Pennsylvania Public Utility Commission

Annual Winter Reliability Assessment

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Introduction

The **Energy Association of Pennsylvania** represents the interests of its

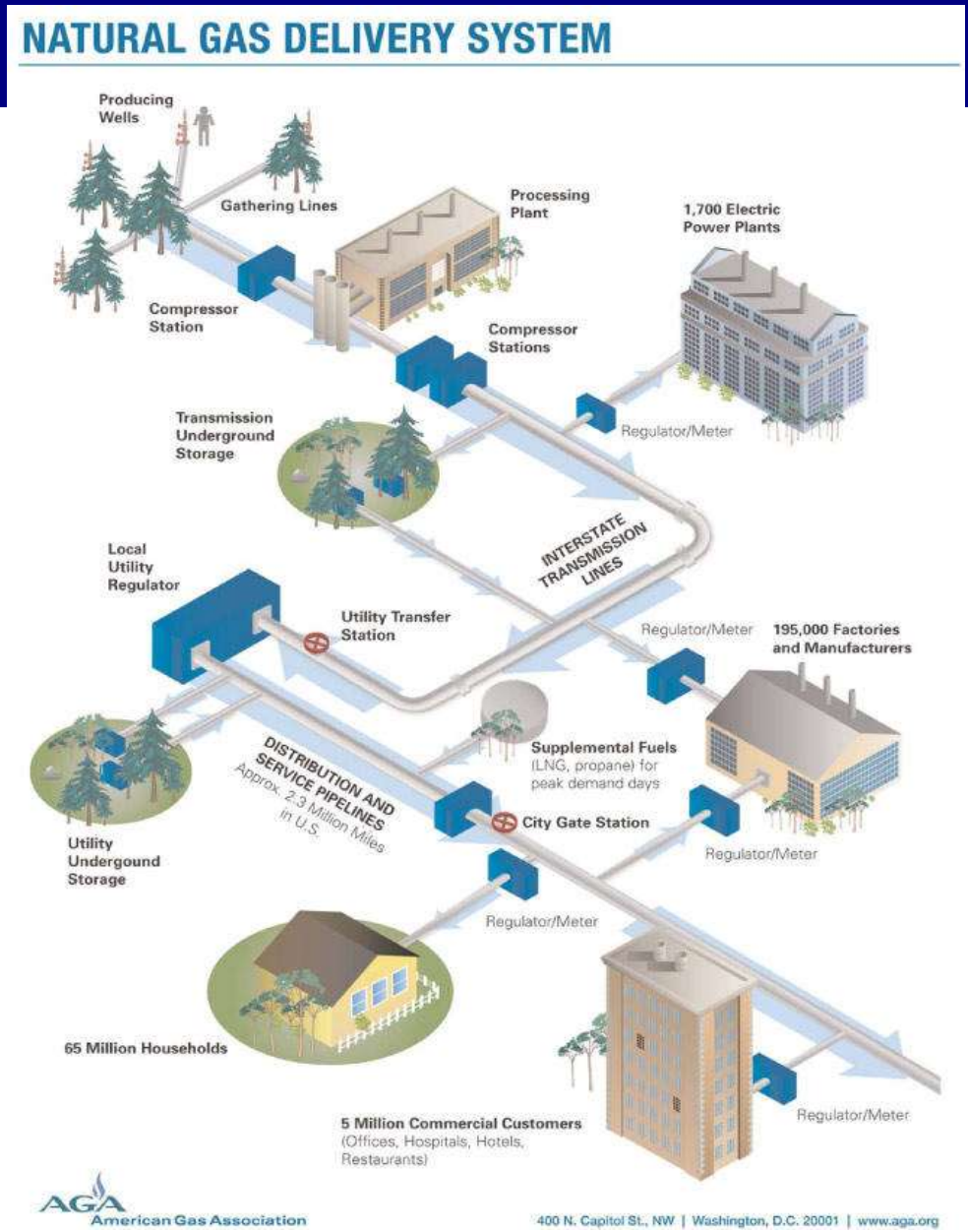
Member Natural Gas Distribution Companies:

Columbia Gas of Pennsylvania
Leatherstocking Gas Company, LLC
National Fuel Gas Distribution Corp.
PECO
Peoples Natural Gas Company LLC
Peoples Gas Company
Philadelphia Gas Works
Pike County Light & Power Company
UGI Utilities, Inc. - Gas Division
Valley Energy

Distributing natural gas to over three million residential, commercial and industrial customers in Pennsylvania

Introduction - How Gas is Delivered

- Extracted from wells and moved from collection point into gathering system for sale into the wholesale market
  - *Includes processing facility where natural gas is purified and useful by-products such as propane and butane are removed*
- Moved into transmission system using compressors
  - *counteracts friction that is created when gas is moved through steel pipe*
- Transported by midstream companies to utility's delivery point ("city gate") or to upstream storage
  - *Pressure reduced*
  - *Odorant added*
- Moved into utility's distribution pipeline and delivered through individual service lines to customer
  - *pressure further reduced for delivery*



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Supply and Demand

Winter 2023-2024

(all natural gas volumes in billions of cubic feet)

Expected Demand	**238.9** Bcf
Expected Supply	
Flowing Interstate Gas	144.2
Storage Withdrawals	90.3
Local Production	2.9
Peak Shaving	1.5
TOTAL	**238.9**

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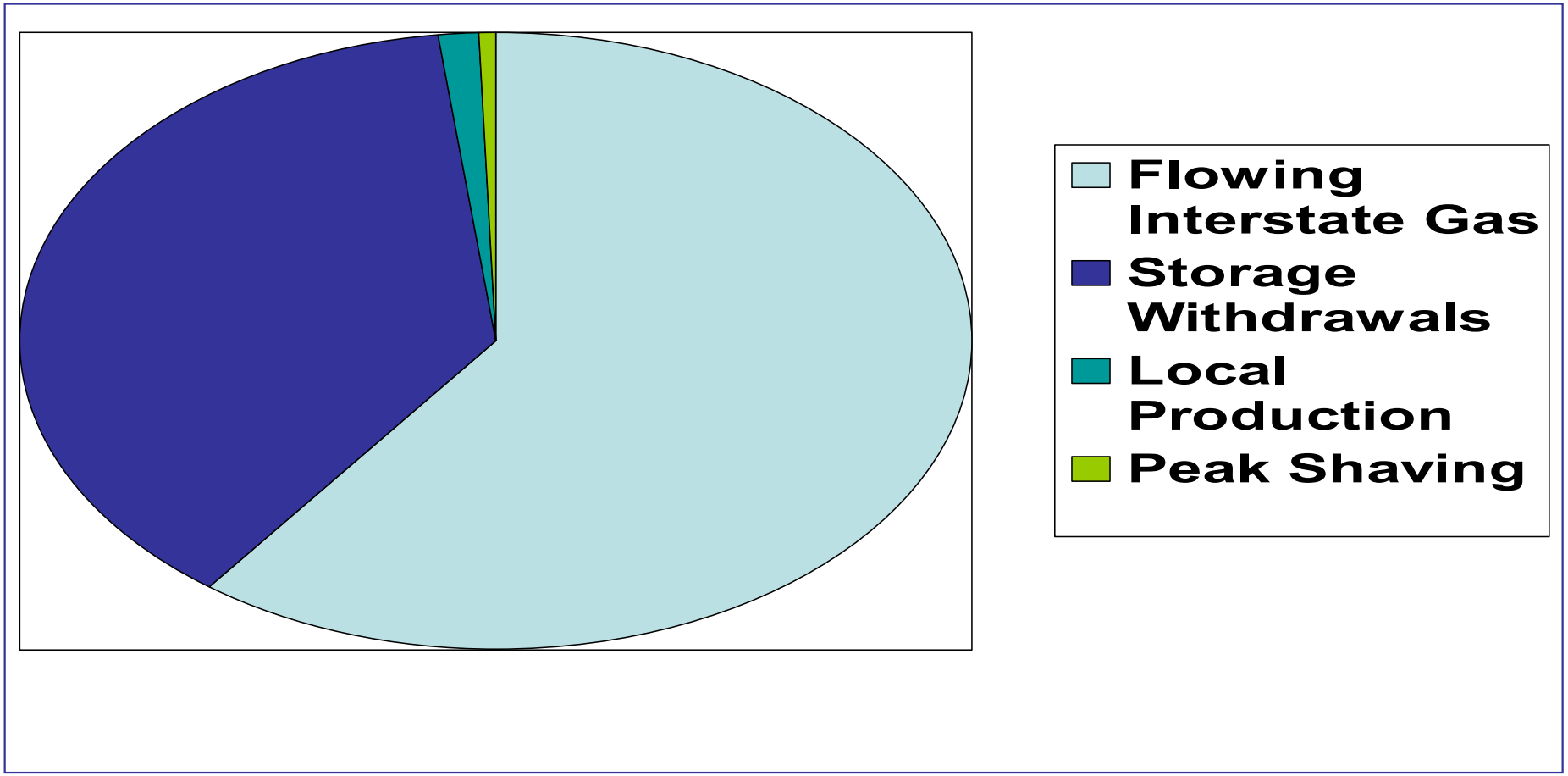
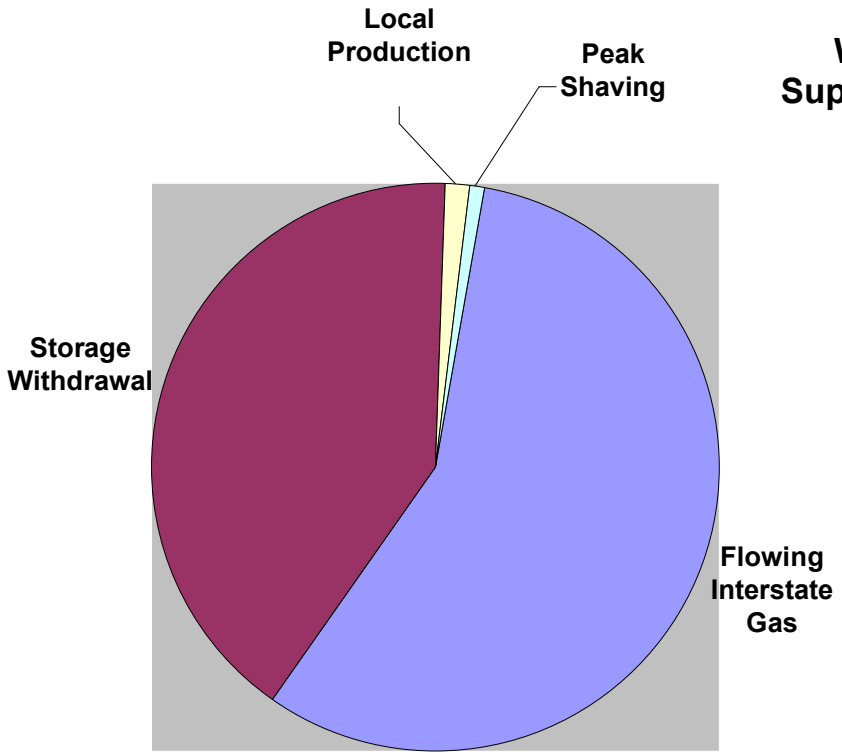
Winter 2023-2024: Supply Sources



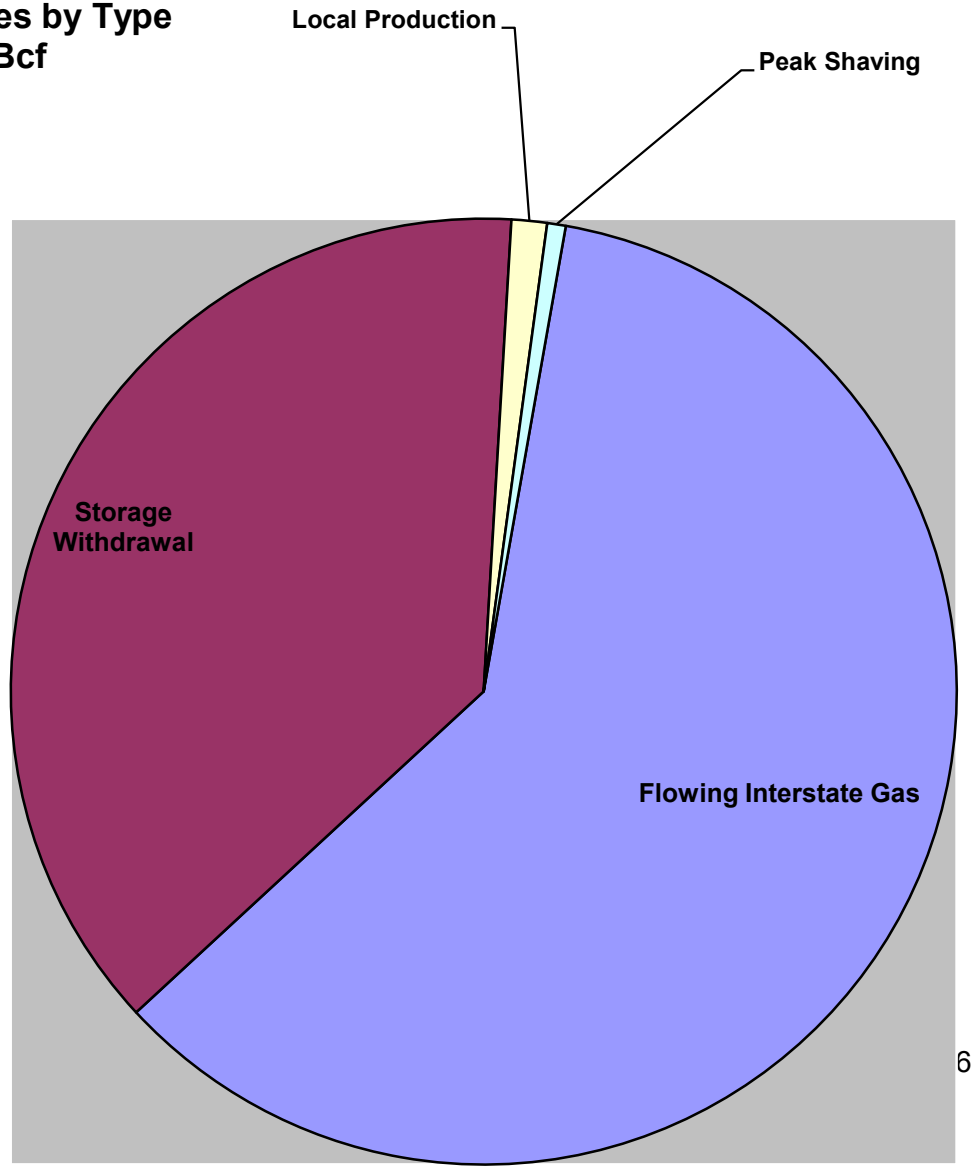
* Note: gas flowing on interstate pipelines can be sourced from Pennsylvania production connected to those interstate pipelines.

Comparison of Forecasts
Last Winter and This Winter



Winter 2022-2023:
Supply Sources by Type
230.7 Bcf

Winter 2023-2024:
Supply Sources by Type
238.9 Bcf



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System Planning Strategies

Objective: To identify supply resources (including upstream transportation and storage capacity) that will be necessary to preserve service reliability at anticipated levels of firm demand

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System Planning Strategies

Capacity and Supply Assets: Natural Gas Distribution Companies (NGDCs) commit to capacity and supply assets as necessary to meet firm customer needs, including operational swings. Commitments may include a reserve, but do not include service to interruptible customers. These assets include:

- Pipeline deliveries per firm transportation agreements
- Underground storage withdrawals (on-system, off-system)
- Pennsylvania local production (where available)
- Peak shaving facilities

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System Planning Strategies - Production

- The US Energy Information Administration (EIA) reports that 2022 U.S. dry natural gas (consumer-grade natural gas) production was the highest on record for any year on record, dating back to 1930. The 2022 injection season was 3.9 billion cubic feet (Bcf) per day higher than the 2021 injection season average.

- In July 2023, dry natural gas production increased year over year for the month for the 28th consecutive month. Preliminary dry natural gas production in July 2023 was 3,222 Bcf, or 103.9 Bcf per day. This level was 3.5% higher than July 2022 and the highest for any month since 1973, when EIA began tracking dry natural gas production. EIA notes that gross withdrawals also increased from July 2022.

- Compared with a year ago, U.S. natural gas production growth this year has not kept pace with growth in LNG exports and record consumption in the electric power section this summer, leading to lower-than-average storage injections in July, August, and September. According to EIA, despite lower-than-average storage injections recently, natural gas inventories remain above the five-year average, and they expect natural gas supplies will be sufficient to meet 2023 winter demand in the base case.

- Dry natural gas production from shale formations in the Appalachian Basin that spans Pennsylvania, West Virginia, and Ohio has been growing since 2008. In 2021, natural gas from shale formations accounted for 79% of all U.S. natural gas production. The Appalachian Basin contains two shale formations, Marcellus and Utica. In the first half of 2021, on its own, the Appalachian Basin would have been the third-largest natural gas producer in the world, behind Russia and the rest of the United States. Production has increased in part because of widespread adoption of two technologies — horizontal drilling and hydraulic fracturing that allow operators to produce shale gas economically. Improvements in drilling technology and more efficient hydraulic fracturing techniques have allowed the expansion of shale gas production. Advances, such as longer well laterals, allow producers to recover greater volumes from a single well.

- According to the 2022 Potential Gas Committee's (PGC) biennial natural gas resources assessment, the U.S. possesses future gas supply of 3,978 trillion cubic feet (Tcf) with 3,352 Tcf of technically recoverable natural gas resources, as well as 625 Tcf of proven gas reserves estimated by EIA and display a picture of strong supply of natural gas in the U.S. for many years to come.

(https://www.iea.org/reports/world-energy-outlook-2020#; US Energy Information Administration (EIA) Today in Energy, release date 9/15/22, 10/21/22; US EIA Short-Term Energy Outlook, release date 10/11/23,; American Gas Association (AGA) Energy Insights, 10/14/22; US EIA 2022 Natural Gas Annual, release date 9/29/23; Potential Supply of Natural Gas in the United States, Report of the Potential Gas Committee, www.potentialgas.org)

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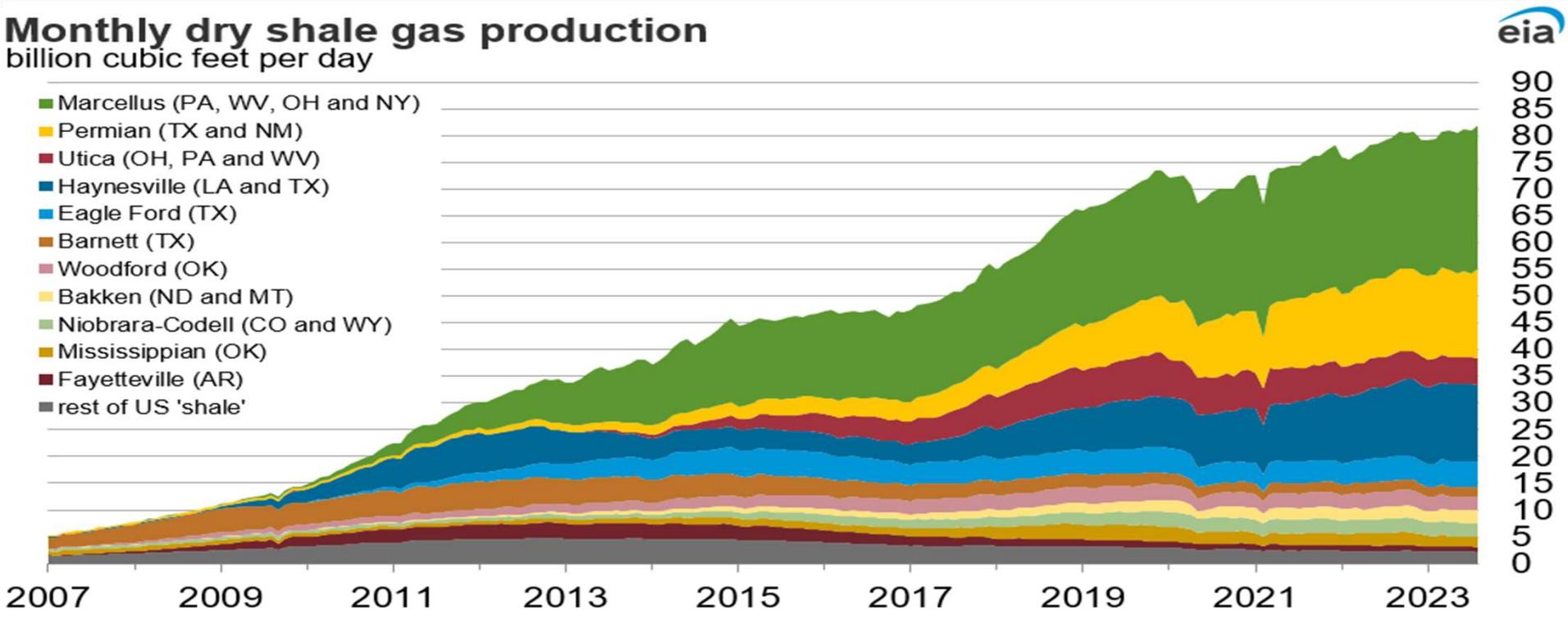
System Planning Strategies - Production



Data source: Enverus

Note: EIA derived these tight oil estimates from Enverus state administrative data. Data are through August 2023. These data are not survey data. State abbreviations indicate the primary states where the plays are located. In addition, EIA has improved its play and well identification methods, which has altered production volumes at various plays and has shifted classification of some wells from tight to other non-tight categories. Because EIA has changed the geologic model it uses to determine formation-level production of the three main oil-producing formations in the Permian Basin—Wolfcamp, Spraberry, and Bonespring—current and historical volume estimates have changed.

PA=Pennsylvania, WV=West Virginia, OH=Ohio, NY=New York, TX=Texas, NM=New Mexico, LA=Louisiana, OK=Oklahoma, ND=North Dakota, MT=Montana, CO=Colorado, WY=Wyoming, AR=Arkansas

(US Energy Information Administration (EIA) eia.gov/naturalgas/weekly/- 10/5/23)

System Planning Strategies - Price

- Serving as a national benchmark, the Henry Hub in southern Louisiana is the best known spot market for natural gas. As of October 4, 2023, the Henry Hub spot price was $2.91 per MMBtu.

- With regard to natural gas spot prices at Northeast regional trading hubs, the price on 10/19/22 was $1.33/MMBtu at the Transcontinental Pipeline Zone 6 (New York).

- Monthly average natural gas wholesale spot prices at the U.S. benchmark Henry Hub have been generally declining so far in 2023, although these relatively low prices do not immediately translate into lower retail prices for residential consumers. Changes in retail natural gas prices lag changes in wholesale natural gas prices, largely due to the nature of utility regulation. Over longer periods, changes in natural gas wholesale and retail prices are more closely correlated.

- Natural gas is the most common source of heat for U.S. households. The U.S. Energy Information Administration (EIA) expects U.S. households that heat with natural gas will spend less on heating costs this winter than last winter. The agency forecasts residential natural gas prices will be about 21% lower than last winter.

- The price of natural gas is determined by numerous market factors such as supply and demand, weather, imports and exports, underground storage levels, and natural gas production. Record high liquefied natural gas (LNG) exports have been a growing source of natural gas demand. The current market pricing is shaped by record year-to-date dry gas production, above average storage inventories, and the flexibility enabled by infrastructure connections within the U.S. and our neighbors to the North and the South.

(US EIA Short-Term Energy Outlook, released 10/11/23; US EIA Natural Gas Weekly Update, released 10/5/23 and 10/21/21; US EIA TODAY IN ENERGY -10/12/23, 7/24/23; US EIA Winter Fuels Outlook 2023-2024, released 10/11/23; AGA Natural Gas Market Indicators -10/3/23)

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System Planning Strategies - Price

((US Energy Information Administration (EIA) eia.gov/naturalgas/weekly/- 10/5/23)

System Planning Strategies - Pipeline Capacity Reliability

- Development of the national pipeline network infrastructure, comprised of interstate and intrastate transmission pipelines and underground natural gas storage facilities, helps meet the needs of the market and reach new customers within the U.S. and abroad.

- Pipeline projects address a growing need for additional natural gas pipeline capacity to support transportation of new natural gas production to regional markets. According to the Federal Energy Regulatory Commission (FERC), access to new production and added natural gas transportation capacity has contributed to breaking down long standing price differences between market hubs and has helped to reduce bottlenecks significantly.

- The pipeline infrastructure in the Northeastern US has not kept pace with soaring natural gas production. In addition to bidirectional pipeline projects, the industry is working to build transportation capacity to support this production growth. Pipeline expansion projects are helping to alleviate a supply glut in the region.

- Growth in pipeline takeaway capacity allows natural gas produced in the Appalachian Basin to reach other demand markets, especially in the Midwest. From 2008 to 2020, total pipeline takeaway capacity from the Northeast increased from 4.5 Bcf/d to 24.5 Bcf/d, alleviating some congestion and supporting higher wholesale natural gas prices in the region. Most of the increase in takeaway capacity happened between 2014 and 2020, when pipeline capacity increased by 16.5 Bcf/d. Pipeline takeaway capacity from Appalachia to Canada and to the Southeast has also increased. In 2022, five new natural gas pipeline capacity projects will expand capacity in Texas out of the Permian Basin.

(US EIA Today in Energy, released 8/4/22, 9/1/21; www.stateimpact.npr.org/pennsylvania/2017/08/17/as-pipelines-alleviate-natural-gas-glut-prices-rise-for-producers-in-northeast/; Federal Energy Regulatory Commission (FERC) State of the Markets Report, released 3/17/16; FERC Summer 2012 Energy Market & Reliability Assessment, 5/17/12)

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Ability to contract for interstate pipeline capacity

- Firm capacity assets are used to transport supplies and manage storage to serve firm customers and operationally balance system requirements
- Members routinely review the interstate capacity market to try to obtain the optimum portfolio of assets to meet their needs
- The temperature sensitive loads of residential and human needs customers require dedicated, firm gas supply assets, including interstate transportation and storage services: There is no substitute
- Members do not report difficulty contracting for firm interstate capacity **when it is available**

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Storage Management

- Inventories must be maintained at the levels necessary to fulfill obligations per planning criteria. Aggregate projected storage levels on Nov. 1, 2023 are sufficient to meet anticipated winter demand

- Warmer than normal weather affects storage utilization, given the need to meet minimum turnover requirements for the integrity of fields and to comply with pipeline tariff provisions

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Storage Management

- Where contractually and operationally permissible, an NGDC may leave gas in storage if projected replacement costs exceed current prices, or an NGDC may use storage in lieu of firm transportation if replacement costs are favorable.

- Storage inventory is managed to prevent deliverability from being reduced before potential design day occurrence, and to prevent firm markets from going un-served for some part of the remainder of the season.

- At the end of October 2023, the Energy Information Administration (EIA) expects U.S. natural gas inventories to total 3,854 billion cubic feet, 6% more than the five-year (2018-2022) average for the end of October.

- Compared with a year ago, U.S. natural gas production growth this year has not kept pace with growth in LNG exports and record consumption in the electric power section this summer, leading to lower-than-average storage injections in July, August, and September. Despite this slower pace of injections, natural gas inventories remain above the five-year average, and EIA expects natural gas supplies will be sufficient to meet 2023 winter demand in the base case.

(American Gas Association (AGA) Natural Gas Market Indicators –10/3/23, 9/20/23; US Energy Information Administration (EIA) Short Term Energy Outlook, released 10/11/23; US EIA Weekly Natural Gas Storage Report, released 10/61/23; US EIA Natural Gas Weekly Update, released 10/5/23)

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Injections into Liquified Natural Gas (LNG) Facilities

- Two Association members own on-system liquefied natural gas (LNG) facilities, which provide a source of wintertime deliverability
- These facilities are also used to mitigate exposure to price volatility, especially during peak periods
- Total volume injected: 4.4 Bcf
- PECO anticipates using LNG to meet 1% of winter day requirements, PGW anticipates using LNG to meet 1.5% of winter requirements
- Management of LNG facilities is primarily a matter of preparedness

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Gas Price Volatility: Hedging

- Based on a weighted average of the members, 54% of this winter's supplies are hedged

- Supplies are considered hedged if they are
  - Already purchased and in storage
  - If they are contracted for delivery under:
    - Fixed-price contracts
    - Forward-priced contracts
    - Price caps

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Conclusion: Supply

- Members are well prepared to accommodate the conditions forecasted in their winter season planning design.
- Underground storage and peak shaving inventories will be adequate to handle design conditions.

Thank you.

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