

The North American advantage

Secure oil and gas production

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Key implications

North America — the US and Canada — is on track to produce over 41 million barrel of oil equivalent per day (boe/d) in 2023. This is more oil and gas than any other region in the world — including the Middle East.* Secure domestic oil and gas production of this magnitude is an advantage that Europe and mainland China do not have. North American consumers and industries are shielded to some extent from the severe pressure on energy supply and price extremes that Europe, and to a lesser extent, mainland China have faced in recent years — particularly for gas. North American energy exports also play a critical role in helping to fill the gap between global supply and demand. North American oil production has more than doubled since 2008 — a 62-year low point in US oil output — putting the US as the largest producer and Canada the fourth-largest producer globally. If North American oil production was stuck at 2008 levels, Russia's leverage in world energy markets would have been far higher than it already was on the eve of the Ukraine invasion. Furthermore, it would have been exceptionally difficult, if not impossible, for supplies from North America to not only protect North America consumers, but also help fill the gap left by the cutoff of Russian oil and gas to Europe.

This report explores the North American advantage of security of oil and gas supply. Where did the growth in production come from and how did the oil sands contribute to that growth? How does this help North America compared to other regions globally and will this advantage endure?

- North America has not always had the oil and gas advantage that it has today. Since 2008, Canada and the US has increased production by over 20 million boe/d. In 2008, US oil production was at a 62-year low and gas output was just beginning to rise from the shale revolution — and it seemed North America was on a course to less energy security, not more. Canadian oil production at that time was over 40% lower than it is today.
- The North American advantage came from unconventional oil and gas, including shale oil, shale gas and the Canadian oil sands. Collectively, these sources more than doubled North American oil and gas production, from over 20 million boe/d in 2008 to 41 million boe/d in 2023. By comparison, the Middle East oil and gas output in 2023 was just over 38 million boe/d — approximately 25% greater than in 2008.
- The North American advantage reflects resource endowments, a highly integrated transportation system and a competitive upstream oil and gas industry that does not exist elsewhere. There are, of course, no certainties about the future. Oil and gas prices, government policy and regulation will shape the future course of North American production and the degree to which this advantage endures.

*Oil and gas refers to crude oil as marketed, natural gas and natural gas liquids as reported in the S&P Global Commodity Insights 2023 Annual Strategic Workbooks.

About this report

Purpose. North America — the US and Canada — produce more oil and gas than any other region in the world in 2023 — including the Middle East. Secure domestic oil and gas supply of this magnitude is an advantage that Europe and mainland China do not have. North American consumers and industries are shielded, to an extent, from the severe pressure on energy supply and price extremes that face Europe, and to a lesser extent, mainland China. North American energy exports also play a critical role in helping to fill the gap between global supply and demand. This report examines the North American advantage of secure oil and gas production in comparison to other global regions and considers how this advantage will endure in the future.

Context. Since 2009, S&P Global Commodity Insights has provided research and reports, through the Oil Sands Dialogue, on issues surrounding the development of the Canadian oil sands. This report and past Oil Sands Dialogue reports can be downloaded at <https://www.spglobal.com/commodityinsights/en/ci/products/energy-industry-oil-sands-dialogue.html>.

Methodology. Commodity Insights conducted extensive research and analysis on this topic, both independently and in consultation with stakeholders. Commodity Insights has full editorial control over this report and is solely responsible for its content.

Structure. This report has six sections.

- Introduction — the North American advantage
- Canadian Oil sands growth made Canada the fourth-largest producer in the world
- The stunning growth of shale gas and shale oil
- The growing importance of the North American advantage
- Will the North American advantage endure?

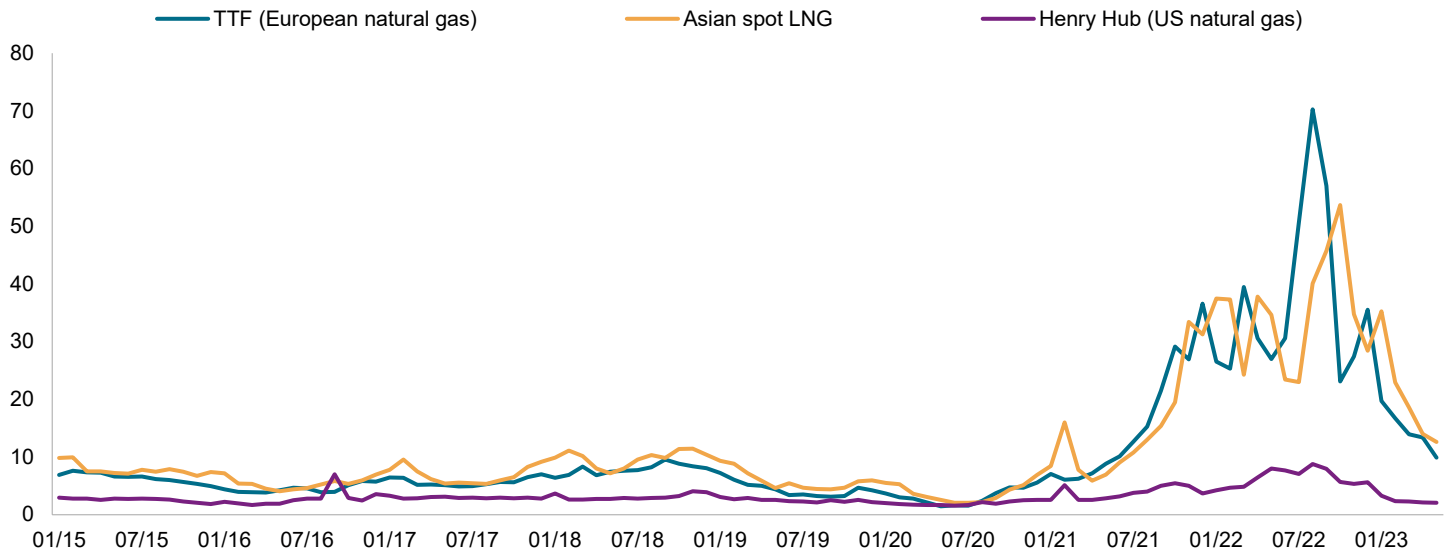
Introduction — the North American advantage

North America has an advantage that Europe and mainland China (and many other nations) do not. The US and Canada produce more oil and gas than any other region in the world — including the Middle East — and they also produce more than they consume. The positive balance of oil and gas production comes despite being the second-largest consuming region in the world.

This level of production buffers North America against the severe energy supply strains that Europe faced in 2021 and 2022 — and to a lesser extent, mainland China. These strains are most evident in the price of natural gas, which averaged in 2022 over 80% less in North America than in Europe and mainland China (see Figure 1). In 2022, at the peak of the disruption, the gas price in Europe (title transfer facility [TTF]) topped US\$70/MMBtu, while the Henry Hub price in the US was more than US\$60/MMBtu lower. In addition to providing secure supply to consumers in the US and Canada, North American oil and gas exports play a critical role in helping to fill the gap left by falling Russian exports to Europe.

Figure 1

Natural gas and LNG historical prices 2015–23 (US\$/MMBtu)

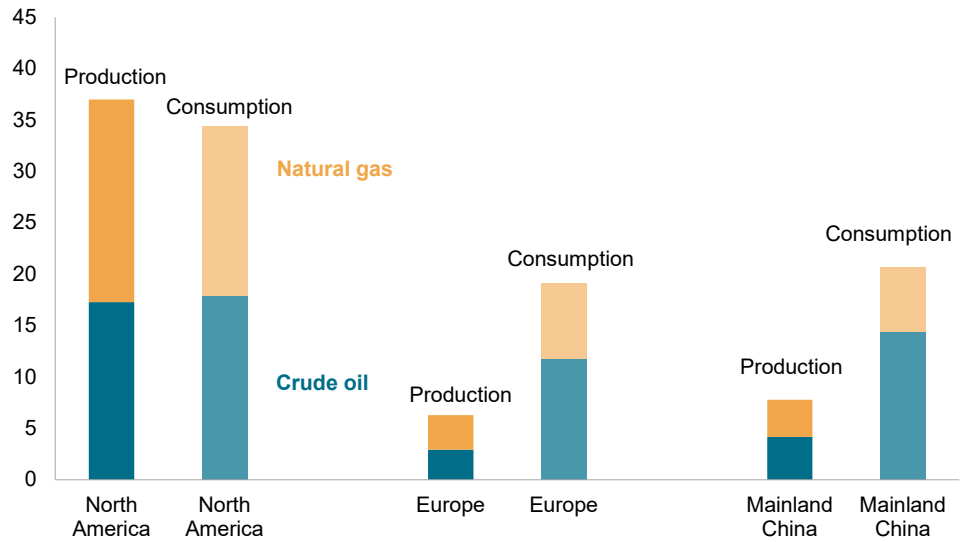


Data compiled Oct. 5, 2023.
 Source: S&P Global Commodity Insights.
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Combined, the US and Canada produced the equivalent of 37 million boe/d of oil and gas in 2023 — 8% more than they consume.¹ In contrast, Europe and mainland China — two of the largest regional economies in the world — consumed far more than they produce (see Figure 2). In Europe, repercussions of the Russian invasion of Ukraine have made clear its vulnerability from dependence on Russia for oil and gas. As a result, Europe’s energy supply is undergoing far greater strain and consumers face higher energy prices than in North America.

Figure 2

Oil and gas production and consumption 2023 estimate (million boe/d)



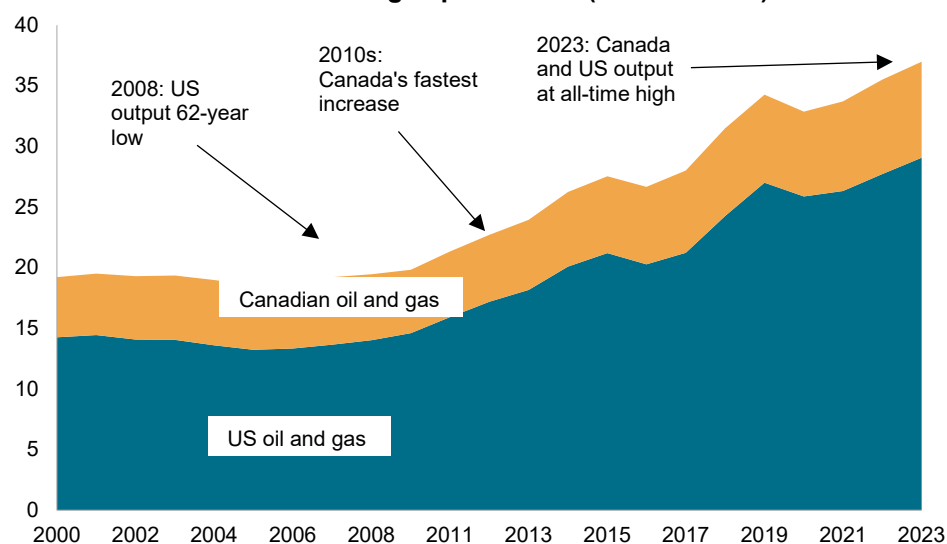
Data compiled Oct. 3, 2023.
 Crude oil and natural gas production.
 Source: S&P Global Commodity Insights.
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1. Oil and gas refers to crude oil as marketed and natural gas as reported in the S&P Global Commodity Insights 2023 Annual Strategic Workbooks.

For North America, the supply surplus is a big change from 2008 when US oil production was at a 62-year low and gas output was just beginning to rise from the shale revolution. Canadian oil production at that time was more than 40% lower than it is today (see Figure 3). On a net basis, North America imported 8.8 million b/d of oil in 2008 and 2.9 million b/d in 2023. What changed to create the North American energy advantage? Unconventional production growth — shale gas (and natural gas liquids), US shale oil and the Canadian oil sands — were the biggest forces of change.

Figure 3

US and Canada crude oil and gas production (million boe/d)



Data compiled Oct. 3, 2023.
 Crude oil and natural gas production.
 Source: S&P Global Commodity Insights.
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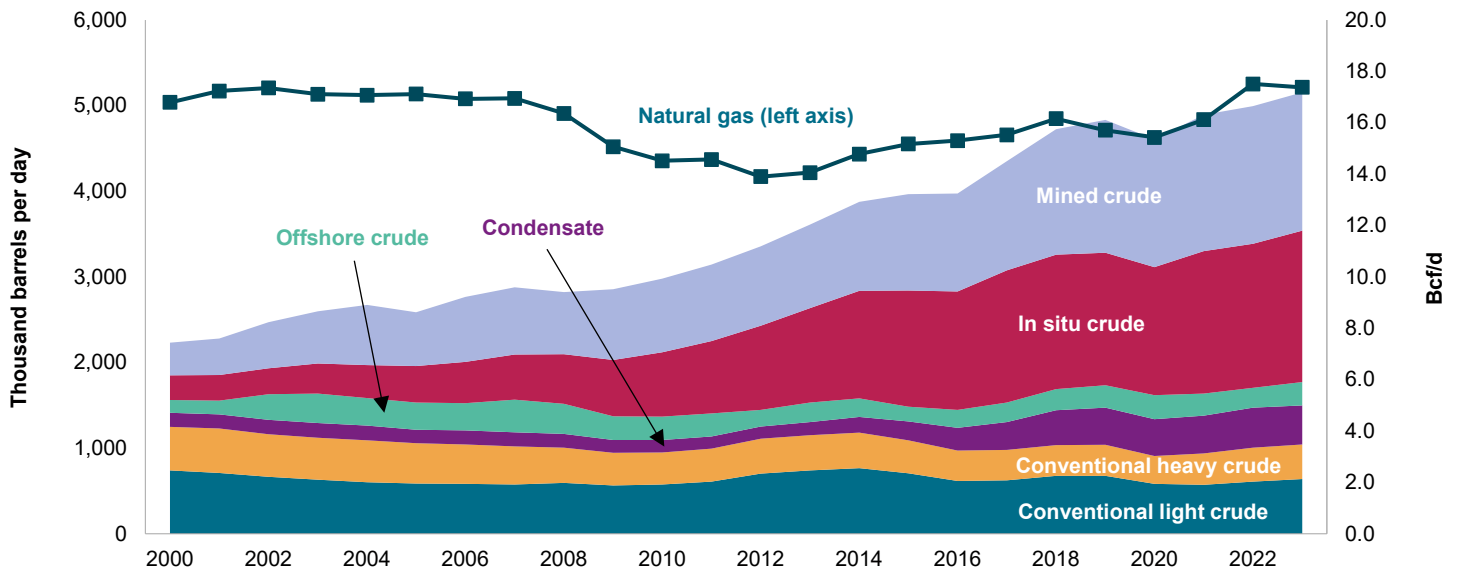
Canadian oil sands growth made Canada the fourth largest producer in the world

In the early 2000s, technology, coupled with a recovery in global oil prices, set the conditions to make much of the modern oil sands today economically viable. During this time, North America had been on a six-year decline in oil production and the world believed the future was one of oil scarcity. Companies and capital flowed into the oil sands. Canadian production rose 2.8 million b/d between 2001 and 2023 — nearly all of this growth coming from the Canadian oil sands (see Figure 4). In 2023, Canadian crude oil production topped 4.9 million b/d, which reflects a record rate of Canadian oil production. Indeed, the oil sands made Canada the fourth largest producer in the world and the largest foreign supplier of oil to the US. In 2008, the US imported 7.9 million b/d of crude from the global market (excluding Canada) and 1.9 million b/d from Canada. In 2023, imports from the global market (excluding Canada) stood at 2.6 million b/d — a 67% decline. In contrast, crude oil imports from Canada increased to 3.9 million b/d — 60% of total US foreign crude oil imports (see Figure 5). No other country comes close.

Canadian natural gas production is another important piece of the energy industry. In the early 2000s, production was around 17 Bcf/d. A moderate decline in production started in 2008, and natural gas production fell to 14 Bcf/d in 2012 before starting a

Figure 4

Canada crude oil and natural gas production

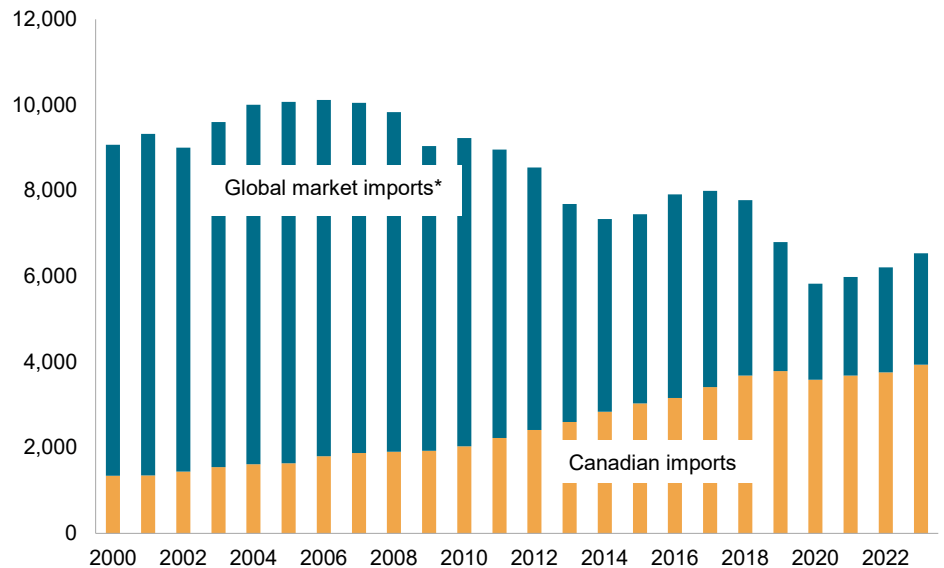


Data compiled Oct. 3, 2023.
 Source: S&P Global Commodity Insights.
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gradual increase. The reason for this decline was not because of a lack of domestic supply, but rather a decline in demand for Canadian natural gas owing to the tremendous rise in US shale gas production. US natural gas production has nearly doubled since 2008, in what was coined “the Shale Gale.” Shale gas production in the Marcellus play, in particular, displaced exported Canadian natural gas volumes, which then struggled to find a home elsewhere. Shale gas technology was also adopted by Canadian producers, but it was not until overall North American natural gas demand grew that Canadian production could fully rebound. In 2023, Canadian natural gas production is expected to reach nearly 18 Bcf/d with further growth expected through the rest of the decade as Canadian gas connects to global markets via LNG.

Figure 5

US crude oil imports 2000–23 (thousand b/d)



Data compiled Oct. 3, 2023.
 *Global market imports exclude imports from Canada.
 Source: S&P Global Commodity Insights.
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The stunning growth of shale gas and shale oil

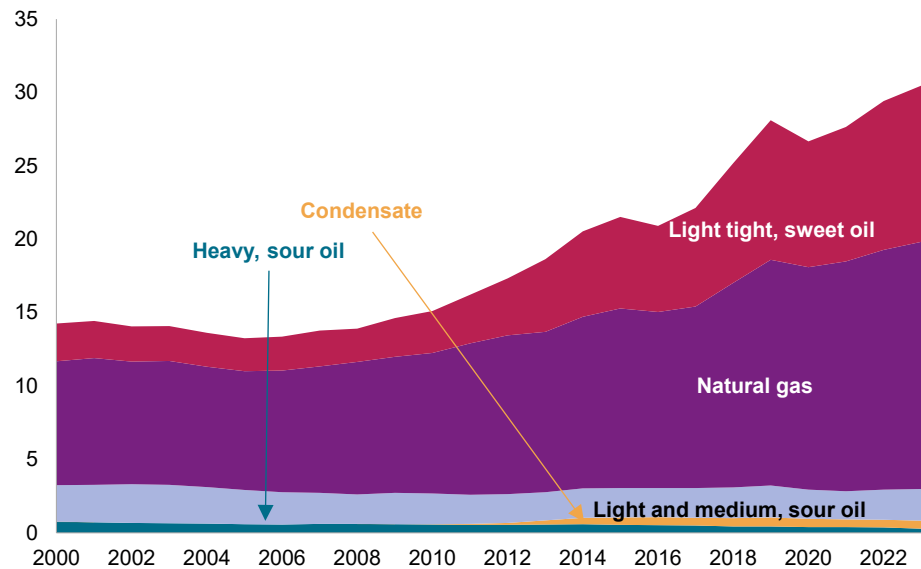
The stunning growth in US oil and gas production over the past 15 years is due to shale gas and shale oil (also known as tight oil) (see Figure 6). This story is well known — and upended the world oil order as it had been known since the 1970s when OPEC asserted dominance over world oil production. The shale gas story is important to oil not only because it inspired the same techniques to be later applied to shale oil with great success, but also because of the large volume of natural gas liquids (NGLs) that are associated with shale gas production. NGLs — ethane, propane, and butane — are considered as part of oil supply but provide critical feedstock for the large North American petrochemical sector. Around 2008, the combination of improvements in horizontal drilling technology and the advent of multistage fracturing began to result in increasingly prolific, and thus economic, gas production in the Northeastern US. From 2008 to 2023, US natural gas production soared from 54 Bcf/d to over 100 Bcf/d.

In rapid succession, these newfound technologies were quickly adopted and deployed to oil production across the US and Canada with great effect. US oil production rose at a rate that is without precedent — from 2008 to 2023, US oil production increased from 5.0 million b/d to 12.2 million b/d, a 145% increase. Canada also experienced the benefits with light oil production growing 330,000 b/d during the same period, a 44% increase.

Quickly the US fortunes reversed from concerns of scarcity to abundance, and necessity of critical infrastructure to support reaching new markets and exports. The new wealth of gas encouraged utilities to convert from coal to gas, lowering US emissions. Surplus natural gas production also led to the rise of US LNG exports — ironically it was once thought that LNG imports would be necessary to meet US energy needs. Meanwhile, the decades-old bans on crude oil exports were lifted and exports soared. Canadian exports continued to find a home in the US given the quality difference between oil sands and US unconventional oil. Canadian oil sands produce a heavy sour crude oil, an ideal fit for heavy complex refineries from the Midwest to US Gulf Coast; however, US unconventional oil is a light sweet crude oil. Together, competitive sources of global supply were displaced as North America became increasingly self-reliant.

Figure 6

US crude oil and natural gas production (million boe/d)



Data compiled Oct. 3, 2023.

Source: S&P Global Commodity Insights.

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The growing importance of the North American advantage

The North American advantage in oil and gas production is growing in importance as Europe, North America and others are deintegrated from Russian oil and gas in response to the invasion of Ukraine. Russia, after North America, is the second-largest producer of oil and gas in the world. Therefore, removing most of it from European, North American and other allied markets was a challenging task. If North American oil and production was still at 2008 levels, Russia's leverage in world energy markets would have been far higher than it already was on the eve of the Ukraine invasion. Also, it would have been exceptionally difficult, if not impossible, for supplies from North America to not only protect North America consumers, but also help fill the gap left by the cutoff of Russian oil and gas to Europe. Europe, North America and the rest of the world would have been notably more vulnerable without the renaissance in North American oil and gas.

Will the North American advantage endure?

The keys to the North American advantage have not changed — the result of advantaged resource endowments and a highly competitive upstream oil and gas industry that does not exist elsewhere. There are, of course, no certainties about the future. Oil and gas prices, government policies and regulations will shape the future course of North American production and the degree to which this advantage endures. Both North America and Europe aspire to decarbonize energy consumption — and reduce oil and gas consumption. The transition will be decades long — and a strong position in oil and gas production put North America in an enviable energy security position with a powerful card to play in an increasingly tense and fragmented geopolitical environment.

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