cap to ease economic pressures on both companies and consumers.<sup>7</sup> Meanwhile, raw material

doubled,<sup>9</sup> the government announced financial support for households and a deal was being negotiated with the United States at COP27.<sup>10</sup> This deal would supply much-needed natural gas to the United Kingdom to help alleviate businesses' woes and help get the economy back on track.<sup>11</sup> In Canada, policies, commitments—such as the proposed emissions cap announced at COP27<sup>12</sup> and to define and phase out Inefficient Fossil Fuel Subsidies (IFFS) by 2025<sup>13</sup>—, and even the recent announcement of the buyback tax could put even more pressure on industries, adding to the economic cost that some businesses are already feeling.

As the winter drags on, businesses will have to balance current cost pressures with long-term thinking on strategic investments. In the short term, Ottawa could support companies by flowing funds through the provinces and territories

to support industries struggling with energy shocks. Additionally, investments in core infrastructure would help to balance out the supply and demands of the energy sector; as a starting point, Canada should get export terminals in place and ensure policies are aligned with investments to support responsible and sustainable energy production.

On a global level, the climbing energy costs and uncertainty surrounding inflation compound complex issues like decarbonization. The implications go well beyond the energy sector, with challenges almost certainly spilling into

other industries. Ultimately, the higher energy costs are likely to be filtered down to consumers. Governments need to help stabilize and calm the outlook with certainty and guarantees.<sup>14</sup> And in the short term, industries need to consider how to balance demand pressures, uncertain energy costs, and consumer spending constraints.

The longer it takes to move on these issues, the higher the risk the energy transition could inflame inflation further, leading to an economic chill that will last well beyond the winter.

## Author

### Michelle Leslie

Senior Manager  
Infrastructure and Capital Projects  
milesie@deloitte.ca

<sup>1</sup> [Consumer Prices, OECD - Updated: 3 November 2022 - OECD](#)

<sup>2</sup> [Organisation for Economic Cooperation and Development \(OECD\)](#)

<sup>3</sup> [Michael Shellenberger Testimony to the House Committee on Oversight & Reform \(congress.gov\)](#)

<sup>4</sup> World Nuclear Association, "[Mineral Requirements for Electricity Generation](#)," updated August 2021.

<sup>5</sup> Anna Cooban, "[Rocketing energy costs are savaging German industry](#)," CNN Business, October 7, 2022.

<sup>6</sup> AP News, "[German economy to shrink in 2023, government advisers expect](#)," November 9, 2022.

<sup>7</sup> Reuters, "[Germany to cap electricity prices for households, industry - govt draft](#)," November 1, 2022.

<sup>8</sup> Ludwig Burger, "[Europe's generic drugmakers say they may cut output due to energy bills](#)," Reuters, September 28, 2022.

<sup>9</sup> Anna Wise, "[UK gas prices doubled in a week, ONS says](#)," Aol.com, November 10, 2022.

<sup>10</sup> Greg Heffer, "[Rishi Sunak 'poised to announce major gas deal with America'](#)," msn.com, November 8, 2022.

<sup>11</sup> Ben Riley-Smith, Rachel Millard, and Emma Gatten, "[Rishi Sunak to strike gas deal with US to ease energy crisis](#)," Telegraph, November 7, 2022.

<sup>12</sup> Government of Canada, [Oil and gas emissions cap](#)

<sup>13</sup> Government of Canada, [Discussion document for Canada's assessment framework of inefficient fossil fuel subsidies](#), 2019.

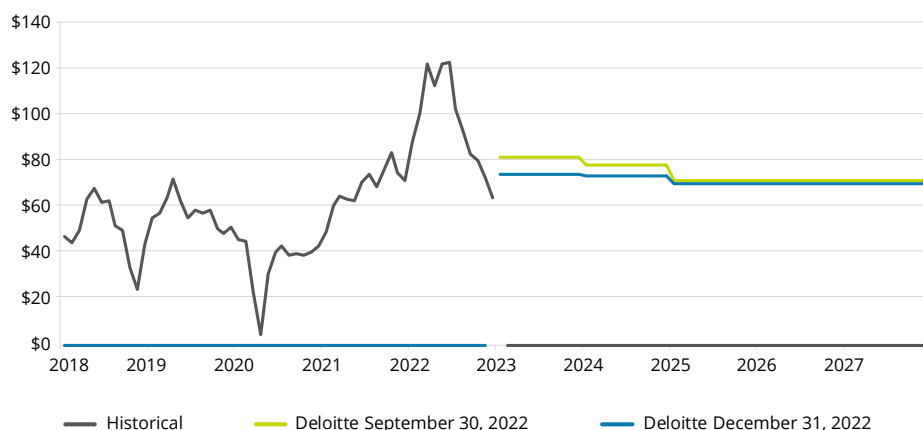
<sup>14</sup> Bank of Canada, [Canada's Inflation Performance, and Why It Matters - Bank of Canada](#), accessed November 2022.



# Canadian domestic price forecast

## Crude oil price and market demand forecast

### Hardisty WCS (real \$)



## Forecast comments

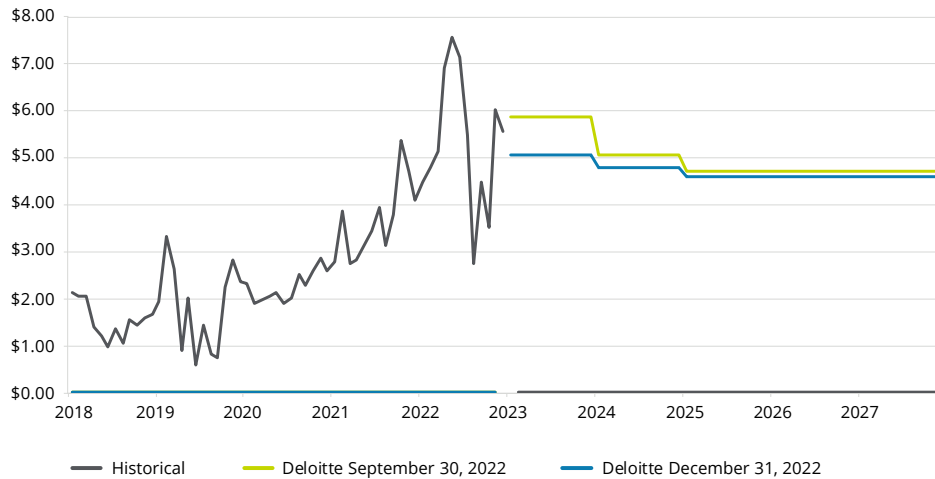
WCS is forecast as a differential to WTI. This differential is based on Western Canadian Select Crude Oil Futures.

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 Real	US\$/bbl Current	C\$/bbl Real	C\$/bbl Current	C\$/bbl Current	C\$/bbl Current	Rate	Rate
<b>Historical</b>								
2019	\$60.60	\$56.98	\$73.40	\$69.02	\$57.33	\$55.11	1.9%	0.754
2020	\$40.90	\$39.23	\$47.64	\$45.69	\$36.09	\$31.48	0.7%	0.746
2021	\$70.38	\$67.99	\$83.27	\$80.44	\$68.21	\$63.82	3.4%	0.798
<b>2022</b>								
12 mths H	\$94.41	\$94.41	\$119.40	\$119.40	\$96.80	\$95.26	6.7%	0.769
0 mths F	-	-	-	-	-	-	-	-
Avg.	\$94.41	\$94.41	\$119.40	\$119.40	\$96.80	\$95.26	-	0.769
<b>Forecast</b>								
2023	\$80.00	\$80.00	\$101.35	\$101.35	\$74.30	\$69.80	0.0%	0.740
2024	\$75.00	\$77.25	\$93.35	\$96.15	\$75.55	\$70.90	3.0%	0.750
2025	\$70.00	\$73.55	\$86.65	\$91.05	\$73.55	\$68.80	2.0%	0.750
2026	\$70.00	\$75.00	\$86.65	\$92.85	\$75.00	\$70.20	2.0%	0.750
2027	\$70.00	\$76.50	\$86.65	\$94.70	\$76.50	\$71.60	2.0%	0.750
2028	\$70.00	\$78.05	\$86.65	\$96.60	\$78.05	\$73.05	2.0%	0.750
2029	\$70.00	\$79.60	\$86.65	\$98.55	\$79.60	\$74.50	2.0%	0.750
2030	\$70.00	\$81.20	\$86.65	\$100.50	\$81.20	\$76.00	2.0%	0.750

## Canadian domestic price forecast

### 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 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 Current	C\$/Mcf Real	C\$/Mcf Current	C\$/Mcf Current	US\$/Mcf Real	US\$/Mcf Current
<b>Historical</b>						
2019	\$1.48	\$1.93	\$1.81	\$1.02	\$2.73	\$2.57
2020	\$2.00	\$2.35	\$2.25	\$2.20	\$2.12	\$2.04
2021	\$3.27	\$3.77	\$3.64	\$3.34	\$4.05	\$3.91
<b>2022</b>						
12 mths H	\$5.10	\$5.31	\$5.31	\$4.39	\$6.40	\$6.40
0 mths F	-	-	-	-	-	-
Avg.	\$5.10	\$5.31	\$5.31	\$4.39	\$6.40	\$6.40
<b>Forecast</b>						
2023	\$4.75	\$5.05	\$5.05	\$4.75	\$5.50	\$5.50
2024	\$4.65	\$4.80	\$4.95	\$4.65	\$5.00	\$5.15
2025	\$4.50	\$4.60	\$4.85	\$4.50	\$4.50	\$4.75
2026	\$4.60	\$4.60	\$4.95	\$4.60	\$4.50	\$4.80
2027	\$4.70	\$4.60	\$5.05	\$4.70	\$4.50	\$4.90
2028	\$4.80	\$4.60	\$5.15	\$4.80	\$4.50	\$5.00
2029	\$4.90	\$4.60	\$5.25	\$4.90	\$4.50	\$5.10
2030	\$5.00	\$4.60	\$5.35	\$5.00	\$4.50	\$5.20

# 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 ASCI/MARS	Avg. OPEC Basket	Nigerian Bonny Light (33.4 API FOB)	Mexico Maya (21.8 API FOB)	Russia Urals (31.7 API FOB)
	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current
<b>Forecast</b>							
2023	\$80.00	\$84.00	\$78.00	\$82.50	\$85.00	\$74.00	\$59.00
2024	\$77.25	\$80.35	\$75.20	\$78.80	\$81.35	\$72.85	\$65.90
2025	\$73.55	\$76.70	\$71.45	\$75.10	\$77.75	\$69.10	\$68.30
2026	\$75.00	\$78.25	\$72.85	\$76.60	\$79.30	\$70.45	\$75.00
2027	\$76.50	\$79.80	\$74.35	\$78.15	\$80.90	\$71.85	\$76.50
2028	\$78.05	\$81.40	\$75.80	\$79.70	\$82.50	\$73.30	\$78.05
2029	\$79.60	\$83.00	\$77.35	\$81.30	\$84.15	\$74.75	\$79.60
2030	\$81.20	\$84.70	\$78.90	\$82.95	\$85.85	\$76.25	\$81.20

- 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% 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.

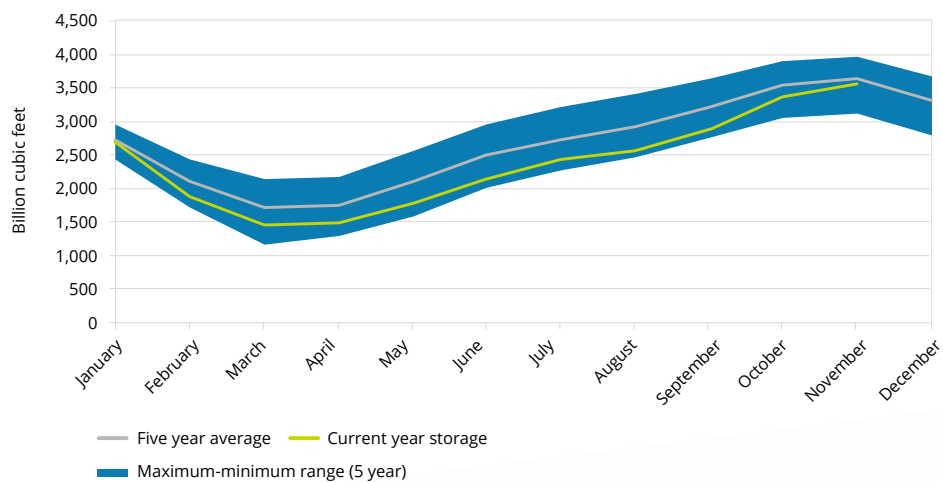
## Natural gas price and market demand forecast

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 Current	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current
<b>Forecast</b>								
2023	1.15	1.00	\$5.50	\$4.50	\$5.10	\$5.20	\$42.50	\$10.00
2024	1.20	1.05	\$5.15	\$4.10	\$4.75	\$4.85	\$32.95	\$16.50
2025	1.20	1.05	\$4.75	\$3.70	\$4.30	\$4.40	\$23.10	\$13.10
2026	1.20	1.05	\$4.80	\$3.75	\$4.40	\$4.50	\$12.85	\$9.65
2027	1.20	1.05	\$4.90	\$3.85	\$4.50	\$4.60	\$13.10	\$6.35
2028	1.20	1.05	\$5.00	\$3.90	\$4.55	\$4.70	\$13.40	\$6.45
2029	1.20	1.05	\$5.10	\$4.00	\$4.65	\$4.80	\$13.65	\$6.60
2030	1.20	1.05	\$5.20	\$4.05	\$4.75	\$4.85	\$13.90	\$6.75



# Global trends

## US natural gas storage



## Storage

### United States

Natural gas storage in the United States peaked at the five-year average moving into the winter season.

Source: Baker Hughes

## Rigs

## United States

Gas rig count growth has slowed along with a decrease in gas price, while oil rig counts have begun to rise again after temporarily slowing in the fall.

## Canada

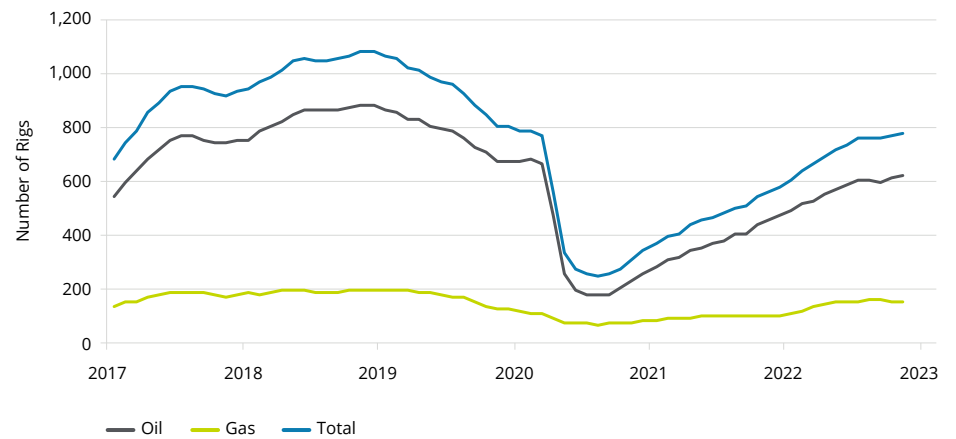
Oil and gas rig counts are at a similar level to those seen in 2017 and 2018, primarily as a result of increased oil drilling. Gas drilling has yet to increase along with the recent rise in AECO prices.

## International

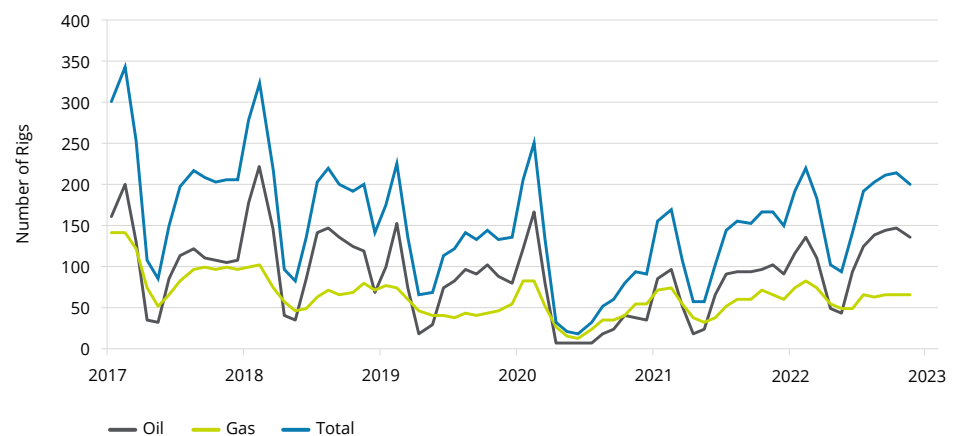
Strength in both oil and gas markets has led to increasing rig counts across much of the globe, with the most growth in recent months seen in the Middle East and Latin America.

\*Source: Baker Hughes

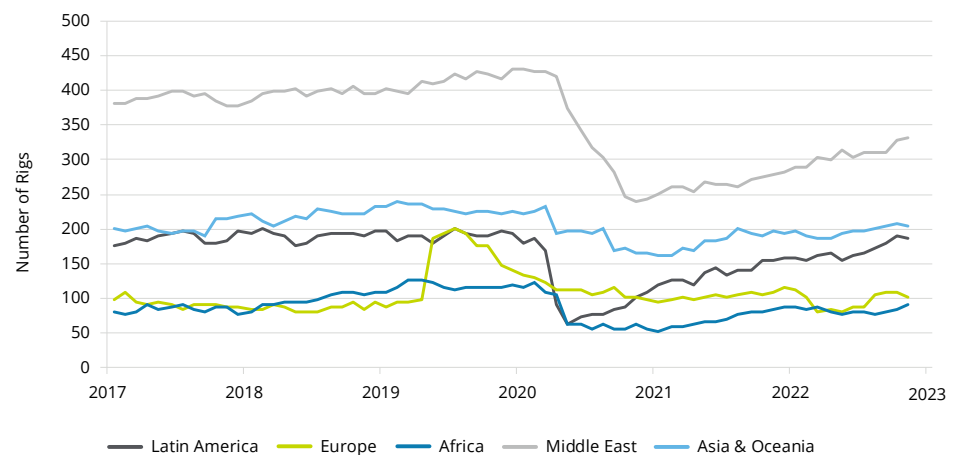
## US\*



## Canada\*



## International\*



# Canadian domestic price tables

Crude Oil Pricing								
Year	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
	Rate	Rate	Rate	US\$/bbl Real	US\$/bbl Current	C\$/bbl Real	C\$/bbl Current	C\$/bbl Current
Historical								
2012	1.5%	1.5%	1.001	\$111.59	\$94.11	\$102.65	\$86.57	\$73.10
2013	0.9%	0.9%	0.972	\$114.33	\$97.91	\$109.02	\$93.36	\$74.97
2014	1.9%	1.9%	0.906	\$107.88	\$93.26	\$108.73	\$94.00	\$81.06
2015	1.1%	1.1%	0.783	\$55.25	\$48.69	\$64.68	\$57.00	\$44.80
2016	1.4%	1.4%	0.755	\$48.42	\$43.15	\$58.59	\$52.22	\$38.90
2017	1.6%	1.6%	0.771	\$56.27	\$50.88	\$68.69	\$62.12	\$49.51
2018	2.3%	2.3%	0.772	\$70.66	\$64.94	\$75.18	\$69.10	\$49.89
2019	1.9%	1.9%	0.754	\$60.60	\$56.98	\$73.40	\$69.02	\$57.33
2020	0.7%	0.7%	0.746	\$40.90	\$39.23	\$47.64	\$45.69	\$36.09
2021	3.4%	3.4%	0.798	\$70.38	\$67.99	\$83.27	\$80.44	\$68.21
2022								
12 mths H	6.7%	6.7%	0.769	\$94.41	\$94.41	\$119.40	\$119.40	\$96.80
0 mths F	0.0%	0.0%	-	-	-	-	-	-
Avg.	N/A	N/A	0.769	\$94.41	\$94.41	\$119.40	\$119.40	\$96.80
Forecast								
2023	0.0%	0.0%	0.740	\$80.00	\$80.00	\$101.35	\$101.35	\$74.30
2024	3.0%	3.0%	0.750	\$75.00	\$77.25	\$93.35	\$96.15	\$75.55
2025	2.0%	2.0%	0.750	\$70.00	\$73.55	\$86.65	\$91.05	\$73.55
2026	2.0%	2.0%	0.750	\$70.00	\$75.00	\$86.65	\$92.85	\$75.00
2027	2.0%	2.0%	0.750	\$70.00	\$76.50	\$86.65	\$94.70	\$76.50
2028	2.0%	2.0%	0.750	\$70.00	\$78.05	\$86.65	\$96.60	\$78.05
2029	2.0%	2.0%	0.750	\$70.00	\$79.60	\$86.65	\$98.55	\$79.60
2030	2.0%	2.0%	0.750	\$70.00	\$81.20	\$86.65	\$100.50	\$81.20
2031	2.0%	2.0%	0.750	\$70.00	\$82.80	\$86.65	\$102.50	\$82.80
2032	2.0%	2.0%	0.750	\$70.00	\$84.50	\$86.65	\$104.55	\$84.50
2033	2.0%	2.0%	0.750	\$70.00	\$86.15	\$86.65	\$106.65	\$86.15
2034	2.0%	2.0%	0.750	\$70.00	\$87.90	\$86.65	\$108.80	\$87.90
2035	2.0%	2.0%	0.750	\$70.00	\$89.65	\$86.65	\$110.95	\$89.65
2036	2.0%	2.0%	0.750	\$70.00	\$91.45	\$86.65	\$113.20	\$91.45
2037	2.0%	2.0%	0.750	\$70.00	\$93.25	\$86.65	\$115.45	\$93.25
2038	2.0%	2.0%	0.750	\$70.00	\$95.15	\$86.65	\$117.75	\$95.15
2039	2.0%	2.0%	0.750	\$70.00	\$97.05	\$86.65	\$120.10	\$97.05
2040	2.0%	2.0%	0.750	\$70.00	\$99.00	\$86.65	\$122.50	\$99.00
2041	2.0%	2.0%	0.750	\$70.00	\$100.95	\$86.65	\$124.95	\$100.95
2042	2.0%	2.0%	0.750	\$70.00	\$103.00	\$86.65	\$127.45	\$103.00
2042+	2.0%	2.0%	0.750	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)
- Real prices listed in 2023 dollars with no escalation considered

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## Canadian domestic price tables

Natural Gas Liquids Pricing Edmonton Par Prices					Natural Gas Pricing						Sulphur
Year	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	C\$/bbl Current	C\$/mcf Current	C\$/mcf Real	C\$/mcf Current	C\$/mcf Current	US\$/Mcf Real	US\$/Mcf Current	C\$/lt Current
<b>Historical</b>											
2012	\$6.73	\$30.80	\$75.47	\$99.67	\$2.25	\$2.83	\$2.39	\$2.29	\$3.26	\$2.75	\$126.81
2013	\$8.68	\$38.54	\$77.44	\$103.52	\$2.98	\$3.71	\$3.17	\$3.11	\$4.35	\$3.73	\$62.17
2014	\$12.46	\$42.93	\$59.43	\$101.47	\$4.22	\$5.21	\$4.50	\$4.16	\$5.08	\$4.39	\$88.99
2015	\$7.49	\$5.35	\$33.70	\$55.15	\$2.56	\$3.05	\$2.69	\$1.81	\$2.98	\$2.63	\$107.45
2016	\$6.04	\$8.71	\$31.45	\$52.43	\$1.93	\$2.42	\$2.16	\$1.75	\$2.82	\$2.52	\$45.40
2017	\$6.11	\$27.92	\$40.98	\$63.65	\$2.13	\$2.42	\$2.19	\$1.56	\$3.30	\$2.99	\$41.85
2018	\$6.90	\$29.76	\$46.17	\$75.74	\$1.36	\$1.67	\$1.54	\$1.26	\$3.45	\$3.17	\$89.25
2019	\$5.00	\$15.82	\$21.40	\$67.57	\$1.48	\$1.93	\$1.81	\$1.02	\$2.73	\$2.57	\$37.54
2020	\$6.20	\$16.11	\$20.93	\$47.14	\$2.00	\$2.35	\$2.25	\$2.20	\$2.12	\$2.04	\$2.60
2021	\$10.08	\$45.46	\$40.28	\$82.91	\$3.27	\$3.77	\$3.64	\$3.34	\$4.05	\$3.91	\$69.73
<b>2022</b>											
12 mths H	\$14.76	\$50.97	\$64.70	\$117.20	\$5.10	\$5.31	\$5.31	\$4.39	\$6.40	\$6.40	\$123.80
0 mths F	-	-	-	-	-	-	-	-	-	-	-
Avg.	\$14.76	\$50.97	\$64.70	\$117.20	\$5.10	\$5.31	\$5.31	\$4.39	\$6.40	\$6.40	\$123.80
<b>Forecast</b>											
2023	\$14.40	\$45.60	\$55.75	\$101.35	\$4.75	\$5.05	\$5.05	\$4.75	\$5.50	\$5.50	\$50.00
2024	\$14.10	\$43.25	\$52.90	\$96.15	\$4.65	\$4.80	\$4.95	\$4.65	\$5.00	\$5.15	\$51.50
2025	\$13.75	\$40.95	\$50.05	\$91.05	\$4.50	\$4.60	\$4.85	\$4.50	\$4.50	\$4.75	\$52.55
2026	\$14.05	\$41.80	\$51.05	\$92.85	\$4.60	\$4.60	\$4.95	\$4.60	\$4.50	\$4.80	\$53.60
2027	\$14.30	\$42.65	\$52.10	\$94.70	\$4.70	\$4.60	\$5.05	\$4.70	\$4.50	\$4.90	\$54.65
2028	\$14.60	\$43.50	\$53.15	\$96.60	\$4.80	\$4.60	\$5.15	\$4.80	\$4.50	\$5.00	\$55.75
2029	\$14.90	\$44.35	\$54.20	\$98.55	\$4.90	\$4.60	\$5.25	\$4.90	\$4.50	\$5.10	\$56.85
2030	\$15.20	\$45.25	\$55.25	\$100.50	\$5.00	\$4.60	\$5.35	\$5.00	\$4.50	\$5.20	\$58.00
2031	\$15.50	\$46.15	\$56.40	\$102.50	\$5.10	\$4.60	\$5.45	\$5.10	\$4.50	\$5.30	\$59.15
2032	\$15.80	\$47.05	\$57.50	\$104.55	\$5.20	\$4.60	\$5.55	\$5.20	\$4.50	\$5.45	\$60.35
2033	\$16.15	\$48.00	\$58.65	\$106.65	\$5.30	\$4.60	\$5.65	\$5.30	\$4.50	\$5.55	\$61.55
2034	\$16.45	\$48.95	\$59.85	\$108.80	\$5.40	\$4.60	\$5.80	\$5.40	\$4.50	\$5.65	\$62.80
2035	\$16.80	\$49.95	\$61.00	\$110.95	\$5.50	\$4.60	\$5.90	\$5.50	\$4.50	\$5.75	\$64.05
2036	\$17.10	\$50.95	\$62.25	\$113.20	\$5.60	\$4.60	\$6.00	\$5.60	\$4.50	\$5.90	\$65.30
2037	\$17.45	\$51.95	\$63.50	\$115.45	\$5.75	\$4.60	\$6.15	\$5.75	\$4.50	\$6.00	\$66.60
2038	\$17.80	\$53.00	\$64.75	\$117.75	\$5.85	\$4.60	\$6.25	\$5.85	\$4.50	\$6.10	\$67.95
2039	\$18.15	\$54.05	\$66.05	\$120.10	\$5.95	\$4.60	\$6.40	\$5.95	\$4.50	\$6.25	\$69.30
2040	\$18.50	\$55.15	\$67.40	\$122.50	\$6.10	\$4.60	\$6.50	\$6.10	\$4.50	\$6.35	\$70.70
2041	\$18.90	\$56.25	\$68.70	\$124.95	\$6.20	\$4.60	\$6.65	\$6.20	\$4.50	\$6.50	\$72.10
2042	\$19.25	\$57.35	\$70.10	\$127.45	\$6.35	\$4.60	\$6.75	\$6.35	\$4.50	\$6.60	\$73.55
2042+	2.0%	2.0%	2.0%	2.0%	2.0%	0.0%	2.0%	2.0%	0.0%	2.0%	2.0%

### Notes

- Data sources include: EIA, DOB, NRC, Flint Hills Resources, Alberta Government
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- 1 Mcf is equivalent to 1 mmbtu
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- NGL prices have been switched from a mix reference to a spec reference

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Additional crude reference prices

Crude oil pricing			Natural gas pricing	
Year	Lt. Sour 35 Deg. API Cromer, SK	MSO 31 Deg. API Hardisty	Syncrude Sweet Premium 32.5 Deg. API	Ontario Dawn Reference Point
	C\$/bbl Current	C\$/bbl Current	C\$/bbl Current	C\$/mcf Current
Historical				
2012	\$84.27	\$77.53		\$3.11
2013	\$91.76	\$82.65		\$4.13
2014	\$92.91	\$89.39		\$5.76
2015	\$55.46	\$54.70		\$3.72
2016	\$51.37	\$48.29		\$3.46
2017	\$62.06	\$58.16		\$3.97
2018	\$73.06	\$62.82		\$4.07
2019	\$69.68	\$65.72		\$3.22
2020	\$45.41	\$43.55	\$36.18	\$2.51
2021	\$80.08	\$76.58	\$69.55	\$4.55
2022				
12 mths H	\$118.09	\$113.08	\$128.02	\$7.90
0 mths F	-	-	-	-
Avg.	\$118.09	\$113.08	\$128.02	\$7.90
Forecast				
2023	\$100.35	\$96.85	\$104.30	\$7.15
2024	\$95.10	\$91.50	\$101.30	\$6.55
2025	\$90.00	\$86.30	\$91.95	\$6.00
2026	\$91.80	\$88.05	\$93.75	\$6.10
2027	\$93.60	\$89.80	\$95.65	\$6.25
2028	\$95.50	\$91.60	\$97.55	\$6.35
2029	\$97.40	\$93.40	\$99.50	\$6.50
2030	\$99.35	\$95.30	\$101.50	\$6.60
2031	\$101.35	\$97.20	\$103.55	\$6.75
2032	\$103.35	\$99.15	\$105.60	\$6.90
2033	\$105.45	\$101.10	\$107.70	\$7.00
2034	\$107.55	\$103.15	\$109.85	\$7.15
2035	\$109.70	\$105.20	\$112.05	\$7.30
2036	\$111.90	\$107.30	\$114.30	\$7.45
2037	\$114.10	\$109.45	\$116.60	\$7.60
2038	\$116.40	\$111.65	\$118.90	\$7.75
2039	\$118.75	\$113.90	\$121.30	\$7.90
2040	\$121.10	\$116.15	\$123.70	\$8.05
2041	\$123.55	\$118.50	\$126.20	\$8.20
2042	\$126.00	\$120.85	\$128.70	\$8.40
2042+	2.0%	2.0%	2.0%	2.0%

Notes

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# International price tables

Crude Oil Pricing															
Year	Average WTI Spot	Alaskan North Slope	California Midway- Sunset	Louisiana Light Sweet	Gulf Coast ASCI/ MARS	Wyoming Sweet	Brent Spot	Average OPEC Basket	Venezuelan Merey	Nigerian Bonny Light	Arabia UAE Dubai Feteh	UAE Murban	Mexico Maya	Russia Urals	Indonesia Minas
	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current	US\$/bbl Current
Forecast															
2023	\$80.00	\$75.00	\$81.00	\$82.00	\$78.00	\$78.00	\$84.00	\$82.50	\$61.00	\$85.00	\$80.00	\$82.00	\$74.00	\$59.00	\$81.75
2024	\$77.25	\$72.10	\$78.30	\$79.30	\$75.20	\$75.20	\$80.35	\$78.80	\$60.75	\$81.35	\$77.75	\$79.05	\$72.85	\$65.90	\$78.00
2025	\$73.55	\$68.30	\$74.60	\$75.65	\$71.45	\$71.45	\$76.70	\$75.10	\$56.75	\$77.75	\$74.05	\$75.40	\$69.10	\$68.30	\$74.35
2026	\$75.00	\$69.65	\$76.10	\$77.15	\$72.85	\$72.85	\$78.25	\$76.60	\$57.85	\$79.30	\$75.55	\$76.90	\$70.45	\$75.00	\$75.80
2027	\$76.50	\$71.05	\$77.60	\$78.70	\$74.35	\$74.35	\$79.80	\$78.15	\$59.00	\$80.90	\$77.05	\$78.45	\$71.85	\$76.50	\$77.35
2028	\$78.05	\$72.45	\$79.15	\$80.25	\$75.80	\$75.80	\$81.40	\$79.70	\$60.20	\$82.50	\$78.60	\$80.00	\$73.30	\$78.05	\$78.90
2029	\$79.60	\$73.90	\$80.75	\$81.90	\$77.35	\$77.35	\$83.00	\$81.30	\$61.40	\$84.15	\$80.15	\$81.60	\$74.75	\$79.60	\$80.45
2030	\$81.20	\$75.40	\$82.35	\$83.50	\$78.90	\$78.90	\$84.70	\$82.95	\$62.65	\$85.85	\$81.80	\$83.25	\$76.25	\$81.20	\$82.05
2031	\$82.80	\$76.90	\$84.00	\$85.20	\$80.45	\$80.45	\$86.35	\$84.60	\$63.90	\$87.55	\$83.40	\$84.90	\$77.80	\$82.80	\$83.70
2032	\$84.50	\$78.45	\$85.70	\$86.90	\$82.05	\$82.05	\$88.10	\$86.30	\$65.15	\$89.30	\$85.10	\$86.60	\$79.35	\$84.50	\$85.40
2033	\$86.15	\$80.00	\$87.40	\$88.65	\$83.70	\$83.70	\$89.85	\$88.00	\$66.45	\$91.10	\$86.80	\$88.30	\$80.95	\$86.15	\$87.10
2034	\$87.90	\$81.60	\$89.15	\$90.40	\$85.40	\$85.40	\$91.65	\$89.75	\$67.80	\$92.90	\$88.50	\$90.10	\$82.55	\$87.90	\$88.85
2035	\$89.65	\$83.25	\$90.95	\$92.20	\$87.10	\$87.10	\$93.50	\$91.55	\$69.15	\$94.75	\$90.30	\$91.90	\$84.20	\$89.65	\$90.60
2036	\$91.45	\$84.90	\$92.75	\$94.05	\$88.85	\$88.85	\$95.35	\$93.40	\$70.55	\$96.65	\$92.10	\$93.75	\$85.90	\$91.45	\$92.40
2037	\$93.25	\$86.60	\$94.60	\$95.95	\$90.60	\$90.60	\$97.25	\$95.25	\$71.95	\$98.60	\$93.95	\$95.60	\$87.60	\$93.25	\$94.25
2038	\$95.15	\$88.35	\$96.50	\$97.85	\$92.40	\$92.40	\$99.20	\$97.15	\$73.40	\$100.55	\$95.80	\$97.50	\$89.35	\$95.15	\$96.15
2039	\$97.05	\$90.10	\$98.40	\$99.80	\$94.25	\$94.25	\$101.20	\$99.10	\$74.85	\$102.60	\$97.75	\$99.45	\$91.15	\$97.05	\$98.10
2040	\$99.00	\$91.90	\$100.40	\$101.80	\$96.15	\$96.15	\$103.20	\$101.10	\$76.35	\$104.65	\$99.70	\$101.45	\$92.95	\$99.00	\$100.05
2041	\$100.95	\$93.75	\$102.40	\$103.85	\$98.05	\$98.05	\$105.30	\$103.10	\$77.90	\$106.75	\$101.70	\$103.50	\$94.85	\$100.95	\$102.05
2042	\$103.00	\$95.60	\$104.45	\$105.90	\$100.05	\$100.05	\$107.40	\$105.20	\$79.45	\$108.85	\$103.70	\$105.55	\$96.70	\$103.00	\$104.10
2042+	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

## Notes

- Data sources include: EIA, OPEC, ARC Energy, Marex Spectron.
- Venezuelan Merey replaced BCF-17 in the OPEC basket March 1, 2009.

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## International price tables

Natural Gas pricing								
Year	USD to GBP	USD to EUR	NYMEX Henry Hub	Permian Waha	San Juan Ignacio	Rocky Mtn. Opal	UK NBP	India Domestic Gas
	Exchange rate	Exchange rate	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current	US\$/Mcf Current
Forecast								
2023	1.150	1.000	\$5.50	\$4.50	\$5.10	\$5.20	\$42.50	\$10.00
2024	1.200	1.050	\$5.15	\$4.10	\$4.75	\$4.85	\$32.95	\$16.50
2025	1.200	1.050	\$4.75	\$3.70	\$4.30	\$4.40	\$23.10	\$13.10
2026	1.200	1.050	\$4.80	\$3.75	\$4.40	\$4.50	\$12.85	\$9.65
2027	1.200	1.050	\$4.90	\$3.85	\$4.50	\$4.60	\$13.10	\$6.35
2028	1.200	1.050	\$5.00	\$3.90	\$4.55	\$4.70	\$13.40	\$6.45
2029	1.200	1.050	\$5.10	\$4.00	\$4.65	\$4.80	\$13.65	\$6.60
2030	1.200	1.050	\$5.20	\$4.05	\$4.75	\$4.85	\$13.90	\$6.75
2031	1.200	1.050	\$5.30	\$4.15	\$4.85	\$4.95	\$14.20	\$6.85
2032	1.200	1.050	\$5.45	\$4.20	\$4.95	\$5.05	\$14.50	\$7.00
2033	1.200	1.050	\$5.55	\$4.30	\$5.05	\$5.15	\$14.75	\$7.15
2034	1.200	1.050	\$5.65	\$4.40	\$5.15	\$5.25	\$15.05	\$7.30
2035	1.200	1.050	\$5.75	\$4.50	\$5.25	\$5.40	\$15.35	\$7.45
2036	1.200	1.050	\$5.90	\$4.55	\$5.35	\$5.50	\$15.70	\$7.60
2037	1.200	1.050	\$6.00	\$4.65	\$5.45	\$5.60	\$16.00	\$7.75
2038	1.200	1.050	\$6.10	\$4.75	\$5.55	\$5.70	\$16.30	\$7.90
2039	1.200	1.050	\$6.25	\$4.85	\$5.70	\$5.80	\$16.65	\$8.05
2040	1.200	1.050	\$6.35	\$4.95	\$5.80	\$5.95	\$16.95	\$8.20
2041	1.200	1.050	\$6.50	\$5.05	\$5.90	\$6.05	\$17.30	\$8.35
2042	1.200	1.050	\$6.60	\$5.15	\$6.05	\$6.20	\$17.65	\$8.55
2042+	1.200	1.050	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%

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- 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 US 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 initialisms 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	NGX	Natural Gas Exchange
CER	Canadian Energy Regulator	NIT	Nova Inventory Transfer
CGA	Canadian Gas Association	NRC	Natural Resources Canada
CME	Chicago Mercantile Exchange	NYMEX	New York Mercantile Exchange
DCQ	Daily Contract Quantity	OECD	Organization of Economic Cooperation and Development
DOB	Daily Oil Bulletin	OPEC	Organization of Petroleum Exporting Countries
EIA	Energy Information Administration	PADD	Petroleum Administration Defense District
FERC	US Federal Energy Regulatory Commission	USGC	US Gulf Coast
FOB	Free on Board (shipper term)	USWC	US West Coast
IEA	International Energy Administration	WCS	Western Canada Select Crude Oil
		WTI	West Texas Intermediate
		WTS	West Texas Sour

# Contacts

**Andrew Botterill**

403-648-3239

abotterill@deloitte.ca

**Lesley Mitchell**

403-648-3215

lemitchell@deloitte.ca

**Sarah Clowes**

587-293-3201

saclowes@deloitte.ca

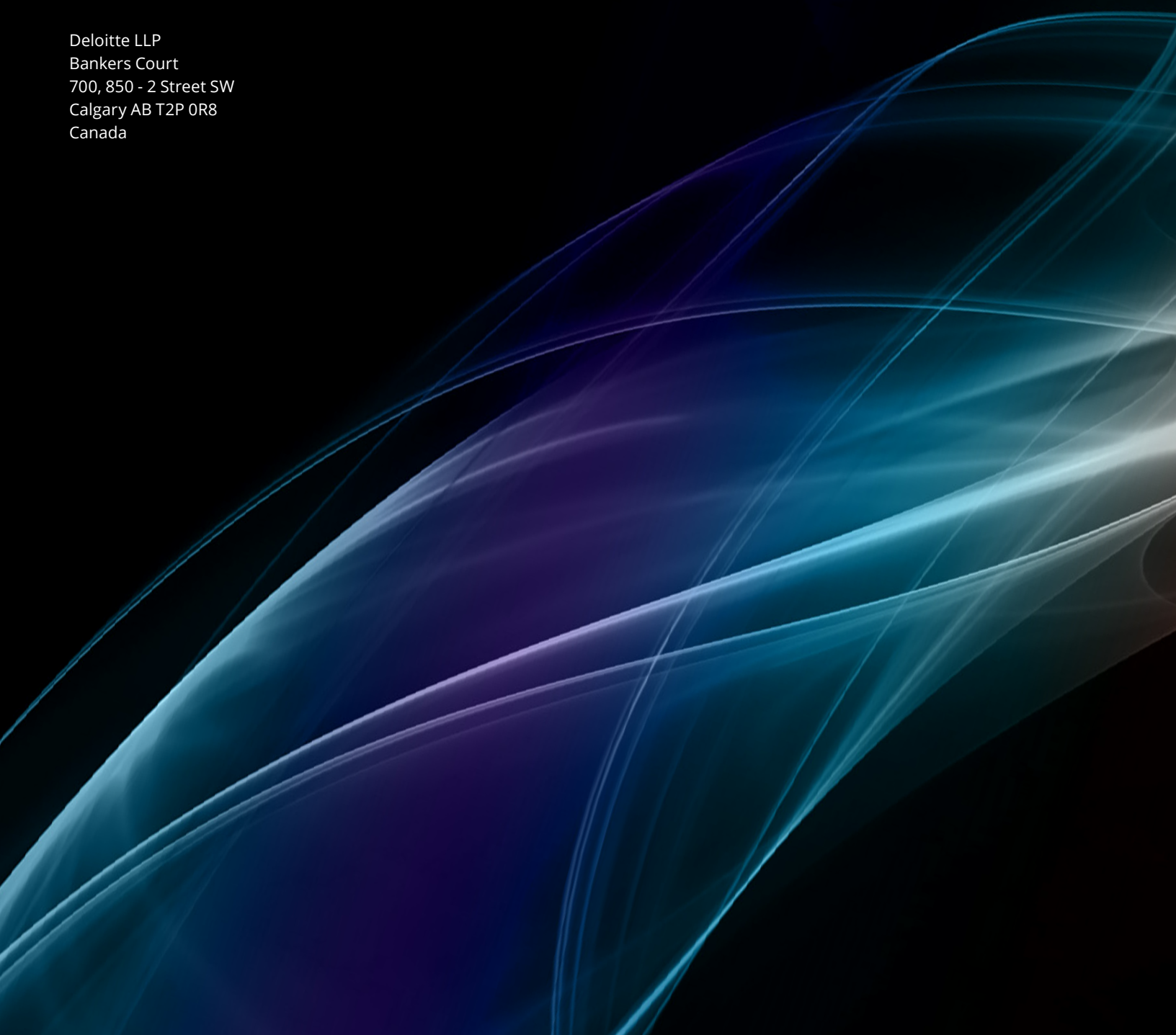
**Jonathan Listoe**

403-648-3254

jlistoe@deloitte.ca

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Deloitte LLP  
Bankers Court  
700, 850 - 2 Street SW  
Calgary AB T2P 0R8  
Canada

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