

CORNERSTONE RESEARCH

Characteristics of U.S. Natural Gas Transactions

Insights from FERC Form 552 Submissions

As of May 15, 2012

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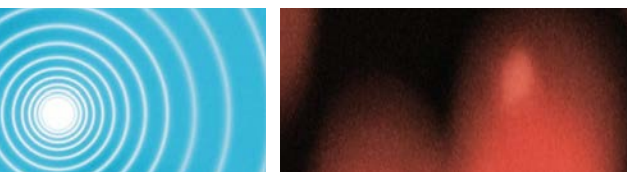
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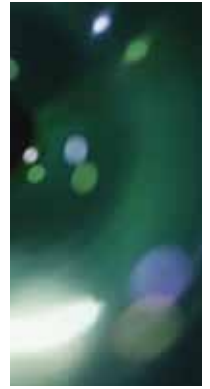
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INTRODUCTION

Cornerstone Research has analyzed the Federal Energy Regulatory Commission's (FERC's) 2011 data on U.S. natural gas transaction activity as supplemented by our proprietary classifications of market participants. FERC collects and publishes the Form 552 submissions as part of its effort to increase the availability of information on trading activity and price formation in the U.S. natural gas market. The data provide the most comprehensive view available of the over-the-counter (OTC) natural gas market. Cornerstone Research's analysis and enhancement of the FERC 552 data provide insight into the pricing structure of the natural gas market.



SUMMARY OF 2011 RESULTS

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- The U.S. natural gas market has grown for the last two years. The total volume of natural gas transactions in 2011 was 8 percent higher than 2010 and 15 percent higher than 2009.
- The U.S. natural gas industry is unconcentrated with a large number of diverse participants. The top twenty transacting companies by volume account for slightly more than half of the transaction volume covered by the Form 552 submissions. Traders or Wholesale Marketers continued to report the largest transaction volumes, accounting for approximately 41 percent of transactions.
- The share of transactions based on index prices increased from approximately 69 percent in 2008 to 72 percent in 2011. These estimated 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 at least 2.96 transactions from production to consumption.
- Of the 686 respondents in 2011, 126 reported transaction information to the price index publishers for at least one affiliate. Only 59 percent of the reporting-eligible volume is transacted by companies that report to the price index publishers.
- Reporting to price index publishers is not consistent across industry segments. Integrated-Upstream and Integrated-Downstream companies and Traders or Wholesale Marketers report the majority of eligible volume to the price index publishers whereas Industrial or Commercial Consumers and Chemical Consumers report less than 10 percent of their eligible volume.
- Participants in upstream industry segments are more likely to be net sellers while participants in downstream segments are more likely to be net buyers. 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, with net buyers reporting 58 percent of transactions and net sellers reporting 37 percent.

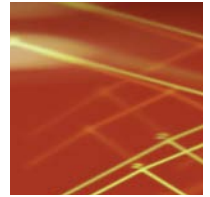
BACKGROUND

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 704A, which governs 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 704C, which provides for slightly revised reporting rules that ease some reporting requirements.³ For 2011 natural gas transactions, Form 552 submissions covered 686 firms.

The data contained on the Form 552 submissions, described more fully in the appendix to this report, 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 its own proprietary research that classifies the respondent companies by industry segments. These industry segments are Municipality, 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



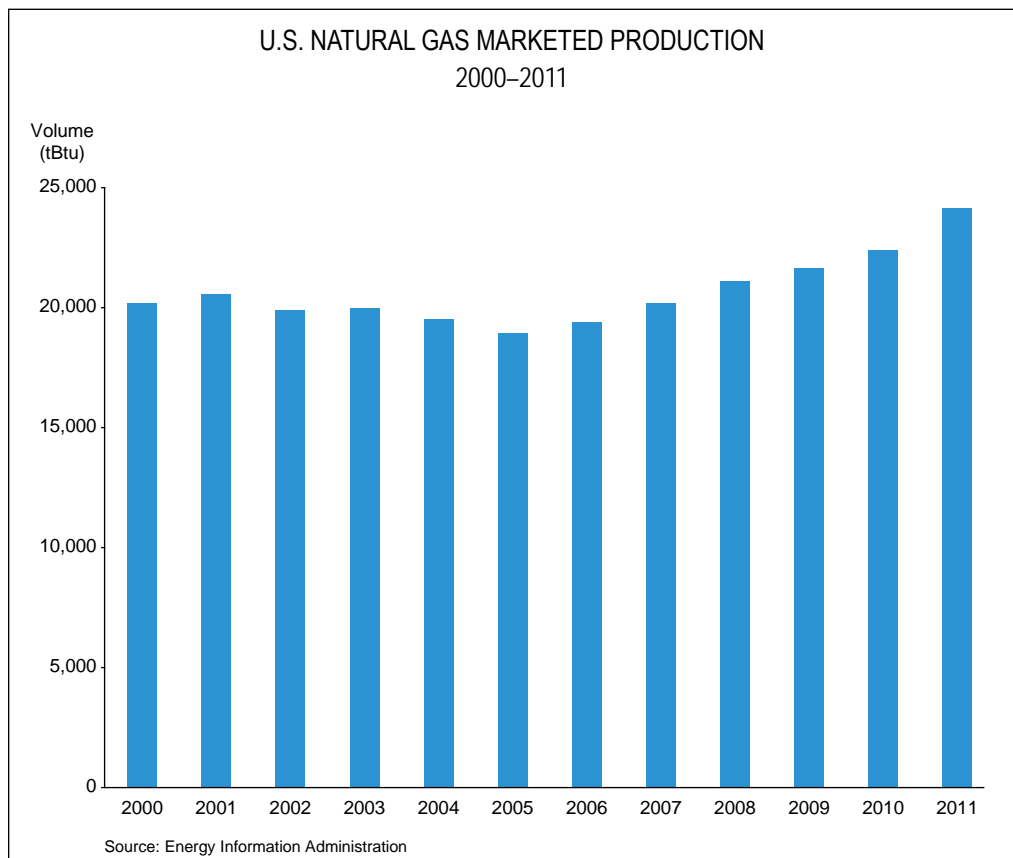


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RESULTS FROM THE 2011 SUBMISSIONS

There has been a recent revival in natural gas production in the United States, with annual marketed production increasing by 28 percent from 2005 to 2011 (Figure 1).⁶ This increase is due to the development and expansion of shale natural gas production, which the Energy Information Administration (EIA) predicts will increase from 23 percent to 49 percent of U.S. natural gas production over the next twenty-five years. 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

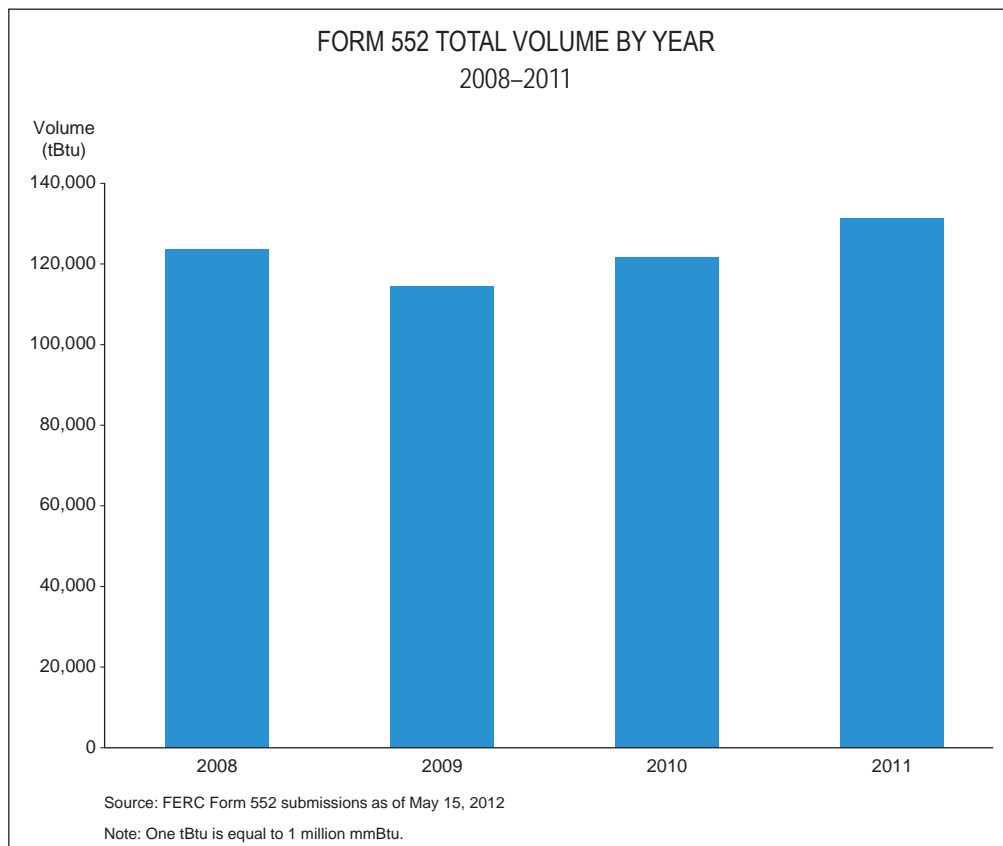


This increase in domestic natural gas production has resulted in decreasing prices and efforts to find innovative ways to use natural gas. From 2005 to 2011, for example, wellhead prices decreased by 46 percent⁸ while the use of natural gas to fuel vehicles increased by 44 percent as natural gas users sought alternatives to higher priced gasoline and diesel.⁹ Waste collection and transfer vehicles represent one of the fastest-growing segments of natural-gas-powered vehicles. Nearly 40 percent of waste collection vehicles purchased in 2011 were powered by natural gas.¹⁰ Natural gas is also increasingly used as an alternative to coal-powered electricity generation, growing by 30 percent from 2005 to 2011.¹¹

Market Volumes and Participants

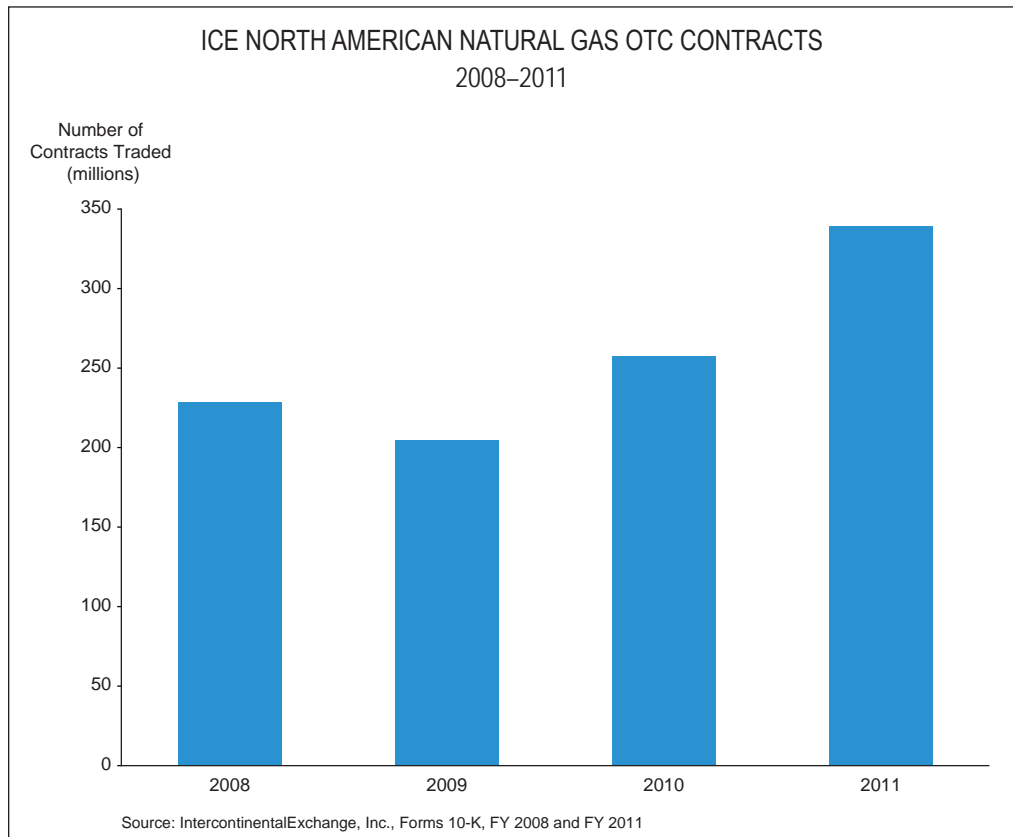
The transactions reported in the Form 552 submissions total 131,436 million mmBtu¹² transacted by 686 companies.¹³ To the extent that both parties to a transaction submit a Form 552, the submissions will include double the volume of that transaction. For example, a trade for 10,000 mmBtus between two companies, each submitting a Form 552, will add 20,000 mmBtus to the total volume. Thus, these Form 552 volumes represent a minimum of 67,569 million mmBtu of trading volume.¹⁴ As shown in Figure 2, these trading volumes represent an 8 percent increase from 2010.

Figure 2



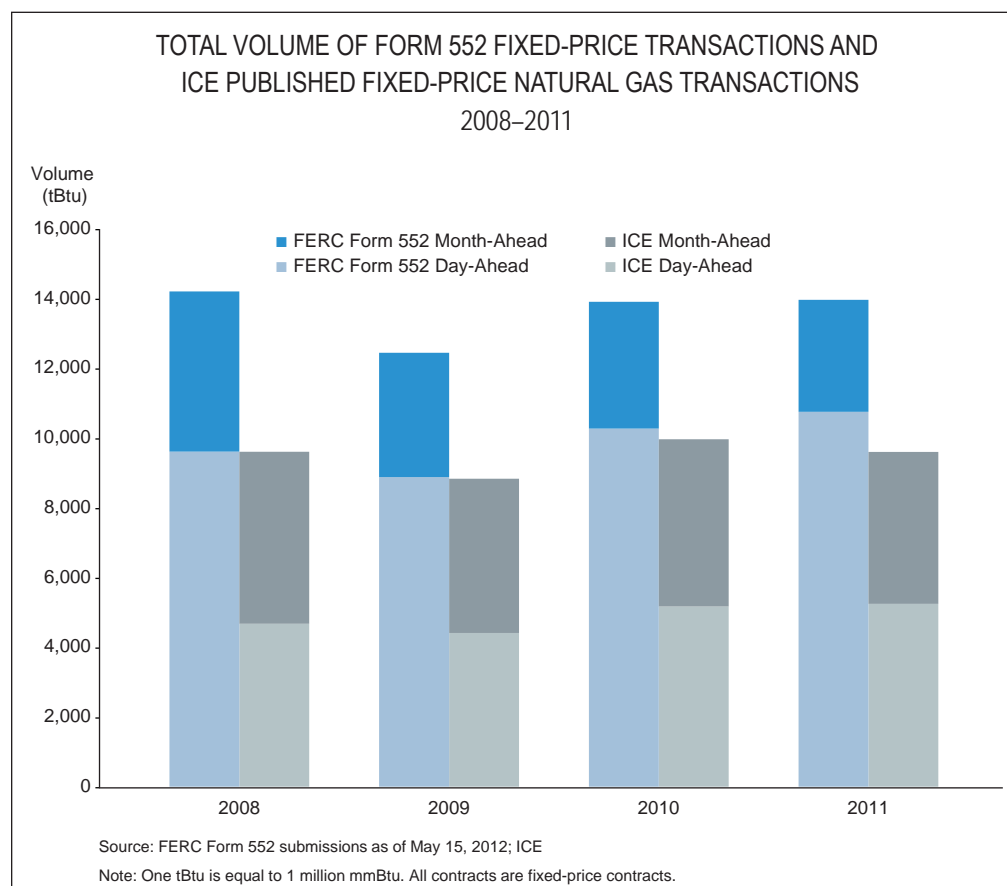
Aggregate North American OTC natural gas trading volumes on the Intercontinental-Exchange (ICE) show even stronger growth trends. During 2011, 339 million North American OTC natural gas contracts traded, an increase of almost 50 percent over the 2008 level of 229 million contracts (Figure 3).¹⁵

Figure 3



In addition to the aggregate number of contracts traded, ICE reports the volumes of fixed-price physical transactions, which form the basis of its price index calculations. The price of a fixed-price physical transaction is set at the time of the transaction agreement rather than by the value of an index. These fixed-price physical volumes from ICE provide a comparison against a portion of the Form 552 data. As shown in Figure 4, the average proportion of fixed-price physical transactions reported by ICE from 2008 to 2011 represent approximately 70 percent of the Form 552 volume.¹⁶ Both ICE transaction volumes and FERC Form 552 submissions show physical transaction volumes remaining relatively flat since 2008. The growth in the overall Form 552 volume since 2009 has occurred in both index-price transactions and fixed-price transactions used to calculate indices.

Figure 4



While overall trading volumes 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 22,813 million mmBtu of gas were delivered to consumers in 2011, an increase of approximately 5 percent since 2008.¹⁷ The level of 2011 deliveries to consumers suggests that each molecule of natural gas passes through a minimum of 2.96 transactions¹⁸ from production to consumption.



Natural Gas Market Participants

As shown in Figure 5, the large Integrated-Upstream and Integrated-Downstream companies and the Traders or Wholesale Marketers account for approximately 72 percent of the Form 552 physical natural gas volume. In contrast, Industrial or Commercial Consumers and Chemical Consumers account for only 2.3 percent of the Form 552 volume. These percentages have remained relatively consistent over the past four years. In 2008, the large integrated companies and the Traders or Wholesale Marketers accounted for 73 percent of the volume.

Figure 5

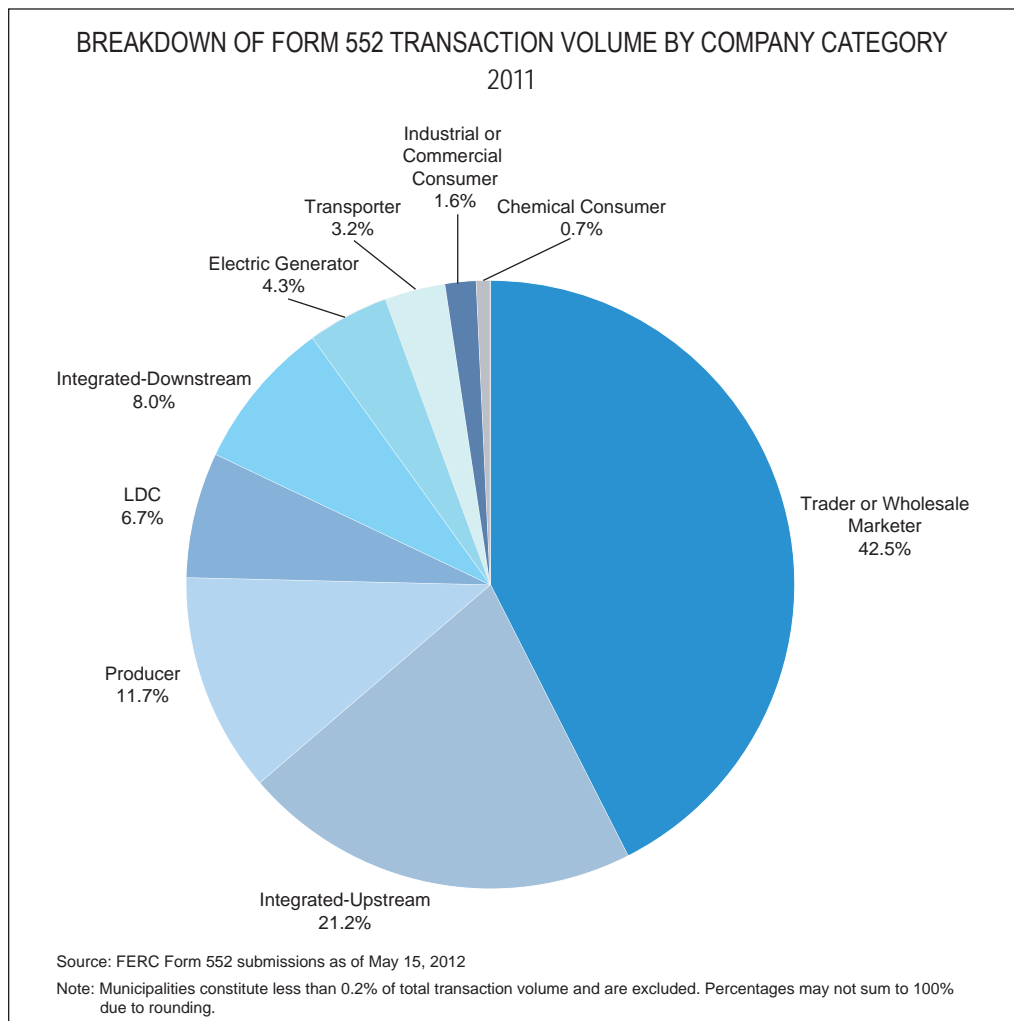
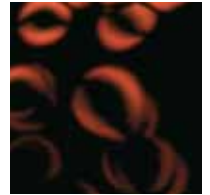
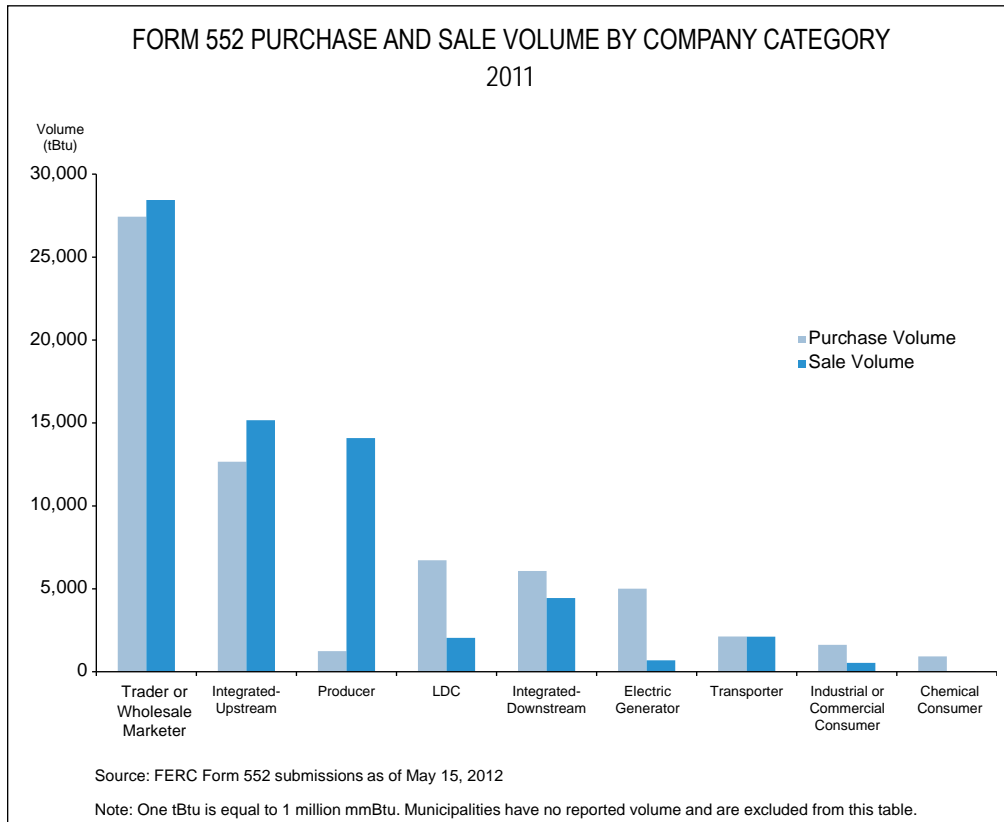


Figure 6 shows the breakdown of Form 552 purchases and sales by company category. Not surprisingly, the Integrated-Upstream companies and the Producers sell more than they purchase, while LDCs, Electric Generators, Industrial or Commercial Consumers, and Chemical Consumers purchase significantly more than they sell. Consistent with their business models, Traders or Wholesale Marketers purchase and sell approximately equal amounts.

Figure 6



As shown in Table 1, the top twenty companies, ranked by total volume, account for 63,233 million mmBtu out of 131,436 million mmBtu contained on all Form 552 submissions. Since 2008, the top twenty companies have accounted for approximately 50 percent of the physical natural gas volumes contained on all Form 552 submissions. BP Energy Company had the largest physical volumes for the fourth consecutive year at 7,609 million mmBtu (down 12 percent from 2010), exceeding ConocoPhillips Company (6,413 million mmBtu) by 1,196 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.

Table 1

TOP TWENTY COMPANIES BY TOTAL FORM 552 VOLUME¹

2011

(Sorted by Total Volume; Volume in tBtu = mil mmBtu)²

Company Name	Any Affiliates Report to Index Publishers	Total Buy Volume	Total Sale Volume	Net Volume	Total Volume	Volume Reportable to Indices ³
BP Energy Company	Y	3,627	3,982	-356	7,609	2,240
ConocoPhillips Company	Y	2,962	3,450	-488	6,413	1,838
Shell Energy North America US, L.P.	Y	2,591	2,797	-206	5,388	1,224
Eni Petroleum US LLC	N	260	4,268	-4,008	4,528	38
Macquarie Energy LLC	Y	2,208	2,242	-34	4,450	1,858
J.P. Morgan Ventures Energy Corp.	N	1,819	1,715	104	3,533	934
EDF Trading North America, LLC	N	1,749	1,760	-10	3,509	1,079
Chevron U.S.A. Inc.	Y	1,587	1,672	-85	3,260	696
Tenaska Marketing Ventures	Y	1,495	1,402	93	2,898	926
AGL Resources Inc.	Y	1,560	1,265	295	2,826	1,592
Total Gas & Power North America, Inc.	Y	1,400	1,404	-5	2,804	1,323
BG Energy Merchants, LLC	Y	1,360	1,405	-46	2,765	851
Natural Gas Exchange Inc.	N	1,150	1,150	0	2,300	1,455
Citigroup Energy Inc.	Y	960	961	-1	1,920	771
Virginia Power Energy Marketing, Inc.	Y	919	722	198	1,641	322
Enterprise Products Company	N	829	722	107	1,552	359
CenterPoint Energy	N	905	627	278	1,532	226
Occidental Energy Marketing, Inc.	N	733	799	-66	1,531	493
ONEOK Energy Services Co., L.P.	N	761	697	64	1,457	419
Chesapeake Energy Corporation	N	113	1,206	-1,094	1,319	49
Top Twenty Companies by Total Volume		28,987	34,246	-5,260	63,233	18,692
All Other Companies		34,880	33,323	1,557	68,203	18,148
Total for All Companies		63,866	67,569	-3,703	131,436	36,840

Source: FERC's Form 552 submissions as of May 15, 2012

Note: 1. Numbers may not sum to totals due to rounding.

2. One tBtu is equal to 1 million mmBtu.

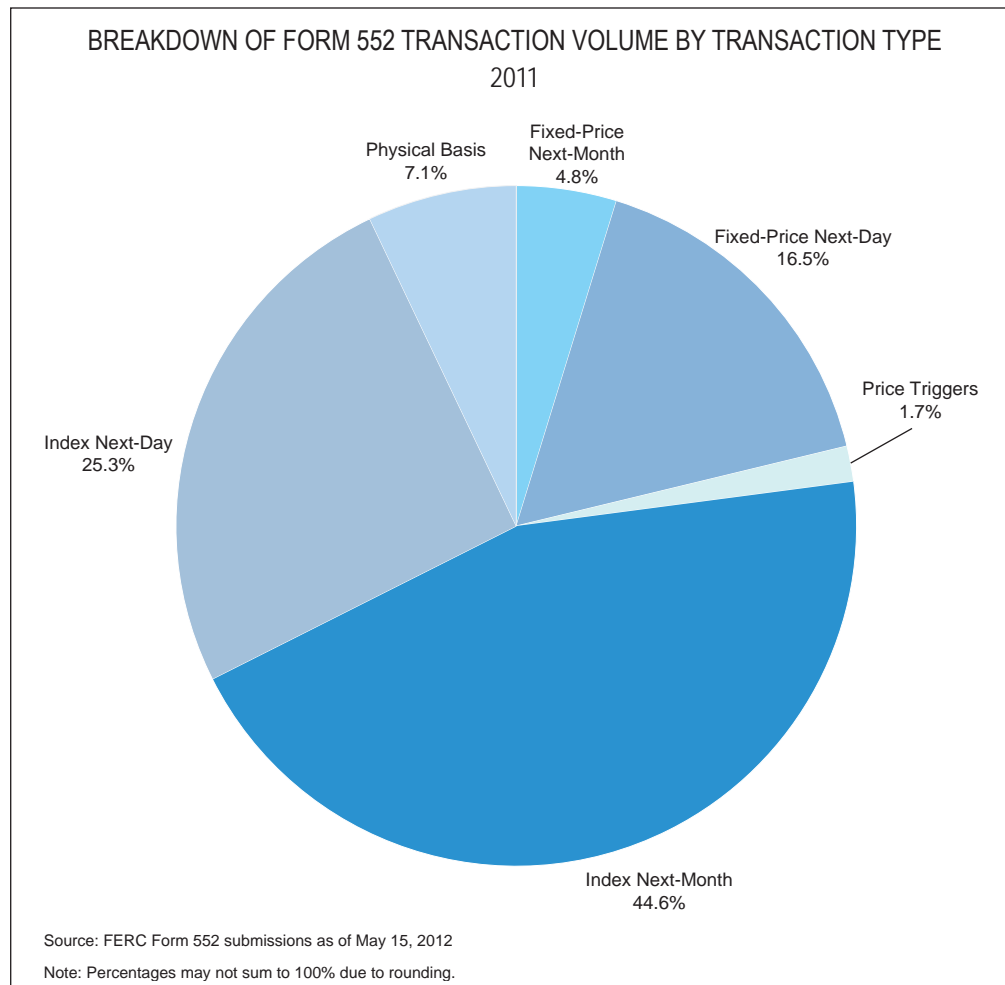
3. Volume Reportable to Indices includes the sum of fixed-price next-month purchases and sales, fixed-price next-day purchases and sales, and physical basis transaction volume reported on Form 552.

Transaction Types

Among the different transaction types covered by Form 552, the next-month gas transactions (49 percent) account for a larger portion of volume than the next-day gas transactions (42 percent).

Index-price transactions constitute the majority of transactions covered by Form 552. As shown in Figure 7, 72 percent¹⁹ of the Form 552 transaction prices depend on an index.²⁰ The monthly index plays an important role in price formation in almost half (45 percent) of the Form 552 transactions. Fixed-price next-month transactions and physical basis transactions each account for only around 5 to 7 percent of the transactions covered by Form 552. Price triggers account for approximately 2 percent of Form 552 transaction volume and are targeted primarily at Industrial or Commercial Consumers, which account for a small amount of purchase and sales volume.

Figure 7





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.

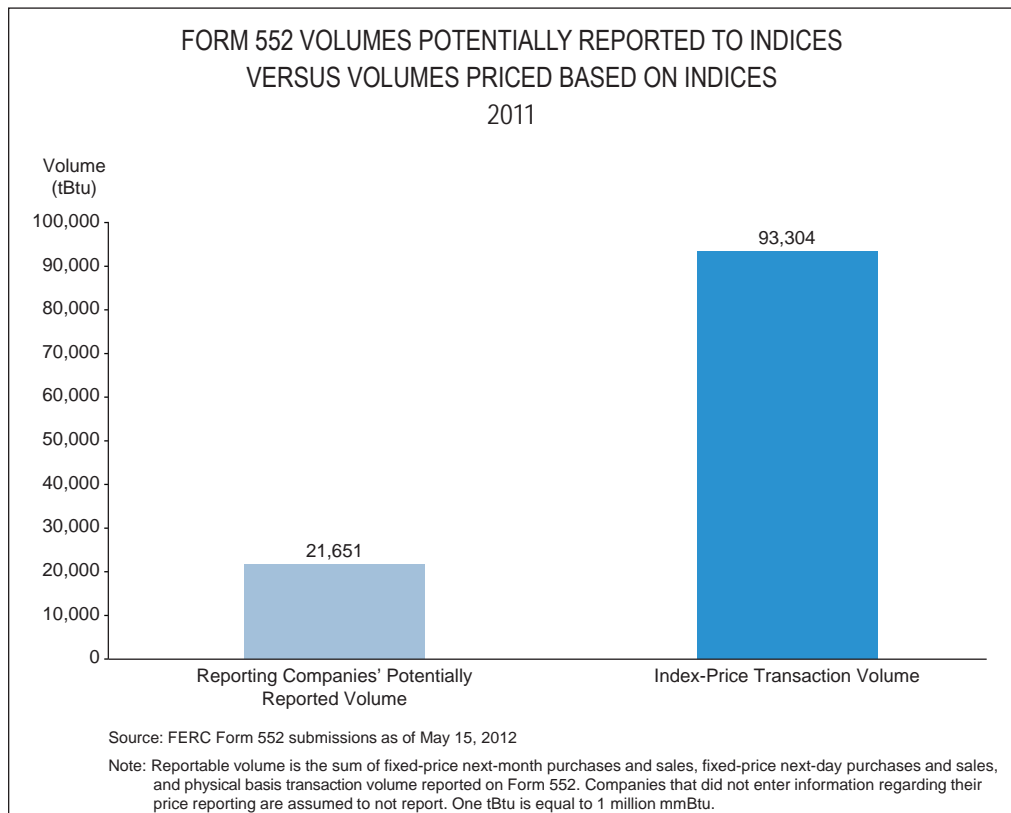
Volume and Depth of Reporting to Price Index Publishers

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

...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.²¹

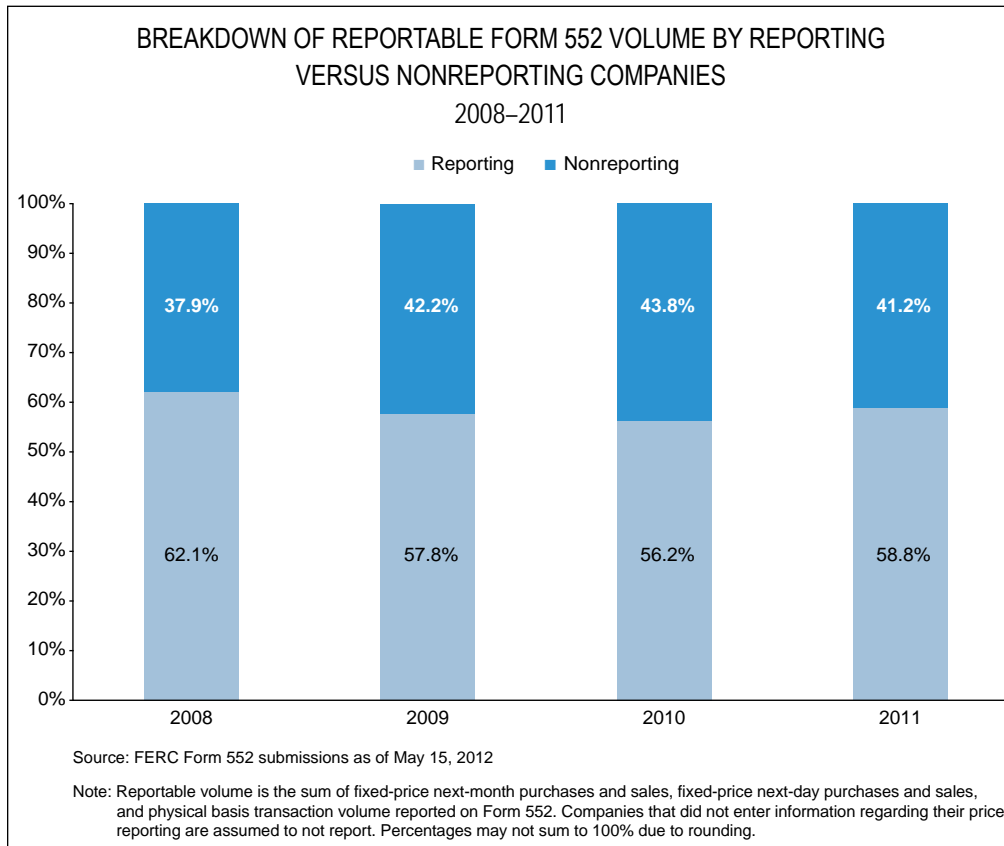
The data show that the volume of transactions dependent on the indices is approximately four times larger than the volume of transactions that form the indices.²² These volumes, shown in Figure 8, are influenced not only by the volume of index-price transactions reported in Form 552 submissions but also by the number of companies that report transaction information to the price index publishers.

Figure 8



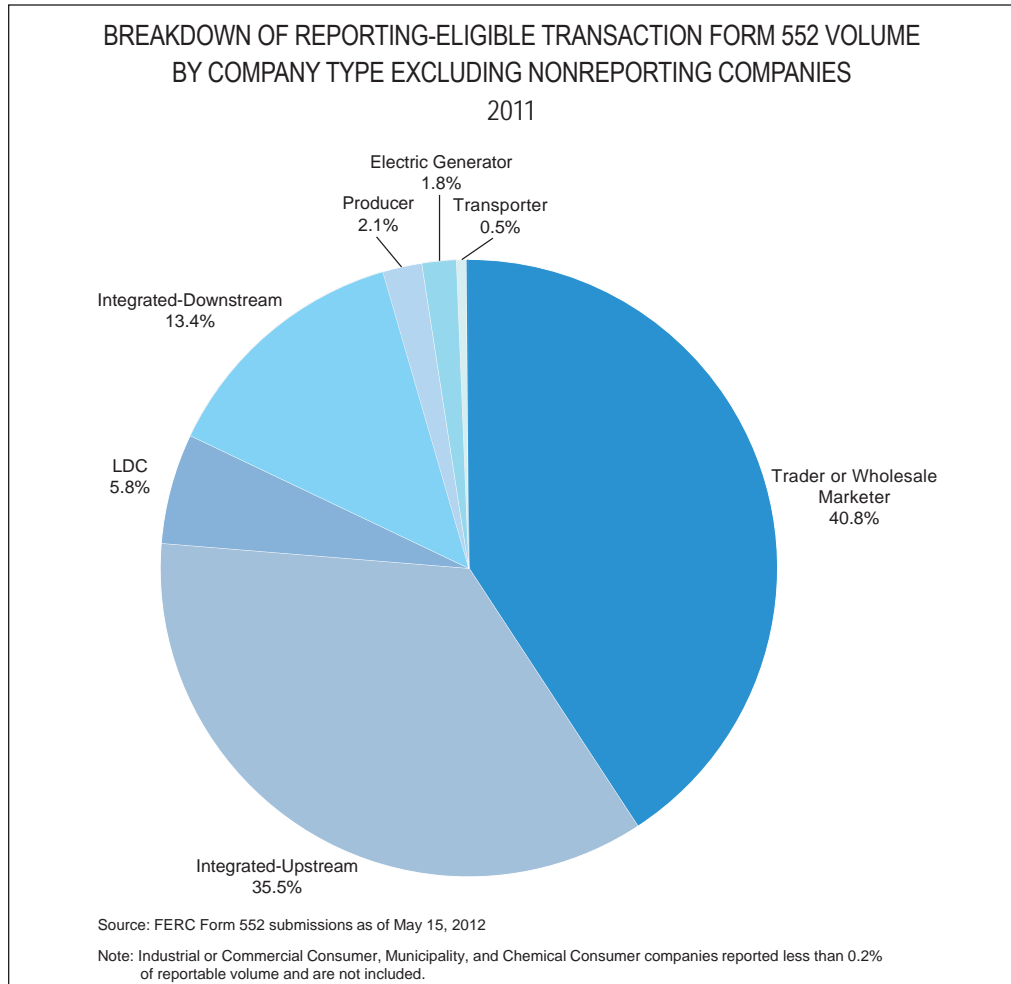
The majority of the companies that submitted a Form 552 did not report to the price index publishers at all. Of the 686 Form 552 respondents who submitted transaction volumes, only 126 indicated that they have at least one affiliate that reports transaction information to the price index publishers. Figure 9 shows that these reporting companies, however, account for the majority (59 percent) of the reporting-eligible, fixed-price volume in 2011. This percentage of reporting companies has ranged between 56 and 62 percent since 2008.

Figure 9



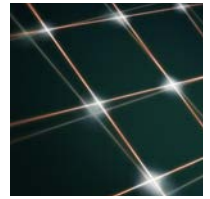
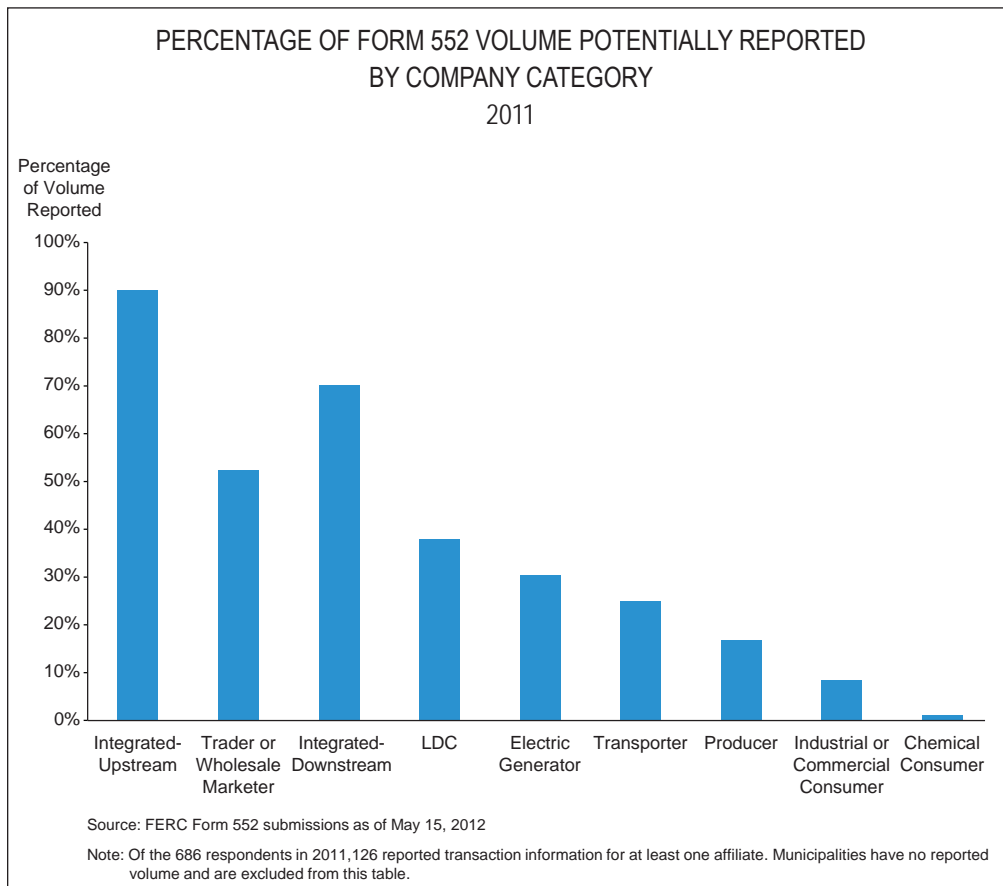
As shown in Figure 10, among the companies that report to the price index publishers, Integrated-Upstream companies, Integrated-Downstream companies, and Traders or Wholesale Marketers account for approximately 90 percent²³ of the reportable volume. Further, among the top twenty reporting companies, eleven report to index publishers, which account for 63 percent²⁴ of the reporting-eligible volume at reporting companies.

Figure 10



As shown in Figure 11, there is significant disparity in the proportion of transaction volume reported by the various industry segments. Only three Chemical Consumers indicated that they report to the price index publishers whereas twenty-eight Traders or Wholesale Marketers report to the price index publishers.

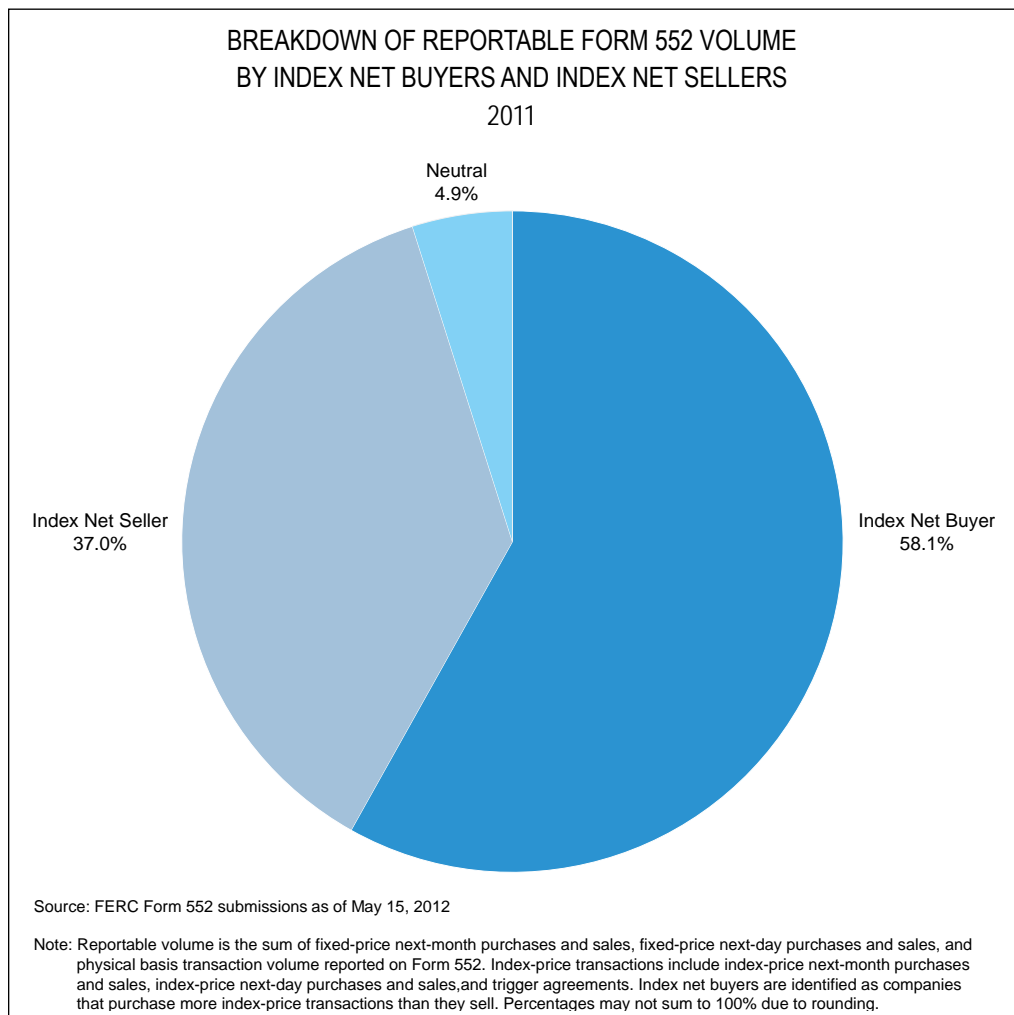
Figure 11



The disparity across industry segments of 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 2011. 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, with net buyers reporting 58 percent of transactions and net sellers reporting 37 percent (Figure 12).

Figure 12

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ICE Natural Gas Data

As discussed above, 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 2011, ICE published a total of 115 gas hub locations reporting month-ahead prices and 145 hubs reporting day-ahead prices.²⁶ As seen in Table 2, in 2011, the three most active hubs by volume for day-ahead transactions were PG&E - Citygate in California, NGPL - TXOK in Texas, and Henry Hub in Louisiana. 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 As seen in Table 3, the three most active hubs in 2011 by volume for month-ahead transactions are TCPL - Alberta in Canada, Dominion - South on the East Coast, and NGPL - TXOK in Texas.

Table 2

TOP TEN HUBS BY VOLUME
ICE DAY-AHEAD INDEX
2011

Hub Name	Years in Top Ten (2008–2010)	Average Volume per Day (mmBtu)	Average Number of Deals per Day	Average Number of Counterparties per Day
PG&E - Citygate	2008–2010	981,204	117	33
NGPL - TXOK	2008–2010	804,447	124	43
Henry	2008–2010	755,325	99	31
Chicago Citygates	2008–2010	731,465	120	36
Dominion - South	2010	666,978	99	36
SoCal Border	2008	579,031	71	24
Col Gas TCO	2008–2010	556,934	97	44
CG - Mainline	2009–2010	529,866	87	38
TETCO - M3		524,446	87	37
Katy	2008–2010	522,249	74	30

Source: ICE

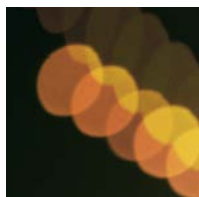
Table 3

TOP TEN HUBS BY VOLUME
ICE MONTH-AHEAD INDEX
2011

Hub Name	Years in Top Ten (2008–2010)	Average Volume per Month (mmBtu)	Average Number of Deals per Month	Average Number of Counterparties per Month
TCPL - Alberta F/B Price	2008–2010	55,368,403	428	39
Dominion - South	2010	16,647,295	68	30
NGPL - TXOK	2008–2010	15,228,203	78	26
Union Gas	2009–2010	14,699,110	110	34
Col Gas TCO	2010	14,368,818	49	28
Chicago Citygates	2008–2009	9,825,743	62	17
SoCal Border	2008	9,749,750	47	14
Sonat - Tier 1 Pool	2010	9,616,065	26	15
El Paso - San Juan Basin, Blanco Pool (Primary only)	2008–2009	9,409,000	46	13
El Paso - Keystone Pool	2008–2009	8,993,250	49	15

Source: ICE

Over the last four years, the geographic concentration of trading has evolved. The increased volumes for PG&E - Citygate and NGPL - TXOK, which surpassed Henry Hub as the most active daily transaction hubs in 2011, are likely due to the shifting geographic patterns of natural gas consumption and production.²⁹ Texas was the fastest-growing producing state in 2011, increasing natural gas production by 4.5 percent year over year to its highest level since 1980. The increase in production in Texas is due in part to growing output from the Eagle Ford shale formation.³⁰ The increase in volume in California is explained by demand-side market developments, as it obtains the majority of its natural gas from out-of-state sources.^{31, 32} The boom in natural gas production is not limited to the United States. Canada, the world's third largest producer and exporter of natural gas, has benefited from the increase in shale natural gas production in North America.³³ In 2011, Canada produced about 4,219 million mmBtu of natural gas, 80 percent of which was exported.



The level of activity and the number of participants varies significantly across hubs, with the most active hub attracting many times the number of deals and number of market participants than are attracted by the least active hubs. Table 4 displays the average volume, average number of deals, and average number of counterparties for quartiles of hubs determined by the total volume transacted in 2011. For the day-ahead contracts, the most active quartile (quartile 4) has approximately twenty-nine times the average daily volume as the smallest quartile (quartile 1), twenty-three times the number of deals, and eight times the average number of counterparties. For the month-ahead contracts, the most active quartile (quartile 4) has approximately forty-six times the average monthly volume as the smallest quartile (quartile 1), thirty-three times the number of deals, and eight times the average number of counterparties. The disparity across quartiles underscores the variability across natural gas hubs in North America.



Table 4

**AVERAGE VOLUME, NUMBER OF DEALS, AND COUNTERPARTIES PER MONTH
PER HUB BY QUARTILE
2011**

Total Volume Quartiles	ICE Day-Ahead Index				ICE Month-Ahead Index			
	Number of Hubs	Per Day per Hub			Number of Hubs	Per Month per Hub		
		Average Volume (mmBtu)	Average Number of Deals	Average Number of Counterparties		Average Volume (mmBtu)	Average Number of Deals	Average Number of Counterparties
Quartile 1	37	14,517	2.8	3.5	29	217,161	1.7	2.5
Quartile 2	36	43,141	8.3	7.6	29	702,225	4.6	5.1
Quartile 3	36	128,074	22.5	14.8	29	2,525,882	13.8	9.8
Quartile 4	36	420,654	66.4	28.8	28	9,905,688	55.5	19.1

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 13).³⁴ PADD 1 is the East Coast, PADD 2 is the Midwest, PADD 3 is the Gulf Coast, PADD 4 is the Rocky Mountains, and PADD 5 is the West Coast (including Alaska and Hawaii).³⁵ Figure 14 shows the day-ahead and month-ahead transaction volume by PADD from 2008 to 2011. Generally, PADD 3 has the largest volume followed by PADD 2, PADD 1, PADD 5, and PADD 4.³⁶ The volume represented by day-ahead transactions is more than the volume represented by month-ahead transactions in all PADDs in 2011, but this does not hold for all PADDs from 2008 to 2010.³⁷

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Figure 13

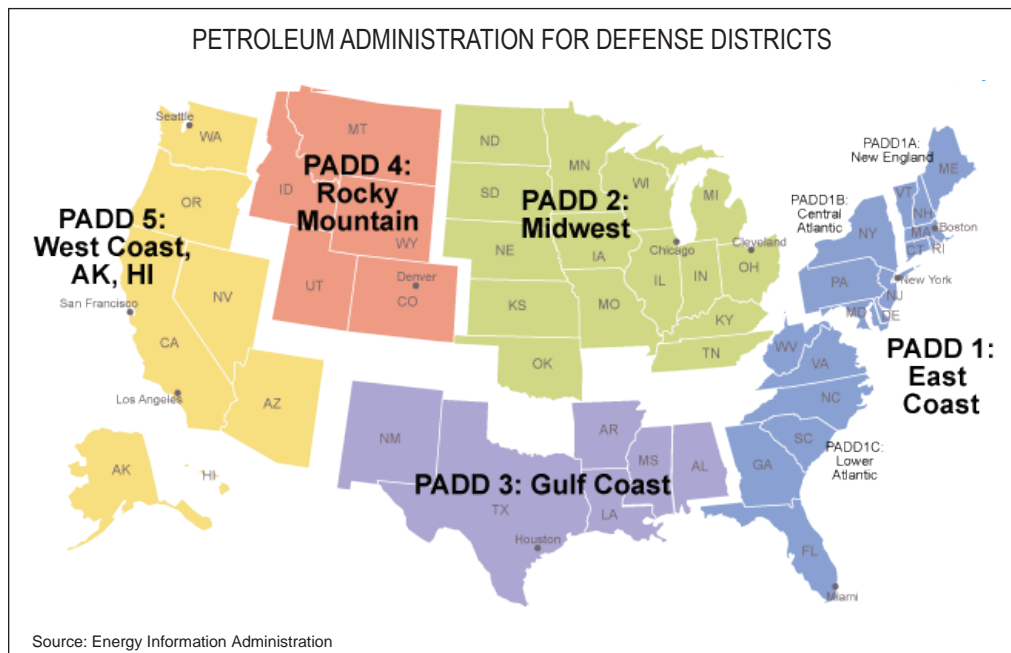
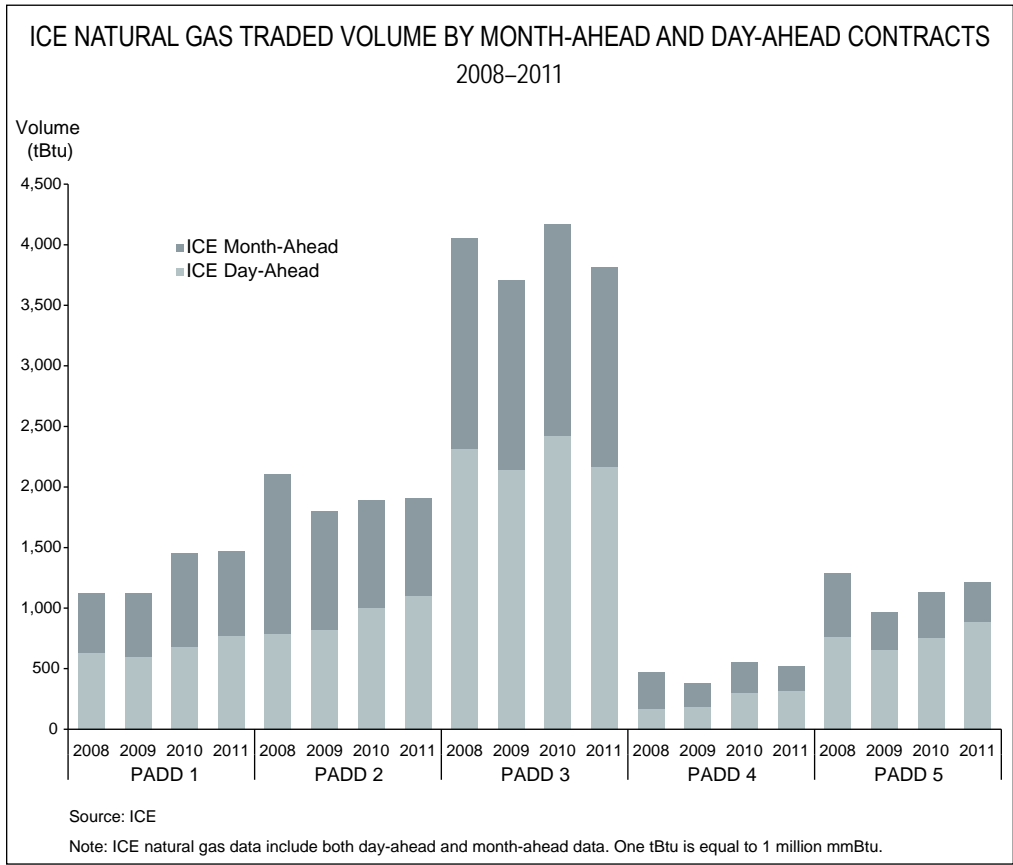


Figure 14



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 of transactions continues. This trend is also demonstrated by the growth in the number of contracts traded on the ICE natural gas OTC market. As the market continues to expand, the U.S. natural gas industry remains unconcentrated with a large number of diverse participants. The top twenty transacting companies by volume account for slightly more than half of the transaction volume covered by the Form 552 submissions.

As reported by the Form 552 submissions, the index-setting, fixed-price natural gas transactions account for a quarter of the volume of index-based natural gas transactions, which has remained relatively stable over time. The 2011 proportion of net buyers and net sellers reporting to the price index publishers did not remain stable in 2011; for the first time in the last four years, the proportion has departed from a relatively equal division to a difference of more than 20 percent.

A comparison of fixed-price physical transactions reported by the company-level Form 552 submissions and hub-level ICE data shows that fixed-price physical transactions reported by ICE from 2008 to 2011 represent approximately 70 percent of the Form 552 volume. The top quartile of hubs reported by ICE has twenty-nine times the average daily day-ahead volume and forty-six 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.

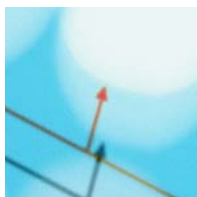


PREVIEW TO 2012

Trading in natural gas futures contracts in the first half of 2012 has reached all-time highs on the NYMEX, the main U.S. natural gas futures market. The NYMEX natural gas futures contract volume increased from 899 million mmBtu in the first half of 2011 to 4,929 million mmBtu in the first half of 2012. The first half of 2012 has already exceeded the total volume traded in natural gas in all of 2011.³⁸

Europe is also showing a similar increasing trend in natural gas futures trading. In the United Kingdom, natural gas futures contracts traded on ICE totaled 1,982 million mmBtu in the first half of 2012, a 621 million mmBtu increase from the first half of 2011 (1,361 million mmBtu).³⁹

APPENDIX

Data Submitted to FERC

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Order 704C requires natural gas market participants with purchases or sales of physical “reportable” natural gas of at least 2,200,000 mmBtu (2.2 tBtu⁴⁰) 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.”⁴¹ Order 704A further clarifies that the latter category includes “bilateral, arms-length, fixed-price physical natural gas transactions between nonaffiliated companies at all trading locations.”⁴²

Order 704C 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 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 704C 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,⁴³ and physical basis transactions.⁴⁴ 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 Energy Policy Act of 2005, Section 316.
- 2 *Ibid.*
- 3 Among other minor revisions, Order 704C 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 sixteen 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, “What is shale gas and why is it important?” Energy in Brief, April 11, 2012, http://www.eia.gov/energy_in_brief/about_shale_gas.cfm.
- 8 EIA, U.S. Natural Gas Wellhead Price (Dollar per Thousand Cubic Feet).
- 9 EIA, U.S. Natural Gas Consumption by End Use (MMcf).
- 10 Natural Gas Vehicles for America, http://www.ngvc.org/about_ngv/index.html.
- 11 EIA, U.S. Natural Gas Consumption by End Use (MMcf), EIA, U.S. Natural Gas Use in the Electric Power Sector is Growing, 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.
- 13 There were 669 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 Table 1. 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 under-represent the volume of transactions represented by Form 552, since some transactions involve market participants that do not submit a Form 552.
- 15 Note that these aggregate figures from ICE represent both financial and physical natural gas contracts. (IntercontinentalExchange 2011 and 2008 10-K, <http://ir.theice.com/secfiling.cfm?filingID=1193125-12-45255&CIK=1174746>).
- 16 Note that the 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. Converted to trillion btu (tBtu) from trillion cubic feet (tcf). One cubic foot = 1,023 Btu.
- 18 Calculated as minimum trading volume of 67,569 from Table 1 divided by 22,813 EIA natural gas delivered = 2.96.
- 19 Calculated based on Figure 7, Index Next-Day 25.3% + Index Next-Month 44.6%, + Price Triggers 1.7% = 71.6%.
- 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 price. Thus, the percentage of transactions with prices at settlement determined by an index price may be lower than these statistics suggest.
- 21 Order No. 704, p. 4.
- 22 Calculated based on Figure 8, volume potentially reported to price index publishers 21,651 divided by the volume of index-price transactions 93,304 = 23.2%.

ENDNOTES (CONTINUED)

- 23 Calculated as 13.4% Integrated-Downstream + 35.5% Integrated-Upstream + 40.8% Trader or Wholesale Marketer = 89.7%.
- 24 Calculated as volume reportable to indices of 13,641 tBtu from Table 1 of top twenty companies that have an affiliate that reports to indices divided by 21,651 tBtu from Figure 8 (1 tBtu = 1 million mmBtu).
- 25 *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 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.
- 29 EIA, “Natural gas consumption reflects shifting sectoral patterns,” <http://www.eia.gov/todayinenergy/detail.cfm?id=6290>.
- 30 EIA, “Top 5 producing states’ combined marketed natural gas output rose in 2011,” <http://www.eia.gov/todayinenergy/detail.cfm?id=6030>.
- 31 California Natural Gas Data and Statistics, <http://energyalmanac.ca.gov/naturalgas/index.html>.
- 32 EIA “Natural Gas Summary” California, http://www.eia.gov/dnav/ng/ng_sum_lsum_dc_u_sca_a.htm.
- 33 Natural Resources Canada, Natural Gas, <http://www.nrcan.gc.ca/energy/sources/natural-gas/1557>.
- 34 EIA, “District Descriptions and Maps,” *Petroleum Supply Monthly*, April 2012, <http://www.eia.gov/petroleum/supply/monthly/pdf/append.pdf>.
- 35 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 states include Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, Tennessee, and Wisconsin. PADD 3 states include Alabama, Arkansas, Louisiana, Mississippi, New Mexico, and Texas. PADD 4 states include Colorado, Idaho, Montana, Utah, and Wyoming. PADD 5 states include Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington. (<http://www.eia.gov/petroleum/supply/monthly/pdf/append.pdf>).
- 36 In 2008, PADD 5 surpassed PADD 1 by 158.8 tBtu.
- 37 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.
- 38 “NYMEX/COMEX Exchange Volume Report—Monthly,” <http://www.cmegroup.com/market-data/volume-open-interest/index.html>. The NYMEX trades both full-size 10,000 mmBtu contracts and mini 2,500 mmBtu contracts.
- 39 “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).
- 40 One million mmBtu equal one tBtu.
- 41 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.
- 42 Order 704A, p. 9.
- 43 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.
- 44 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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