NGI's Shale Daily®

METHODOLOGY

UPDATED MAY 2023

Introduction

Natural Gas Intelligence, incorporated as Intelligence Press, Inc. (herein referred to as NGI) launched the first of its North American natural gas products in 1981, with the inaugural issue of its flagship *Natural Gas Intelligence* newsletter. It was in that publication that NGI initiated the U.S. natural gas industry's first spot market price table in 1983. In response to the further deregulation of the industry, NGI expanded on that seminal price table in 1988 with the creation of *NGI's Weekly Gas Price Index* and *NGI's Bidweek Survey* newsletters. NGI began publishing its *Daily Gas Price Index* newsletter in 1993 and launched *NGI's Shale Daily* in 2010.

Shale Daily is home to the Shale Price Indexes, the industry's first natural gas spot market prices for unconventional producing areas within the United States. These prices attempt to measure the price of natural gas as it is delivered to pipelines within the major shale and tight sands formations around the country by surveying transactions of next-day natural gas prices in the wholesale market.

The purpose of this document is to provide an overview of how NGI's Shale Price Indexes are constructed and calculated and highlight what delivered-to-pipeline locations are deemed representative of each of the unconventional resources.

Data Sources

NGI calculates Shale Price Indexes using negotiated fixed-priced transactions. All the data we include in our calculations are the product of arms-length transactions between non-affiliated counterparties. We obtain these data from two main sources:

1) **Data from companies who are principals to the trade**
   NGI receives data from Price Data Providers spanning multiple sectors of the natural gas industry. This includes natural gas producers, marketers, financial institutions, power generators, utilities and local distribution companies. FERC in its 2003 Policy Statement, which was revised effective December 31, 2022, has provided guidance to Price Data Providers pertaining to what data to report and from which department within the company these data should be sent. NGI appreciates the leadership FERC has provided in this regard as this has resulted in high quality, standardized reporting for nearly two decades.
2) **Data from the Intercontinental Exchange (ICE)**
   In March 2007, NGI reached an agreement with ICE that dramatically increased the volume and quality of data available for use in the formulation of NGI's natural gas price indexes. This has enabled NGI to include in its price index determination process the natural gas deals transacted on the ICE trading platform as well as the Price Data Provider deals done off ICE.

Index Calculation

Shale Price Indexes are an aggregation of various next-day market trading locations that NGI believes represent the wholesale cost of natural gas in a shale-producing region or "basin." NGI uses historical price data, pipeline tariff information, pipeline flow volumes and state- and county-level information to determine which next-day trading locations to include in a Shale Price Index.

The process by which reported data become NGI's Shale Price Indexes is as follows:

1) NGI's Price Editors upload the raw price reports from each Price Data Provider into our proprietary price determination software system called Abacus. Abacus reads the descriptions of where each deal occurred and matches these deals to different market locations.
2) Once all data have been submitted to NGI and uploaded to Abacus, NGI Price Editors review the submitted data for every market location. NGI Price Editors will remove outlier deals and any other transaction that is noted by the Price Data Provider as not being representative of the wholesale cost of natural gas (e.g. retail deals) at the individual market locations. Examples of outliers include:

Reason	Why Exclude?
Unconfirmed transactions that are more than three (3) standard deviations from the mean	Including an abnormal and unconfirmed transaction may artificially skew the index higher or lower.
Retail transactions	These do not comply with our attempt to measure the wholesale price of gas.
Deal includes a credit adder	Such deals usually include a significant premium to compensate a party for the risk of transacting with a less-than-creditworthy counterparty. However, this type of premium is not indicative of the market value of the gas being transacted.
Trades between affiliated parties	These are not arms-length transactions.
Transactions completed outside of our survey window	We must adhere to a strict and consistent time frame for collecting data, otherwise we would introduce measuring bias.
Reports flagged by our data contributors as being irregular or out of the market	Most of our exclusions fall into this category.
Deals that do not comply with the definition of each index	We will only include those transactions that are delivered to pipelines that comprise each of our Shale Prices Indexes. For example, deals in the Permian Basin are not included in our Haynesville Shale indexes.
Intra-day deals	Do not conform to our definition of the flow period for day-ahead indexes.

3) Once the data have been reviewed for each market location, Shale Price Indexes are calculated as the volumetric weighted average of all deals in all market locations that NGI believes represent the shale basin being measured. The low and high prices for the Shale Price Indexes will be the lowest and highest price among all included deals, and the volume and deal count statistics will represent the sum of the volumes of all included deals and the number of those included deals, respectively.

All component market locations are treated equally in their contribution of component deals when forming a Shale Price Index.

Example:

The Utica Shale Price Index is composed of two market locations: Tennessee Zn 4 313 Pool and Tenn Zn 4 200L. Once those two market locations have been reviewed, the data included in both of them would be aggregated to form the Utica Shale Price Index.

1. *Low: The low for the Utica Shale Price Index would be calculated as the minimum price across all included deals between Tennessee Zn 4 313 Pool and Tenn Zn 4 200L.*

2. *High: The high for the Utica Shale Price Index would be calculated as the maximum price across all included deals between Tennessee Zn 4 313 Pool and Tenn Zn 4 200L.*

3. *Average: To calculate the average, the price for each deal from both market locations would be multiplied by their respective volume and then summed. The resulting sum would then be divided by the sum of the volumes to arrive at a volumetric weighted average.*

4. *Volume: The volume would be the sum of the volumes of all deals included in both Tennessee Zn 4 313 Pool and Tenn Zn 4 200L.*

5. *Deal Count: The deal count would be the number of deals included in both Tennessee Zn 4 313 Pool and Tenn Zn 4 200L.*

Index Components

The following table lists all Shale Price Indexes published by NGI and the component market locations for each. NGI first began publishing Shale Price Indexes in 2010, back when the industry was still in its formative stages, and when the definitions of each play and pricing relationships in the various regions still were evolving. However, we believe the industry has reached a more mature state, and we have therefore streamlined the trading locations we include in each Shale Price Index location (versus those we listed in the previous version of this methodology dated October 2017) in order to focus on those pipelines we believe are the most representative of pricing activity in each location.

Shale Location	Shale	Region	Included Market Locations
Arkoma - Woodford	SMCWARK	Midcontinent	Enable East
Bakken	SRMTBAKKEN	Rocky Mountains / West	Northern Border Upstream, WBI Energy Transmission
Barnett	SNTXBARNETT	Gulf Coast	Atmos Zone 3, Tolar Hub
Cana - Woodford	SMCWCANA	Midcontinent	NGPL Midcontinent, OGT, Panhandle Eastern
Eagle Ford	SSTXEAGLE	Gulf Coast	NGPL S. TX, Tennessee Zone 0 South, Texas Eastern S. TX
Fayetteville	SMCWFAY	Midcontinent	NGPL Gulf Coast Mainline, Trunkline Zone 1A
Granite Wash	SMCWGWA	Midcontinent	ANR SW, El Paso Anadarko
Green River Basin	SRMTGRN	Rocky Mountains / West	Kern River Receipts, Northwest Wyoming Pool, Opal, Pioneer
Haynesville - E. TX	SETXHAYNE	Gulf Coast	Carthage, NGPL TexOk, Texas Eastern E. TX
Haynesville - N. LA	SNLAHAYNE	Gulf Coast	Tennessee Zone 0 North, Tenn Zone 1 non-St. 87
Marcellus - NE PA	SNEAMARCE	Northeast	Transco-Leidy Line, Millennium East Pool, Tennessee Zn 4 Marcellus
Marcellus - NE PA: Other	SNEAMAOTH	Northeast	Millennium East Pool, Transco-Leidy Line
Marcellus - NE PA: Tenn	SNEAMATEN	Northeast	Tennessee Zn 4 Marcellus
Marcellus - SW PA/WV	SNEAPAWV	Northeast	Eastern Gas South, Columbia Gas (TCO), Texas Eastern M-2, 30 Receipt
Niobrara-DJ	SRMTNIOB	Rocky Mountains / West	Cheyenne Hub, CIG DJ Basin
Permian	SWTXPERM	Gulf Coast	El Paso - Keystone Pool, El Paso - Plains Pool, Northern Natural Gas 1-7, Transwestern - W. TX, Transwestern - Central
Piceance Basin	SRMTWHT	Rocky Mountains / West	White River Hub
San Juan Basin	SRMTSANJUAN	Rocky Mountains / West	El Paso Bondad Pool, El Paso Bondad Station, El Paso San Juan, Transwestern San Juan

Shale Location	Shale	Region	Included Market Locations
Tuscaloosa Marine Shale	SSLATMS	Gulf Coast	Florida Gas Zone 2, Pine Prairie, Transco Zone 3 St. 65
Uinta Basin	SRMTUNITA	Rocky Mountains / West	Questar, White River Hub
Utica	SNEAOHUTICA	Northeast	Tennessee Zn 4 313 Pool, Tenn Zone 4 200L

Index Maintenance

NGI continuously monitors the market to ensure the price indexes we publish reflect current market conditions. Accordingly, NGI will periodically amend the index definitions or index mappings used to calculate its price indexes in order for the indexes to remain current.

We conduct a formal review of our indexes no less than once per year, but we will do so more frequently as conditions warrant. Events that may lead NGI to add new indexes, alter the definitions of existing locations or remove indexes from our price tables include, but are not limited to: new pipelines going into service, changes in pipeline tariffs, developments in local supply/demand fundamentals that may cause prices to differ materially along the same pipeline and a lack of trading liquidity.

Whenever NGI identifies potential changes to our price tables, we first will notify our subscribers and channel partners in writing about what those changes may be and when we plan for them to go into effect. We also give our audience a period of time (typically one to two months) to provide any comments or market feedback that we will consider before making a final decision.

After a final decision has been made, NGI once again will notify our subscribers and Price Data Providers in writing about those changes and confirm when they will be implemented. We will then update our methodology to incorporate those changes the same day they go into effect.