CORNERSTONE RESEARCH
ECONOMIC AND FINANCIAL CONSULTING AND EXPERT TESTIMONY

Characteristics of U.S. Natural Gas Transactions

Insights from FERC Form 552 Submissions

As of May 20, 2011

Greg Leonard

Nicole M. Aulerich

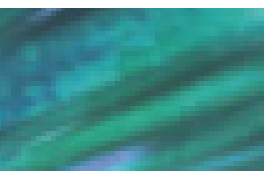
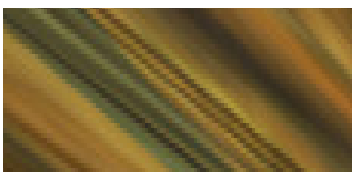


For more than twenty-five years, Cornerstone Research staff have provided economic and financial analysis in all phases of commercial litigation and regulatory proceedings.

We work with a broad network of testifying experts, including faculty and industry practitioners, in a distinctive collaboration. Our staff consultants contribute expertise in economics, finance, accounting, and marketing, as well as business acumen, familiarity with the litigation process, and a commitment to produce outstanding results. The experts with whom we work bring the specialized expertise of researchers or practitioners required to meet the demands of each assignment.

Cornerstone Research has more than four hundred staff and offices in Boston, Los Angeles, Menlo Park, New York, San Francisco, and Washington.

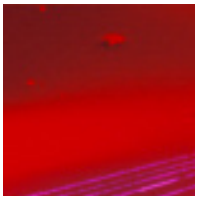
www.cornerstone.com

INTRODUCTION

Cornerstone Research has analyzed the Federal Energy Regulatory Commission's (FERC's) 2010 data on U.S. natural gas transaction activity as supplemented with 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 2010 RESULTS



- The total volume of natural gas transactions in 2010 remained consistent with 2008 and 2009 levels. Aggregate trading volumes in 2010 increased slightly from 2009 but remained lower than in 2008. Volume for the top transacting companies held steady from 2009, with two new companies entering the top twenty in 2010.
- 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 FERC submissions. Traders or Wholesale Marketers continued to report the largest transaction volumes, with a steadily increasing industry segment share from 2008 to 2010.
- The share of transactions based on index prices continues to be approximately 70 percent. The estimated percentage likely overestimates the actual share of index-price transactions because the data include all index-price transactions but may exclude other types of physical transactions not based on indices.
- As transactions between physical participants take place, an average molecule of natural gas passes through an estimated 2.74 transactions from production to consumption.
- Of the 677 respondents in 2010, 126 reported transaction information to price index publishers for at least one affiliate. Only 56 percent of the reporting-eligible volume is transacted by companies that report to the price index publishers.
- Reporting to the price index publishers is not consistent across industry segments. Integrated-Upstream 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 4 percent.
- As expected, participants in upstream industry segments are more likely to be net sellers while participants in downstream segments are more likely to be net purchasers. Despite the disparity in reporting rates across industry segments, however, net sellers and net buyers of index-price natural gas report their transaction volumes to the price index publishers in roughly equal percentages.

BACKGROUND

In 2005, Congress passed the Energy Policy Act of 2005 (EPAct 2005), which authorized FERC to "facilitate price transparency in markets for the sale or transportation of physical natural gas in interstate commerce."[1] The EPAct 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. On June 17, 2010, FERC issued Order 704C, which provides for slightly revised reporting rules that ease some reporting requirements.[3]

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. FERC received its third round of annual Form 552 submissions in 2011 detailing U.S. natural gas transaction activity for 2010 and covering 677 firms.

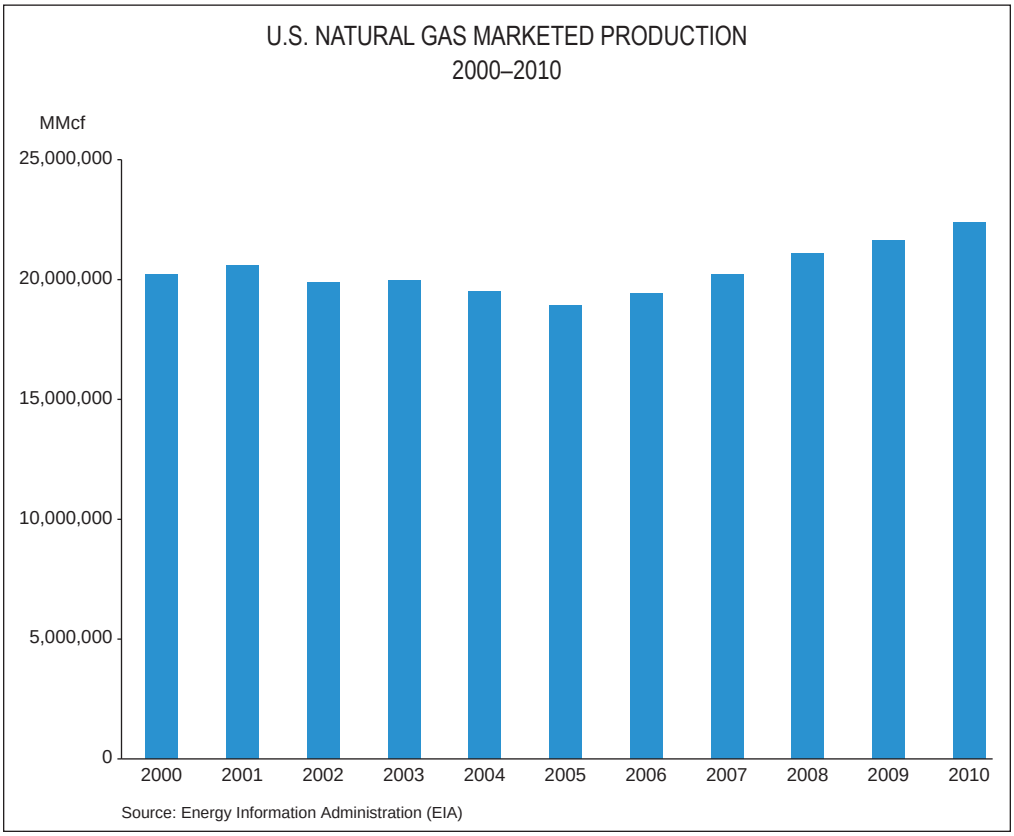
The data contained in the Form 552 submissions provide a unique view into the size and nature of the physical natural gas market. The data, described more fully in the appendix to this report, have some limitations but are the best source for information on natural gas transaction volumes, transaction participants, and price formation, and are a particularly good source for describing activity 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]

RESULTS FROM THE 2010 SUBMISSIONS

Our analysis takes place in a context of increased production of and reliance on natural gas in the United States. There has been a recent revival in natural gas production in the United States, with annual marketed production increasing by 18 percent from 2005 to 2010 (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.[7] As the U.S. natural gas market evolves, it continues to be important to analyze market participants and the pricing of natural gas.

Figure 1



This boom in domestic natural gas production has resulted in decreasing prices and efforts to find innovative ways to use natural gas. From 2005 to 2010, for example, wellhead prices decreased by 39 percent[8] while the use of natural gas to fuel vehicles increased by 34 percent, as consumers sought alternatives to higher priced gasoline and diesel.[9] U.S. automakers are strategically introducing natural-gas-powered vehicles to American consumers, with General Motors and Ford both offering pickup trucks powered by natural gas.

Market Volumes and Participants

The transactions reported in Form 552 submissions total 121,750 million mmBtu transacted by 677 companies.[10] 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 61,178 million mmBtu of trading volume.[11]

The Form 552 submissions show physical trading volumes in excess of annual U.S. natural gas consumption. The EIA reports that approximately 22,326 million mmBtu of gas were delivered to consumers in 2010.[12] This suggests that each molecule of natural gas passes through an estimated 2.74 transactions[13] from production to consumption.

As shown in Figure 2, the large Integrated-Upstream and Integrated-Downstream companies and the Traders or Wholesale Marketers account for approximately 75 percent of the Form 552 transaction volume. In contrast, Industrial or Commercial Consumers and Chemical Consumers account for only 2.3 percent of the Form 552 volume.

Figure 2

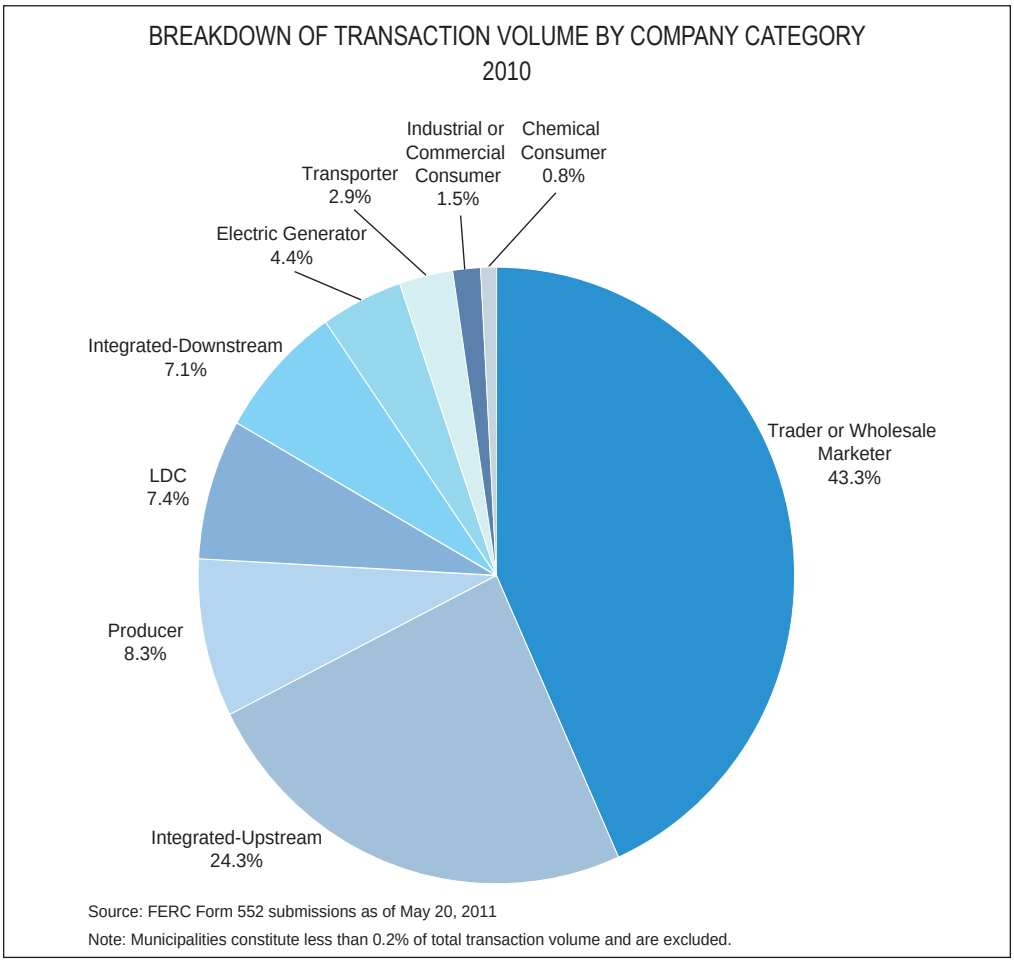
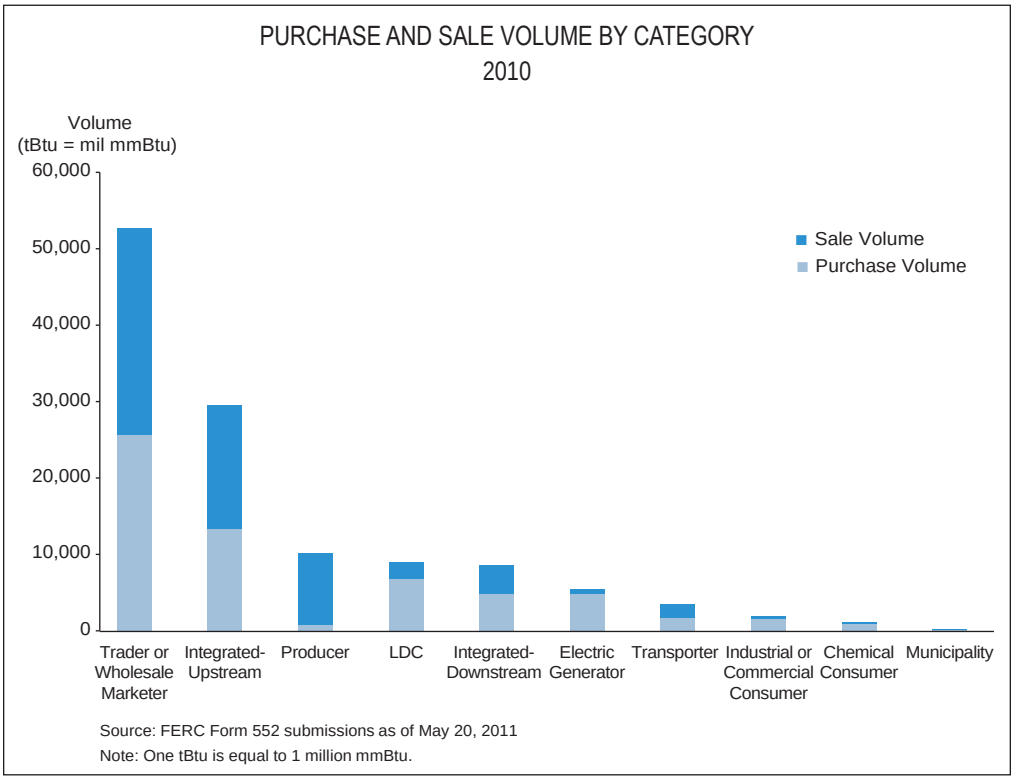
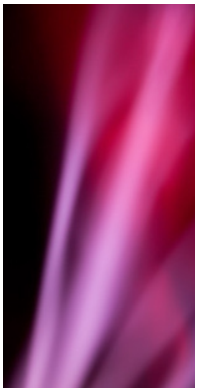


Figure 3 shows the breakdown of Form 552 purchases and sales by category. Not surprisingly, the Producers sell more than they purchase, while LDCs, Electric Generators, Industrial or Commercial Consumers, and Chemical Consumers consume significantly more than they sell. Consistent with their business models, Traders or Wholesale Marketers and Integrated Upstream companies purchase and sell approximately equal amounts.

Figure 3





As shown in Table 1, the top twenty companies, ranked by total transaction volume, account for 61,439 million mmBtu out of 121,750 million mmBtu, slightly greater than 50 percent of the physical natural gas volumes contained on all Form 552 submissions. As in 2009, BP Energy Company had the largest physical volumes in 2010 (8,685 million mmBtu), exceeding Shell Energy North America (6,259 million mmBtu) by 2,426 million mmBtu. In general, the Form 552 data 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 VOLUME[1]
2010
(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	4,027	4,657	-630	8,685	2,407
Shell Energy North America (US), L.P.	Y	2,994	3,265	-271	6,259	1,545
ConocoPhillips Company	Y	2,726	3,258	-532	5,984	1,601
Macquarie Energy LLC	Y	2,873	2,866	7	5,739	2,472
J.P. Morgan Ventures Energy Corp.	N	1,838	1,746	92	3,584	887
Chevron U.S.A. Inc.	Y	1,596	1,764	-167	3,360	693
EDF Trading North America, LLC	N	1,643	1,701	-58	3,344	1,214
Total Gas & Power North America, Inc	Y	1,390	1,530	-140	2,920	1,242
Tenaska Marketing Ventures	Y	1,496	1,402	94	2,898	1,024
BG Energy Merchants, LLC	Y	1,170	1,308	-138	2,478	818
Louis Dreyfus Energy Services L.P.	N	1,141	1,085	56	2,226	704
AGL Resources Inc.	N	1,073	1,018	56	2,091	1,372
Occidental Energy Marketing, Inc.	N	953	964	-10	1,917	584
Natural Gas Exchange Inc.	N	917	917	0	1,834	1,050
ONEOK Energy Services Company L.P.	N	813	745	67	1,558	382
CenterPoint Energy	N	900	620	281	1,520	237
Enterprise Products Company	N	777	666	112	1,443	283
Sempra Energy	Y	657	614	43	1,271	847
Iberdrola Renewables, LLC	Y	537	641	-104	1,178	542
Encana Corporation	Y	121	1,031	-910	1,151	358
Top Twenty Companies by Total Volume		29,643	31,796	-2,153	61,439	20,262
All Other Companies		30,928	29,382	1,546	60,311	16,182
Total for All Companies		60,572	61,178	-607	121,750	36,443

Source: FERC's Form 552 submissions as of May 20, 2011

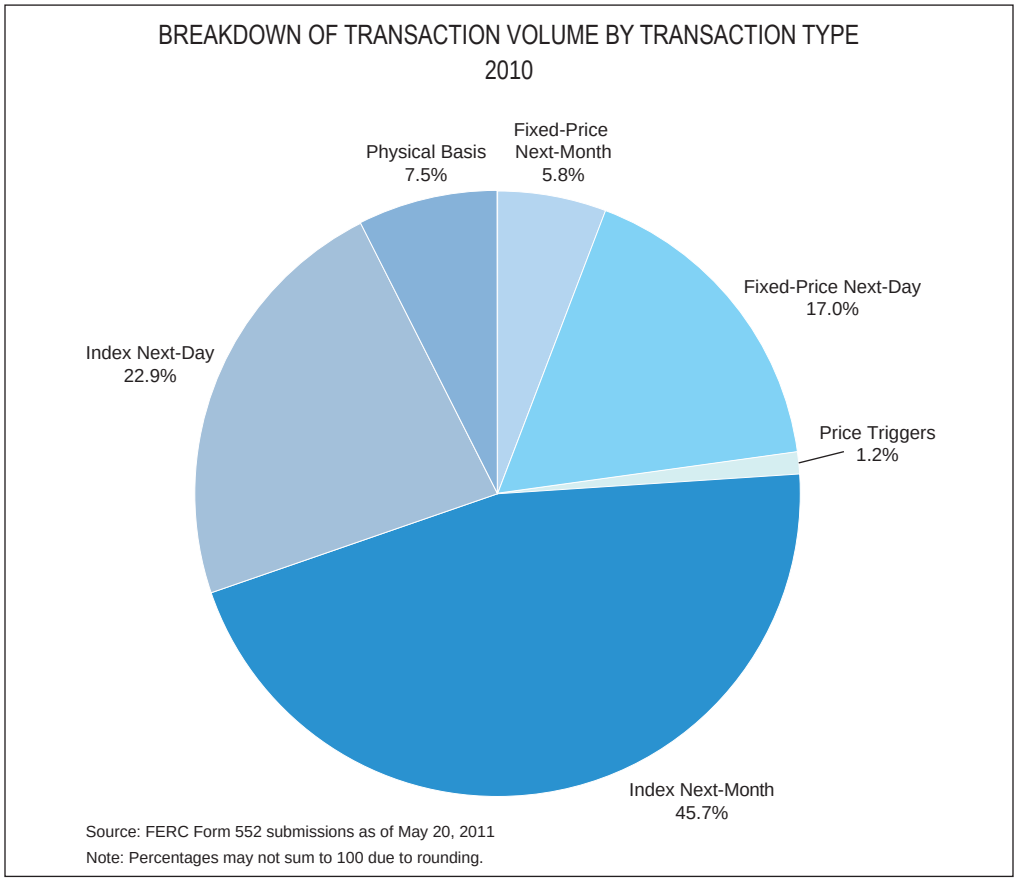
Note: 1. Numbers may not total due to rounding.
2. One tBtu is equal to 1 million mmBtu.
3. Volume Reportable to Indices includes the sum of fixed-price next-month purchases and sales, fixed-price next-day purchases and sales, and physical basis transaction volume reported on Form 552.

Transaction Types

Among the different transactions types covered by Form 552, the next-month gas transactions (52 percent) account for a larger portion of volume than the next-day gas transactions (40 percent).

Index-price transactions constitute the majority of volume covered by Form 552. As shown in Figure 4, 70 percent[14] of the Form 552 transaction volume depends on an index.[15] The monthly index plays a role in determining the price in almost half (46 percent) of the Form 552 transactions. Fixed-price next-month transactions and physical basis transactions each account for only around 6 to 7.5 percent of the volume covered by Form 552. Price triggers account for approximately 1 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 volumes.

Figure 4



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-based physical transactions, less than 70 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

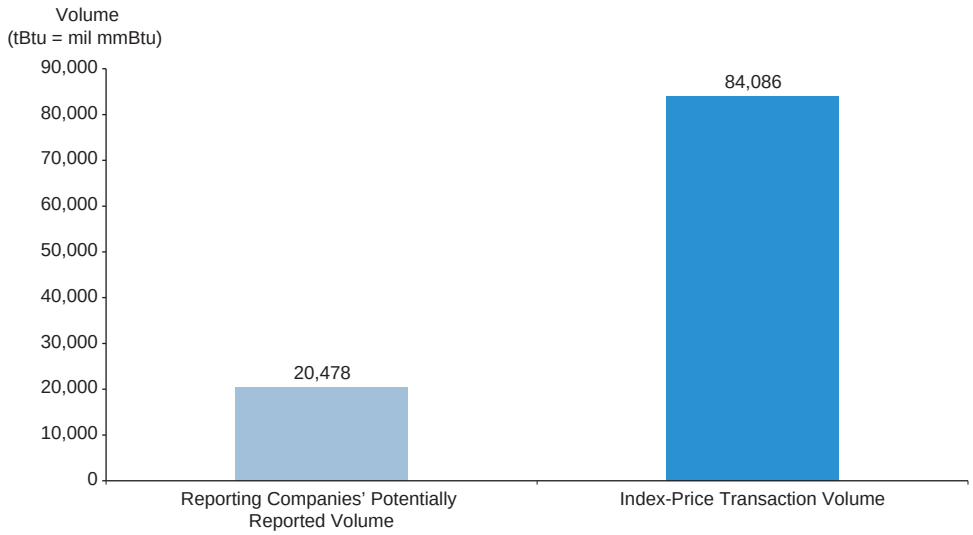
In Order 704, FERC commented that understanding the relative volume of index-price transactions and reporting-eligible, fixed-price transactions was a core purpose of the Form 552 submissions:

> …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.[16]

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.[17] These volumes, shown in Figure 5, 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 5

VOLUMES POTENTIALLY REPORTED TO INDICES
VERSUS VOLUMES PRICED BASED ON INDICES
2010

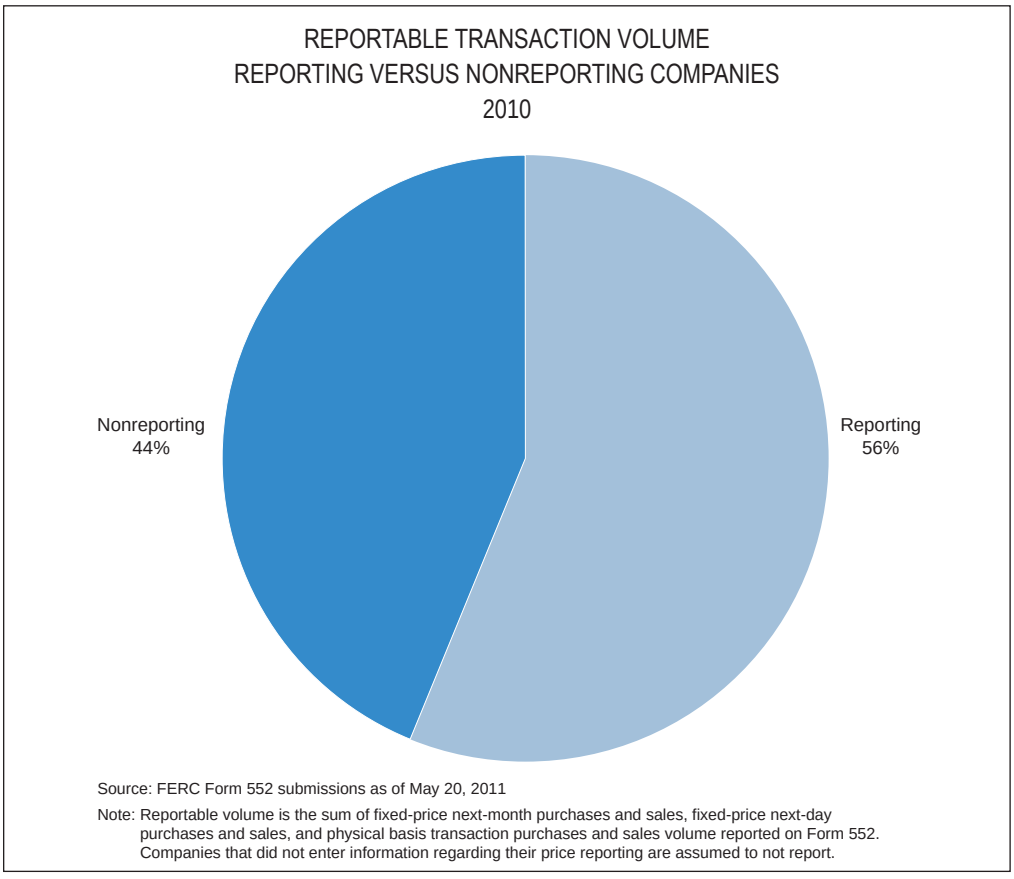


Source: FERC Form 552 submissions as of May 20, 2011

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 1 million mmBtu.

The majority of the companies that submitted a Form 552 did not report to the price index publishers. Of the 677 Form 552 respondents who submitted transaction volumes, only 126 indicated that at least one affiliate reports transaction information to the price index publishers. Figure 6 shows that these reporting companies, however, account for the majority (56 percent) of the reporting-eligible, fixed-price volume. The remaining 44 percent of the fixed-price transaction volume is purchased or sold by companies that do not report to the price index publishers.

Figure 6



Source: FERC Form 552 submissions as of May 20, 2011

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 purchases and sales volume reported on Form 552. Companies that did not enter information regarding their price reporting are assumed to not report.

As shown in Figure 7, among the companies that report to the price index publishers, large Integrated-Upstream companies, Integrated-Downstream companies, and Traders or Wholesale Marketers account for approximately 88 percent[18] of the reported volume. Further, the top twenty reporting companies account for 66 percent[19] of the reporting-eligible volume from reporting companies.

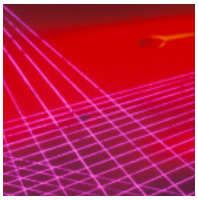
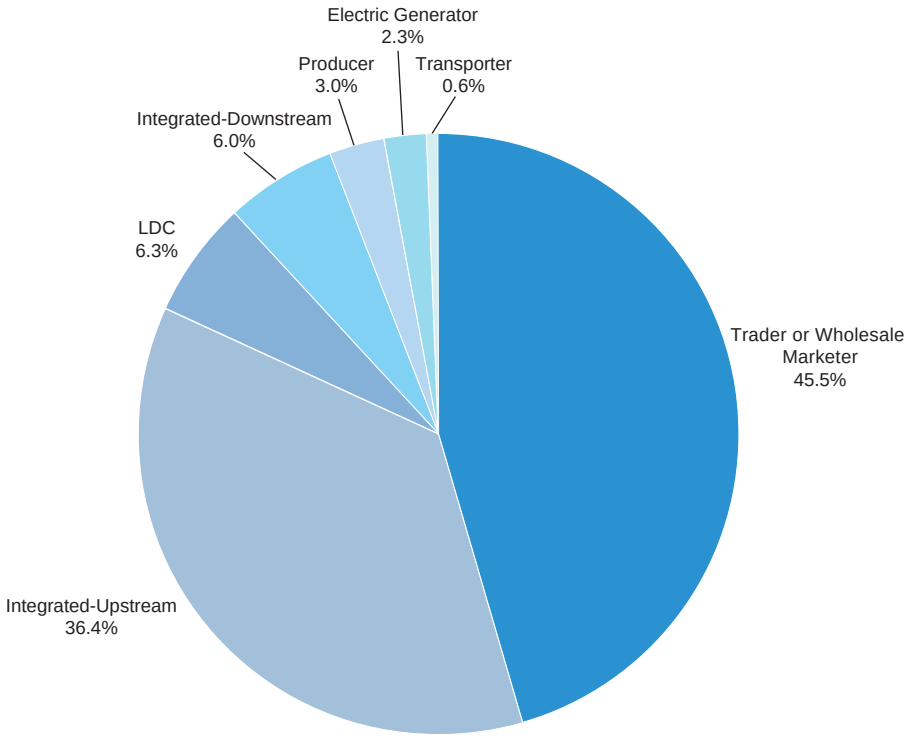


Figure 7

BREAKDOWN OF REPORTING-ELIGIBLE TRANSACTION VOLUME BY COMPANY TYPE
EXCLUDING NONREPORTING COMPANIES
2010



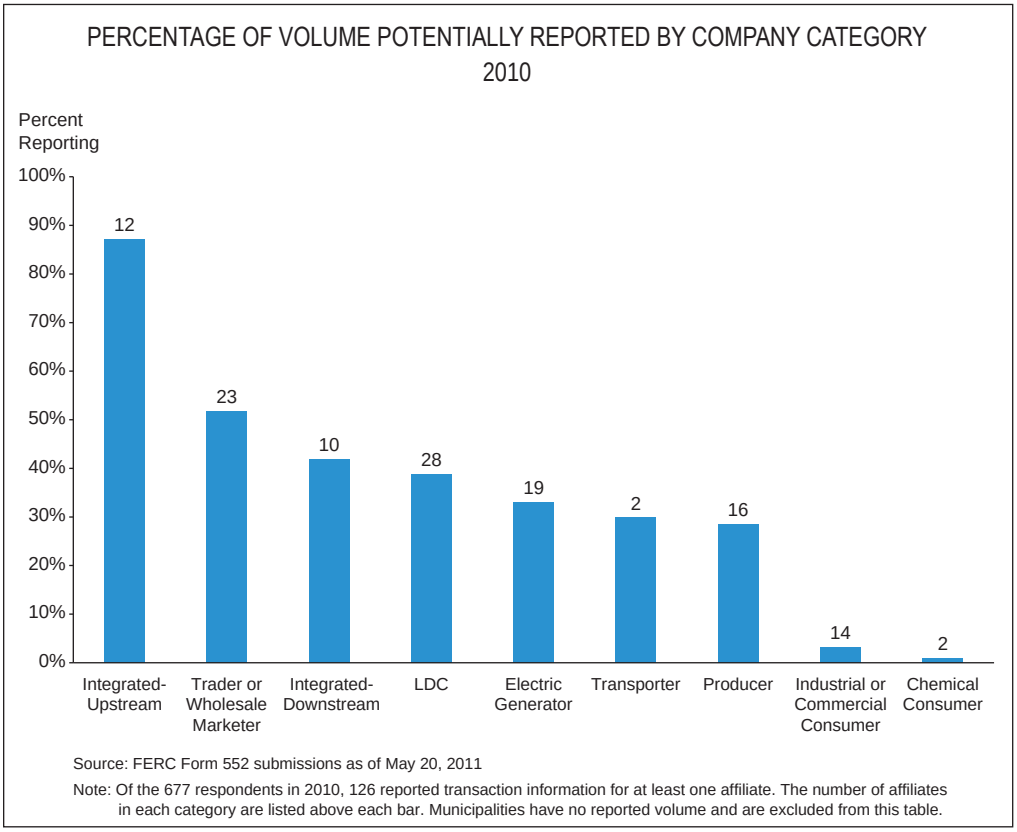
Source: FERC Form 552 submissions as of May 20, 2011

Note: Percentages may not sum to 100 due to rounding.

Industrial or Commercial Consumer, Municipality, and Chemical Consumer companies reported less than 0.1% of reportable volume and are not included.

As shown in Figure 8, there is significant disparity in the proportion of transaction volume reported by the various industry segments. Only two Chemical Consumers indicated that they report to the price index publishers, whereas twenty-three Traders or Wholesale Marketers report to the price index publishers.

Figure 8

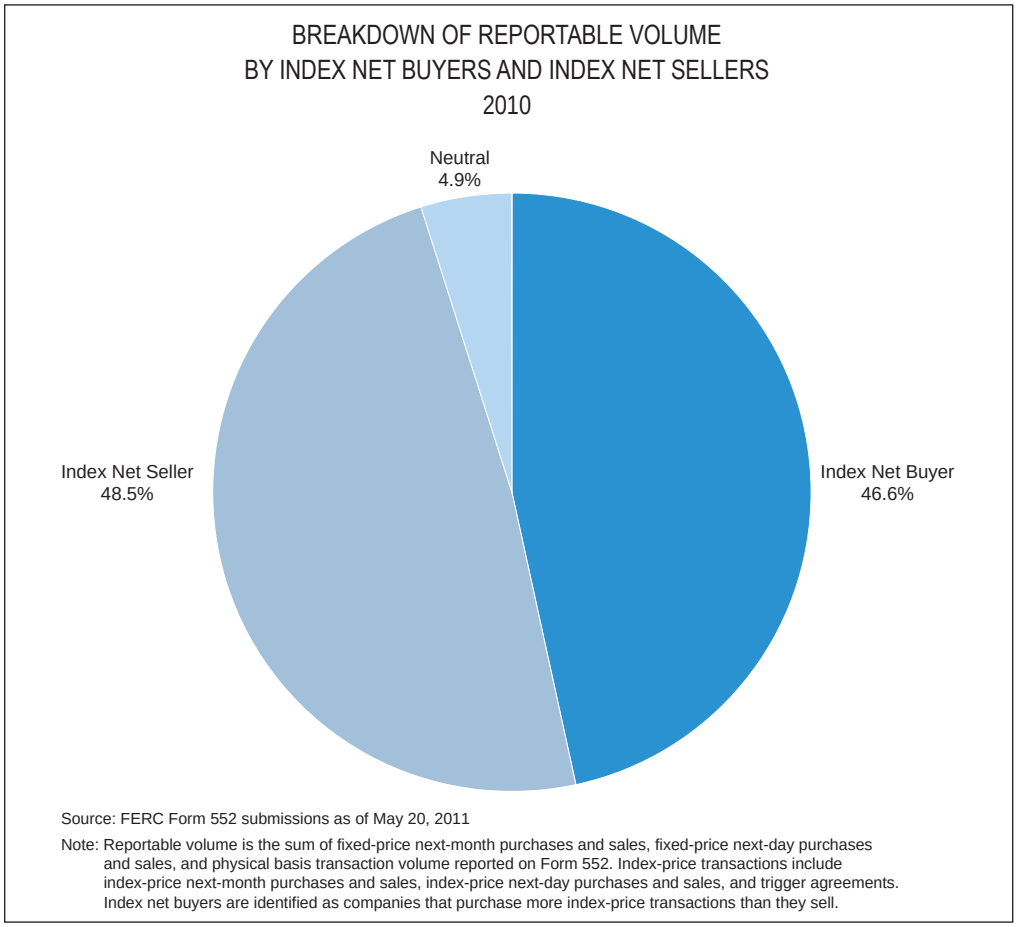


Source: FERC Form 552 submissions as of May 20, 2011

Note: Of the 677 respondents in 2010, 126 reported transaction information for at least one affiliate. The number of affiliates in each category are listed above each bar. Municipalities have no reported volume and are excluded from this table.

The disparity across industry segments in 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, however, that at least on an aggregate level, this is not the case. Rather, as shown in Figure 9, the volume of reportable transactions from companies that report to the price index publishers comes in roughly equal amounts from net sellers and net buyers of index-price natural gas.

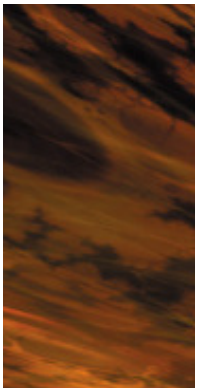
Figure 9



Source: FERC Form 552 submissions as of May 20, 2011

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. 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.

The results in 2010 are not vastly different than 2008 and 2009, with the largest portion of transaction volume coming from Traders or Wholesale Marketers, which report approximately 50 percent of their volume. The index-setting, fixed-price natural gas transactions account for a quarter of the volume of index-based natural gas transactions; that is, index-based transactions outnumber fixed-price transactions four to one. The reporting of index-setting transactions is roughly split between net buyers and net sellers despite two industry segments reporting the majority of transactions.



APPENDIX

Data Submitted to FERC

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 tBtu[20]) in the prior calendar year to report these activities on Form 552. Specifically, these market participants must submit volumes of reportable physical natural gas transactions defined as "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."[21] 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."[22]

Because order 704C excludes any transaction that does not depend on a published price index or that could not be reported to an index price publisher, it specifically excludes 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 between affiliates from the submission requirement.

While respondents aggregate their reported transaction volumes across locations and for the entire calendar year, they are required to 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,[23] and physical basis transactions.[24] In addition to reporting 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 Although the categorization process necessarily involves making judgment calls, it is 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 (MMcf).

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 There were 669 companies that submitted a Form 552 with non-zero volumes.

11 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 underrepresent the volume of transactions represented by Form 552, since some transactions involve market participants that do not submit a Form 552.

12 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.

13 Calculated at minimum trading volume of 61,178 divided by 22,326 EIA natural gas delivered = 2.74.

14 Calculated based on Figure 4, Index Next-Day 22.9% + Index Next-Month 45.7%, + Price Triggers 1.2% = 69.8%.

15 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.

16 Order No. 704, p. 4.

17 Calculated based on Figure 5, reported to index volume 20,478 divided by index-price transactions 84,086 = 24.35%.

18 Calculated based on Figure 7, 6% Integrated-Downstream + 36.4% Integrated-Upstream + 45.5% Trader or Wholesale Marketer = 87.9%.

19 Calculated as volume reportable to indices of 13,549 tBtu from Table 1 of top 20 companies that report to indices divided by 20,478 British thermal units (tBtu) from Figure 5 (1 tBtu = 1 million mmBtu).

20 One million mmBtu equal one tBtu.

21 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.

22 Order 704A, p. 9.

23 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.

24 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.

Please direct any questions, requests for additional information, or permission to reprint charts to:

Greg Leonard
gleonard@cornerstone.com
202.912.8921

Boston
617.927.3000

Los Angeles
213.553.2500

Menlo Park
650.853.1660

New York
212.605.5000

San Francisco
415.229.8100

Washington
202.912.8900

www.cornerstone.com