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Oil and gas price forecast

Refining change: Driving net-zero with Canadian oil and gas

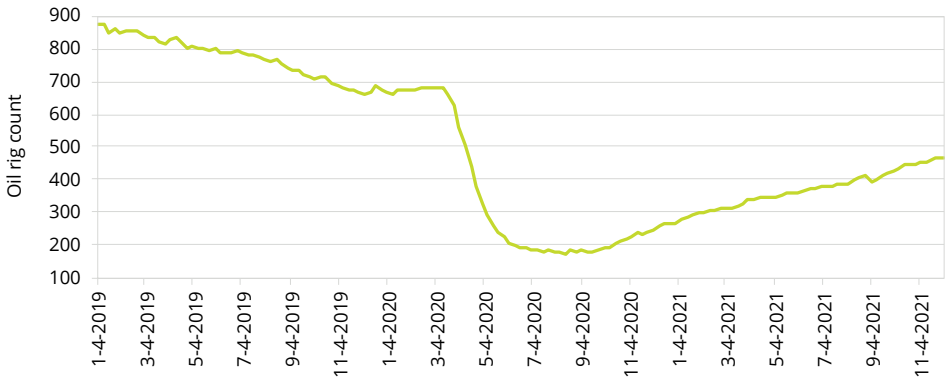
December 31, 2021

Forecast commentary

Crude oil prices tumbled in the latter weeks of 2021 with a coordinated release of supply from strategic reserves and the emergence of a new COVID-19 variant resulting in global demand concerns. The strategic release of reserve supply was led by the US, alongside China, India, South Korea, Japan, Britain, and others. This move aims to increase global supply, decrease crude oil prices, and decrease petroleum product prices such as gasoline. This is the first time the US has partnered with some of the world's largest oil consumers to ease market prices. In response, the Organizations of Petroleum Exporting Countries (OPEC+) met in early December to consider supply options in response to the announcement by the US, as well as the new COVID-19 variant Omicron. These combined market impacts have created concerns over demand strength and may result in short-term supply gluts. OPEC+ members announced they will move forward with the previously planned output increase of 400,000 bbl/d in January 2022. Although OPEC+ members have stated they plan to increase production, members failed to meet September and October production targets and produced approximately 700,000 bbl/d less than expected.

Operator discipline in the US has also contributed to low domestic supply. Despite increased prices in the fall, rig counts within the US have not rebounded to pre-pandemic levels, indicating limited short-term domestic supply growth. Uncertainty in the industry has led to cautious spending. The combination of carbon dioxide emission reduction targets and demand growth uncertainty has left producers hesitant to invest in increased production levels.

US oil rig counts

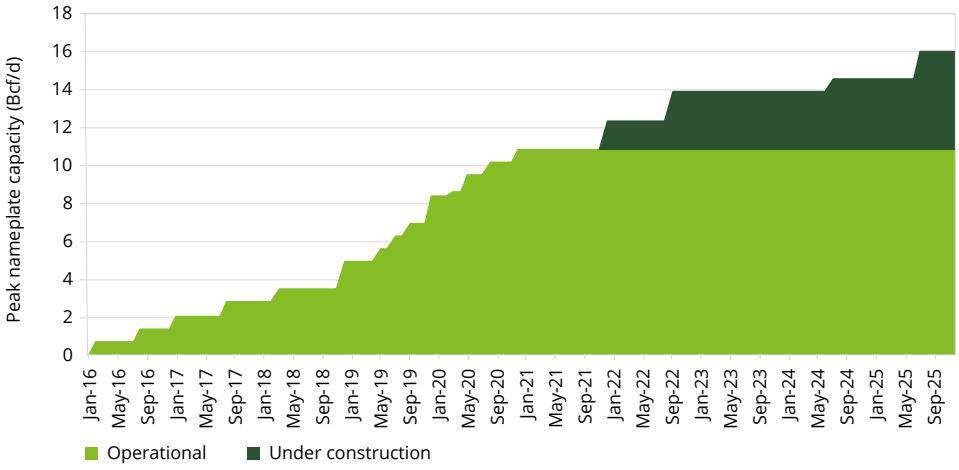


Source: Baker Hughes

In recent months, we saw wider differentials in Canadian heavy oil prices, which trend closer to historical values. WCS prices showed an average differential to WTI of US$19.05 in November 2021, an almost 200% increase from November 2020 differentials. The increase can be attributed to heavier OPEC+ production returning to the market and increased Canadian heavy oil production. The transportation portion of the WCS to WTI differential has remained relatively stable, indicating it is not an egress issue—a silver lining for land-locked Canadian producers who transport to the US. We expect this differential to remain as long as we continue to see competitive heavy oil production growth from Canada.

North American natural gas supply remains below pre-pandemic production rates, resulting in elevated prices amid growth in demand. Gas prices have begun to weaken in recent weeks as US supply gradually increases amid seasonally warm temperatures. LNG exports continue to be a major demand driver for the US. In November, the feed gas demand for LNG facilities in the US Gulf Coast reached 11.2 Bcf/d, the highest ever recorded. LNG projects are set to increase their peak liquefaction capacity from 11.4 Bcf/d in 2021, to 13.9 Bcf/d in 2022 with the completion of additional trains at existing facilities, as well as new export terminals. If all goes to plan, the US will become the largest natural gas exporter globally in 2022, surpassing Australia (11.4 Bcf/d) and Qatar (10.3 Bcf/d). However, Qatar announced plans in 2021 to increase LNG export capacity and will continue to be a significant rival to US domination.

US LNG capacity



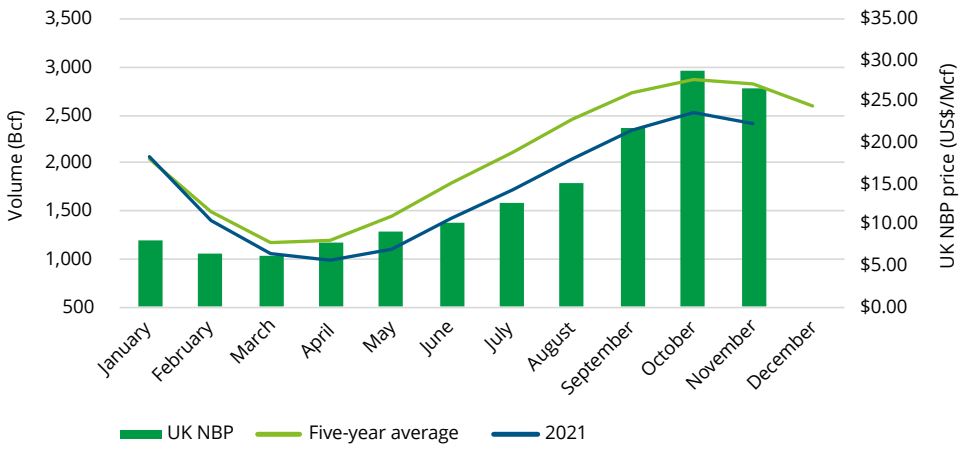
Source: EIA

Regulatory approved projects are expected to add an additional 19.3 Bcf/d of LNG capacity, with over 65% of these increases attributed to projects which have completed front-end engineering and design. A further increase of 6.6 Bcf/d is associated with proposed projects that have not yet been approved by regulatory bodies. Between the proposed, approved, developing, and operational facilities, the US LNG peak capacity is expected to reach 42 Bcf/d in total, representing a 368% increase from current peak capacity levels.

Natural gas storage levels are trending near the five-year average in Canada and US amid seasonally warmer weather and relatively flat production. Europe continues to struggle with declining storage levels. European natural gas stock volumes are currently 15% below the five-year average, which has led to elevated prices close to all-time highs. European gas markets were further distressed in mid-November when the German government announced the suspension of their approval process for the Nord Stream 2 pipeline, further delaying the on-stream date into mid-2022. The lack of supply, decreased storage volumes, and resulting high prices have caused mass volatility across European natural gas markets and potential power outages during the winter months. The large increase in gas prices has led to further discussion regarding renewable energy to generate power and heat, as small UK utility companies continue to collapse.

Overall, we expect prices to remain elevated over the winter months, compared to last year, as demand increases from residential uses in both North America and Europe.

European natural gas storage and price



Source: Aggregated Gas Storage Inventory (AGSI), Marex

Refining change: Driving net-zero with Canadian oil and gas

Pulling together

Greater frequency of major weather-related disasters, temperature changes, and growing public discourse have driven an increasing sense of urgency around climate action. Tackling climate change by eliminating carbon emissions across all economic sectors is now a priority for almost every nation. As one of the largest emitters of greenhouse gasses (GHGs) in Canada, the oil and gas sector faces intense scrutiny and pressure to do its part. Recognizing the elevated reputational and financial risks associated with high carbon emitters, institutional investors have shown a greater reluctance to include oil and gas companies in their investment portfolios.

While consumers and investors look for ways to distance themselves from this sector, they've failed to recognize that oil and gas companies are also uniquely positioned to contribute more than any other to carbon reduction. Apart from the potential to make an immediate impact on emissions, investing in the decarbonization of the oil and gas sector makes sense for several reasons.

Many of the companies in the sector, particularly the larger players, have strong balance sheets. This means they have the capital and resources to invest in decarbonization projects. Oil and gas companies also have the technical and commercial experience needed to develop large, complex engineering projects. But perhaps more importantly, the leaders in the sector have already demonstrated a willingness to make meaningful strides to decarbonize its operations. Many have already taken tangible steps to display their resolve.

Signs of progress are present across the sector. For instance, fugitive methane[1] from operations and pipeline leaks was reduced by 60% from 2014 to 2019.[2] Integrated oil company Shell is also looking to develop new carbon capture and storage (CCS) methods, a key lever to reduce emissions.

The road to 2050

Building off the momentum created by the oil and gas sector will be critical if we are to reach our national commitments of carbon neutrality by 2050—which remains a somewhat uncertain journey for Canada. Doing so without major economic disruption will be a complicated process involving many stakeholders, including oil and gas companies, all levels of governments, First Nations, customers, and consumers.

Although Canada's track record of timely stakeholder collaboration is spotty, the coordinated response to the COVID-19 crisis shows what's possible. While not perfect, the multifaceted response to COVID-19 demonstrated that disparate interests—government, health care, employers, educators, etc.—can work together towards

[1] Alberta Energy Regulator website, "Methane Performance", https://www.aer.ca/protecting-what-matters/holding-industry-accountable/industry-performance/methane-performance, accessed December 3, 2021.
[2] Fugitive emissions rose in 2020 due to re-allocation of vented volumes previously classified as fuel volumes.

solutions when urgency demands it. The level of cooperation needed to reduce carbon emissions from oil and gas will be similar in scale and just as urgent.

The infrastructure lens

The most viable solutions to reducing emissions are rooted in infrastructure. New and upgraded frameworks are needed to build the facilities and equipment to store carbon, expand hydrogen use, and develop biofuels. Projects like this will help to decarbonize the economy, but they'll also be expensive and risky to investors because of their nature and scale.

Both private and public sector support is required for these efforts to succeed. Governments need to explore strategies to help mitigate investor risk to encourage private sector backing. Decarbonization projects are important to the public interest and should be viewed similarly to public investment in highways, airports, or power plants.

A recent national highway project in Chile shows how partnerships between the public and private sectors can make a project possible and serve the public good. Private companies bidding on the project were assured a minimum return on investment to help reduce risks associated with unpredictable traffic volumes. This decision reassured investors enough for the highway to be successfully financed.

While many of the largest oil and gas companies have already started to build decarbonization infrastructure on their own, provincial and federal governments in Canada are showing signs of greater support. Alberta is investing $131 million across seven decarbonizing projects, which may encourage some mid-sized players to build or expand CCS facilities.

Setting the priorities

Decisions on where to direct investment should be made according to current priorities, these include:

Ongoing management of current emissions

In addition to other efforts to reduce emissions, monitoring and managing fugitive methane should continue to be a focus. The Emissions Reduction Fund, announced last year by the federal government, provides $675 million in green technology investments and methane emission reduction.[3] Another $75 million targets GHGs from the offshore industry in Newfoundland.

Carbon sequestration and storage

A recent Deloitte study determined that CCS could account for up to 13% of the GHG reductions needed to reach net-zero by 2050.[4] However, many questions remain around the economic viability of CCS at current prices. Upfront costs are substantial and come with elevated levels of risk without price certainty. Unknowns surrounding the mechanisms that will govern the global carbon credit and trading market will push the risk level even higher.

Attracting investment to CCS will require government partnerships to support future cash flow risk, regardless of pricing and volatility on the global market. Once governments take that first step, they will likely find eager partners within the industry.

[3] Government of Canada news release, "Minister O'Regan Launches $750-Million Fund for Oil and Gas Companies to Reduce Methane Emissions", October 29, 2020, https://www.canada.ca/en/natural-resources-canada/news/2020/10/minister-oregan-launches-750-million-fund-for-oil-and-gas-companies-to-reduce-methane-emissions.html, accessed December 10, 2021.

[4] Deloitte Canada, "Building Canada's Future: Maximizing clean-energy infrastructure to reach net-zero emissions by 2050," https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/fcc/ca-en-building-canadas-future-maximizing-clean-energy-infrastructure-to-reach-net-zero-emissions-lastest.pdft, accessed December 1, 2021.

To date, the largest companies in the sector have been leading the conversation around CCS.[5] Shell Canada has already built one CCS facility that has safely stored 6 million tonnes of carbon dioxide (CO2) over the past six-years. The Polaris facility planned at its Scotford Complex, near Edmonton, will have the capacity to store 300 million tonnes of CO2 over its lifetime, with the first phase intended to sequester 750,000 tonnes of CO2 per year. Once in operation, Shell says the plant could reduce its direct and indirect refinery emissions (Scopes 1 and 2) by up to 40% and up to a third from the chemicals plant. It would also create around 2,000 jobs.

Six of Canada's largest oil sands producers—representing 95% of all national oil sands production—have launched a CCS initiative called Pathways to Net Zero.[6] The coalition proposes to build a major CCS facility to store carbon produced by the oil sands extraction process. The project is modeled on similar CCS strategies in Norway and the Netherlands, both of which received significant government support to get them off the ground.

Recent interest in CCS has been seen among mid-sized players, demonstrating that the broader industry is interested in the future of this carbon-reduction strategy.

Alternatives to oil and gas

Nationally, our knowledge in the production and distribution of fuels makes us a natural fit to pioneer alternative fuels, like biofuels, which are increasingly part of the energy mix for aviation and other forms of transportation. Canada's oil and gas industry is well-positioned to capitalize on the economic advantages offered by alternative fuels.

The same will be true of hydrogen—another alternate fuel source—once the demand reaches the point of economic viability. An early adopter, Air Products and Chemicals Inc., has announced plans to build a $1.3 billion hydrogen production facility to begin operations in 2024.[7] This transformational facility was made possible with federal and provincial incentives.

The industry can also use its retail presence to drive change. Existing gas stations can be refitted with biofuel pumps or recharging stations for electric vehicles (EVs). This, as well as other initiatives, would give oil and gas brands a more customer-centric approach. This would mean demand at the customer level has a greater role in shaping strategic decisions and future investments.

Once again, governments will have a role in incentivizing the use and demand for EVs or other alternative fuels, like hydrogen and biofuels. Without immediate incentives to mitigate risk and kick-start demand, the use of alternative fuels will not grow. Without growth, investments will stagnate and carbon emissions will continue to climb.

Reporting

To foster a climate of trust and cooperation, which is vital to decarbonizing the oil and gas industry, companies must commit to transparent, timely, and data-rich reporting on progress. Reports should be reviewed by third parties to ensure proper and verifiable measurement of emissions. This will give investors and the public more confidence in the industry's efforts.

[5] Shell press release, "Shell proposes large-scale CCS facility in Alberta", https://www.shell.ca/en_ca/media/news-and-media-releases/news-releases-2021/shell-proposes-large-scale-ccs-facility-in-alberta.html, accessed December 3, 2021.

[6] Oil Sands Pathways website, https://www.oilsandspathways.ca/, accessed December 3, 2021.

[7] Globe and Mail article, "Air Products plans $1.3-billion hydrogen plant in Alberta as oil and gas industry seeks net-zero emissions", June 10, 2021, https://www.theglobeandmail.com/business/article-air-products-plans-13b-hydrogen-plant-in-alberta-as-oil-and-gas/, accessed December 8, 2021.

Urgent but attainable goals

Poor coordination and a lack of cooperation often come with a high cost. Proposed liquified natural gas (LNG) pipelines from Alberta wells to Pacific ports presented an outstanding opportunity for the country's resource sector, as well as lower carbon alternatives to coal in Asian end markets. However, a chronic lack of cooperation from the various stakeholders led to delays and uncertainties. In the end, pipeline capacity and investment in LNG plants were far smaller than initially planned, limiting the opportunity.

Decarbonization cannot afford to suffer the same fate. The 28-year runway for carbon neutrality by 2050 should not obscure the fact that decarbonization is an urgent matter. Delays will not only be costly but potentially disastrous. This only underlines the need for stakeholders—public and private—to cooperate and collaborate to help Canada reach its carbon reduction goals without major economic disruption. Early signs are positive. But it is the work that lies ahead that will determine Canada's GHG-free future.

Recommended Reading

Building Canada's Future: Maximizing clean-energy infrastructure to reach net-zero emissions by 2050

Bright Futures: A prosperous lower-carbon outlook for Canada

Decarbonization solutions

Deloitte offers a broad range of climate change services and solutions that link finance to science. Applying the latest climate science, these solutions consider multiple strategic and financial factors, such as business growth and capital allocation, to help companies make meaningful investments in emissions-abatement opportunities.

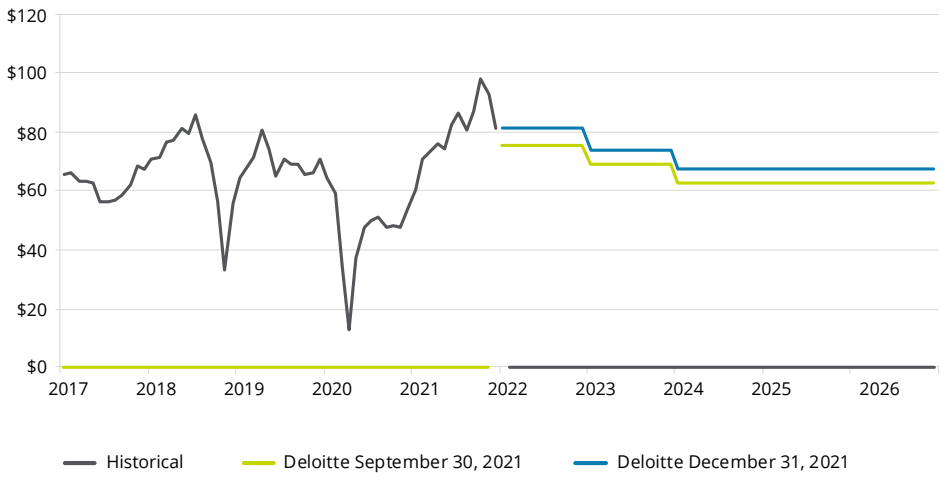
The Decarbonization Solutions package includes modules relating to abatement portfolio management, decarbonization scenarios, abatement pathways, impact analysis, and consideration of physical climate risk. The modules are based on scientific information from leading bodies and methodologies, such as Represented Concentration Pathways from the Intergovernmental Panel on Climate Change, shared socio-economic scenarios from the International Institute for Applied Systems Analysis, and methodologies from the Science-based Targets Initiative, among others. The modules compare forecast emissions reductions from selected abatement projects with short, medium, and longer-term aspirations and pathways as well as identify physical climate risk.

Deloitte also offers access to a deep pool of professionals with science, business, and technology backgrounds. They can help companies to identify grants and incentives to fund the transition, establish sustainability targets and metrics, disclose performance, implement digital solutions, including data integration and intelligent monitoring systems, and respond to ESG requests, concerns, and challenges.

Canadian domestic price forecast

Crude oil price and market demand forecast

Edmonton par (real $)



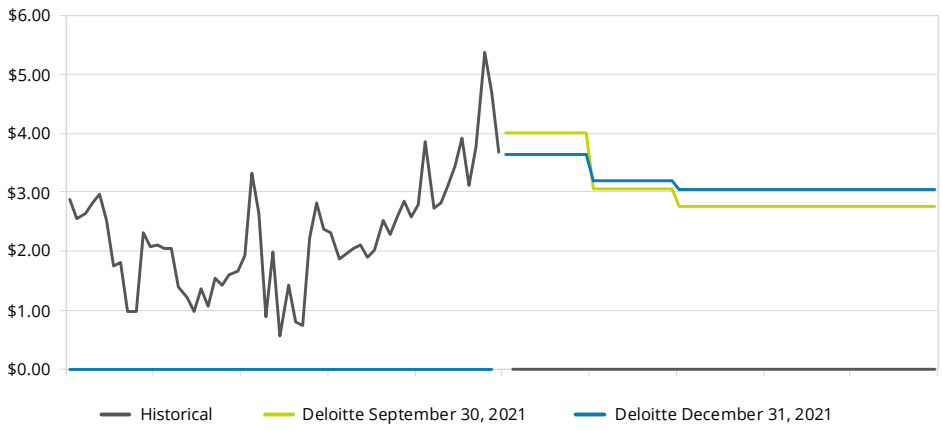
Forecast comments

- 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$/bbl Real	US$/bbl Current	C$/bbl Real	C$/bbl Current	C$/bbl Current	C$/bbl Current	Rate	Rate
Historical								
2018	$68.26	$64.94	$72.63	$69.10	$49.89	$45.34	2.3%	0.772
2019	$58.53	$56.98	$70.90	$69.02	$57.33	$55.11	1.9%	0.754
2020	$39.52	$39.23	$46.03	$45.69	$36.09	$31.48	0.7%	0.746
2021								
12 Mths H	$67.65	$67.65	$79.80	$79.80	$67.65	$64.04	3.3%	0.798
0 Mths F	-	-	-	-	-	-	-	-
Avg.	$67.65	$67.65	$79.80	$79.80	$67.65	$64.04	-	0.798
Forecast								
2022	$69.00	$69.00	$81.25	$81.25	$67.50	$63.00	0.0%	0.800
2023	$64.00	$65.30	$73.75	$75.25	$62.50	$57.90	2.0%	0.800
2024	$59.00	$61.40	$67.50	$70.25	$57.20	$52.55	2.0%	0.800
2025	$59.00	$62.60	$67.50	$71.65	$58.35	$53.60	2.0%	0.800
2026	$59.00	$63.85	$67.50	$73.05	$59.55	$54.65	2.0%	0.800
2027	$59.00	$65.15	$67.50	$74.55	$60.70	$55.75	2.0%	0.800
2028	$59.00	$66.45	$67.50	$76.00	$61.95	$56.85	2.0%	0.800
2029	$59.00	$67.75	$67.50	$77.55	$63.20	$58.00	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						
2018	$1.36	$1.62	$1.54	$1.26	$3.33	$3.17
2019	$1.48	$1.86	$1.81	$1.02	$2.64	$2.57
2020	$2.00	$2.27	$2.25	$2.20	$2.05	$2.04
2021						
12 Mths H	$3.20	$3.61	$3.61	$3.30	$3.92	$3.92
0 Mths F	-	-	-	-	-	-
Avg.	$3.20	$3.61	$3.61	$3.30	$3.92	$3.92
Forecast						
2022	$3.25	$3.65	$3.65	$3.55	$4.00	$4.00
2023	$2.85	$3.20	$3.25	$3.15	$3.50	$3.55
2024	$2.75	$3.05	$3.15	$3.05	$3.25	$3.40
2025	$2.80	$3.05	$3.25	$3.15	$3.25	$3.45
2026	$2.85	$3.05	$3.30	$3.20	$3.25	$3.50
2027	$2.95	$3.05	$3.35	$3.25	$3.25	$3.60
2028	$3.00	$3.05	$3.45	$3.30	$3.25	$3.65
2029	$3.05	$3.05	$3.50	$3.40	$3.25	$3.75

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
	Current	Current	Current	Current	Current	Current	Current
Forecast							
2022	$69.00	$72.00	$67.00	$71.00	$72.00	$65.00	$70.25
2023	$65.30	$69.35	$63.25	$68.35	$69.35	$62.20	$67.60
2024	$61.40	$65.55	$59.30	$64.50	$65.55	$58.25	$63.70
2025	$62.60	$66.85	$60.50	$65.80	$66.85	$59.45	$65.00
2026	$63.85	$68.20	$61.70	$67.10	$68.20	$60.60	$66.30
2027	$65.15	$69.55	$62.95	$68.45	$69.55	$61.85	$67.60
2028	$66.45	$70.95	$64.20	$69.80	$70.95	$63.05	$69.00
2029	$67.75	$72.35	$65.50	$71.20	$72.35	$64.35	$70.35

- 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
			US$/Mcf	US$/Mcf	US$/Mcf	US$/Mcf	US$/Mcf	US$/Mcf
	Rate	Rate	Current	Current	Current	Current	Current	Current
Forecast								
2022	1.35	1.15	$4.00	$3.70	$3.75	$3.85	$20.00	$5.50
2023	1.35	1.15	$3.55	$3.25	$3.30	$3.40	$13.75	$8.70
2024	1.35	1.15	$3.40	$3.05	$3.10	$3.25	$9.10	$6.30
2025	1.35	1.15	$3.45	$3.15	$3.20	$3.30	$9.30	$4.55
2026	1.35	1.15	$3.50	$3.20	$3.25	$3.35	$9.45	$4.65
2027	1.35	1.15	$3.60	$3.25	$3.30	$3.40	$9.65	$4.75
2028	1.35	1.15	$3.65	$3.30	$3.40	$3.50	$9.85	$4.85
2029	1.35	1.15	$3.75	$3.40	$3.45	$3.55	$10.05	$4.95

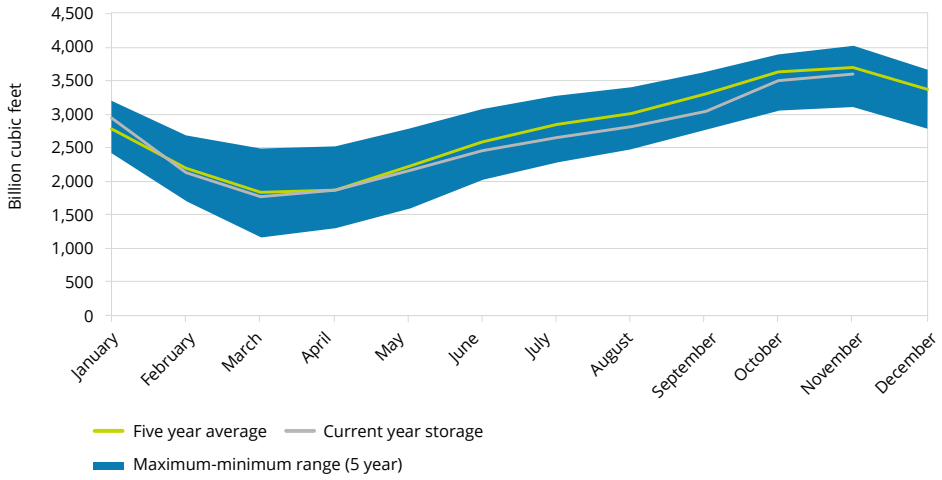
Global trends

Storage

United States

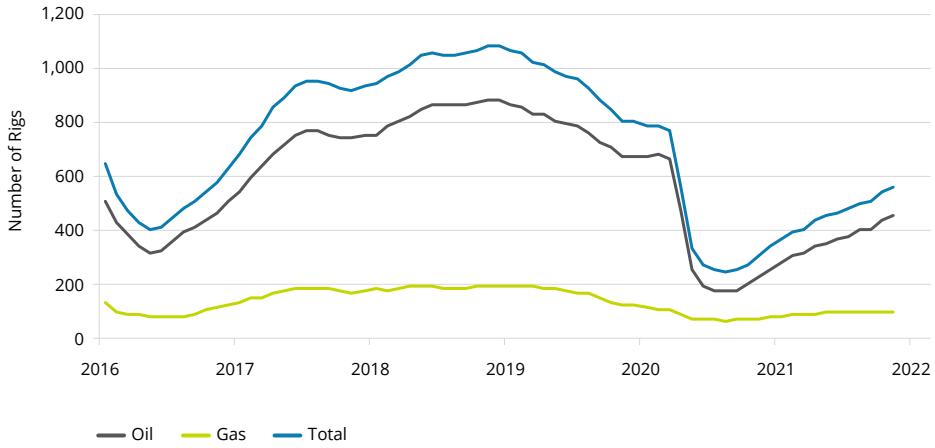
Natural gas storage in the United States has begun to match the five-year average amid seasonally warm weather and relatively flat production.

US natural gas storage



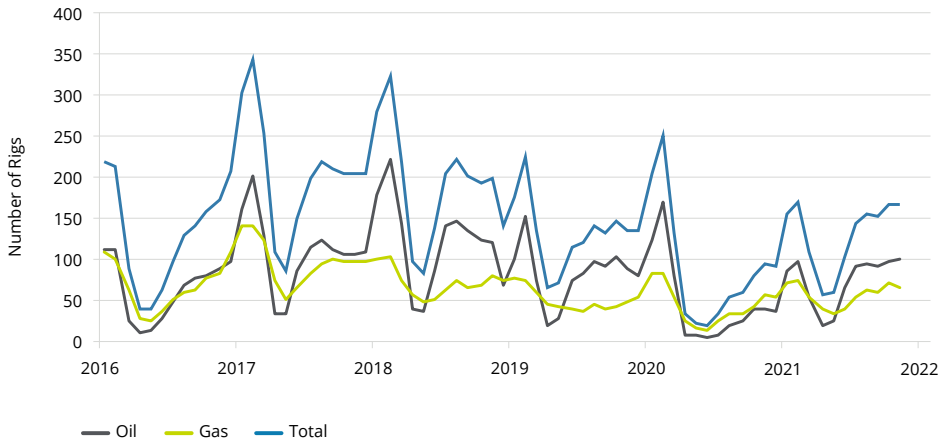
Source: Baker Hughes.

US rig counts



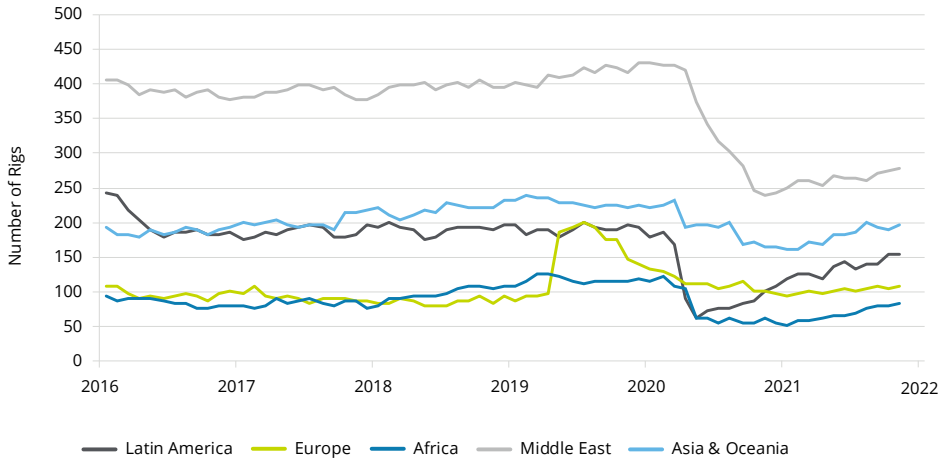
Source: Baker Hughes.

Canada rig counts



Source: Baker Hughes.

International rig counts



Source: Baker Hughes.

Rigs

United States

Oil rig counts continue to grow as oil prices remain strong, while gas rig counts have levelled off in spite of historically strong prices.

Canada

Oil and gas rig counts appear on track to meet or exceed the activity levels seen in 2019 this winter drilling season as companies look to capitalize on stronger oil and gas prices.

International

Strength in both oil and gas markets has led to rig counts increasing across much of the globe. Latin America and Africa are currently experiencing the highest rates of growth.

Canadian domestic price tables

Year	Price Inflation	Cost Inflation	CAD to USD Exchange	Crude Oil Pricing				
				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								
2011	2.9%	2.9%	1.012	$111.96	$94.88	$112.74	$95.54	$77.12
2012	1.5%	1.5%	1.001	$107.81	$94.11	$99.17	$86.57	$73.10
2013	0.9%	0.9%	0.972	$110.46	$97.91	$105.33	$93.36	$74.97
2014	1.9%	1.9%	0.906	$104.23	$93.26	$105.05	$94.00	$81.06
2015	1.1%	1.1%	0.783	$53.38	$48.69	$62.49	$57.00	$44.80
2016	1.4%	1.4%	0.755	$46.77	$43.15	$56.60	$52.22	$38.90
2017	1.6%	1.6%	0.771	$54.35	$50.88	$66.10	$61.88	$49.51
2018	2.3%	2.3%	0.772	$68.26	$64.94	$72.63	$69.10	$49.89
2019	1.9%	1.9%	0.754	$58.53	$56.98	$70.90	$69.02	$57.33
2020	0.7%	0.7%	0.746	$39.52	$39.23	$46.03	$45.69	$36.09
2021								
12 Mths H	3.3%	3.3%	0.798	$67.65	$67.65	$79.80	$79.80	$67.65
0 Mths F	0.0%	0.0%	-	-	-	-	-	-
Avg.	N/A	N/A	0.798	$67.65	$67.65	$79.80	$79.80	$67.65
Forecast								
2022	0.0%	0.0%	0.800	$69.00	$69.00	$81.25	$81.25	$67.50
2023	2.0%	2.0%	0.800	$64.00	$65.30	$73.75	$75.25	$62.50
2024	2.0%	2.0%	0.800	$59.00	$61.40	$67.50	$70.25	$57.20
2025	2.0%	2.0%	0.800	$59.00	$62.60	$67.50	$71.65	$58.35
2026	2.0%	2.0%	0.800	$59.00	$63.85	$67.50	$73.05	$59.55
2027	2.0%	2.0%	0.800	$59.00	$65.15	$67.50	$74.55	$60.70
2028	2.0%	2.0%	0.800	$59.00	$66.45	$67.50	$76.00	$61.95
2029	2.0%	2.0%	0.800	$59.00	$67.75	$67.50	$77.55	$63.20
2030	2.0%	2.0%	0.800	$59.00	$69.15	$67.50	$79.10	$64.45
2031	2.0%	2.0%	0.800	$59.00	$70.50	$67.50	$80.65	$65.75
2032	2.0%	2.0%	0.800	$59.00	$71.90	$67.50	$82.30	$67.05
2033	2.0%	2.0%	0.800	$59.00	$73.35	$67.50	$83.95	$68.40
2034	2.0%	2.0%	0.800	$59.00	$74.85	$67.50	$85.60	$69.75
2035	2.0%	2.0%	0.800	$59.00	$76.30	$67.50	$87.30	$71.15
2036	2.0%	2.0%	0.800	$59.00	$77.85	$67.50	$89.05	$72.55
2037	2.0%	2.0%	0.800	$59.00	$79.40	$67.50	$90.85	$74.00
2038	2.0%	2.0%	0.800	$59.00	$81.00	$67.50	$92.65	$75.50
2039	2.0%	2.0%	0.800	$59.00	$82.60	$67.50	$94.50	$77.00
2040	2.0%	2.0%	0.800	$59.00	$84.25	$67.50	$96.40	$78.55
2041	2.0%	2.0%	0.800	$59.00	$85.95	$67.50	$98.35	$80.10
2041+	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 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 2022 dollars with no escalation considered

	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$/bbl	C$/bbl	C$/bbl	C$/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											
2011	$10.30	$52.41	$86.98	$105.24	$3.46	$4.28	$3.63	$3.34	$4.72	$4.00	$101.60
2012	$6.73	$30.80	$75.47	$99.67	$2.25	$2.74	$2.39	$2.29	$3.15	$2.75	$126.81
2013	$8.68	$38.54	$77.44	$103.52	$2.98	$3.58	$3.17	$3.11	$4.21	$3.73	$62.17
2014	$12.46	$42.93	$59.43	$101.47	$4.22	$5.03	$4.50	$4.16	$4.91	$4.39	$88.99
2015	$7.49	$5.35	$33.70	$55.15	$2.56	$2.95	$2.69	$1.81	$2.88	$2.63	$107.45
2016	$6.04	$8.71	$31.45	$52.43	$1.93	$2.34	$2.16	$1.75	$2.73	$2.52	$45.40
2017	$6.11	$27.92	$40.98	$63.65	$2.13	$2.34	$2.19	$1.56	$3.19	$2.99	$41.85
2018	$6.90	$29.76	$46.17	$75.74	$1.36	$1.62	$1.54	$1.26	$3.33	$3.17	$89.25
2019	$5.00	$15.82	$21.40	$67.57	$1.48	$1.86	$1.81	$1.02	$2.64	$2.57	$37.54
2020	$6.20	$16.11	$20.93	$47.14	$2.00	$2.27	$2.25	$2.20	$2.06	$2.04	$2.60
2021											
12 Mths H	$10.06	$45.92	$40.30	$81.87	$3.20	$3.61	$3.61	$3.30	$3.92	$3.92	$65.37
0 Mths F	-	-	-	-	-	-	-	-	-	-	-
Avg.	$10.06	$45.92	$40.30	$81.87	$3.20	$3.61	$3.61	$3.30	$3.92	$3.92	$65.37
Forecast											
2022	$10.05	$44.70	$56.90	$85.30	$3.25	$3.65	$3.65	$3.55	$4.00	$4.00	$75.00
2023	$9.00	$33.85	$45.15	$79.00	$2.85	$3.20	$3.25	$3.15	$3.50	$3.55	$51.00
2024	$8.75	$31.65	$42.15	$73.75	$2.75	$3.05	$3.15	$3.05	$3.25	$3.40	$52.00
2025	$8.90	$32.25	$43.00	$75.25	$2.80	$3.05	$3.25	$3.15	$3.25	$3.45	$53.05
2026	$9.10	$32.90	$43.85	$76.75	$2.85	$3.05	$3.30	$3.20	$3.25	$3.50	$54.10
2027	$9.25	$33.55	$44.70	$78.30	$2.95	$3.05	$3.35	$3.25	$3.25	$3.60	$55.20
2028	$9.45	$34.25	$45.60	$79.85	$3.00	$3.05	$3.45	$3.30	$3.25	$3.65	$56.30
2029	$9.65	$34.90	$46.50	$81.45	$3.05	$3.05	$3.50	$3.40	$3.25	$3.75	$57.45
2030	$9.85	$35.60	$47.45	$83.05	$3.10	$3.05	$3.55	$3.45	$3.25	$3.80	$58.60
2031	$10.05	$36.35	$48.40	$84.75	$3.15	$3.05	$3.65	$3.55	$3.25	$3.90	$59.75
2032	$10.25	$37.05	$49.35	$86.45	$3.25	$3.05	$3.70	$3.60	$3.25	$3.95	$60.95
2033	$10.45	$37.80	$50.35	$88.15	$3.30	$3.05	$3.80	$3.65	$3.25	$4.05	$62.15
2034	$10.65	$38.55	$51.35	$89.90	$3.35	$3.05	$3.85	$3.75	$3.25	$4.10	$63.40
2035	$10.85	$39.35	$52.40	$91.70	$3.45	$3.05	$3.95	$3.80	$3.25	$4.20	$64.70
2036	$11.10	$40.10	$53.45	$93.55	$3.50	$3.05	$4.00	$3.90	$3.25	$4.30	$65.95
2037	$11.30	$40.90	$54.50	$95.40	$3.55	$3.05	$4.10	$3.95	$3.25	$4.35	$67.30
2038	$11.55	$41.75	$55.60	$97.35	$3.65	$3.05	$4.20	$4.05	$3.25	$4.45	$68.65
2039	$11.75	$42.55	$56.70	$99.30	$3.70	$3.05	$4.25	$4.15	$3.25	$4.55	$70.00
2040	$12.00	$43.40	$57.85	$101.25	$3.80	$3.05	$4.35	$4.20	$3.25	$4.65	$71.40
2041	$12.25	$44.30	$59.00	$103.30	$3.85	$3.05	$4.45	$4.30	$3.25	$4.75	$72.85
2041+	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
- 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)
- 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
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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

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				
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	$69.68	$65.72	$58.85	$3.22
2020	$45.41	$43.55	$36.18	$2.51
2021				
12 Mths H	$77.59	$74.34	$69.39	$4.57
0 Mths F	-	-	-	-
Avg.	$77.59	$74.34	$69.39	$4.57
Forecast				
2022	$81.25	$77.25	$69.70	$4.50
2023	$75.25	$71.15	$64.20	$4.30
2024	$70.25	$66.05	$58.90	$4.00
2025	$71.65	$67.40	$60.05	$4.10
2026	$73.05	$68.75	$61.25	$4.15
2027	$74.55	$70.10	$62.50	$4.25
2028	$76.00	$71.50	$63.75	$4.35
2029	$77.55	$72.95	$65.00	$4.40
2030	$79.10	$74.40	$66.30	$4.50
2031	$80.65	$75.90	$67.65	$4.60
2032	$82.30	$77.40	$69.00	$4.70
2033	$83.95	$78.95	$70.35	$4.80
2034	$85.60	$80.55	$71.80	$4.90
2035	$87.30	$82.15	$73.20	$5.00
2036	$89.05	$83.80	$74.70	$5.10
2037	$90.85	$85.45	$76.20	$5.20
2038	$92.65	$87.15	$77.70	$5.30
2039	$94.50	$88.90	$79.25	$5.40
2040	$96.40	$90.70	$80.85	$5.50
2041	$98.35	$92.50	$82.45	$5.60
2041+	2.0%	2.0%	2.0%	2.0%

Notes:

- Data sources include: EIA, DOB, NRC, Flint Hills Resources, Alberta Government
- All prices are in Canadian dollars except WTI and NYMEX gas which are in US dollars
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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$/bbl	US$/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
	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current	Current
Forecast																
2022	$69.00	$63.50	$68.50	$69.00	$68.25	$67.00	$65.50	$72.00	$67.00	$71.00	$53.00	$72.00	$70.50	$65.00	$70.25	$69.75
2023	$65.30	$59.65	$64.75	$65.30	$64.50	$63.25	$61.70	$69.35	$63.25	$68.35	$50.00	$69.35	$67.85	$62.20	$67.60	$67.05
2024	$61.40	$55.65	$60.85	$61.40	$60.60	$59.30	$57.75	$65.55	$59.30	$64.50	$45.80	$65.55	$64.00	$58.25	$63.70	$63.20
2025	$62.60	$56.75	$62.10	$62.60	$61.80	$60.50	$58.90	$66.85	$60.50	$65.80	$46.70	$66.85	$65.25	$59.45	$65.00	$64.45
2026	$63.85	$57.90	$63.30	$63.85	$63.05	$61.70	$60.05	$68.20	$61.70	$67.10	$47.65	$68.20	$66.55	$60.60	$66.30	$65.75
2027	$65.15	$59.05	$64.60	$65.15	$64.30	$62.95	$61.30	$69.55	$62.95	$68.45	$48.60	$69.55	$67.90	$61.85	$67.60	$67.05
2028	$66.45	$60.25	$65.90	$66.45	$65.60	$64.20	$62.50	$70.95	$64.20	$69.80	$49.55	$70.95	$69.25	$63.05	$69.00	$68.40
2029	$67.75	$61.45	$67.20	$67.75	$66.90	$65.50	$63.75	$72.35	$65.50	$71.20	$50.55	$72.35	$70.65	$64.35	$70.35	$69.80
2030	$69.15	$62.70	$68.55	$69.15	$68.25	$66.80	$65.05	$73.80	$66.80	$72.65	$51.55	$73.80	$72.05	$65.60	$71.75	$71.20
2031	$70.50	$63.95	$69.90	$70.50	$69.60	$68.10	$66.35	$75.30	$68.10	$74.10	$52.60	$75.30	$73.50	$66.95	$73.20	$72.60
2032	$71.90	$65.20	$71.30	$71.90	$71.00	$69.50	$67.65	$76.80	$69.50	$75.60	$53.65	$76.80	$74.95	$68.25	$74.65	$74.05
2033	$73.35	$66.50	$72.75	$73.35	$72.45	$70.85	$69.00	$78.35	$70.85	$77.10	$54.70	$78.35	$76.45	$69.65	$76.15	$75.55
2034	$74.85	$67.85	$74.20	$74.85	$73.90	$72.30	$70.40	$79.90	$72.30	$78.65	$55.80	$79.90	$78.00	$71.00	$77.70	$77.05
2035	$76.30	$69.20	$75.70	$76.30	$75.35	$73.75	$71.80	$81.50	$73.75	$80.20	$56.90	$81.50	$79.55	$72.45	$79.25	$78.60
2036	$77.85	$70.60	$77.20	$77.85	$76.85	$75.20	$73.25	$83.15	$75.20	$81.80	$58.05	$83.15	$81.15	$73.90	$80.80	$80.15
2037	$79.40	$72.00	$78.75	$79.40	$78.40	$76.70	$74.70	$84.80	$76.70	$83.45	$59.20	$84.80	$82.75	$75.35	$82.45	$81.75
2038	$81.00	$73.45	$80.30	$81.00	$79.95	$78.25	$76.20	$86.50	$78.25	$85.10	$60.40	$86.50	$84.45	$76.90	$84.10	$83.40
2039	$82.60	$74.90	$81.90	$82.60	$81.55	$79.80	$77.70	$88.20	$79.80	$86.80	$61.60	$88.20	$86.10	$78.40	$85.75	$85.05
2040	$84.25	$76.40	$83.55	$84.25	$83.20	$81.40	$79.25	$90.00	$81.40	$88.55	$62.85	$90.00	$87.85	$80.00	$87.50	$86.75
2041	$85.95	$77.95	$85.20	$85.95	$84.85	$83.05	$80.85	$91.80	$83.05	$90.30	$64.10	$91.80	$89.60	$81.60	$89.25	$88.50
2041+	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%	2.0%

Notes:

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

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$/Mcf Current	US$/Mcf Current	US$/Mcf Current	US$/Mcf Current	US$/Mcf Current	US$/Mcf Current	US$/gal Current
Forecast									
2022	1.350	1.150	$4.00	$3.70	$3.75	$3.85	$20.00	$5.50	$2.50
2023	1.350	1.150	$3.55	$3.25	$3.30	$3.40	$13.75	$8.70	$2.55
2024	1.350	1.150	$3.40	$3.05	$3.10	$3.25	$9.10	$6.30	$2.60
2025	1.350	1.150	$3.45	$3.15	$3.20	$3.30	$9.30	$4.55	$2.65
2026	1.350	1.150	$3.50	$3.20	$3.25	$3.35	$9.45	$4.65	$2.70
2027	1.350	1.150	$3.60	$3.25	$3.30	$3.40	$9.65	$4.75	$2.75
2028	1.350	1.150	$3.65	$3.30	$3.40	$3.50	$9.85	$4.85	$2.80
2029	1.350	1.150	$3.75	$3.40	$3.45	$3.55	$10.05	$4.95	$2.85
2030	1.350	1.150	$3.80	$3.45	$3.50	$3.65	$10.25	$5.05	$2.95
2031	1.350	1.150	$3.90	$3.55	$3.60	$3.70	$10.45	$5.15	$3.00
2032	1.350	1.150	$3.95	$3.60	$3.65	$3.80	$10.65	$5.25	$3.05
2033	1.350	1.150	$4.05	$3.65	$3.75	$3.85	$10.90	$5.35	$3.10
2034	1.350	1.150	$4.10	$3.75	$3.80	$3.95	$11.10	$5.45	$3.15
2035	1.350	1.150	$4.20	$3.80	$3.90	$4.00	$11.30	$5.55	$3.25
2036	1.350	1.150	$4.30	$3.90	$3.95	$4.10	$11.55	$5.65	$3.30
2037	1.350	1.150	$4.35	$3.95	$4.05	$4.15	$11.80	$5.80	$3.35
2038	1.350	1.150	$4.45	$4.05	$4.10	$4.25	$12.00	$5.90	$3.45
2039	1.350	1.150	$4.55	$4.15	$4.20	$4.35	$12.25	$6.00	$3.50
2040	1.350	1.150	$4.65	$4.20	$4.30	$4.45	$12.50	$6.15	$3.55
2041	1.350	1.150	$4.75	$4.30	$4.35	$4.50	$12.75	$6.25	$3.65
2041+	1.350	1.150	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.

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 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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