

CORNERSTONE RESEARCH

Economic and Financial Consulting and Expert Testimony

Characteristics of U.S. Natural Gas Transactions

Insights from FERC Form 552 Submissions as of July 3, 2020

Table of Contents

2019 Executive Summary	1
2020 Midyear Review: A Look at COVID-19's Impact	2
Trends in Natural Gas Production and Consumption	4
Natural Gas Production	6
Liquefied Natural Gas	7
Market Volume	9
Exchange Trading	10
Transaction Volume	11
Purchase and Sale Volume	12
Top 20 Companies	13
Transaction Types	14
Reporting to Price Index Publishers	16
Fixed Price Volume by Industry Segments	18
Glossary	20
Appendices	22
Endnotes	23
About the Authors	26

Table of Figures and Appendices

Figure 1: Evolution of Spot and Forward Gas Prices	3
Figure 2: U.S. Natural Gas Balance Sheet	5
Figure 3: U.S. Natural Gas in Underground Storage	5
Figure 4: U.S. Natural Gas Marketed Production and Average Natural Gas Henry Hub Spot Price	6
Figure 5: U.S. Liquefied Natural Gas Exports and LNG Prices by Country	8
Figure 6: Total Reported Volume	9
Figure 7: ICE and CME Natural Gas Contracts Traded	10
Figure 8: Transaction Volume by Industry Segment	11
Figure 9: Purchase and Sale Volume by Industry Segment	12
Figure 10: Top 20 Companies by Total Reported Volume	13
Figure 11: Transaction Volume by Transaction Type	14
Figure 12: Next-Month and Next-Day Transaction Volume across Both Fixed-Price and Index-Priced Transactions	15
Figure 13: Total Volumes Potentially Reported to Indices versus Transaction Volumes Priced Based on Indices	16
Figure 14: Fixed-Price Volume by Reporting versus Non-Reporting Companies	17
Figure 15: Fixed-Price Volume for Entities Reporting to Price Index Publishers by Company Type	18
Figure 16: Percentage of Fixed-Price Volume Reported to Price Index Publishers by Industry Segment	19
Appendix 1: Energy Policy Act of 2005, Form 552 Submissions, and Cornerstone Research’s Proprietary Analysis	22
Appendix 2: Data Submitted to FERC	22

The Federal Energy Regulatory Commission (FERC) receives and compiles the most comprehensive information on trading activity and pricing methods in U.S. natural gas trading markets. The information, collected from market participants’ FERC Form 552 submissions, provides a database of trading activity that spans both physical and financial trading by a range of companies, from producers to end users.

By supplementing the data with proprietary classifications of market participants, Cornerstone Research adds deeper insight into market activities and characteristics across the various types of participants. See Appendix 1 for additional information.

2019 Executive Summary

Form 552 data for 2019 confirmed the trends observed in recent years. Total trading volume increased for the fifth consecutive year, while the percentage of volume reported to indices as a share of reportable volume continued to decline.

Aggregate exchange trading of natural gas contracts also declined for the second year in a row, at an even greater rate than in 2018. The share of Form 552 index-priced transaction volume, and the breakdown between next-month and next-day transactions, were both consistent with 2018.

FERC Submissions

- Trading activity in 2019 totaled 153,249 tBtu, approximately 5 percent greater than in 2018.¹ (page 9)
- In 2019, there were 676 respondents, slightly fewer than in 2018.² (page 9)

Exchange Trading Activity

- Aggregate exchange trading of natural gas contracts decreased on the two main futures exchanges: CME Group Inc. (CME) and Intercontinental Exchange (ICE). However, volumes for the first half of this year signal a likely increase in 2020. (page 10)
- CME's volume decreased by 11 percent, and ICE's volume declined approximately 12 percent. (page 10)

“Continuing a seven-year trend, in 2019 we saw the largest volume of index-priced transactions and the lowest volume potentially reported to indices since FERC began reporting Form 552 data.”

Greg Leonard, Cornerstone Research

Market Participants

- The top 20 companies accounted for approximately 42 percent of reported volume. (page 13)
- The proportion of companies reporting to price index publishers varied substantially across industry segments. (page 19)

Reporting to Price Index Publishers

- Index-priced transactions comprised around 82 percent of all Form 552 transactions, an increase of 15 percentage points since 2008. (page 14)
- The ratio of next-day to next-month transactions was nearly unchanged, with next-day equaling 51.2 percent and next-month at 48.8 percent. This represents a 12 percentage point decline from 2008. (page 15)
- For the fifth consecutive year, companies that chose not to report represented more than half of the reportable fixed-price volume, and reached a level over 60 percent. (page 17)
- In 2019, approximately 14 percent of Form 552 respondents reported transaction information to the price index publishers for themselves or at least one affiliate. These respondents accounted for 39 percent of the reporting-eligible, fixed-price volume in 2019, compared to over 62 percent in 2008. (page 17)
- The volume of these reported transactions indicates that, on average, one molecule of natural gas was traded through approximately 2.6 transactions from production to consumption.³

2020 Midyear Review: A Look at COVID-19's Impact

While global demand for natural gas has decreased, consumption remains relatively resilient in the U.S., as power generation continues to move from coal to natural gas. U.S. natural gas production increased by 5 percent on average year-on-year from January through May 2020.

The International Energy Agency (IEA) forecasts a 4 percent drop in global natural gas demand as a result of global lockdowns to mitigate the spread of COVID-19 and low heating demand due to warm weather.

Lower Domestic Consumption Supported by Coal-to-Gas Switching

- U.S. natural gas consumption decreased by 2.8 percent year-on-year for the period from January through May 2020.⁴ This contrasts to Europe or Japan, which fell 7 percent and 5 percent, respectively, over the same period.⁵ The U.S. Energy Information Administration (EIA) forecasts a 3 percent and 5 percent contraction in 2020 and 2021.⁶
- The consumption drop was caused by a mild winter in Q1 2020 that affected the residential and commercial sectors, and by the COVID-19 pandemic and imposed lockdown measures in the industrial sector in Q2. The decline was mitigated by increased consumption in the power generation sector, with natural gas generation growing at the expense of coal.⁷ Coal-to-gas switching is often irreversible and may signal long-term structural changes that will impact the floor of the consumption of natural gas going forward.⁸

Continued Production Growth Leads to Inventory Build

- U.S. natural gas production increased by 5.3 percent year-on-year on average from January to the end of May 2020 despite the lower domestic consumption.⁹

- This was offset by lower imports from Canada and an increase in Mexican and liquefied natural gas (LNG) exports, as well as a buildup in inventory levels.¹⁰ Inventory levels were 19 percent higher than their five-year average at the end of May and approaching the maximum level reached over the past decade.¹¹
- The EIA projects production to contract in both 2020 and 2021.¹² Protracted low prices could lead to less gas being produced as a secondary product from oil wells. In 2018, gas as a secondary product represented almost 15 percent of U.S. gas production.¹³

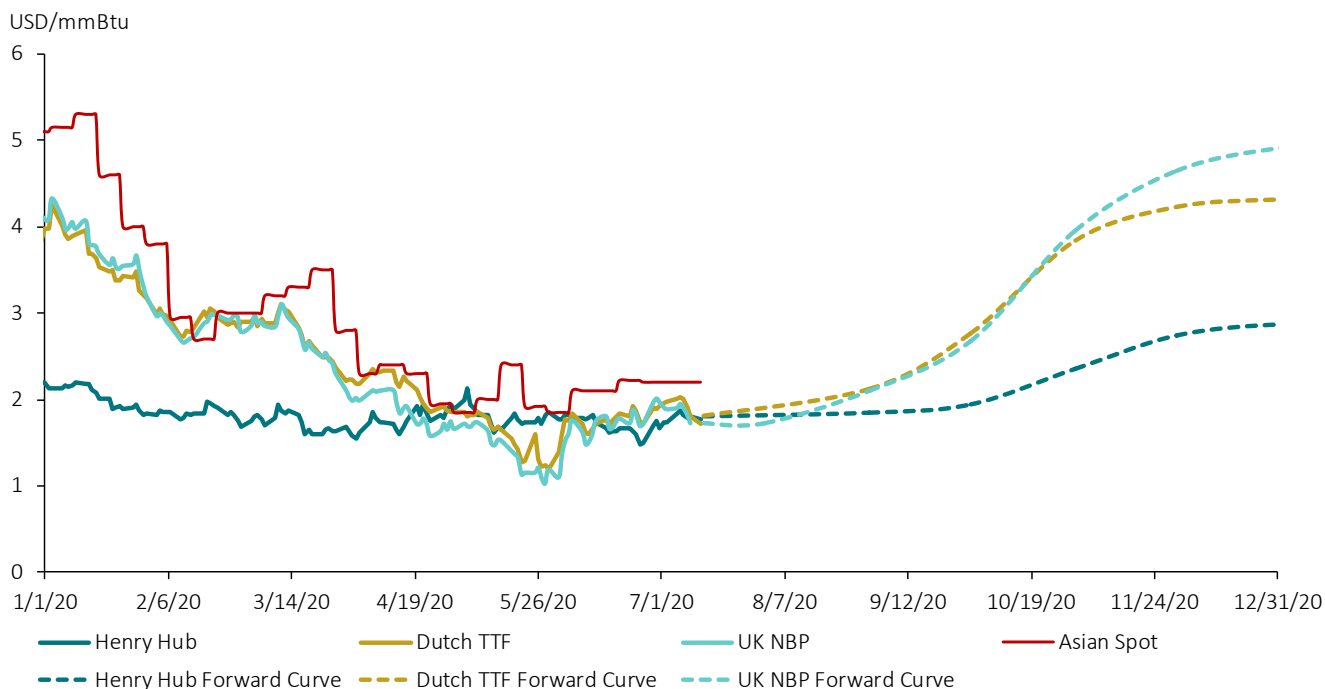
Prices Are Searching for New Lows

- Henry Hub prices in Q1 2020 fell by over 33 percent year-on-year to an average of \$1.9/mmBtu, the lowest quarterly price level since 1999, and reached \$1.48/mmBtu in late June, the lowest inflation-adjusted price in over 30 years.¹⁴
- Both Asian and European prices dropped by roughly 60 percent over the first five months of the year. Asian LNG month-ahead contracts traded at an average of \$2.03/mmBtu while Dutch TTF fell to \$1.57/mmBtu in May. The tightening spread between U.S. and global benchmarks is closing opportunities for interregional arbitrage.

LNG Trade Volumes Remained High but Outlook Is Uncertain

- While LNG trade volumes remained high in the first four months of 2020, with average daily U.S. LNG exports 54 percent higher than in 2019, they declined by 17 percent between April and May.¹⁵ The EIA still expects LNG exports to increase by 8 percent in 2020.
- Europe accounts for two-thirds of global increases in LNG demand since the beginning of the year, amid subdued growth in Asia. Despite a 9 percent decrease in natural gas imports, European LNG imports increased by more than 20 percent year-on-year, replacing traditional pipeline imports from North Africa and Russia.¹⁶
- U.S. LNG exporters are facing mounting challenges due to weakened demand and heavy competition from Qatar, Australia, and Russia.¹⁷ The IEA projects a 4 percent drop in global natural gas demand in 2020, which would be “the largest recorded annual decrease in consumption since the natural gas market developed at scale in the second half of the 20th century.”¹⁸
- Meanwhile, global storage is building up across major markets, with European storage close to 80 percent full as of the end of June, and Japan and Korea LNG stocks 17 percent above their five-year average at the end of March.¹⁹
- Over 100 U.S. LNG cargoes scheduled for loading in June onwards have been canceled to date, causing U.S. LNG exports to operate at less than half capacity.²⁰ The EIA estimates that as a result of these cancellations, average daily U.S. LNG exports for July and August will drop by 56 percent compared to the 2019 average before recovering in the fall as demand improves.²¹
- Oil-indexed LNG contract prices, prevalent in Asian imports, did not experience as large a decrease during the first half of the year. The weighted average LNG import price for China, Japan, and Korea only decreased by just over 15 percent year-on-year in the first four months of 2020, to \$8.8/mmBtu. However, prolonged low oil prices since March 2020 should impact oil-indexed LNG contract prices starting between July and September 2020, as the price-setting reference period is usually between three and six months ahead of delivery.²²

Figure 1: Evolution of Spot and Forward Gas Prices 2020



Source: Refinitiv

Note: The TTF front month price is converted from USD/MWH to USD/mmBtu using a conversion rate of 3.4121416331279 mmBtu per MWh. See <https://www.aqua-calc.com/convert/energy/megawatt-hour-to-british-thermal-unit>.

Trends in Natural Gas Production and Consumption

Marketed production of natural gas reached a record high in 2019, continuing the steady growth observed since 2005. This growth, driven by U.S. shale expansion, outpaced consumption and net exports, leading to a storage buildup.

In January 2020, the EIA estimated annual growth of natural gas production through 2025 to hover around 2 percent. The repercussions of the COVID-19 pandemic, however, ushered in a contraction of consumption, rising storage capacity utilization, and a price collapse.

Domestic Market

- Annual marketed production of natural gas increased 10 percent in 2019, reaching 41,117 tBtu.
- Natural gas consumption rose in 2019 by 3 percent, increasing from 34,305 tBtu to 35,499 tBtu.
- The EIA, which until January projected annual natural gas production to grow by 2 percent through 2025,²³ now anticipates a 3 percent and 6 percent contraction in 2020 and 2021 as a result of the COVID-19 pandemic and falling prices.²⁴
- The EIA expects U.S. natural gas consumption to decline by 3 percent in 2020 and 5 percent in 2021 given the lower industrial sector economic activity caused by COVID-19 mitigation efforts.²⁵

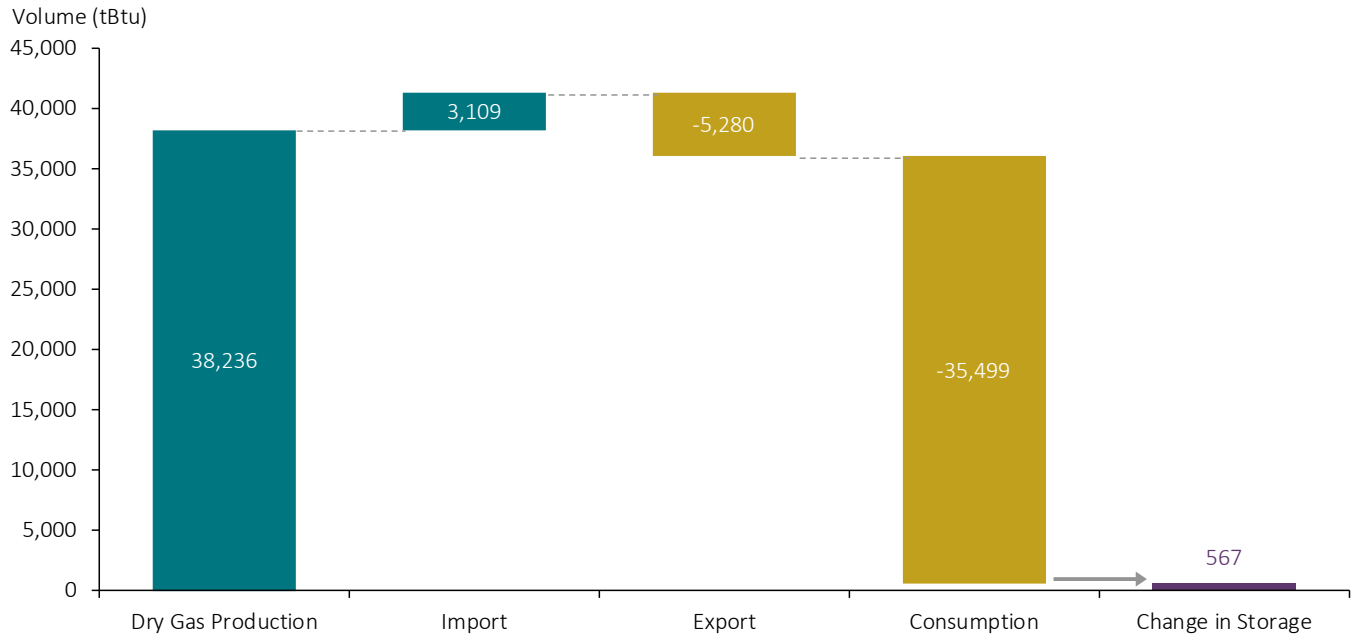
Exports

- Global demand for natural gas cooled in 2019 following a milder winter and slower economic growth.²⁶ As a result, U.S. net exports did not bridge the production to consumption gap, leading to a strong storage buildup (see Figures 2 and 3).
- LNG's share of total U.S. natural gas exports rose to 39 percent in 2019 from 30 percent in 2018. The remaining 61 percent was exported via pipeline.²⁷
- U.S. LNG exports to China decreased by over 90 percent, with Europe absorbing the majority of incremental supply.²⁸
- The EIA, which until January projected U.S. net exports of natural gas to increase by 120 percent between 2019 and 2021, has revised this forecast to 43 percent. Projected LNG export growth over the same period was reduced from 77 percent to 46 percent.²⁹

“Export growth, driven by LNG, is forecasted to slow in the second half of 2020 due to COVID-19, leading to a storage buildup.”

Nicole Moran, Cornerstone Research

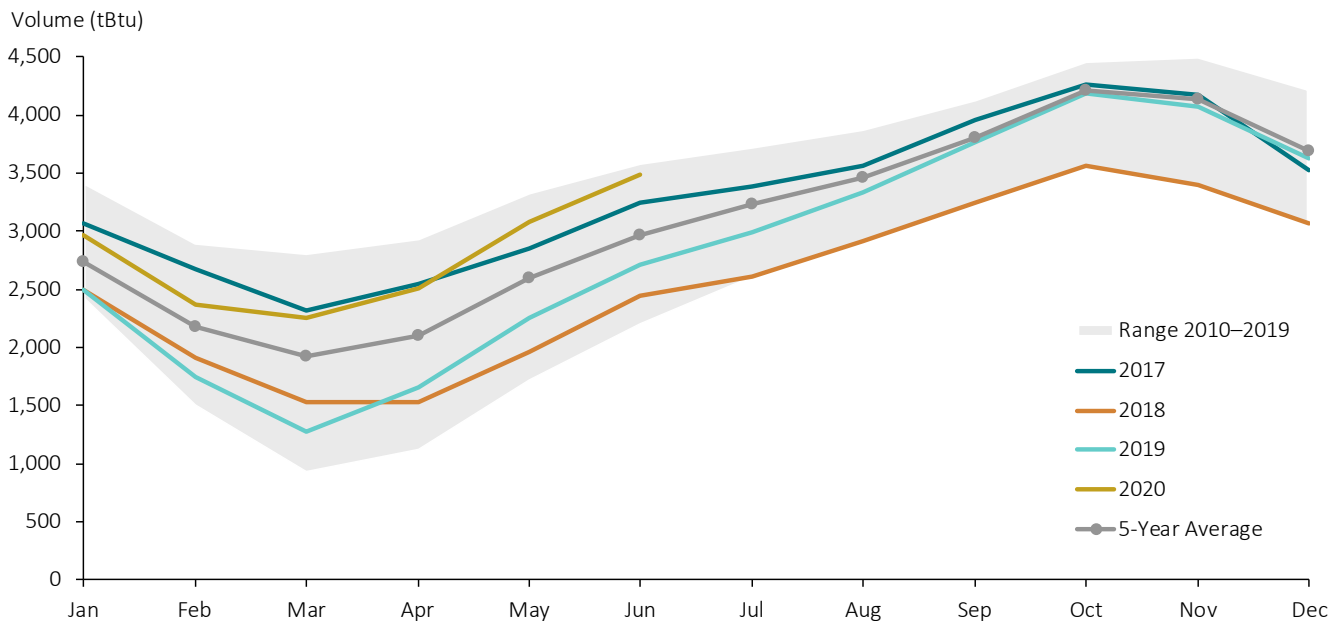
Figure 2: U.S. Natural Gas Balance Sheet 2019



Source: U.S. Energy Information Administration

Note: Values are converted using the 2019 Marketed Production conversion rate of 1,134 Btu per cubic foot of natural gas. Dry Gas Production is Marketed Production (41,117 tBtu) less Natural Gas Plant Liquids (NGPL) Production (2,881 tBtu). The Dry Gas Production value also includes “Supplemental Gaseous Fuels.” Consumption value also includes the “Balancing Item” used by EIA to reconcile volume measurements.

Figure 3: U.S. Natural Gas in Underground Storage 2010–2019



Source: U.S. Energy Information Administration (EIA)

Note: tBtu conversion uses the Marketed Heat Content Btu per cubic foot. Volumes are converted from billions of cubic feet to tBtu using the Marketed Heat Content reported by the EIA. Five-year averages and 2010–2019 ranges are based on daily linear interpolations of the working gas inventory values between each week reported, and are converted to tBtu using the 2019 Marketed Heat Content Btu per cubic foot.

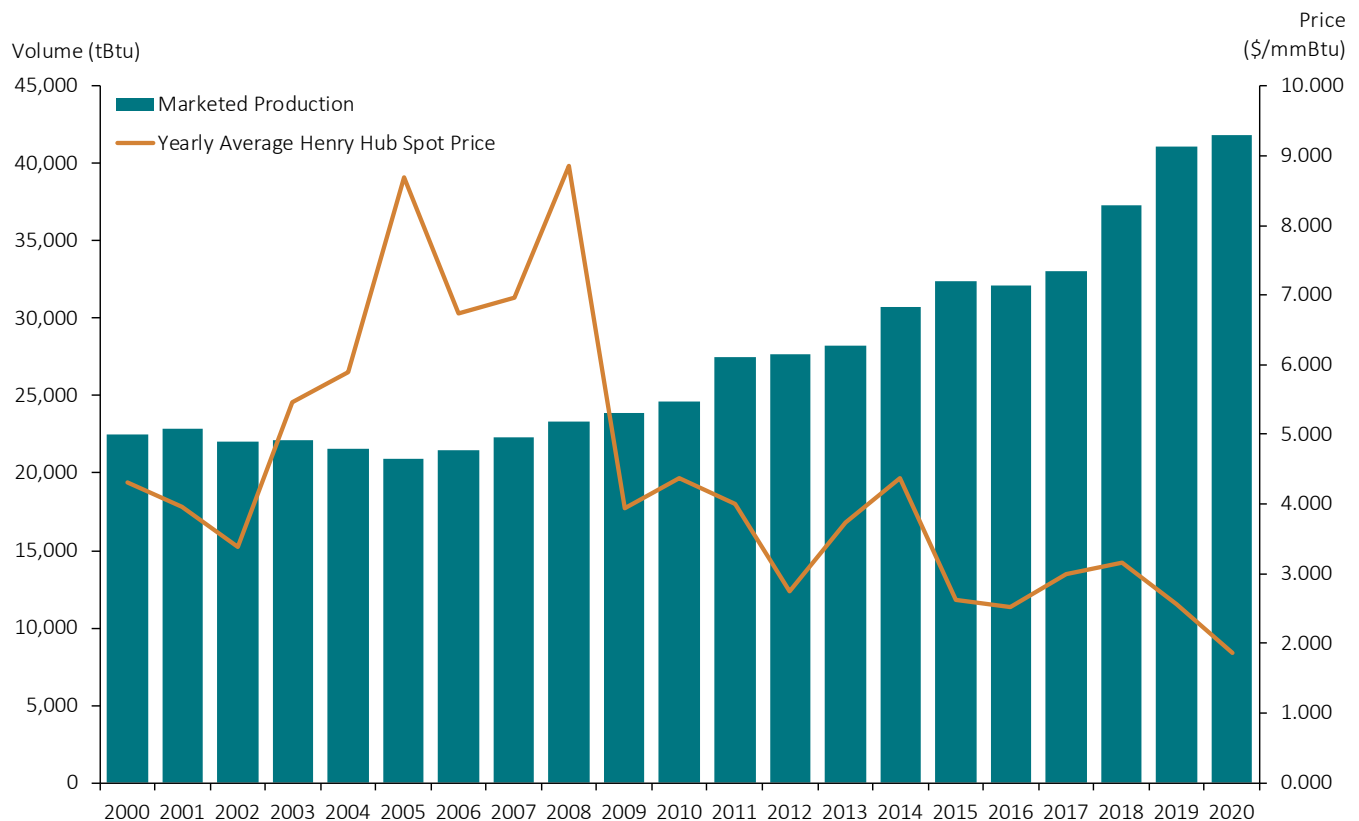
Natural Gas Production

- Annual marketed production increased by 10 percent in 2019, setting a record high of 41,117 tBtu.³⁰ The Appalachian and Permian basins contributed almost two-thirds of this growth.³¹
- Consumption was primarily driven by power generation, with electricity generated from natural gas continuing to gain share on coal.³² Output from natural gas powered electricity plants increased by 8 percent in 2019 following a 15 percent increase in 2018. In 2019, a record 38 percent of U.S. electricity was generated by natural gas.³³
- Since September 2017, the U.S. has been a growing net exporter of natural gas, with LNG exports comprising most of this growth. In 2019, 61 percent of U.S. natural gas was exported via pipeline to Canada and Mexico (down from 70 percent in 2018).³⁴

Marketed production surpassed 40,000 tBtu for the first time.

- After increasing from 8 percent in 2013 to 15 percent in 2018, the share of natural gas production from oil formations was expected, prior to COVID-19, to stabilize. The level of natural gas production from oil formations primarily depends on prices of crude oil, not natural gas.³⁵ Protracted low prices could lead to less gas being produced as a secondary product from oil wells. For example, associated natural gas production in the Bakken Shale formation dipped in early 2020 then returned to previous levels, but is expected to slowly decline through the winter of 2020.³⁶
- The annual average Henry Hub price dropped by 19 percent in 2019, nearing lows not seen since 2016, and continued to decline in early 2020.³⁷

Figure 4: U.S. Natural Gas Marketed Production and Average Natural Gas Henry Hub Spot Price 2000–2020



Source: U.S. Energy Information Administration (EIA)

Note: One tBtu equals one million mmBtu. The values for 2020 are annualized based on data from the first four months of 2020.

Liquefied Natural Gas

- According to the IEA, global LNG trade in 2019 grew by 12 percent. This was largely driven by U.S., Australian, and Russian LNG export increases.³⁸
- The U.S. exported more than 1,819 billion cubic feet of LNG in 2019, up 68 percent from 2018, supplanting Malaysia as the third-largest exporter, and trailing only Australia and Qatar.³⁹ This growth was supported by new LNG terminals, which more than doubled liquefaction capacity in 2019.⁴⁰ The U.S. now counts six facilities and 15 liquefaction units (referred to as “trains”) in service.⁴¹
- Liquefaction capacity investments in the U.S. increased sharply in 2019, surpassing the combined investments of the previous four years. With similar investments taking place in Russia and Africa, global capacity is set to increase by 16 percent in the next two to four years.⁴²
- LNG’s share of total U.S. natural gas exports increased to 39 percent, up from 30 percent in 2018.⁴³ The remaining 61 percent was exported via pipeline.⁴⁴
- The EIA reports that the European and Asian spot benchmark prices dropped by close to 45 percent in 2019, compared to 19 percent for Henry Hub, which could reduce the profitability of interregional arbitrage.⁴⁵ This did not translate into lower LNG prices in key East Asian U.S. export markets, however. The U.S. export price decreased by 5 percent in Japan but increased by 4 percent in South Korea.⁴⁶ This was due to a persistent high share of oil indexation in long-term LNG import contracts, which account for a majority of Asian imports.⁴⁷ In contrast, the U.S. export price for France and Italy decreased by 24 percent and 23 percent, respectively.

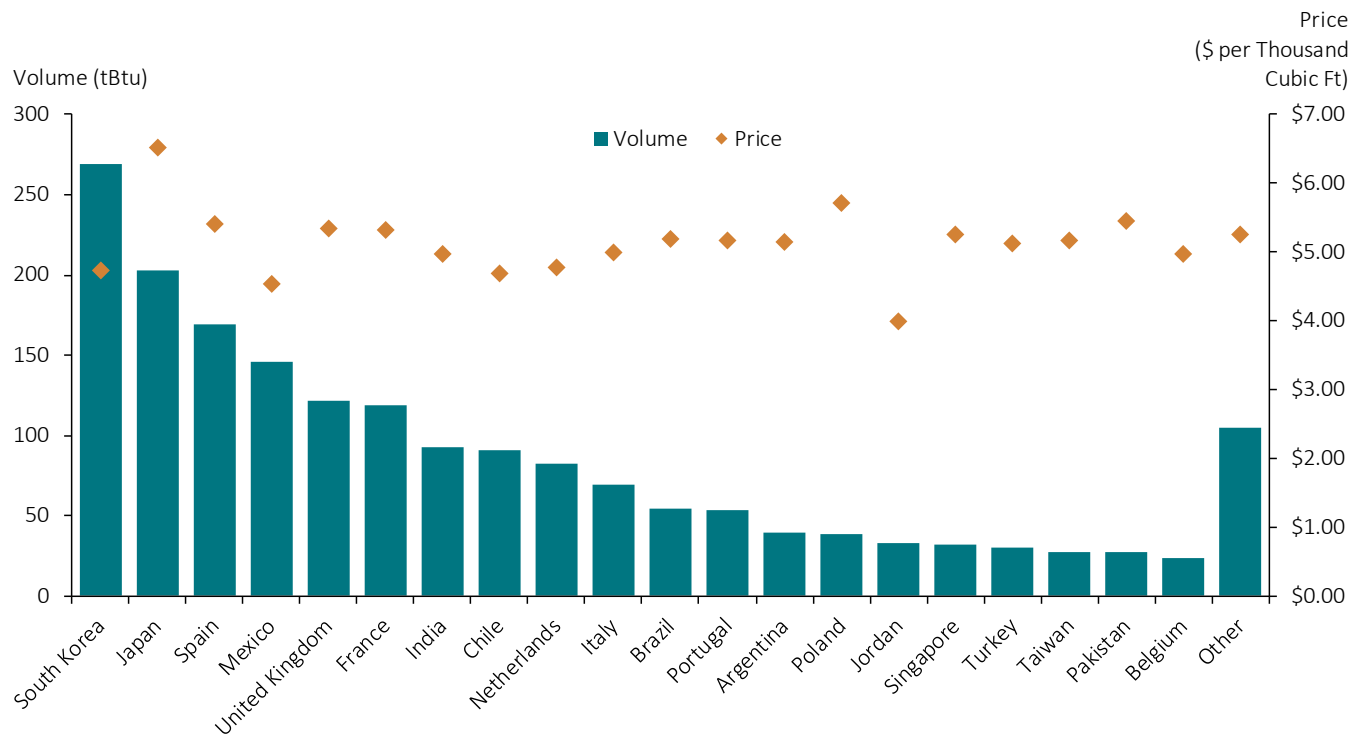
U.S. LNG exports to China decreased by over 90 percent, with Europe absorbing the vast majority of incremental supply.

- East Asia decreased considerably as a share of total U.S. LNG exports, accounting for less than 30 percent in 2019 compared to 45 percent in 2018.⁴⁸ The decline was largely due to an over 90 percent drop in exports to China, which resulted from a 10 percent tariff imposed on U.S. LNG shipments in September 2018 and later raised to 25 percent in June 2019.⁴⁹ A warm winter in Asia also cut heating demand and prompted Asian importers to divert cargoes to Europe.⁵⁰ Japan’s and Korea’s global combined LNG imports fell by 7 percent as nuclear output rebounded, leading to a decrease in gas for power.⁵¹ Overall, the IEA reported that Asia represented less than 15 percent of incremental global LNG demand, in sharp contrast to the previous three years when it accounted for 90 percent of growth.

U.S. LNG exports to East Asia decreased relative to exports to Europe, which reached an all-time high.

- Europe filled the gap in U.S. export demand from lower consumption by Asian countries, absorbing 38 percent of U.S. exports (up from 12 percent in 2018), and over 80 percent of global incremental LNG supply. U.S. LNG exports to Europe reached an all-time high, accounting for 20 percent of European gas demand.⁵² France and Poland increased U.S. LNG imports by factors of 6 and 12, respectively, and Belgium entered the top 20 after not importing any U.S. LNG in 2018.⁵³
- China has agreed, under the terms of the so-called Phase 1 trade deal reached in December 2019 between the U.S. and China, to increase its purchases in 2020 of U.S. energy products, primarily LNG, by \$18.5 billion above the 2017 baseline.⁵⁴

Figure 5: U.S. Liquefied Natural Gas Exports and LNG Prices by Country 2019



Source: U.S. Energy Information Administration (EIA)

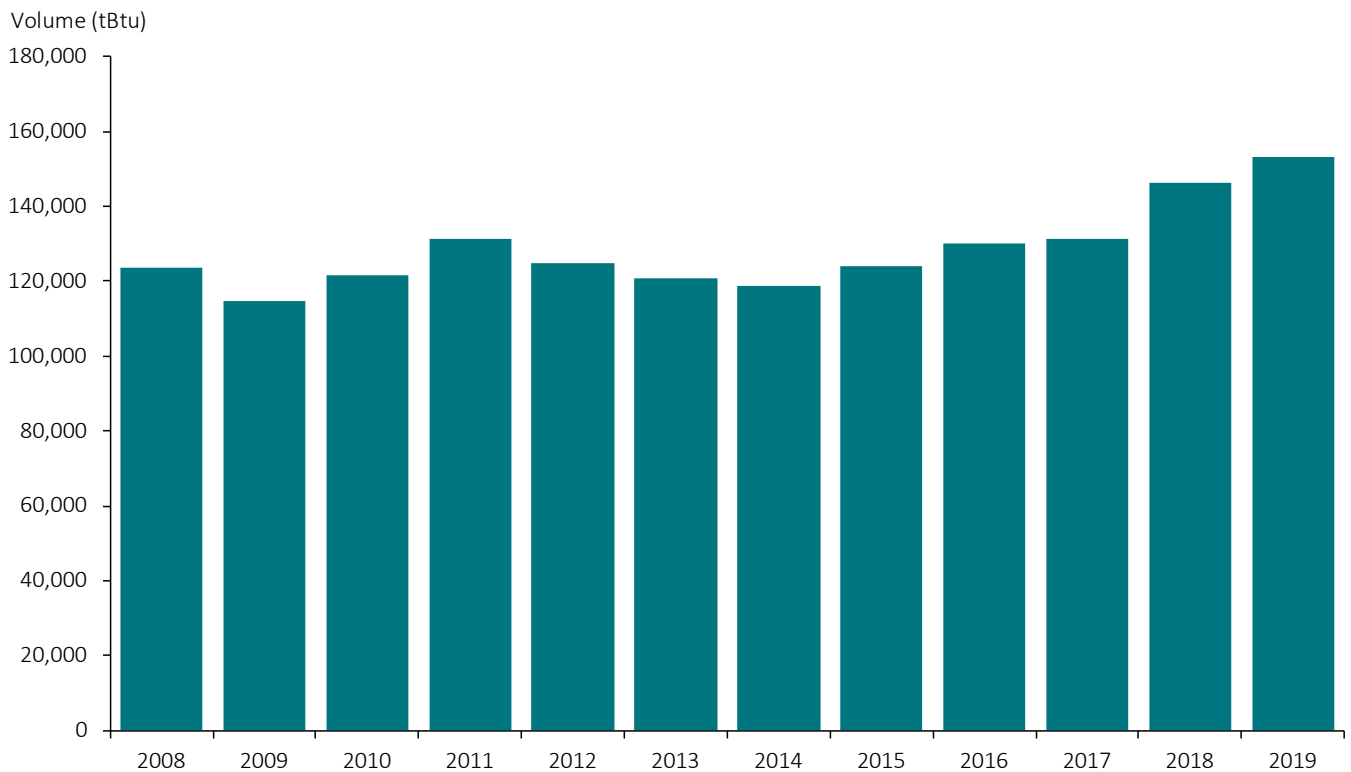
Note: tBtu conversion uses 2019 Btu per cubic foot for Natural Gas Exports Heat Content. Volumes are converted from millions of cubic feet to tBtu using the Natural Gas Export Heat content reported by the EIA. LNG prices are export-location specific. “Mexico” includes Mexico Vessel Exports and Mexico Truck Exports. “Other” includes Truck Exports to Canada and Vessel Exports to the Bahamas, Barbados, China, Columbia, Dominican Republic, Greece, Jamaica, Kuwait, Lithuania, Malta, Panama, Thailand, and the United Arab Emirates.

Market Volume

- Form 552 volumes continued to increase in 2019, albeit at a slower rate than in 2018. Total reported volume grew about 5 percent between 2018 and 2019, compared to 10 percent between 2017 and 2018.
- Trading activity reported in Form 552 submissions in 2019 totaled 153,249 tBtu, transacted by 676 respondents.
- Form 552 volumes in 2019 represented a minimum of 78,107 tBtu of trading volume, which is 2,344 tBtu more than the 2018 minimum trading volume of 75,763.⁵⁵

Total volume increased for the fifth consecutive year, representing a 29 percent increase in volume since 2014.

Figure 6: Total Reported Volume 2008–2019



Source: FERC Form 552 submissions as of July 3, 2020

Note: One tBtu equals one million mmBtu.

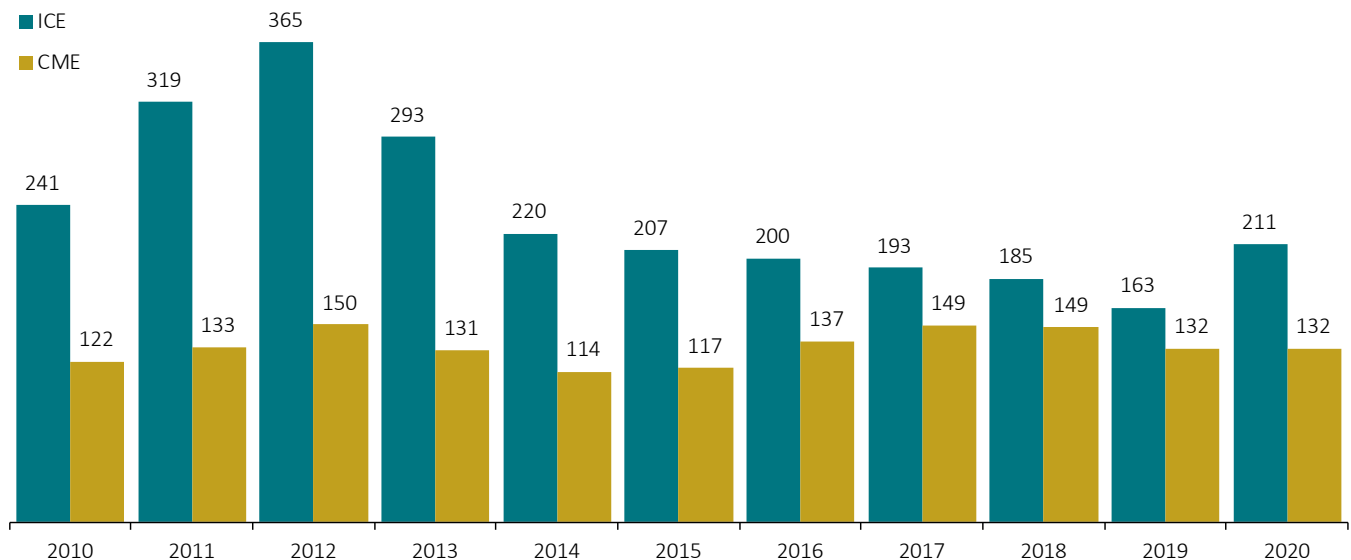
Exchange Trading

- For the second consecutive year, aggregate exchange trading of natural gas contracts decreased, as both ICE and CME trading declined.
- ICE natural gas contract volume declined for the seventh consecutive year, falling approximately 12 percent between 2018 and 2019. Since 2014, the number of contracts traded on ICE has decreased by 26 percent.
- In 2019, trading of natural gas products on CME decreased by 11 percent. This followed a small decline (less than 1 percent) in 2018.⁵⁶
- While ICE attributed the latest decline to “lower Henry Hub volumes” and “increased volumes in [its] European TTF gas contract,”⁵⁷ CME attributed the decline in energy contracts traded on its platform to “lower price volatility within the energy markets” partially due to an “expanded production of natural gas.”⁵⁸
- Natural gas is also traded on other platforms, including NASDAQ.⁵⁹ Natural gas contracts traded on NASDAQ in 2019 represented approximately 1 percent of volumes traded on ICE or CME.⁶⁰

CME attributes the 11 percent decline in exchange trading to expanded production of natural gas and lower price volatility.

Figure 7: ICE and CME Natural Gas Contracts Traded 2010–2020

(Millions)



Source: ICE Form 10-Ks; ICE Market Data Report Center; CME Form 10-Ks; CME Group NYMEX/COMEX Exchange Volume Report - Monthly

Note: Due to ICE’s conversion of swaps to futures in October 2012, the ICE 10-Ks report an aggregated total of natural gas futures, options, and cleared OTC contracts. In its 2012 10-K, ICE provides comparable totals for 2010 and 2011 to reflect the 2012 reclassification. The figures reflect only North America’s contract volume for all years except 2012, which reflects worldwide contract volume. In 2012, the non–North America contract volume accounts for less than 3 percent of total contracts traded. Values from 2013 onward are sourced from the Historical Monthly Volumes Section of the Market Data available from ICE. The figures reported by CME represent the average daily volume of its natural gas products, and have been multiplied by 250 to convert them to annual values. The contract sizes between ICE and CME are not directly comparable. Contract sizes may differ across products; for example, the CME Henry Hub Natural Gas Futures contract is 10,000 mmBtu and the ICE Henry LD1 Fixed Price Future contract is 2,500 mmBtu. The 2020 volumes are annualized based on the first six months of 2020.

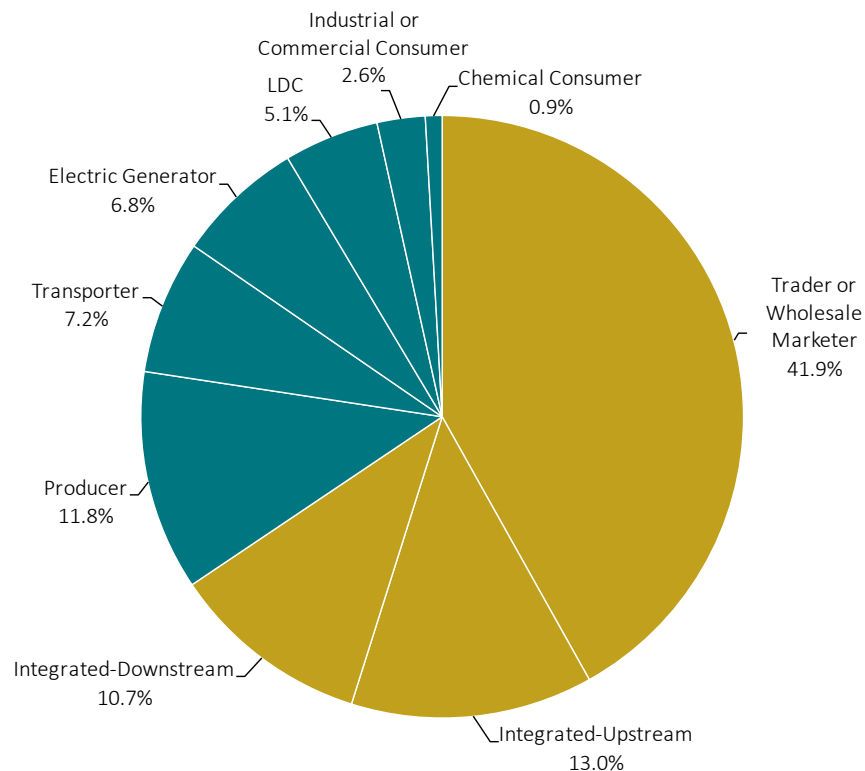
Transaction Volume

Cornerstone Research supplements FERC Form 552 data with proprietary research that classifies the respondent companies by industry segments. Companies are classified by their primary natural gas business activity, yielding unique insights into the natural gas market.

- Generally, the shares of trading volume attributed to each industry segment of market participant have remained relatively stable over recent years.
- The share of Form 552 natural gas volume attributed to large integrated-upstream and integrated-downstream companies and traders or wholesale marketers has decreased between 2011 and 2019 (from 72 percent to 66 percent of all transaction volume).
- Industrial or commercial consumers and chemical consumers accounted for less than 4 percent of the 2019 Form 552 volume.

The shares of trading volume attributed to each industry segment of market participant have remained relatively stable over recent years.

Figure 8: Transaction Volume by Industry Segment 2019



Source: FERC Form 552 submissions as of July 3, 2020

Note: Percentages may not add up to 100 percent due to rounding.

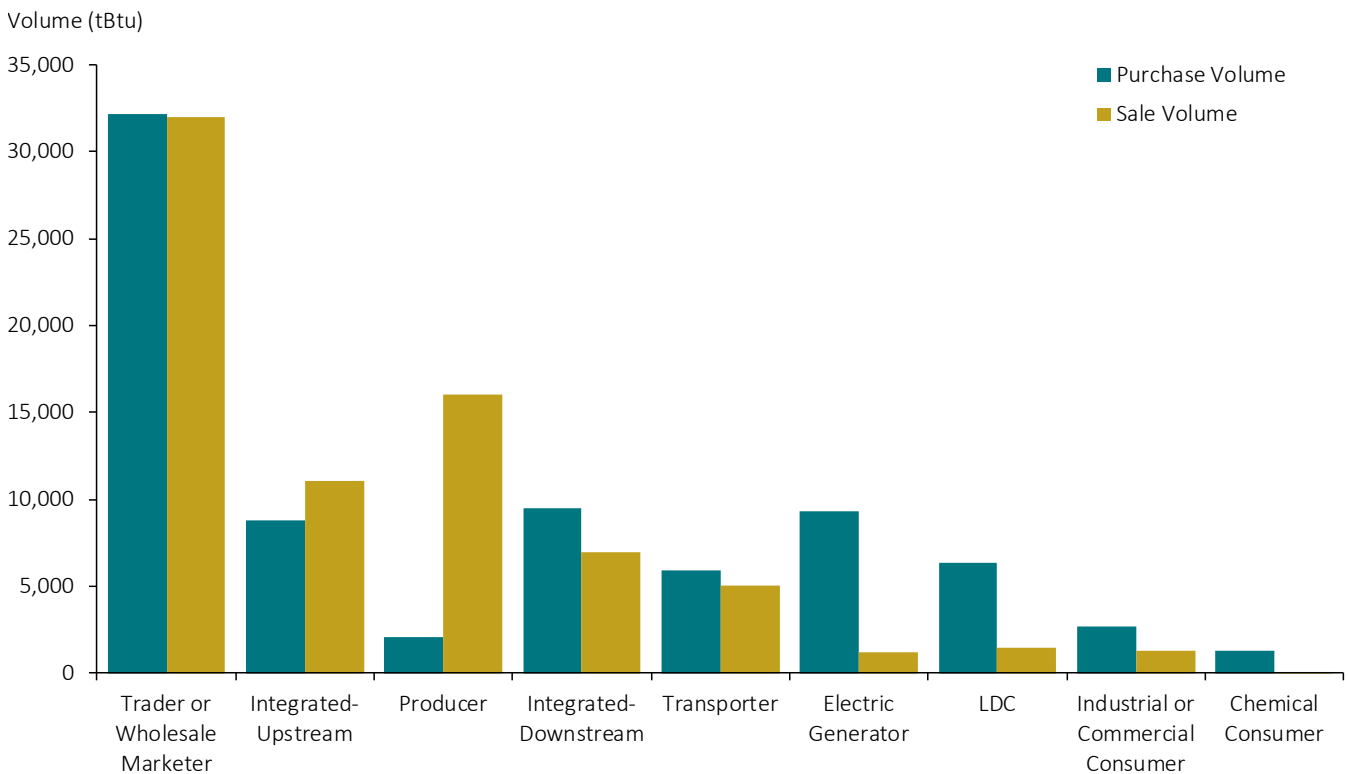
Purchase and Sale Volume

As would be expected, companies primarily engaging in “upstream” or “downstream” activities are net sellers or buyers of natural gas, respectively, while “midstream” companies buy and sell in approximately equal amounts.⁶¹

Electric generators and LDCs remained the largest net purchasers of natural gas.

- The breakdown of Form 552 purchases and sales by industry segment showed that producers and integrated-upstream companies sold more natural gas than they purchased in 2019.
- Producers sold 14 percent more natural gas in 2019 than in 2018 (16,022 tBtu versus 14,033 tBtu).
- Integrated-downstream companies, local distribution companies (LDCs), electric generators, industrial or commercial consumers, and chemical consumers purchased more than they sold in 2019.
- Consistent with their business models, traders or wholesale marketers and transporters purchased and sold approximately equal amounts in 2019.

Figure 9: Purchase and Sale Volume by Industry Segment 2019



Source: FERC Form 552 submissions as of July 3, 2020
 Note: One tBtu equals one million mmBtu.

Top 20 Companies

The list of 20 companies with the largest total transaction volumes indicates that the U.S. natural gas market continues to have a large number of diverse participants. These 20 companies tend to be consistent from year to year—18 of the top 20 companies in 2019 were also among the leading 20 companies in 2018.

- The top 20 companies accounted for 64,830 tBtu out of 153,249 tBtu, or approximately 42 percent of volume reported on Form 552 submissions in 2019. This share of volume is generally consistent with that of recent years.
- BP Energy Company had the highest physical volumes for the 12th consecutive year at 8,002 tBtu, an approximately 8 percent decrease from 2018. BP's volume was 37 percent higher than the second-largest trader.

- Two companies fell from the top 20. Concord Energy LLC and Exelon Generation Company LLC, ranked 16 and 17 in 2018, now rank 27 and 23, respectively.
- Koch Energy Services LLC and CIMA Energy LP entered the top 20 this year, ranking 16 and 19, respectively.
- Only seven out of the top 20 companies reported to price index publishers in 2019, compared to eight in 2018 and 14 in 2008.

The top 20 companies accounted for 42 percent of total volume.

Figure 10: Top 20 Companies by Total Reported Volume 2019 (Sorted by Total Transaction Volume, in tBtu)

	Company Name	Any Affiliates Report to Index Publishers	Total Buy Volume	Total Sale Volume	Net Volume	Total Transaction Volume	Volume Reportable to Indices
1	BP Energy Company	Y	3,783	4,219	-437	8,002	1,521
2	Tenaska Marketing Ventures	Y	3,142	2,718	424	5,860	1,416
3	Macquarie Energy LLC	Y	2,900	2,626	274	5,527	1,179
4	Shell Energy North America (US) L.P.	Y	2,084	2,077	7	4,161	803
5	Southern Company Gas	N	2,238	1,778	460	4,015	682
6	ConocoPhillips Company	Y	1,762	1,880	-118	3,641	465
7	EDF Trading North America LLC	N	1,549	1,495	54	3,044	695
8	DTE Energy Trading Inc.	N	1,499	1,464	35	2,963	434
9	Mercuria Energy America Inc.	N	1,409	1,414	-5	2,823	476
10	ICE NGX Canada Inc.	N	1,396	1,396	0	2,792	968
11	Morgan Stanley Capital Group Inc.	N	1,375	1,249	126	2,624	327
12	Chevron U.S.A. Inc.	N	1,182	1,370	-189	2,552	330
13	CenterPoint Energy Inc.	N	1,351	1,017	334	2,369	155
14	J. Aron & Company LLC	Y	1,141	1,065	76	2,206	431
15	EQT Energy LLC	N	418	1,725	-1,308	2,143	249
16	Koch Energy Services LLC	N	1,201	939	263	2,140	308
17	Twin Eagle Resource Management LLC	N	1,262	875	386	2,137	392
18	NextEra Energy Marketing LLC	Y	1,022	1,005	18	2,027	249
19	CIMA Energy LP	N	1,034	953	80	1,987	219
20	Direct Energy Marketing Inc.	N	1,186	632	554	1,818	406
	Top 20 Companies by Total Volume		32,932	31,898	1,034	64,830	11,703
	All Other Companies		45,175	43,244	1,931	88,419	14,596
	Total for All Companies		78,107	75,142	2,965	153,249	26,300

Source: FERC Form 552 submissions as of July 3, 2020

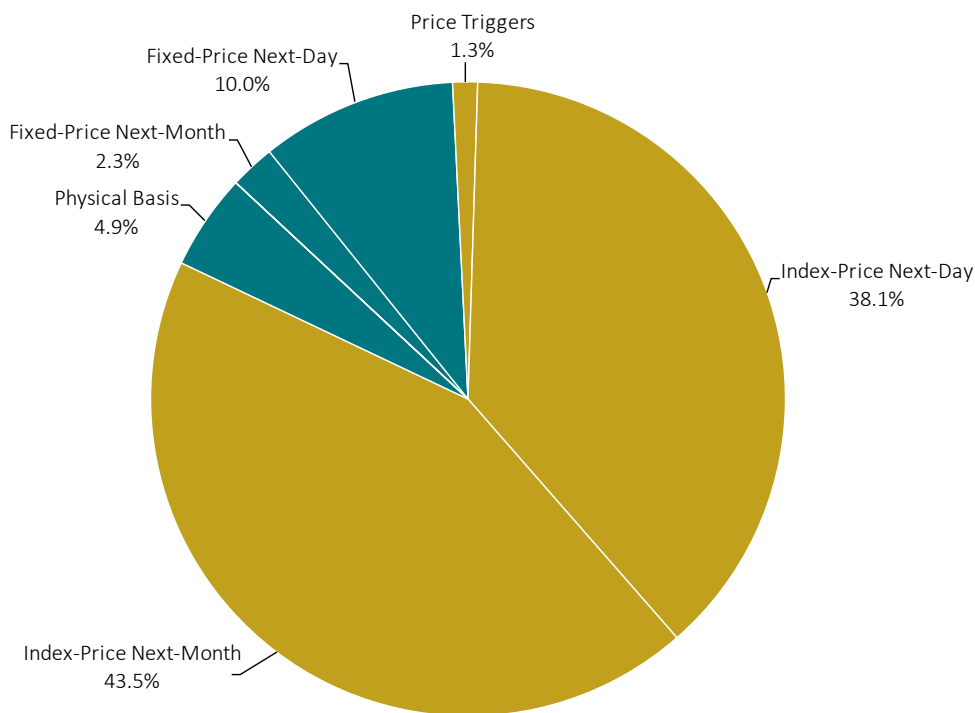
Note: Company-specific numbers may not add up to indicated totals due to rounding. One tBtu equals one million mmBtu. "Volume Reportable to Indices" includes the sum of fixed-price next-month purchases and sales, fixed-price next-day purchases and sales, and physical-basis-transaction volume reported on Form 552.

Transaction Types

- Between 2018 and 2019, index-priced transactions increased slightly from 80 percent to 82 percent of transaction volume.⁶² Over the same period, index-priced next-day transactions increased from approximately 37 percent to 38 percent while index-priced next-month transactions remained stable at approximately 43 percent.⁶³
- Between 2018 and 2019, next-day index-priced transaction volume increased from 78 percent to 79 percent of total next-day volume.
- Next-month index-priced transaction volume made up 95 percent of total next-month transaction volume in 2019.
- Since 2008, transactions that reference the monthly index have been the most prevalent among index-priced transactions.
- The share of next-day transactions remained constant between 2018 and 2019 at 48 percent. The share of next-month transactions increased slightly, from 45 percent in 2018 to 46 percent in 2019.
- Price triggers remained the least prevalent transaction type, comprising less than 2 percent of Form 552 transactions in 2019.

Since 2008, index-priced transactions have comprised an increasing share of Form 552 transactions while the percentage of transactions with fixed prices has steadily declined.

Figure 11: Transaction Volume by Transaction Type 2019

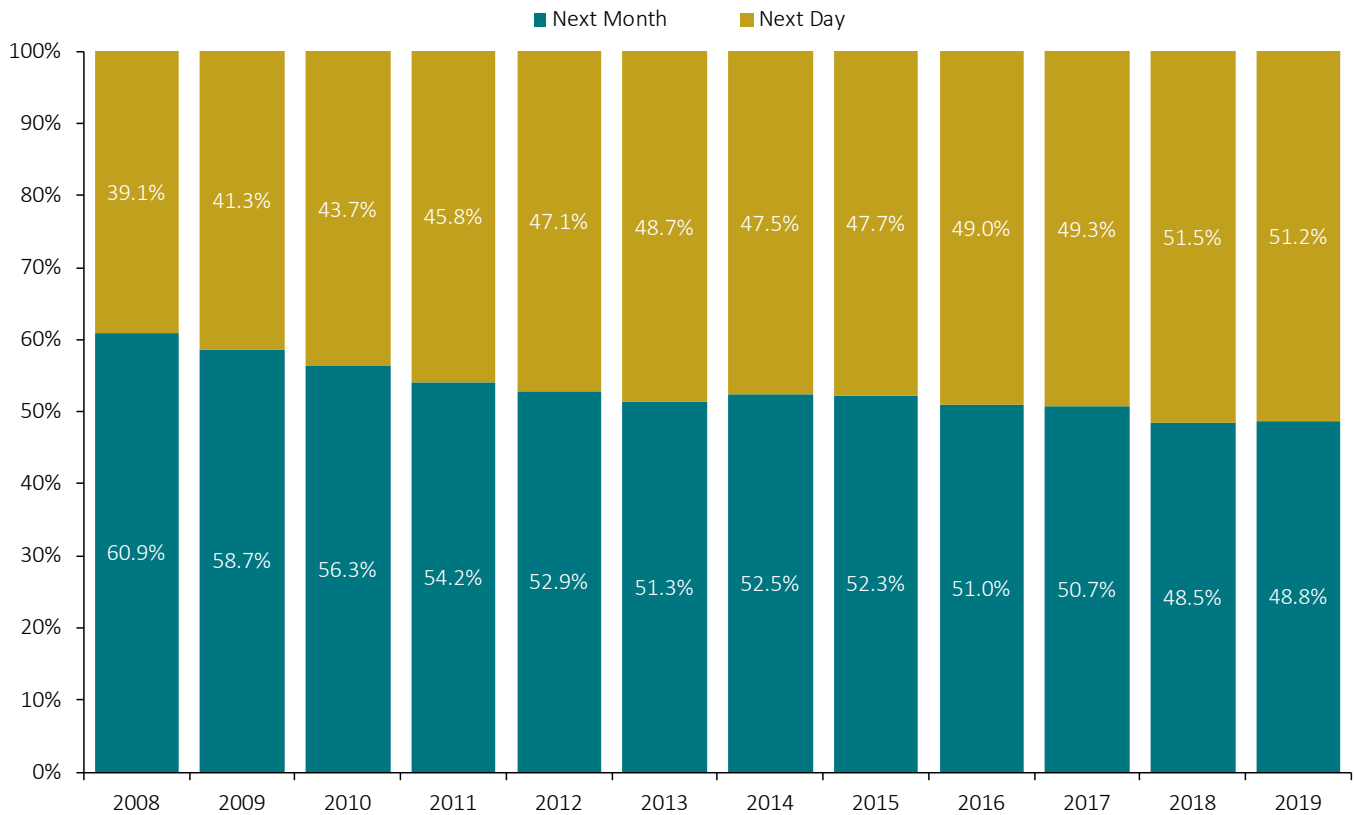


Source: FERC Form 552 submissions as of July 3, 2020
 Note: Percentages may not add up to 100 percent due to rounding.

- Next-day transactions have increased relative to next-month transactions since 2008, while the volume of fixed-price transactions as a percentage of total transaction volume also declined.⁶⁴
- The percentage of volume based on next-month transactions has decreased by 12 percentage points between 2008 and 2019 (from 61 percent to 49 percent).
- The percentage of next-day transactions between 2018 and 2019 has remained stable at approximately 51 percent, but this share is substantially higher than the 39 percent share observed in 2008.

The split between next-day and next-month index transactions is relatively even at 50/50.

Figure 12: Next-Month and Next-Day Transaction Volume across Both Fixed-Price and Index-Priced Transactions 2008–2019



Source: FERC Form 552 submissions as of July 3, 2020
 Note: Percentages may not add up to 100 percent due to rounding.

Reporting to Price Index Publishers

In Order 704, FERC commented that understanding the relative sizes of the volume of index-priced transactions and reporting-eligible, fixed-price transactions was a core objective of mandating Form 552 submissions.⁶⁵

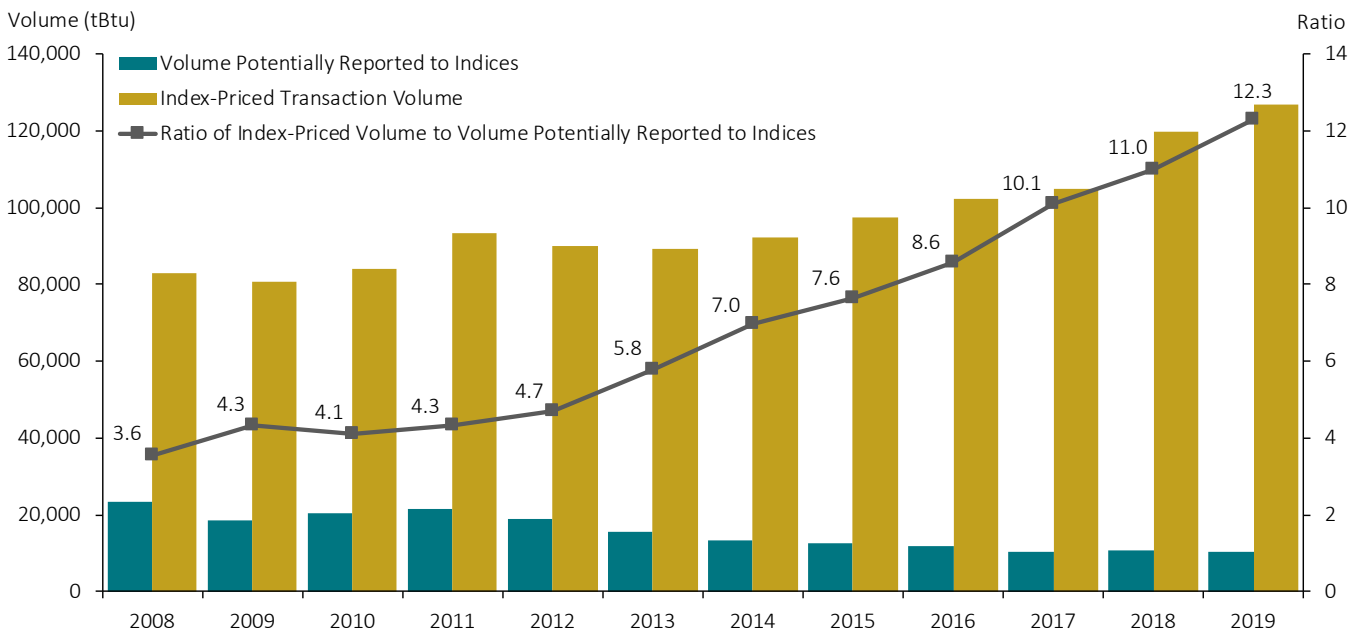
- For the ninth year in a row, the Form 552 data show an increase in the ratio of index-priced volume dependent on indices to volume potentially reportable to indices.
- The growth in this ratio resulted from a 6 percent increase in the volume of index-priced transactions relative to a 5 percent decrease in the fixed-price volume potentially reportable to indices.
- Continuing a six-year trend, 2019 witnessed the largest volume of index-priced transactions reported to indices since the inception of Form 552 reporting. The volume potentially reportable decreased slightly in 2019, which is consistent with the trend in previous years.
- In 2019, the ratio of index-priced transactions to potentially reported fixed-price transactions was the largest since Form 552 data were first collected in 2008. The ratio increased for both next-day and next-month contracts.

- In 2017, price index publisher Platts began incorporating anonymized natural gas transactions from ICE’s platform for use in Platts’s daily natural gas assessments.⁶⁶ A company does not need to report to index publishers in order to have these trades incorporated into an index. It is important to note that while these additional transactions enter into the index-formation process, these data are not necessarily included in the Form 552 reporting requirements.

“The shift to index-priced gas is a vote of confidence by the entities that have money at stake.”

Greg Leonard, Cornerstone Research

Figure 13: Total Volumes Potentially Reported to Indices versus Transaction Volumes Priced Based on Indices 2008–2019



Source: FERC Form 552 submissions as of July 3, 2020

Note: Reportable volume is the sum of fixed-price next-month purchases and sales, fixed-price next-day purchases and sales, and physical-basis-transaction volume reported on Form 552. Companies that did not enter information regarding their price reporting are assumed to not report. One tBtu is equal to one million mmBtu.

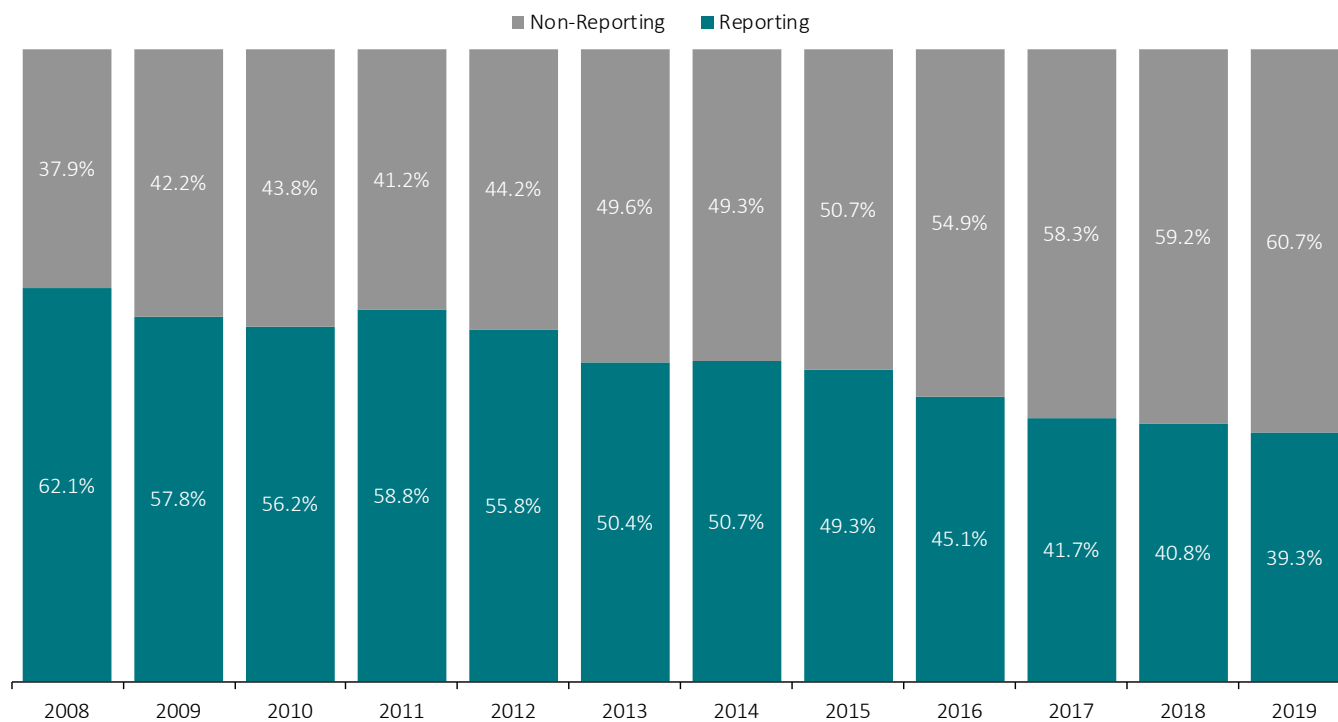
Form 552 submissions also provide information on which companies had volume eligible to be reported (i.e., fixed-price transactions⁶⁷) and whether they reported that volume to the indices.

- The percentage of fixed-price volume transacted by non-reporting companies increased slightly from 59 percent in 2018 to 61 percent in 2019.
- Of the 676 respondents in 2019, 95 (about 14 percent) reported transaction information to the price index publishers for themselves or at least one affiliate.
- The reporting companies accounted for 39 percent of the reporting-eligible, fixed-price volume in 2019, compared to more than 62 percent in 2008.

- Analysts have offered multiple hypotheses explaining why companies did not report to indices, including (1) the FERC safe harbor provision was not safe enough to protect against inadvertent errors, and (2) costs associated with internal systems and regulatory risk were too high.⁶⁸

For the fifth consecutive year, companies that chose not to report fixed-price volume to the indices comprised a larger share of fixed-price volume than reporting companies.

Figure 14: Fixed-Price Volume by Reporting versus Non-Reporting Companies 2008–2019



Source: FERC Form 552 submissions as of July 3, 2020

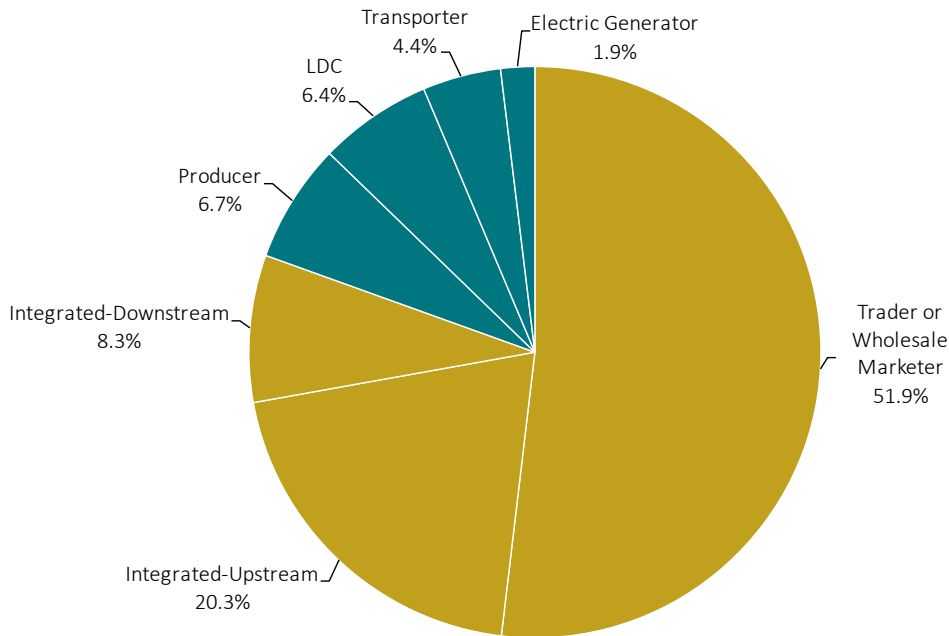
Note: Reportable volume is the sum of fixed-price next-month purchases and sales, fixed-price next-day purchases and sales, and physical-basis-transaction volume reported on Form 552. Companies that did not enter information regarding their price reporting were assumed to not report. Percentages may not add up to 100 due to rounding.

Fixed Price Volume by Industry Segments

- Integrated-upstream companies, integrated-downstream companies, traders, and wholesale marketers accounted for approximately 81 percent of the fixed-price volume potentially reported to the price index publishers in 2019.⁶⁹
- Seven of the top 20 companies by total transaction volume reported to index publishers in 2019. These seven companies accounted for 59 percent of the fixed-price volume potentially reported to price index publishers.⁷⁰

Traders and wholesale marketers traded the majority of the potentially reported fixed-price volume.

Figure 15: Fixed-Price Volume for Entities Reporting to Price Index Publishers by Company Type 2019



Source: FERC Form 552 submissions as of July 3, 2020

Note: Industrial or commercial consumer and chemical consumer companies reported less than 0.1 percent of reportable volume and are not included.

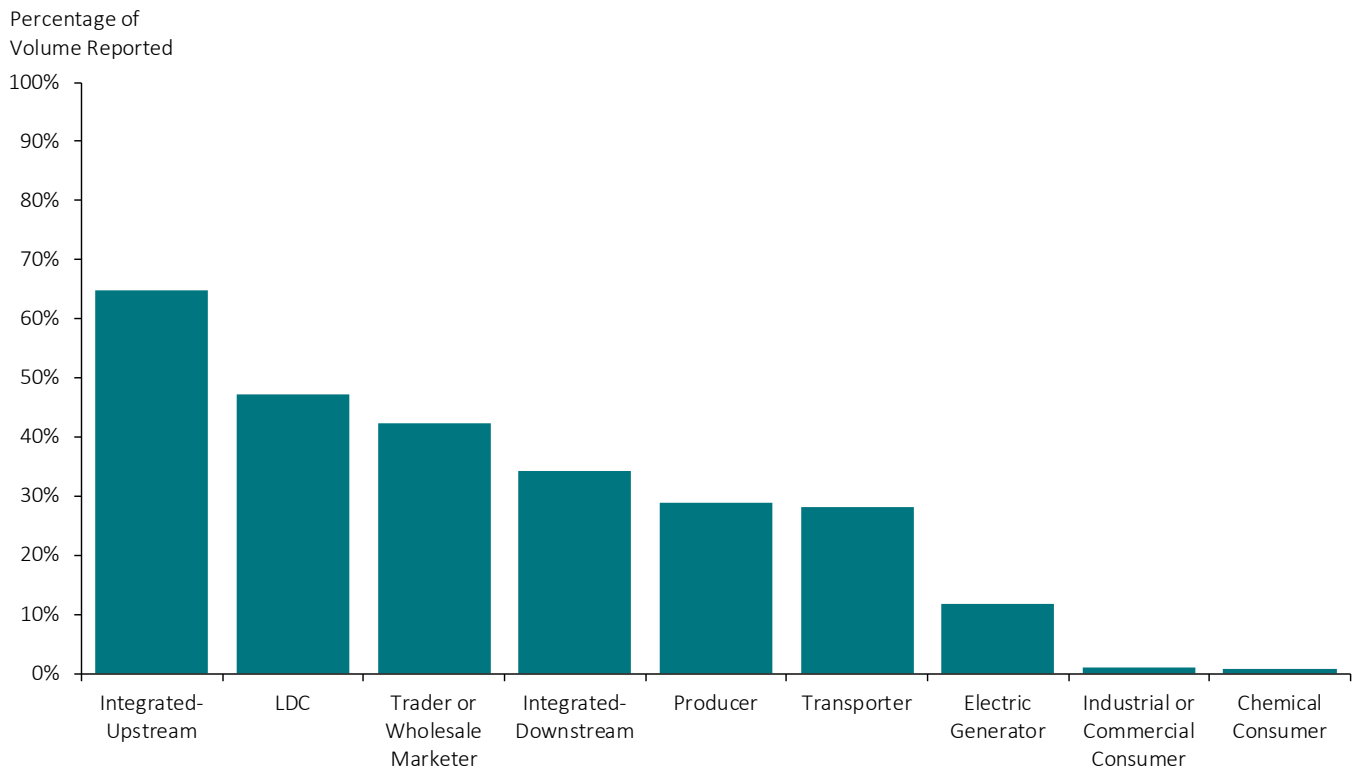
In 2019, the share of volume reported by producers increased considerably, while the share reported by electric generators nearly halved. These levels are similar to 2017, following a distinct change in 2018 when the share of volume reported by producers was lower than both transporters and electric generators.⁷¹

- A majority of transactions (65 percent) executed by integrated-upstream companies took place at companies that report to price index publishers, although this share has declined considerably since 2017. In 2017, the reported share of fixed-price volume was 85 percent, and in 2018 it was 76 percent.
- LDCs, traders or wholesale marketers, and integrated-downstream companies reported between 30 percent and 50 percent of fixed-price transaction volume to indices.

- Companies with a primary business outside the natural gas markets—such as industrial or commercial consumers and chemical consumers—reported 1 percent or less of their combined fixed-price transaction volume to indices.

Fixed-price transactions reported by integrated-upstream companies dropped for the second consecutive year.

Figure 16: Percentage of Fixed-Price Volume Reported to Price Index Publishers by Industry Segment 2019



Source: FERC Form 552 submissions as of July 3, 2020

Note: Of the 676 respondents in 2019, 95 indicated they reported transaction information to price index publishers for themselves or at least one affiliate.

Glossary

Btu: A British thermal unit (Btu) is the amount of heat energy needed to raise the temperature of one pound of water by one degree Fahrenheit. Millions of this unit are written as mmBtu, and trillions as tBtu.

CME Group Inc. (CME): A “diverse derivatives marketplace” that offers “global benchmark products across all major asset classes” so that businesses can “manage risk and achieve growth.”

<https://www.cmegroup.com/company/history/>

Downstream: “A term used in the petroleum industry referring to the refining, transportation, and marketing side of the business.”

<https://www.energy.ca.gov/resources/energy-glossary>

Dutch Title Transfer Facility (TTF): A principal natural gas trading hub in Europe. It is the virtual trading hub for the Netherlands’ natural gas market. The TTF has become the unrivalled leading hub in the European gas market landscape, leaving the UK NBP (“National Balancing Point”—the TTF equivalent for the UK) and other hubs far behind. <https://www.cmegroup.com/education/articles-and-reports/a-story-of-success-the-evolution-of-ttf-trading.html>

EIA: U.S. Energy Information Administration. “EIA provides a wide range of information and data products covering energy production, stocks, demand, imports, exports, and prices; and prepares analyses and special reports on topics of current interest.”

<http://www.eia.gov/about/>

FERC Form 552: Annual Report of Natural Gas Transactions. “FERC Form No. 552 collects transactional information from natural gas market participants. The filing of this information is necessary to provide information regarding physical natural gas transactions that use an index and transactions that contribute to, or may contribute to gas price indices. This form is considered to be a non-confidential public use form.”

<https://www.ferc.gov/sites/default/files/2020-04/form-552.pdf>

Fixed price: “A ‘Physical Natural Gas Transaction’ price determined by agreement between buyer and seller and not benchmarked to any other source of information.”

<https://www.ferc.gov/sites/default/files/2020-04/form-552.pdf>

Fixed-price, next-day transaction: “[D]elivery of natural gas pursuant to a transaction executed prior to NAESB [North American Energy Standards Board] nomination deadline (1:00 pm Central Prevailing Time) on one day for uniform physical delivery over the next pipeline day.”

<https://www.ferc.gov/sites/default/files/2020-04/form-552.pdf>

Fixed-price, next-month transaction: “[D]elivery of natural gas pursuant to a transaction executed during the last five (5) business days of one month (bidweek) for uniform physical delivery over the next month.”

<https://www.ferc.gov/sites/default/files/2020-04/form-552.pdf>

Gross withdrawals: “Full well stream volume from both oil and gas wells, including all natural gas plant liquids and nonhydrocarbon gases after oil, lease condensate, and water have been removed. Also includes production delivered as royalty payments and production used as fuel on the lease.”

https://www.eia.gov/tools/glossary/?id=gross_withdrawals

Henry Hub: A principal natural gas trading hub in North America, with connections to nine interstate and four intrastate pipelines. Henry Hub serves as the delivery point for the U.S. natural gas futures contract traded on the New York Mercantile Exchange (NYMEX).

https://www.theice.com/publicdocs/ICE_NatGas_Brochure.pdf; http://www.cmegroup.com/trading/energy/natural-gas/natural-gas_contract_specifications.html

Intercontinental Exchange Inc. (ICE): An “electronic marketplace” that connects participants in major markets and offers “the ability to manage risk and make informed decisions.”

<https://www.intercontinentalexchange.com/about>

Index price: “A price obtained from an industry publication, which is intended to represent an average price of gas delivered to a specific point on the pipeline at or during a specified period of time.”

<http://www.uniongas.com/storage-and-transportation/resources/additional-info/glossary>

Liquefied natural gas (LNG): “Natural gas (primarily methane) that has been liquefied by reducing its temperature to [negative] 260 degrees Fahrenheit at atmospheric pressure.”

<http://www.eia.gov/tools/glossary/index.cfm?id=L>

Local distribution company (LDC): “A legal entity engaged primarily in the retail sale and/or delivery of natural gas through a distribution system that includes main lines (that is, pipelines designed to carry large volumes of gas, usually located under roads or other major right-of-ways) and laterals (that is, pipelines of smaller diameter that connect the end user to the mainline). Since [the] structuring of the gas industry, the sale of gas and/or delivery arrangements may be handled by other agents, such as producers, brokers, and marketers that are referred to as ‘non-LDC.’”

<https://www.eia.gov/tools/glossary/index.cfm?id=L>

Marketed production: “Gross withdrawals less gas used for repressuring, quantities vented and flared, and nonhydrocarbon gases removed in treating or processing operations. Includes all quantities of gas used in field and processing plant operations.”

<https://www.eia.gov/tools/glossary/index.php?id=M>

Midstream: Activity involving “transportation on intrastate and interstate pipeline systems,” “processing the gas to remove liquids and impurities,” and “storage facilities.”

<https://www.ferc.gov/sites/default/files/2020-06/energy-primer-2020.pdf>

Natural gas plant liquids (NGPL): “Those hydrocarbons in natural gas that are separated as liquids at natural gas processing, fractionating, and cycling plants. Products obtained include ethane, liquefied petroleum gases (propane, normal butane, and isobutane), and natural gasoline.”

<https://www.eia.gov/tools/glossary/index.php?id=N>

Physical-basis transactions: “[T]ransactions in which the basis value is negotiated on one of the first three days of bidweek and the price is set by the final closing value of the near-month NYMEX Natural Gas Futures contract plus or minus the negotiated basis. These transactions are for uniform physical delivery over the next month.”

<https://www.ferc.gov/sites/default/files/2020-04/form-552.pdf>

Price trigger: According to FERC Form 552, a trigger agreement is “a NYMEX trigger transaction that is contingent upon a futures contract that trades on an exchange, resulting in an automatic physical trade at an agreed upon price.”

<https://www.ferc.gov/sites/default/files/2020-04/form-552.pdf>

Shale gas: “Natural gas produced from wells that are open to shale formations. Shale is a fine-grained, sedimentary rock composed of mud from flakes of clay minerals and tiny fragments (silt-sized particles) of other materials. The shale acts as both the source and the reservoir for the natural gas.”

<https://www.eia.gov/tools/glossary/index.php?id=S>

Tight gas: “Tight gas refers to natural gas reservoirs locked in extraordinarily impermeable, hard rock, making the underground formation extremely ‘tight.’”

http://www.rigzone.com/training/insight.asp?insight_id=346

Tight oil: “Oil produced from petroleum-bearing formations with low permeability such as the Eagle Ford, the Bakken, and other formations that must be hydraulically fractured to produce oil at commercial rates.”

<https://www.eia.gov/tools/glossary/index.cfm?id=T>

Upstream: “A term used in the petroleum industry referring to the exploration and production side of the business.”

<https://www.energy.ca.gov/resources/energy-glossary>

Appendices

Appendix 1: Energy Policy Act of 2005, Form 552 Submissions, and Cornerstone Research’s Proprietary Analysis

In 2005, Congress passed the Energy Policy Act of 2005 (EPAAct 2005), which authorized FERC to “facilitate price transparency in markets for the sale or transportation of physical natural gas in interstate commerce” (§ 316). The EPAAct 2005 allowed FERC to issue rules to “provide for the dissemination, on a timely basis, of information about the availability and prices of natural gas sold at wholesale and in interstate commerce to the Commission, State commissions, buyers and sellers of wholesale natural gas, and the public.” (§ 316) After an extensive rule-making process, FERC issued Order 704-A, which established reporting requirements.

In the summer of 2009, FERC received the first round of Form 552 submissions covering 2008 natural gas transactions from more than 1,121 respondents. On June 17, 2010, FERC issued Order 704-C, which provided for slightly revised reporting rules that eased some reporting requirements.⁷² For 2019 natural gas transactions, Form 552 submissions covered 676 firms.

The data contained on the Form 552 submissions, described more fully in Appendix 2, provide a unique view into the size and nature of the physical natural gas market. First, these forms quantify the number of trade participants and trade volumes of firms that report to the price index publishers. Second, the data provide insight into the relative proportion of fixed-price and index-priced transactions. Third, while FERC did not request information on all natural gas transactions, the data yield an outline of the size of the physical natural gas market, especially at the trading and wholesale levels.

Cornerstone Research supplements the FERC Form 552 data with proprietary research that classifies the respondent companies by industry segments. These industry segments are producer, transporter, electric generator, industrial or commercial consumer, chemical consumer, trader or wholesale marketer, LDC, integrated-downstream, and integrated-upstream.⁷³ The latter two categories capture companies that span multiple industry segments.⁷⁴

Appendix 2: Data Submitted to FERC

Order 704-C requires natural gas market participants with purchases or sales of physical “reportable” natural gas of at least 2.2 tBtu in the prior calendar year to report these activities on Form 552. Specifically, these market participants must submit volumes of physical natural gas transactions that “are only those transactions that refer to an index, or that contribute to, or could contribute to the formation of a gas index during the calendar year.”⁷⁵ Order 704-A (p. 9) further defines the transactions that could be reported to an index publisher as any “bilateral, arms-length, fixed[-]price physical natural gas transactions between nonaffiliated companies at all trading locations.”

Order 704-C excludes any transaction that does not depend on a published price index or that could not be reported to a price index publisher. The criteria for reporting to a price index publisher specifically exclude transactions for balance-of-month supply, intraday trades consummated after the pipeline nomination deadline, monthly fixed-price transactions conducted prior to bidweek, fixed-price

transactions for terms longer than one month, and fixed-price transactions including other services or features (such as volume flexibility) that would render them ineligible for price reporting. Further, Order 704-C excludes transactions by affiliates from the submission requirements.

While respondents aggregate their reported transaction volumes across locations and for the entire calendar year, they must submit purchase and sale volumes separately for each of the following types of transactions: fixed-price for next-day delivery, index-price referencing next-day indices, fixed-price for next-month delivery, index-price referencing next-month indices, transactions with price triggers,⁷⁶ and physical-basis transactions.⁷⁷ In addition to volumes of physical transactions, market participants are required to state whether they report transaction information to the price index publishers.

Endnotes

- ¹ Data as of July 3, 2020, were used for all respondents.
- ² A respondent is defined as a unique reporting company-respondent combination as reported on FERC Form 552.
- ³ Calculated as minimum trading volume of 78,107 tBtu from Figure 10 divided by 29,907 tBtu EIA natural gas delivered to consumers. See Endnote 55 for an explanation of how minimum trading volume is calculated from Figure 10. “U.S. Natural Gas Consumption by End Use,” EIA, http://www.eia.gov/dnav/ng/NG_CONS_SUM_DCU_NUS_A.htm. Converted to trillion Btu (tBtu) from million cubic feet (MMcf). 1 cubic foot = 1,037 Btu, the annual Total Consumption conversion factor in the EIA time series “Approximate Heat Content of Natural Gas (Btu per Cubic Foot),” EIA, https://www.eia.gov/dnav/ng/ng_cons_heat_dcu_nus_a.htm.
- ⁴ “Gas 2020: Analysing the Impact of the COVID-19 Pandemic on Global Natural Gas Markets,” IEA, June 2020, <https://www.iea.org/reports/gas-2020> (“2020 IEA Report”), p. 18.
- ⁵ 2020 IEA Report, pp. 16, 20.
- ⁶ “Short-Term Energy Outlook (STEO),” EIA, July 7, 2020, https://www.eia.gov/outlooks/steo/pdf/steo_full.pdf (“2020 EIA STEO Report”).
- ⁷ 2020 IEA Report, p. 18.
- ⁸ “More Than 100 Coal-Fired Plants Have Been Replaced or Converted to Natural Gas since 2011,” EIA, August 5, 2020, <https://www.eia.gov/todayinenergy/detail.php?id=44636>.
- ⁹ 2020 IEA Report, p. 24.
- ¹⁰ 2020 IEA Report, p. 24.
- ¹¹ 2020 IEA Report, p. 28.
- ¹² 2020 EIA STEO Report.
- ¹³ “Annual Energy Outlook 2020,” EIA, January 29, 2020, <https://www.eia.gov/outlooks/aeo/pdf/aeo2020.pdf> (“2020 EIA AEO Report”), p. 54.
- ¹⁴ 2020 EIA STEO Report.
- ¹⁵ 2020 EIA STEO Report.
- ¹⁶ 2020 IEA Report, p. 24.
- ¹⁷ “U.S. Natural Gas: Once Full of Promise, Now in Retreat,” Council on Foreign Relations, July 2, 2020, <https://www.cfr.org/blog/us-natural-gas-once-full-promise-now-retreat>.
- ¹⁸ 2020 IEA Report, p. 22.
- ¹⁹ “Commodity Tracker: 5 Charts to Watch This Week,” S&P Global Platts, July 6, 2020, <https://blogs.platts.com/2020/07/06/Ing-imports-demand-recovery-gas-storage/>; 2020 IEA Report, p. 28.
- ²⁰ 2020 EIA STEO Report, p. 15; “August Cargo Cancellations at US LNG Terminals Push Summer Total over 100,” S&P Global Platts, June 22, 2020, <http://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/062220-august-cargo-cancellations-at-us-lng-terminals-push-summer-total-over-100>.
- ²¹ 2020 EIA STEO Report, p. 15.
- ²² 2020 IEA Report, p. 26.
- ²³ 2020 EIA AEO Report, p. 46.
- ²⁴ 2020 EIA STEO Report.
- ²⁵ 2020 EIA STEO Report.
- ²⁶ China’s economic growth rate fell to an estimated 6.1 percent according to the IMF, its lowest annual increase since 1990.
- ²⁷ Percentage for 2018: 1,083,118 mmcf total LNG exports / 3,607,418 mmcf total natural gas exports = 30 percent. Percentage for 2019: 1,819,386 mmcf total LNG exports / 4,656,312 mmcf total natural gas exports = 39 percent. See “U.S. Natural Gas Exports and Re-Exports by Country,” EIA, accessed July 31, 2020, https://www.eia.gov/dnav/ng/NG_MOVE_EXPC_S1_A.htm (“EIA U.S. Natural Gas Exports Data”).
- ²⁸ EIA U.S. Natural Gas Exports Data.
- ²⁹ 2020 EIA STEO Report, Table 5a; 2020 EIA AEO Report, Table 13.
- ³⁰ The EIA has revised the 2016 and 2017 numbers reported for U.S. Natural Gas Marketed Production from those previously reported in Cornerstone Research’s 2017 *Characteristics of U.S. Natural Gas Transactions* report.
- ³¹ 2020 IEA Report, p. 10.

- ³² “U.S. Natural Gas-Fired Combined-Cycle Capacity Surpasses Coal-Fired Capacity,” EIA, April 10, 2019, <https://www.eia.gov/todayinenergy/detail.php?id=39012>; “EIA Expects Less Electricity to Come from Coal This Summer as Natural Gas, Renewables Rise,” EIA, May 9, 2019, <https://www.eia.gov/todayinenergy/detail.php?id=39412>.
- ³³ 2020 IEA Report, p. 9; “Gas 2019: Analysis and Forecasts to 2024,” IEA, June 2019, p. 37, <https://www.iea.org/reports/gas-2019>.
- ³⁴ EIA U.S. Natural Gas Exports Data.
- ³⁵ 2020 EIA AEO Report, p. 54.
- ³⁶ “Analysis: Bakken Shale Associated Natural Gas Production Rebounds Following Shut-Ins,” S&P Global Platts, July 24, 2020, <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/072420-bakken-shale-associated-natural-gas-production-rebounds-following-shut-ins>.
- ³⁷ “Henry Hub Natural Gas Spot Price,” EIA, accessed July 20, 2020, <https://www.eia.gov/dnav/ng/hist/rngwhhdd.htm>.
- ³⁸ 2020 IEA Report, p. 11.
- ³⁹ 2020 IEA Report, p. 11.
- ⁴⁰ 2020 IEA Report, p. 11.
- ⁴¹ “Natural Gas Weekly Update,” EIA, December 12, 2019, https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2019/12_12/#itn-tabs-1.
- ⁴² 2020 IEA Report, p. 12. Export terminals can take two to four years to build. See “Frequently Asked Questions about LNG,” California Energy Commission, <https://ww2.energy.ca.gov/lng/faq.html>.
- ⁴³ Percentage for 2018: 1,083,118 mmcf total LNG exports / 3,607,418 mmcf total natural gas exports = 30 percent. Percentage for 2019: 1,819,386 mmcf total LNG exports / 4,656,312 mmcf total natural gas exports = 39 percent. See EIA U.S. Natural Gas Exports Data.
- ⁴⁴ Percentage for 2018: 1,083,118 mmcf total LNG exports / 3,607,418 mmcf total natural gas exports = 30 percent. Percentage for 2019: 1,819,386 mmcf total LNG exports / 4,656,312 mmcf total natural gas exports = 39 percent. See EIA U.S. Natural Gas Exports Data.
- ⁴⁵ 2020 IEA Report, p. 13.
- ⁴⁶ EIA U.S. Natural Gas Exports Data.
- ⁴⁷ 2020 IEA Report, p. 13.
- ⁴⁸ EIA U.S. Natural Gas Exports Data.
- ⁴⁹ “Factbox: How China Tariffs on U.S. Commodities, Energy Stand after Phase 1 Trade Deal,” Reuters, January 15, 2020, <https://www.reuters.com/article/us-usa-trade-china-commoditiestariffs-fa/factbox-how-china-tariffs-on-us-commodities-energy-stand-after-phase-1-trade-deal-idUSKBN1ZF0C9>; “China to Raise Tariff on Us LNG to 25% but Excludes Us Crude from List,” S&P Global Platts, May 13, 2019, <https://www.spglobal.com/platts/en/market-insights/latest-news/natural-gas/051319-china-to-raise-tariff-on-us-lng-to-25-but-excludes-us-crude-from-list>; EIA U.S. Natural Gas Exports Data.
- ⁵⁰ “Asian LNG Offers Drop below UK Gas Price, Prompt Diversions to Europe,” Reuters, January 31, 2019, <https://www.reuters.com/article/us-asia-lng-europe/asian-lng-offers-drop-below-uk-gas-price-prompt-diversions-to-europe-idUSKCN1PP1NA>.
- ⁵¹ 2020 IEA Report, p. 11.
- ⁵² 2020 IEA Report, p. 11.
- ⁵³ EIA U.S. Natural Gas Exports Data.
- ⁵⁴ “Economic and Trade Agreement between the United States of America and the People’s Republic of China, Phase One,” Office of the United States Trade Representative and United States Department of the Treasury, January 15, 2020, <http://prod-upp-image-read.ft.com/d08f2b80-37b2-11ea-a6d3-9a26f8c3cba4>.
- ⁵⁵ If both parties to a transaction submit a Form 552, the total volume submitted to FERC will be double the volume of that transaction. For example, a trade for 10,000 mmBtu between two companies, each submitting a Form 552, will add 20,000 mmBtu to the total submitted volume. The minimum volume that could be represented by Form 552 is the maximum of the buy and sale totals shown in Figure 10, which in 2019 was 78,107 tBtu. Adding the buy and sale volume can double count transactions if both the buyer and seller file a Form 552. A potential limitation of this is that estimating volume with only sales or only purchases may underrepresent the volume of transactions represented by Form 552, since some transactions involve market participants that do not submit a Form 552.
- ⁵⁶ The figures reported by CME represent the average daily volume of its natural gas products, and have been multiplied by 250 to convert them to annual values. CME reports the total number of contracts, and the volume represented by each contract may vary in size. See CME Forms 10-K.
- ⁵⁷ ICE 2019 10-K, p. 52.
- ⁵⁸ CME 2019 10-K, p. 38.
- ⁵⁹ “Nasdaq Futures Products,” NASDAQ, retrieved from Wayback Machine, <https://web.archive.org/web/20181201185710/https://business.nasdaq.com/nasdaq-futures/products>. Note that NFX ceased to have these futures listed as of June 2, 2020.

- ⁶⁰ “Exchange Volume by Class,” OCC, <https://www.theocc.com/Market-Data/Market-Data-Reports/Volume-and-Open-Interest/Exchange-Volume-by-Class>.
- ⁶¹ Midstream refers to integrated-upstream, integrated-downstream, and transporters. Traders and wholesale marketers also have nearly equal levels of buying and selling through their role in market-making.
- ⁶² The index-priced transaction percentage does not include price triggers. For 2018 transaction volume percentages, see “Characteristics of U.S. Natural Gas Transactions: Insights from FERC Form Submissions as of June 6, 2019,” Cornerstone Research, July 2019, <https://www.cornerstone.com/Publications/Reports/Characteristics-of-U-S-Natural-Gas-Transactions-FERC-Form-552-Submissions-as-of-June-2019.pdf>.
- ⁶³ Data do not cover all transactions in the OTC market, since Form 552 excludes certain types of non-index-priced transactions. See Appendix 2.
- ⁶⁴ Physical basis and price trigger trades are not included in this analysis.
- ⁶⁵ Order 704 (Appendix 1, p. 4) states that Form 552 submissions should be used “to determine important volumetric relationships between (a) the fixed price, day-ahead or month-ahead transactions that form price indices; and (b) transactions that use price indices. Without the most basic information about these volumetric relationships, the Commission has been hampered in its oversight and its ability to assess the adequacy of price-forming transactions.”
- ⁶⁶ “S&P Global Platts Announces North America Natural Gas Assessment Methodology Details Following Its Agreement with Intercontinental Exchange to Improve Price Transparency and Bolster Benchmarks,” S&P Global Platts, February 9, 2017, <https://www.prnewswire.com/news-releases/sp-global-platts-announces-north-america-natural-gas-assessment-methodology-details-following-its-agreement-with-intercontinental-exchange-to-improve-price-transparency-and-bolster-benchmarks-300405153.html>; “Natural Gas Trade Activity Numbers Leap after ICE Agreement,” S&P Global Platts, June 7, 2018, <https://blogs.platts.com/2018/06/07/natural-gas-trade-activity-leap-ice-agreement/#more-27725>.
- ⁶⁷ For the purposes of this analysis, physical-basis transactions are also included in the category of fixed-priced volume.
- ⁶⁸ FERC Technical Conference, Developments in Natural Gas Index Liquidity and Transparency, June 29, 2017, Docket No. AD17-12-000, 25:19–25; 151:9–23.
- ⁶⁹ Calculated based on Figure 15: integrated-downstream plus integrated-upstream plus traders or wholesale marketers: 8.3 percent + 20.3 percent + 51.9 percent = 80.5 percent.
- ⁷⁰ Calculated based on Figure 10 and Figure 13. From Figure 10: seven of the top 20 companies have any affiliates that report to index publishers, which totals 6,063 tBtu. From Figure 13: the 2019 volume potentially reported to indices totals 10,332 tBtu. The top 20 companies with volume reportable to indices and an affiliate that reports to index publishers divided by total volume potentially reported to index publishers: $6,063 \div 10,332 = 58.7$ percent.
- ⁷¹ “Characteristics of U.S. Natural Gas Transactions: Insights from FERC Form Submissions as of June 5, 2018,” Cornerstone Research, July 2018, <https://www.cornerstone.com/Publications/Reports/Characteristics-of-US-Natural-Gas-Transactions-FERC-Form-552-Submissions-June-2018.pdf>; “Characteristics of U.S. Natural Gas Transactions: Insights from FERC Form Submissions as of June 6, 2019,” Cornerstone Research, July 2019, <https://www.cornerstone.com/Publications/Reports/Characteristics-of-U-S-Natural-Gas-Transactions-FERC-Form-552-Submissions-as-of-June-2019.pdf>.
- ⁷² Among other minor revisions, Order 704-C exempts transactions involving unprocessed natural gas as well as cash-out and imbalance transactions. Further, for 2009, companies that hold blanket marketing certificates but do not meet the minimum transaction volume threshold are no longer required to file a Form 552. For 2008, more than 300 companies filed a Form 552 and did not report any transaction volume. For 2009, only 16 companies filed a Form 552 without reporting transaction volumes.
- ⁷³ The categorization process was necessarily judgmental and based on company websites and financial filings. Companies were categorized as closely as possible to their most significant natural gas market activity.
- ⁷⁴ Since these integrated companies typically have a focus at either the industry segment that is upstream (such as production, gathering, or processing) or downstream (such as electric generation, marketing to wholesale users, or industrial consumption), two categories were created to allow for investigation of any differences between these types of companies.
- ⁷⁵ FERC Form 552 (2019 version). Note that Form 552 covers only physical natural gas transactions. Financial transactions, such as swaps and options, are excluded, as are futures contracts, regardless of whether they are taken to physical delivery.
- ⁷⁶ FERC includes NYMEX plus contracts among trigger contracts. In these contracts, the price is typically set at a specified index value as a default. The buyer, however, has the option to fix (or trigger) the price at any given point in time based on the prevailing market prices. Typically, the buyer can fix the price at the prevailing NYMEX price for the delivery month plus a predetermined premium. When they are triggered, these contracts become fixed-price trades. Thus, while trigger contracts are initially dependent on an index price, they often shed this dependence and give the buyer the price certainty of a fixed-price transaction.
- ⁷⁷ Physical-basis transactions are physical transactions that have prices set as a predetermined amount plus the NYMEX settlement price. The price index publishers state that they incorporate physical-basis transactions into their price assessments.

About the Authors

Greg Leonard

Ph.D., University of Rochester; M.A., University of Rochester; B.A., University of Texas at Austin

Greg Leonard, a vice president in the firm’s London office, has more than 15 years of experience consulting to clients in complex commercial litigation and regulatory proceedings involving energy, commodities, finance, antitrust, and intellectual property. In the energy and commodity markets, Dr. Leonard has extensive experience in analyzing market manipulation claims, analyzing trading patterns and strategies, valuing trading businesses and portfolios, valuing alleged breaches of contract, evaluating risk management practices, and analyzing the price impacts of alleged wrongful conduct. Dr. Leonard has led consulting projects involving the trading of natural gas, natural gas liquids, liquefied natural gas, crude oil, refined products, agricultural products, electric power, and electric generation capacity on futures exchanges as well as in the OTC market. On behalf of clients, he has appeared before the enforcement staffs of the U.S. Commodity Futures Trading Commission, the Federal Energy Regulatory Commission, the Federal Bureau of Investigation, and the U.S. Department of Justice.

Nicole M. Moran

Ph.D., University of Illinois at Urbana–Champaign; B.S., University of Wisconsin

Nicole Moran is a principal in the energy and commodities practice in Cornerstone Research’s Washington, D.C. office. She provides financial and economic analysis in complex commercial litigation and regulatory proceedings and supports experts in preparing for deposition and trial testimony. Her experience spans several industries including energy, agriculture, foreign exchange, consumer lending, and electronics; her case experience includes arbitration, regulatory investigations, market manipulation, antitrust, consumer finance, and financial institutions. Dr. Moran’s emphasis has been on derivative markets for both exchange-traded and OTC products that involve trading activity, order book data, and evaluation of market design intricacies that affect market participant behavior. Prior to joining Cornerstone Research, Dr. Moran was a research economist at the U.S. Commodity Futures Trading Commission, where she conducted statistical and econometric analyses on derivative markets and agricultural futures. Her research is published in leading journals, including the *Journal of Futures* and the *Journal of Agricultural and Applied Economics*.

Laurent Samuel

M.B.A., Harvard Business School; B.Com., McGill University

Laurent Samuel is a manager in the energy and commodities practice in Cornerstone Research’s Washington, D.C. office. His casework to date has focused on derivative markets for both exchange-traded and OTC products in commodities (energy, metals, and agriculture), fixed income (U.S. Treasury Futures, Interest Rate Swaps, Foreign Exchange), and equity markets. Issues covered include market manipulation allegations, alleged antitrust behavior, and order executions linked to high-frequency trading. Prior to joining Cornerstone Research, Mr. Samuel was a Grains Trader at Louis Dreyfus Company, a leading merchant and processor of agricultural goods. He also worked as an internal consultant (“Inspection Générale”) at Société Générale, a French financial services group, where he carried out consulting and auditing assignments across various business lines ranging from retail banking to corporate investment banking and capital markets.

The views expressed in this report are solely those of the authors, who are responsible for the content, and do not necessarily represent the views of Cornerstone Research.

Many publications quote, cite, or reproduce data or figures from Cornerstone Research reports. The authors request that you reference Cornerstone Research in any reprint of the figures or findings. Please direct any questions to:

Greg Leonard
202.912.8921
gleonard@cornerstone.com

Nicole M. Moran
202.912.8963
nmoran@cornerstone.com

Laurent Samuel
202.912.8948
lsamuel@cornerstone.com

About Cornerstone Research

Cornerstone Research provides economic and financial consulting and expert testimony in all phases of complex litigation and regulatory proceedings. The firm works with an extensive network of prominent faculty and industry practitioners to identify the best-qualified expert for each assignment. Cornerstone Research has earned a reputation for consistent high quality and effectiveness by delivering rigorous, state-of-the-art analysis for more than thirty years. The firm has over 700 staff and offices in Boston, Chicago, London, Los Angeles, New York, San Francisco, Silicon Valley, and Washington.

