

Characteristics of U.S. Natural Gas Transactions

Insights from FERC Form 552 Submissions

As of May 15, 2013





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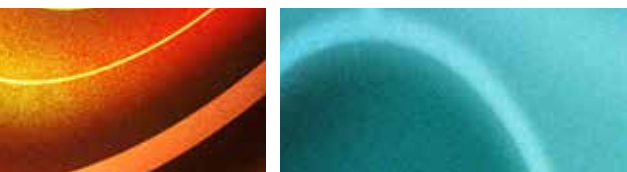


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INTRODUCTION

The Federal Energy Regulatory Commission (FERC) receives and compiles the most comprehensive information on trading activity and pricing methods in the U.S. natural gas trading markets. The information, collected from market participants' FERC Form 552 submissions, forms a database of trading activity that spans both physical and financial trading by a wide range of companies, from end users to producers. By supplementing the data with proprietary classifications of market participants, Cornerstone Research adds deeper insight into the market activities and characteristics across the various types of participants.

SUMMARY OF 2012 DATA

- The total volume of natural gas transactions reported to FERC decreased by 5 percent from 2011 to 2012, reversing a two-year trend of increasing activity. The transaction volume in 2012 was still 2 percent higher than in 2010.
- In contrast, the number of natural gas contracts traded on IntercontinentalExchange, Inc. (ICE) increased by more than 11 percent from 2011 to 2012.
- The U.S. natural gas industry is unconcentrated, with a large number of diverse participants. The top twenty transacting companies by volume accounted for slightly less than half of the transaction volume covered in the Form 552 submissions. Traders or wholesale marketers continued to report the largest transaction volumes, accounting for approximately 43 percent of transactions.
- The share of transactions based on index prices increased from approximately 69 percent in 2008 to 72 percent in 2011 and 2012. These percentages likely overestimate the actual share of index-price transactions because the data include all index-price transactions but exclude some other types of physical transactions not based on indices.
- As transactions between physical participants take place, an average molecule of natural gas passes through approximately 2.63 transactions from production to consumption, down from 2.96 in 2011.
- Of the 665 Form 552 respondents in 2012, 116 (17 percent) reported transaction information to the price-index publishers for at least one affiliate. While the majority of the Form 552 respondents did not report, the reporting companies tend to be larger than average. Thus, 56 percent of the reporting-eligible volume was transacted by companies that report to the price-index publishers.
- Reporting to price-index publishers was not consistent across industry segments. Integrated-upstream and integrated-downstream companies, along with traders or wholesale marketers, reported the majority of eligible volume to the price-index publishers, whereas industrial or commercial consumers and chemical consumers reported less than 10 percent of their eligible volume.
- From 2008 to 2010, the proportion of reported volume by net buyers and net sellers was approximately equal. In 2011, the difference between the proportion of net buyers and net sellers that reported to the price-index publishers exceeded 20 percent for the first time. This narrowed by 9 percentage points in 2012, resulting in almost 13 percent more volume from buyers than sellers.

BACKGROUND

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.”¹ 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.”² After an extensive rule-making process, FERC issued Order 704-A, which establishes 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 provides for slightly revised reporting rules that ease some reporting requirements.³ For 2012 natural gas transactions, Form 552 submissions covered 665 firms.

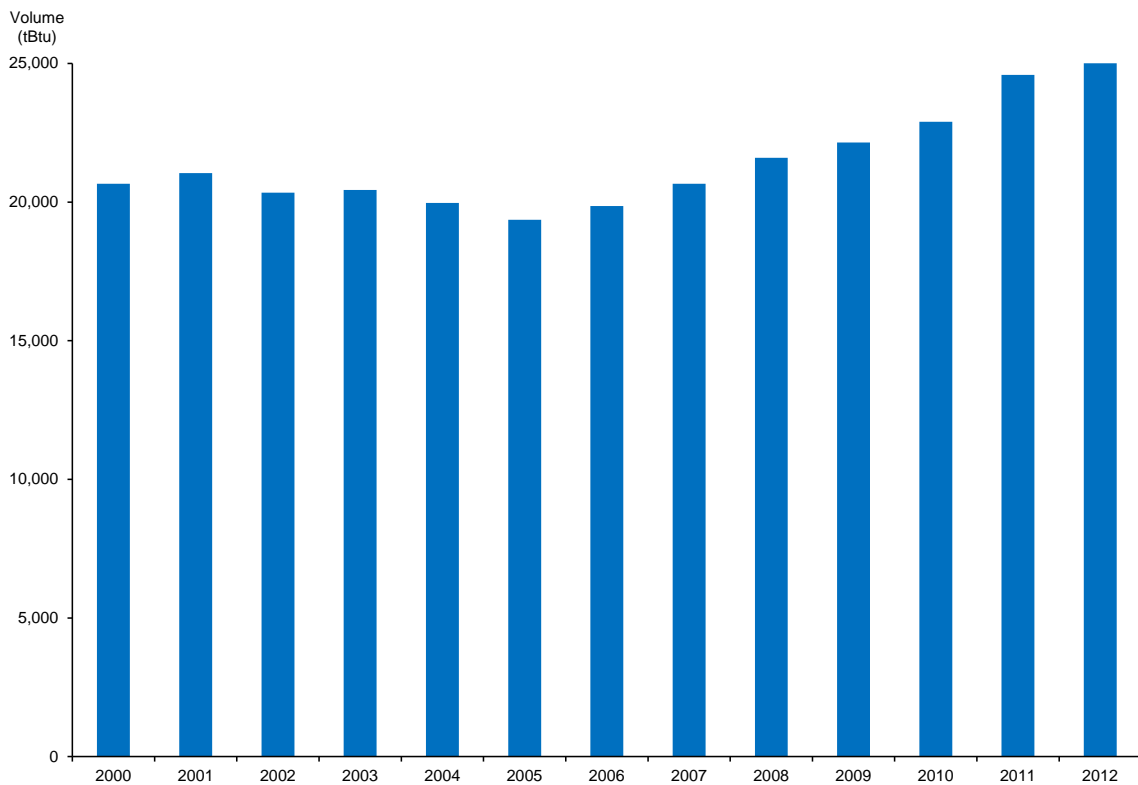
The data contained on the Form 552 submissions, described more fully in the Appendix, provide a unique view into the size and nature of the physical natural gas market. First, these forms quantify the number of trade participants and trade volumes of firms that report to the price-index publishers. Second, the data provide insight into the relative proportion of fixed-price and index-price 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 has supplemented the FERC 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, local distribution company (LDC), integrated downstream, and integrated upstream.⁴ The latter two categories capture companies that span multiple industry segments.⁵

DATA FROM THE 2012 SUBMISSIONS

There has been a recent revival in natural gas production in the United States with annual marketed production increasing 34 percent from 2005 to 2012 (Figure 1).⁶ This increase was due to the development and expansion of shale natural gas production, which the U.S. Energy Information Administration (EIA) predicts will increase from approximately 35 percent to 50 percent of U.S. natural gas production by 2040. As the U.S. natural gas market evolves, it continues to be important to analyze market participants and the pricing of natural gas.⁷

**FIGURE 1: U.S. NATURAL GAS MARKETED PRODUCTION
2000–2012**



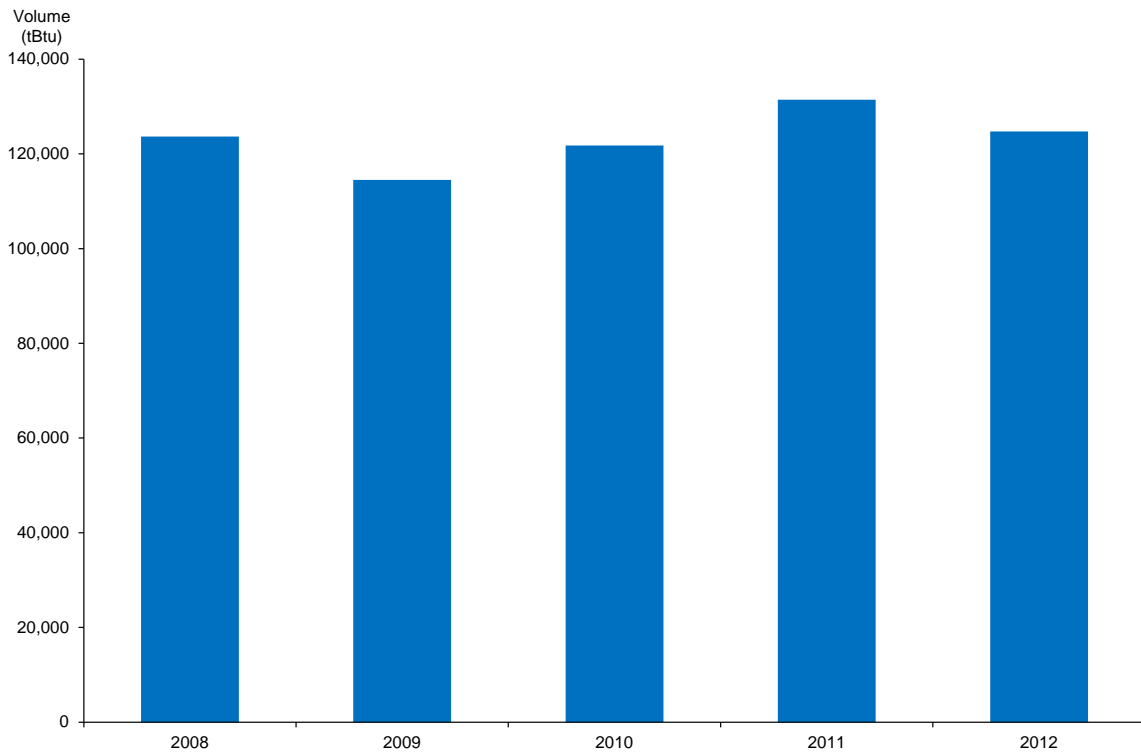
Source: EIA
Note: One tBtu equals 1 million mmBtu.

This increase in domestic natural gas production has resulted in decreasing prices and efforts to find innovative ways to use natural gas. From 2005 to 2012, for example, wellhead prices decreased by 64 percent⁸ while the use of natural gas to fuel vehicles increased by 44 percent, as natural gas users sought alternatives to higher-priced gasoline and diesel.⁹ By 2040, natural gas is projected to power approximately 25 to 40 percent of heavy-duty vehicles in the United States.¹⁰ Natural gas is also increasingly used as an alternative to coal-powered electricity generation, growing 56 percent from 2005 to 2012.¹¹

MARKET VOLUMES AND PARTICIPANTS

The transactions reported in the Form 552 submissions total 124,738 million mmBtu¹² transacted by 665 companies.¹³ This represented a 5 percent decrease from 2011, although still 2 percent higher than in 2010 (Figure 2). To the extent that both parties to a transaction submit a Form 552, the submissions will include 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 volume. Thus, these Form 552 volumes represent a minimum of 63,027 million mmBtu of trading volume.¹⁴

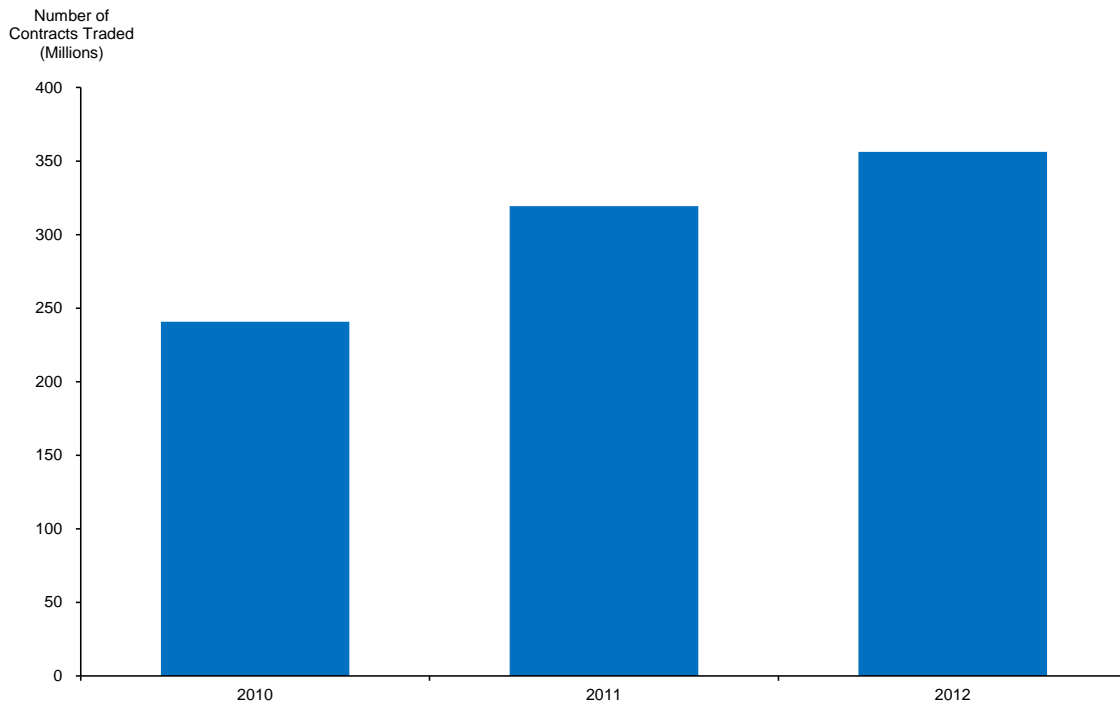
**FIGURE 2: FORM 552 TOTAL VOLUME BY YEAR
2008–2012**



Source: FERC Form 552 submissions as of May 15, 2013
 Note: One tBtu equals 1 million mmBtu.

Unlike the decrease in volume reported to FERC, the aggregate number of North American futures, options, and cleared over-the-counter (OTC) natural gas contracts on ICE increased by more than 11 percent from 2011 to 2012. During 2012, 356 million North American natural gas contracts traded, 48 percent more than the 2010 level of 241 million contracts (Figure 3).¹⁵

FIGURE 3: ICE NORTH AMERICAN NATURAL GAS FUTURES, OPTIONS, AND CLEARED OTC CONTRACTS 2010–2012

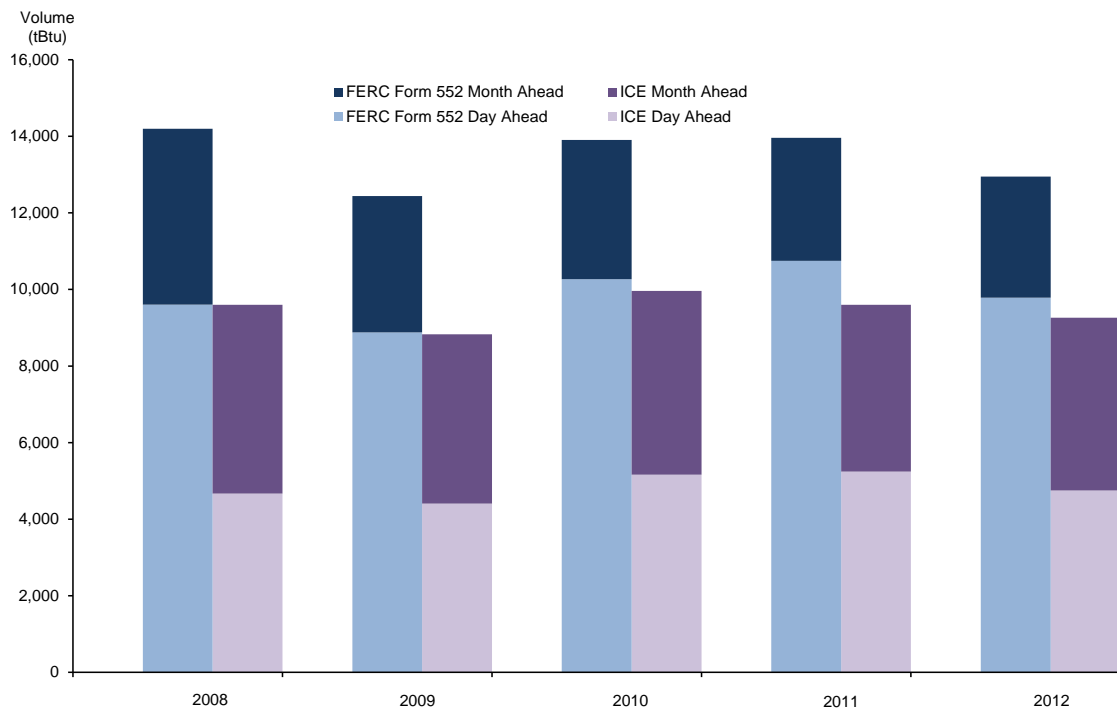


Source: ICE 2012 Form 10-K

Note: Due to ICE's conversion of swaps to futures in October 2012, the ICE 10-K reports an aggregated total of natural gas futures, options, and cleared OTC contracts. In its 2012 10-K, ICE provides comparable totals for 2011 and 2010 to reflect the 2012 reclassification.

In addition to the aggregate number of contracts traded, ICE reports the volumes of fixed-price physical transactions, which form the bases of price-index calculations. The price of a fixed-price physical transaction is set at the time the transaction is agreed upon rather than by the value of an index at the time the trade is executed. These fixed-price physical volumes from ICE provide a comparison against a portion of the Form 552 data. On average, the volume of fixed-price physical transactions reported by ICE from 2008 to 2012 represents approximately 70 percent of the Form 552 volume (Figure 4).¹⁶ Both ICE transaction volumes and FERC Form 552 submissions show physical transaction volumes have remained relatively flat since 2008.

FIGURE 4: TOTAL VOLUME OF FERC FORM 552 FIXED-PRICE TRANSACTIONS AND ICE-PUBLISHED FIXED-PRICE NATURAL GAS TRANSACTIONS 2008–2012



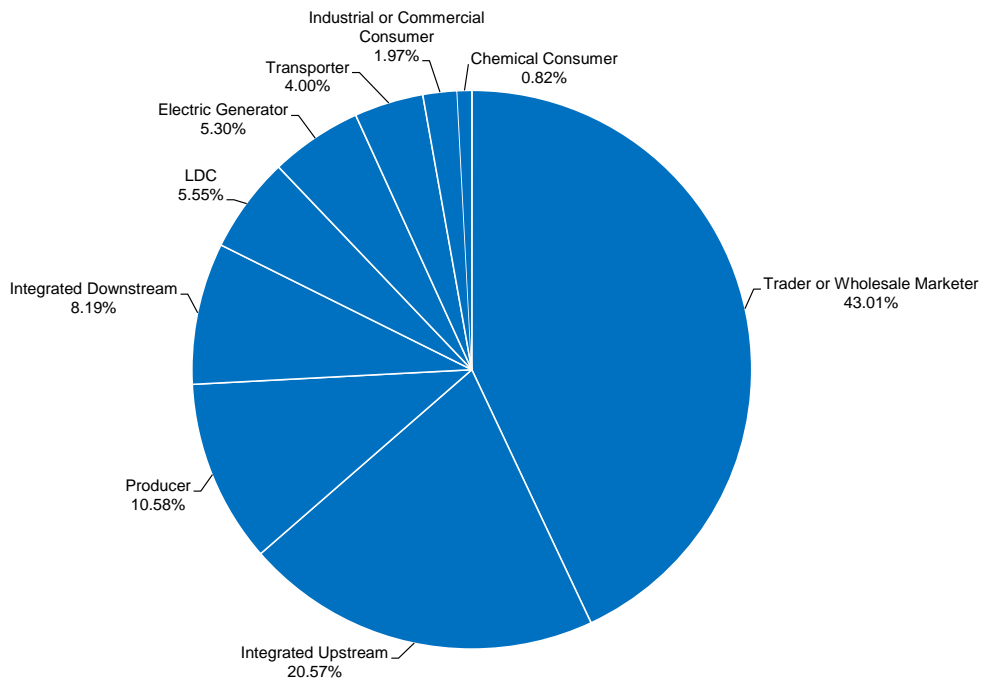
Source: FERC Form 552 submissions as of May 15, 2013; ICE
 Note: All contracts are fixed-price contracts. ICE fixed-price month-ahead volumes are reported as delivery per day and are multiplied by 30 to reflect total monthly volume. FERC fixed-price month-ahead volumes are reported as monthly volume. One tBtu equals 1 million mmBtu.

While overall trading volumes on ICE have shown relatively high annual growth rates, the volume of natural gas delivered to consumers has grown at a slower rate. The EIA reports that approximately 23,932 million mmBtu of gas were delivered to consumers in 2012, an increase of approximately 9 percent since 2008.¹⁷ When compared against the transaction volumes, the level of 2012 deliveries to consumers suggests that each molecule of natural gas passes through approximately 2.63 transactions¹⁸ from production to consumption.

NATURAL GAS MARKET PARTICIPANTS

The large integrated-upstream and integrated-downstream companies and the traders or wholesale marketers accounted for approximately 72 percent of the Form 552 physical natural gas volume (Figure 5). In contrast, industrial or commercial consumers and chemical consumers accounted for only 2.8 percent of the Form 552 volume. These percentages have remained relatively consistent over the past five years. In 2008, the large integrated companies and the traders or wholesale marketers accounted for 73 percent of the volume.

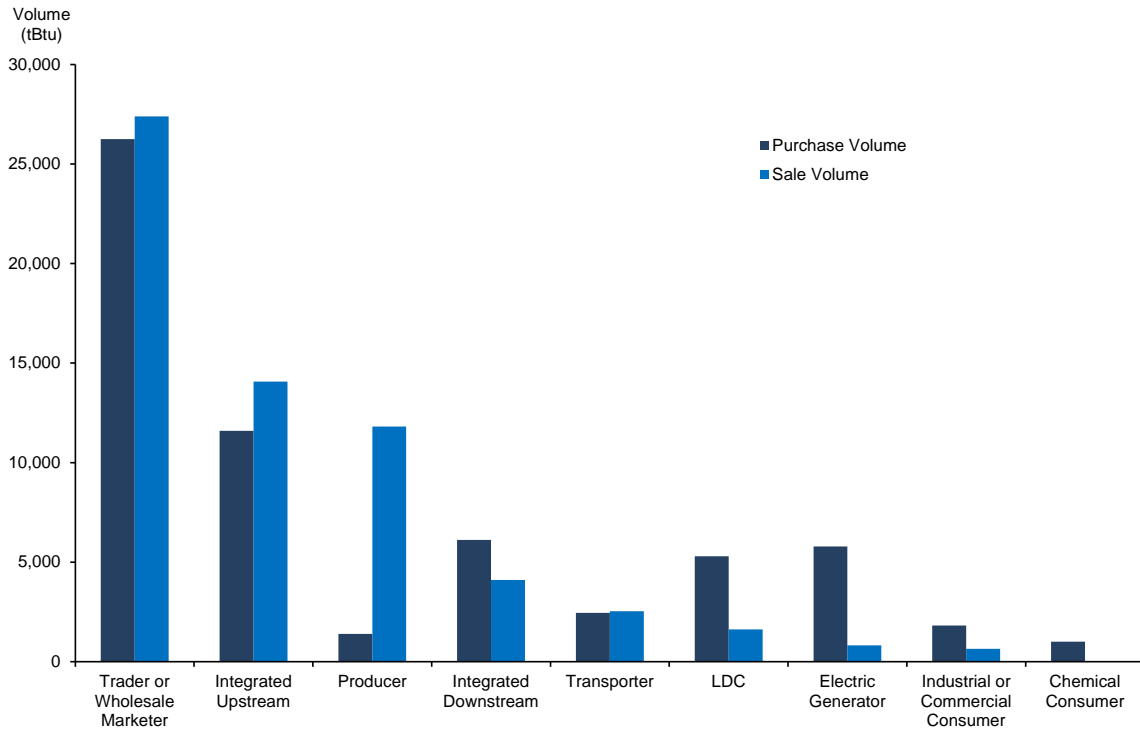
FIGURE 5: BREAKDOWN OF FORM 552 TRANSACTION VOLUME BY COMPANY CATEGORY 2012



Source: FERC Form 552 submissions as of May 15, 2013
 Note: Percentages may not add up to 100 percent due to rounding.

The breakdown of Form 552 purchases and sales by company category (Figure 6) shows, not surprisingly, that the integrated-upstream companies and the producers sold more than they purchased, while LDCs, electric generators, industrial or commercial consumers, and chemical consumers purchased significantly more than they sold. Consistent with their business models, traders or wholesale marketers purchased and sold approximately equal amounts.

FIGURE 6: FORM 552 PURCHASE AND SALE VOLUME BY COMPANY CATEGORY 2012



Source: FERC Form 552 submissions as of May 15, 2013
 Note: One tBtu equals 1 million mmBtu.

The top twenty companies, ranked by total transaction volume (Figure 7), accounted for 57,877 million mmBtu out of 124,738 million mmBtu, or 46 percent of volume reported on Form 552 submissions. Since 2008, the top twenty companies have accounted for approximately 50 percent of the physical natural gas volumes reported on Form 552 submissions. BP Energy Company had the largest physical volumes for the fifth consecutive year at 8,037 million mmBtu (up approximately 6 percent from 2011), exceeding ConocoPhillips Company (6,200 million mmBtu) by 1,837 million mmBtu. In general, the Form 552 data continue to show that the U.S. natural gas market is an unconcentrated industry, with a large number of diverse participants.

**FIGURE 7: TOP TWENTY COMPANIES BY TOTAL FORM 552 VOLUME
2012**

(Sorted by Total 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 ²
BP Energy Company	Y	3,844	4,194	-350	8,037	2,214
ConocoPhillips Company	Y	2,951	3,249	-299	6,200	1,525
Shell Energy North America, (US) L.P.	Y	2,442	2,661	-219	5,103	1,216
Macquarie Energy LLC	Y	2,304	2,352	-48	4,656	1,581
EDF Trading North America, LLC	N	1,802	1,822	-20	3,624	982
Chevron U.S.A. Inc.	Y	1,489	1,639	-150	3,127	646
J.P. Morgan Ventures Energy Corporation	N	1,592	1,336	256	2,928	761
AGL Resources Inc.	Y	1,552	1,304	248	2,857	1,669
Tenaska Marketing Ventures	Y	1,495	1,338	157	2,833	987
BG Energy Merchants, LLC	Y	1,228	1,390	-161	2,618	830
Natural Gas Exchange Inc.	N	1,031	1,031	0	2,061	1,109
Total Gas & Power North America, Inc	Y	947	1,100	-153	2,047	821
Enterprise Products Partners L.P.	N	999	855	144	1,854	395
Citigroup Energy Inc.	Y	780	853	-73	1,633	543
CenterPoint Energy, Inc.	N	869	609	260	1,477	157
Chesapeake Energy Corporation	N	92	1,337	-1,245	1,429	82
Anadarko Petroleum Corporation	Y	224	1,202	-978	1,426	150
Occidental Energy Marketing, Inc.	N	638	729	-91	1,367	447
Pacific Summit Energy, LLC	N	672	686	-15	1,358	678
Energy Transfer Partners, L.P.	Y	574	669	-95	1,244	355
Top Twenty Companies by Total Volume		27,521	30,355	-2,834	57,877	17,149
All Other Companies		34,190	32,671	1,518	66,861	17,064
Total for All Companies		61,711	63,027	-1,316	124,738	34,213

Source: FERC Form 552 submissions as of May 15, 2013

Note:

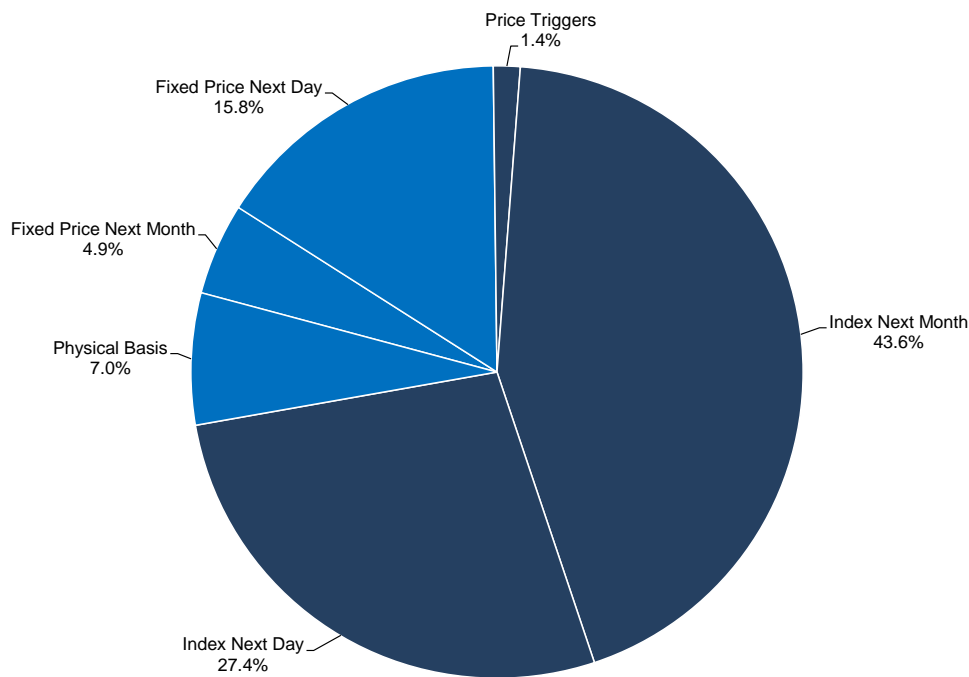
1. Numbers may not add up to totals due to rounding.
2. Volume Reportable to Indices includes the sum of fixed-price next-month purchases and sales, fixed-price next-day purchases and sales, and physical-basis transaction volume reported on Form 552.

TRANSACTION TYPES

Among the different transaction types covered by Form 552, next-month gas transactions (48.5 percent) accounted for a larger portion of volume than next-day gas transactions (43.2 percent).

Index-price transactions constituted the majority of transactions covered by Form 552; 72 percent¹⁹ of the Form 552 transaction prices depended on an index (Figure 8).²⁰ The monthly index played an important role in price formation in almost half (43.6 percent) of the Form 552 transactions. Fixed-price next-month transactions and physical-basis transactions each accounted for only around 5 to 7 percent of the transactions covered by Form 552. Price triggers accounted for less than 2 percent of Form 552 transaction volume and were targeted primarily at industrial or commercial consumers, which accounted for a small amount of purchase and sales volume.

FIGURE 8: BREAKDOWN OF FORM 552 TRANSACTION VOLUME BY TRANSACTION TYPE 2012



Source: FERC Form 552 submissions as of May 15, 2013
 Note: Percentages may not add up to 100 percent due to rounding.

Although these results may suggest that the index-price transactions account for the majority of OTC natural gas transactions, it is important to remember that the Form 552 data do not cover all of the transactions in the OTC market. Since Form 552 excludes certain types of non-index-price transactions, less than 72 percent of the entire market is made up of index-price transactions. Without additional data, however, it is impossible to quantify the volume of excluded transactions.

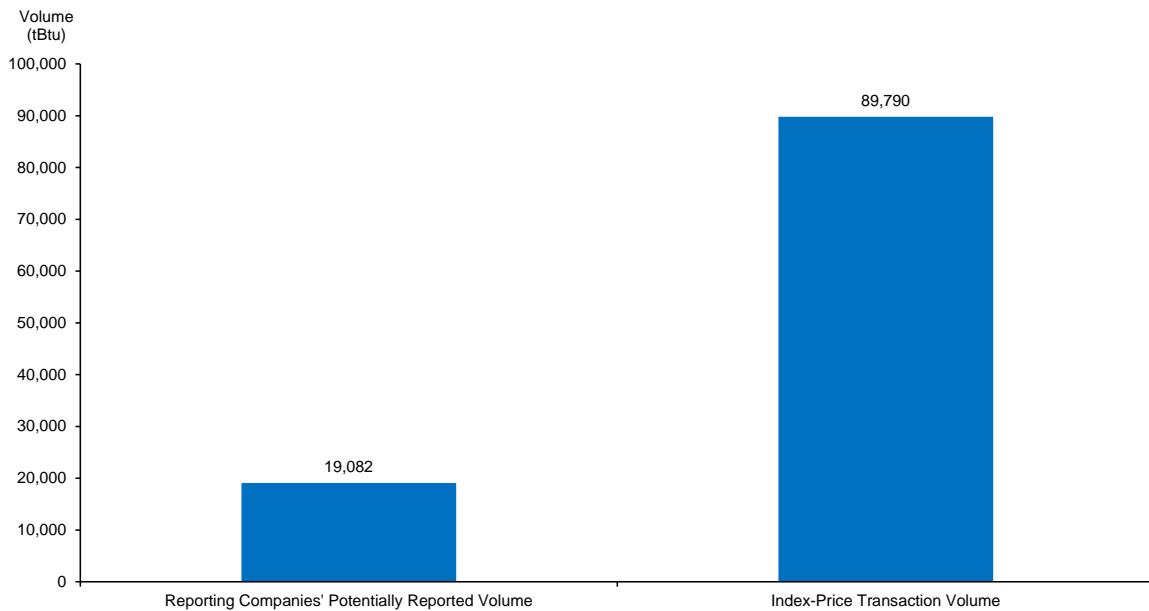
VOLUME AND DEPTH OF REPORTING TO PRICE-INDEX PUBLISHERS

In Order 704, FERC commented that understanding the relative sizes of the volume of index-price transactions and reporting-eligible, fixed-price transactions was a core purpose of the Form 552 submissions:

[T]o 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.²¹

The data show that the volume of transactions dependent on the indices was more than four times larger than the volume of transactions that formed the indices.²² These volumes (Figure 9) were influenced not only by the volume of index-price transactions reported in Form 552 submissions but also by the number of companies that report transaction information to the price-index publishers.

FIGURE 9: FORM 552 VOLUMES POTENTIALLY REPORTED TO INDICES VERSUS VOLUMES PRICED BASED ON INDICES 2012

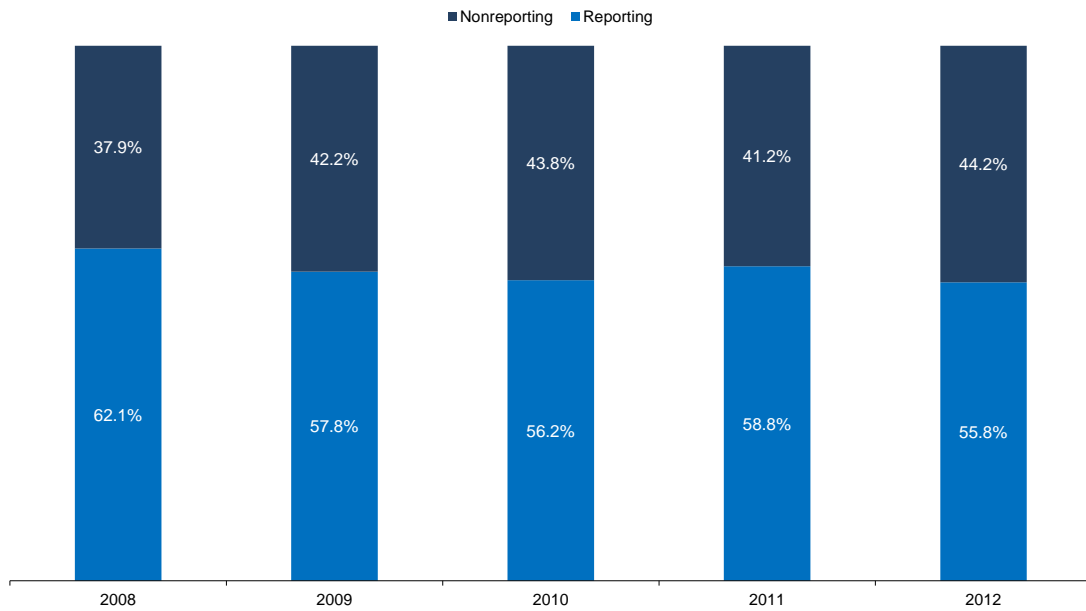


Source: FERC Form 552 submissions as of May 15, 2013

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. One tBtu equals 1 million mmBtu.

The majority of the companies that submitted a Form 552 did not report to the price-index publishers at all. Of the 665 Form 552 respondents, only 116 indicated that they had at least one affiliate that reported transaction information to the price-index publishers. These reporting companies, however, accounted for the majority (56 percent) of the reporting-eligible, fixed-price volume in 2012 (Figure 10). This percentage of reporting companies has remained stable over time, ranging between 56 and 62 percent since 2008.

FIGURE 10: BREAKDOWN OF REPORTABLE FORM 552 VOLUME BY REPORTING VERSUS NONREPORTING COMPANIES 2008–2012

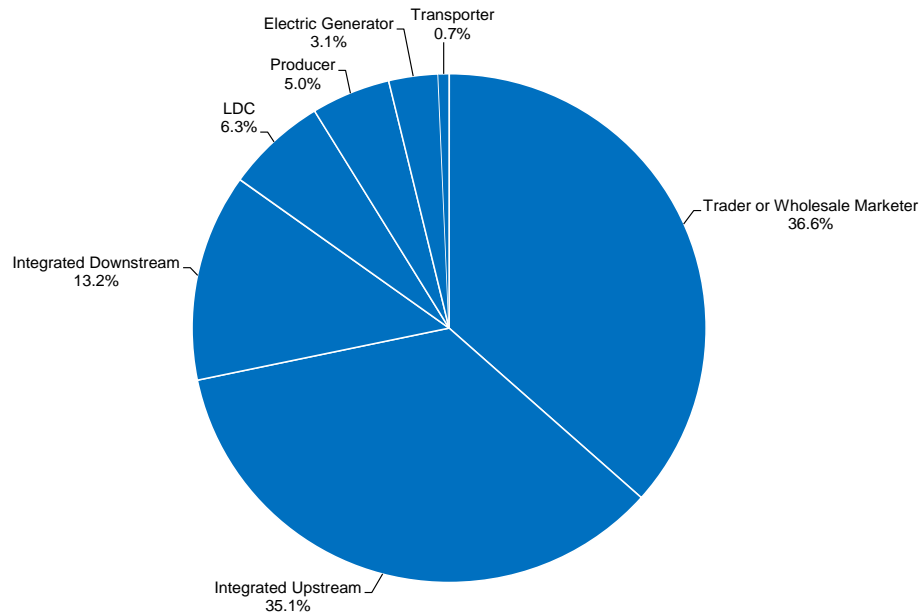


Source: FERC Form 552 submissions as of May 15, 2013

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.

Among the companies that reported to the price-index publishers, integrated-upstream companies, integrated-downstream companies, and traders or wholesale marketers accounted for approximately 85 percent²³ of the reportable volume (Figure 11). Further, among the top twenty reporting companies, twelve reported to index publishers, which accounted for 66 percent²⁴ of the reporting-eligible volume at reporting companies.

FIGURE 11: BREAKDOWN OF REPORTING-ELIGIBLE TRANSACTION FORM 552 VOLUME BY COMPANY TYPE EXCLUDING NONREPORTING COMPANIES
2012

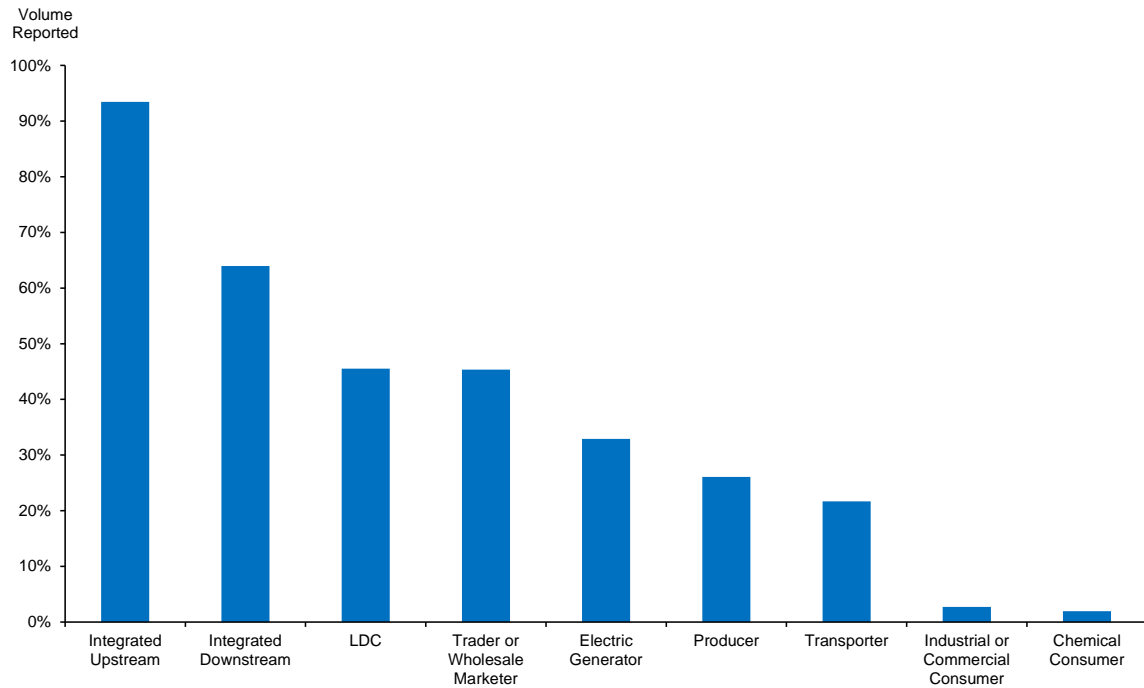


Source: FERC Form 552 submissions as of May 15, 2013

Note: Industrial or commercial consumer and chemical consumer companies reported less than 0.05 percent of reportable volume and are not included. Percentages may not add up to 100 percent due to rounding.

There was significant disparity in the proportion of transaction volume reported by the various industry segments (Figure 12). Only four chemical consumers indicated that they reported to the price-index publishers, whereas twenty-three traders or wholesale marketers reported to the price-index publishers.

FIGURE 12: PERCENTAGE OF FORM 552 VOLUME POTENTIALLY REPORTED BY COMPANY CATEGORY 2012

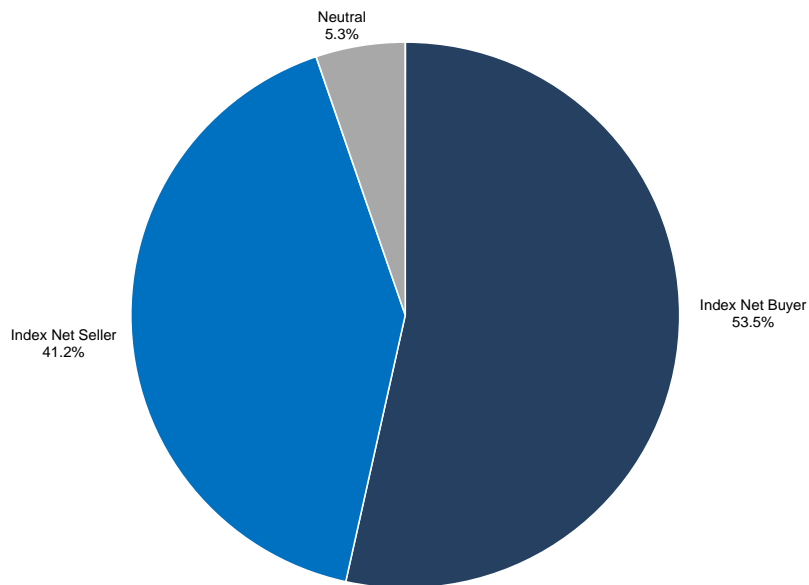


Source: FERC Form 552 submissions as of May 15, 2013

Note: Of the 665 respondents in 2012, 116 indicated they reported transaction information to price-index publishers for themselves or at least one affiliate.

The disparity between industry segments reporting transaction information to the price-index publishers may cause concern that the basis for the price indices might arise predominantly from segments that have either long or short exposure to the published indices. These data suggest that, at least on an aggregate level, this may be the case in 2012. From 2008 to 2010, the proportion of reported volume by net buyers and net sellers was roughly equal. In 2011, the difference between the proportion of net buyers and net sellers that report to the price-index publishers exceeded 20 percent for the first time. The gap declined by 9 percentage points in 2012, with net buyers reporting 54 percent of transactions and net sellers reporting 41 percent (Figure 13).

FIGURE 13: BREAKDOWN OF REPORTABLE FORM 552 VOLUME BY INDEX NET BUYERS AND INDEX NET SELLERS 2012



Source: FERC Form 552 submissions as of May 15, 2013

Note: Reportable volume to price-index publishers 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. Index-price transactions include index-price next-month purchases and sales, index-price next-day purchases and sales, and trigger agreements. Index net buyers are identified as companies that purchase more index-price transactions than they sell. Percentages may not add up to 100 percent due to rounding.

ICE NATURAL GAS DATA

As discussed, ICE publishes information on the transactions that form the bases for its indices, including total volume, the number of transactions, and the number of counterparties per month for next-month gas trades and per day for next-day gas trades.²⁵

In 2012, ICE published a total of 122 gas hub locations with month-ahead prices and 155 hubs with day-ahead prices.²⁶ The three most active hubs in 2012 by volume for month-ahead transactions were TCPL-Alberta in Canada, Henry Hub in Louisiana, and Dominion-South on the East Coast (Figure 14).

**FIGURE 14: TOP TEN HUBS BY VOLUME
ICE MONTH-AHEAD INDEX
2012**

Hub Name	Years in Top Ten (2008–2012)	Average Volume per Month (mmBtu)	Average Number of Deals per Month	Average Number of Counterparties per Month
TCPL-Alberta F/B Price	Since 2008	51,806,550	12,083	1,059
Henry ¹	2012	22,961,913	203	190
Dominion-South	Since 2010	17,507,438	2,030	953
NGPL-TXOK	Since 2008	14,698,868	2,208	723
Union Gas	Since 2008	12,972,583	2,885	654
Col Gas TCO	Since 2010	11,958,153	1,285	848
Panhandle Eastern Pipe Line Co.	2008–2010, 2012	10,136,595	2,223	708
Chicago Citygates	2008–2009 2011–2012	9,701,415	1,620	463
Texas Eastern Transmission Corp.	2009, 2012	8,831,355	1,328	748
TransCo-Station 85	2010	8,685,800	853	635

Source: ICE

Note:

1. Listed as Henry Hub in day-ahead data and as Henry Hub (IHT) in month-ahead data.

The three most active hubs by volume for day-ahead transactions in 2012 were Columbia Gas Transmission Company (Col Gas TCO) in Pennsylvania, Pacific Gas & Electric (PG&E)-Citygate in California, and Henry Hub in Louisiana (Figure 15). Henry Hub is a principal natural gas trading hub in North America, with connections to nine interstate and four intrastate pipelines.²⁷ Henry Hub serves as the delivery point for the U.S. natural gas futures contract traded on the New York Mercantile Exchange (NYMEX).²⁸

**FIGURE 15: TOP TEN HUBS BY VOLUME
ICE DAY-AHEAD INDEX
2012**

Hub Name	Years in Top Ten (2008–2012)	Average Volume per Day (mmBtu)	Average Number of Deals per Day	Average Number of Counterparties per Day
Col Gas TCO	Since 2008	766,129	126	46
PG&E-Citygate	Since 2008	762,154	88	29
Henry ¹	Since 2008	694,658	89	31
Chicago Citygates	Since 2008	657,723	104	33
Dominion-South	Since 2010	654,129	113	42
Socal-Citygate	2012	599,410	65	25
CG-Mainline	Since 2009	576,191	92	40
Transco-85	2010, 2012	520,298	77	33
NGPL-TXOK	Since 2008	494,966	78	34
SoCal Border	2008, 2011–2012	486,858	56	20

Source: ICE

Note:

1. Listed as Henry Hub in day-ahead data and as Henry Hub (IHT) in month-ahead data.

Over the last four years, the geographic concentration of trading has evolved. The increased volumes for Col Gas TCO in Pennsylvania and PG&E-Citygate in California, which surpassed Henry Hub as the most active daily transaction hubs in 2012, were likely due to the shifting geographic patterns of natural gas consumption and production.²⁹ Pennsylvania's natural gas production increased 69 percent from 2011 to 2012, largely due to the accelerated drilling activity in the Marcellus Shale Formation in recent years.³⁰ Large backlogs of wells drilled in previous years were connected to pipeline and processing infrastructure in 2012. The increase in volume in California is explained by demand-side market developments, as the state obtains the majority of its natural gas from out-of-state sources.³¹ The boom in natural-gas production is not limited to the United States. Canada is the world's third-largest producer and fourth largest exporter of natural gas; currently, Canada sends all of its natural gas exports to the United States in pipelines. New export prospects for Canada are emerging as plans to export liquefied natural gas (LNG) develop.³²

The level of activity and the number of participants varied significantly across hubs, with the most active hub attracting many times the number of deals and number of market participants attracted by the least active hubs (Figure 16). For the day-ahead contracts in 2012, the highest-volume quartile had approximately twenty-one times the average daily volume of the lowest-volume quartile, twenty times the number of deals, and eight times the average number of counterparties. For the month-ahead contracts, the most active quartile had approximately forty times the average monthly volume as the smallest quartile, twenty-four times the number of deals, and six times the average number of counterparties. The disparity across quartiles underscores the variability across natural gas hubs in North America.

FIGURE 16: AVERAGE VOLUME, NUMBER OF DEALS, AND COUNTERPARTIES PER MONTH PER HUB BY QUARTILE 2012

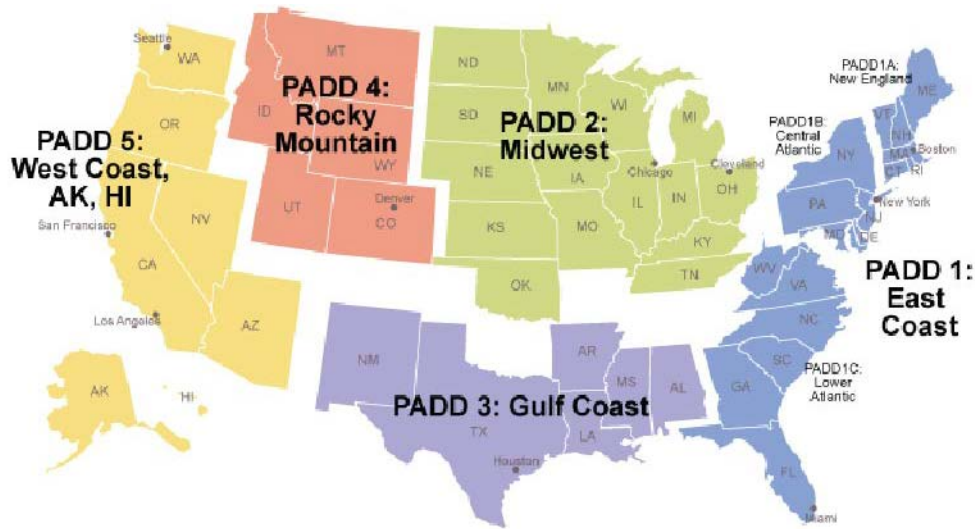
Total Volume Quartiles	ICE Day Ahead				ICE Month Ahead			
	Number of Hubs	Average Volume per Day per Hub (mmBtu)	Average Number of Deals per Day per Hub	Average Number of Counterparties per Day per Hub	Number of Hubs	Average Volume per Month per Hub (mmBtu)	Average Number of Deals per Month per Hub	Average Number of Counterparties per Month per Hub
Quartile 1	40	16,768	2.7	3.1	30	242,005	2.1	2.9
Quartile 2	40	35,828	6.9	6.6	29	803,522	4.9	5.5
Quartile 3	40	95,829	17.2	12.5	29	2,669,907	14.5	10.2
Quartile 4	40	353,128	56.2	26.1	29	9,614,682	50.6	18.5

Source: ICE

Note: Quartiles are based on total volume (in mmBtu) sold under day-ahead and month-ahead contracts at each hub.

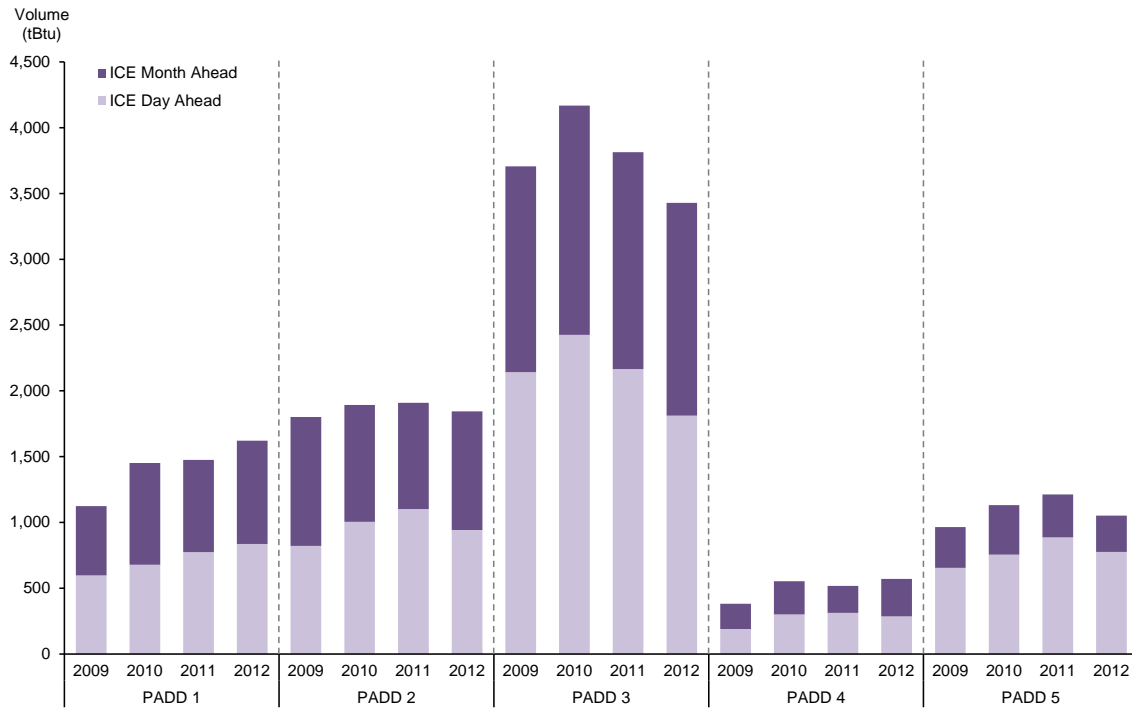
The distribution of natural gas trading volume in the United States can also be analyzed using the Petroleum Administration for Defense Districts (PADDs) as defined by the EIA (Figure 17).³³ PADD 1 is the East Coast, PADD 2 is the Midwest, PADD 3 is the Gulf Coast, PADD 4 is the Rocky Mountain, and PADD 5 is the West Coast (including Alaska and Hawaii).³⁴ Generally, PADD 3 has had the largest volume (Figure 18).³⁵ The volume represented by day-ahead transactions was more than the volume represented by month-ahead transactions in all PADDs in 2012, but this did not hold for all PADDs from 2009 to 2011.³⁶

FIGURE 17: PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS



Source: EIA

FIGURE 18: ICE PHYSICAL NATURAL GAS TRADED VOLUME BY MONTH-AHEAD AND DAY-AHEAD CONTRACTS 2009–2012



Source: ICE

Note: ICE natural gas data include both physical OTC day-ahead and month-ahead data. ICE fixed-price month-ahead volumes are reported as delivery per day and are multiplied by 30 to reflect total monthly volume. One tBtu equals 1 million mmBtu.

CONCLUSION

While much of the breakdown of the market by company or transaction type has remained relatively stable over the past four years, the upward trend in volume that was present from 2009 to 2011 decreased in 2012. However, natural gas contracts traded on ICE increased more than 11 percent from 2011 to 2012. The U.S. natural gas industry remains unconcentrated, with a large number of diverse participants. The top twenty transacting companies by volume account for less than half of the transaction volume covered in the Form 552 submissions.

As reported in the Form 552 submissions, fixed-price natural gas transactions used to set the index account for less than a quarter of the volume of natural gas transactions based on the index, a relationship which has remained relatively stable over time. While the proportion of net buyers and net sellers in 2011 diverged by 20 percent, this gap narrowed by 9 percentage points in 2012, resulting in almost 13 percent more volume reported by buyers than sellers.

A comparison of fixed-price physical transactions reported in the company-level Form 552 submissions and hub-level ICE data shows that the average proportion of fixed-price physical transactions reported by ICE from 2008 to 2012 represents approximately 70 percent of the Form 552 volume. The top quartile of hubs reported by ICE has twenty-one times the average daily day-ahead volume and forty times the average monthly month-ahead volume of the bottom quartile of hubs. The disparity across quartiles underscores the variability across natural gas hubs in North America.

PREVIEW OF 2013

Trading in natural gas futures contracts in the first half of 2013 continues to trend up, reaching all-time highs on the NYMEX, the main U.S. natural gas futures market. The NYMEX natural gas futures contract volume increased from 2,363 million mmBtu in the first quarter of 2012 to 6,630 million mmBtu in the first quarter of 2013. The volume in the first quarter of 2013 has already exceeded the first quarter of 2012 by 180 percent.³⁷ Two major catalysts contributing to the increase in natural gas trading include the increase in U.S. shale natural gas production and the future prospects for LNG.

Europe has not shown the same upward trend in volume as the U.S. NYMEX natural gas futures contract. In the United Kingdom, natural gas futures contracts traded on ICE totaled 1,024 million mmBtu in the first quarter of 2013, a 165 million mmBtu decrease from the first quarter of 2012 (1,189 million mmBtu).³⁸

APPENDIX

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 million mmBtu 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.”³⁹ Order 704-A further clarifies that the latter category includes “bilateral, arms-length, fixed-price physical natural gas transactions between nonaffiliated companies at all trading locations.”⁴⁰

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

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,⁴¹ and physical-basis transactions.⁴² In addition to volumes of physical transactions, market participants are required to state whether or not they report transaction information to the price-index publishers.

ENDNOTES

- 1 EPAAct 2005, Section 316.
- 2 Ibid.
- 3 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.
- 4 The categorization process is necessarily judgmental and was based on company websites and financial filings. Companies were categorized as closely as possible to their most significant natural gas market activity.
- 5 Since these integrated companies typically have a focus at either the upstream (such as production, gathering, or processing) or downstream (such as electric generation, marketing to wholesale users, or industrial consumption) segments of the industry, two categories were created to allow for investigation of any differences between these types of companies.
- 6 EIA, U.S. Natural Gas Marketed Production (tBtu).
- 7 EIA, “Annual Energy Outlook 2013,” p. 79, [http://www.eia.gov/forecasts/aeo/pdf/0383\(2013\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf).
- 8 EIA, “U.S. Natural Gas Wellhead Price (Dollar per Thousand Cubic Feet),” <http://www.eia.gov/dnav/ng/hist/n9190us3a.htm>.
- 9 EIA, “U.S. Natural Gas Consumption by End Use (Million Cubic Feet [MMcf]),” http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.
- 10 EIA, “Annual Energy Outlook 2013,” p. 37, [http://www.eia.gov/forecasts/aeo/pdf/0383\(2013\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2013).pdf).
- 11 EIA, “U.S. Natural Gas Consumption by End Use (Million Cubic Feet [MMcf]),” http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm; EIA, “Natural gas use in the electric power sector is growing,” July 6, 2011, <http://205.254.135.7/todayinenergy/detail.cfm?id=2090#>.
- 12 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; express millions of this unit as mmBtu and trillions as tBtu.
- 13 There were 659 companies that submitted a Form 552 with non-zero volumes.
- 14 The minimum volume represented by Form 552 is the maximum of the buy and sale totals shown in Figure 7. The addition of the buy and sale volume can double count transactions if both the buyer and seller file a Form 552. Conversely, 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.
- 15 These aggregate figures from ICE represent both financial and physical natural gas contracts. ICE reports the total number of contracts, and the volume represented by each contract can vary in size. (IntercontinentalExchange 2011 and 2008 SEC Form 10-K, <http://ir.theice.com/secfiling.cfm?filingID=1193125-12-45255&CIK=1174746>).
- 16 Note that ICE transactions data are not strictly a subset of the Form 552 data, since they cover natural gas transactions not only in the United States but in all of North America, and may include smaller counterparties that do not meet the Form 552 reporting requirements.
- 17 EIA, “U.S. Natural Gas Consumption by End Use (Million Cubic Feet [MMcf]),” http://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm. Converted to tBtu from trillion cubic feet (Tcf). One cubic foot equals 1,023 Btu.
- 18 Calculated as minimum trading volume of 63,027 from Figure 7 divided by 23,932 EIA natural gas delivered, which equals 2.63.
- 19 Calculated based on Figure 8: Index Next-Day 27.4% + Index Next-Month 43.6% + Price Triggers 1.4% = 72.4%.
- 20 For the purposes of this discussion, price-trigger agreements are considered to be dependent on an index because they are, at inception, often priced based on an index. Since they often convert to fixed prices, however, the buyer can ultimately end up paying a price that is no longer dependent on an index price. Further, the set of other index-price transactions likely includes purchases by industrial consumers with embedded price caps or associated hedges, so that the buyer ultimately does not end up paying a price determined by an index. Thus, the percentage of transactions with prices at settlement determined by an index price may be lower than these statistics suggest.
- 21 Order 704, p. 4.
- 22 Calculated based on Figure 8, volume potentially reported to index publishers divided by the volume of index-price transactions: $19,082 \div 89,790 = 21.2\%$.
- 23 Calculated as integrated downstream plus integrated upstream plus traders or wholesale marketers: $13.2\% + 35.1\% + 36.6\% = 84.9\%$.
- 24 Calculated based on Figures 7 and 9, top twenty companies with volume reportable to indices and an affiliate who reports to index publishers divided by total volume potentially reported to index publishers: $12,537 \div 19,082 = 66\%$.
- 25 ICE, “ICE Day Ahead Natural Gas Price Report,” <https://www.theice.com/marketdata/reports/ReportCenter.shtml#report/76>.
- 26 The totals include all unique natural gas hub indices reported by ICE. This total can vary from month to month since ICE does not report a price if no traders are recorded at a particular hub.
- 27 ICE, “ICE OTC Natural Gas,” https://www.theice.com/publicdocs/ICE_NatGas_Brochure.pdf.
- 28 CME Group, “Henry Hub Natural Gas Futures,” http://www.cmegroup.com/trading/energy/natural-gas/natural-gas_contract_specifications.html.

ENDNOTES (CONTINUED)

- 29 EIA, “Natural gas consumption reflects shifting sectoral patterns,” May 16, 2012, <http://www.eia.gov/todayinenergy/detail.cfm?id=6290>.
- 30 EIA, “Pennsylvania natural gas production rose 69% in 2012 despite reduced drilling activity,” March 21, 2013, <http://www.eia.gov/todayinenergy/detail.cfm?id=10471>.
- 31 California Energy Commission, “California Natural Gas Data and Statistics,” <http://energyalmanac.ca.gov/naturalgas/index.html>; EIA, “Natural Gas Summary” for California, http://www.eia.gov/dnav/ng/ng_sum_lsum_dcu_SCA_a.htm.
- 32 EIA, “Canada,” <http://www.eia.gov/countries/cab.cfm?fips=CA>.
- 33 EIA, “District Descriptions and Maps,” Appendix A to *Petroleum Supply Monthly*, March 2013, <http://www.eia.gov/petroleum/supply/monthly/pdf/append.pdf>.
- 34 PADD 1 includes Connecticut, Delaware, District of Columbia, Florida, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, and West Virginia. PADD 2 includes Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, Oklahoma, Tennessee, and Wisconsin. PADD 3 includes Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas. PADD 4 includes Colorado, Idaho, Montana, Utah, and Wyoming. PADD 5 includes Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington. (EIA, “District Descriptions and Maps,” Appendix A to *Petroleum Supply Monthly*, March 2013, <http://www.eia.gov/petroleum/supply/monthly/pdf/append.pdf>).
- 35 In 2008, PADD 5 surpassed PADD 1 by 158.8 tBtu.
- 36 The proportion of month-ahead transactions exceeded day-ahead transactions in PADD 1 in 2010, in PADD 2 in 2008 and 2009, and in PADD 4 in 2008 and 2009.
- 37 CME Group, “NYMEX/COMEX Exchange Volume Report—Monthly,” http://www.cmegroup.com/wrappedpages/web_monthly_report/Web_Volume_Report_NYMEX_COMEX.pdf. Figures based on the volume of NYMEX Henry Hub Natural Gas Penultimate Financial Futures, NYMEX Henry Hub Natural Gas Last Day Financial Futures, and NYMEX E-Mini Natural Gas Futures. The former two NYMEX securities are full-size (10,000 mmBtu) contracts, and the latter is a mini (2,500 mmBtu) contract.
- 38 ICE, “ICE Futures Europe Volumes,” <https://www.theice.com/marketdata/reports/ReportCenter.shtml#report/7>. The ICE natural gas contract is traded in 5,000 therms per contract, which is equivalent to 500 mmBtu (1mmBtu = 10 therms).
- 39 FERC Form 552 (2009 version). Note that Form 552 covers only physical natural gas transactions. Financial transactions, such as swaps and options, are excluded, as are futures contracts, whether or not they are taken to physical delivery.
- 40 Order 704-A, p. 9.
- 41 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.
- 42 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.

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The authors request that you reference Cornerstone Research in any reprint of the figures or information included in this study and include a link to the report: www.cornerstone.com/FERC-Form-552-Submissions-May-2013.

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