

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

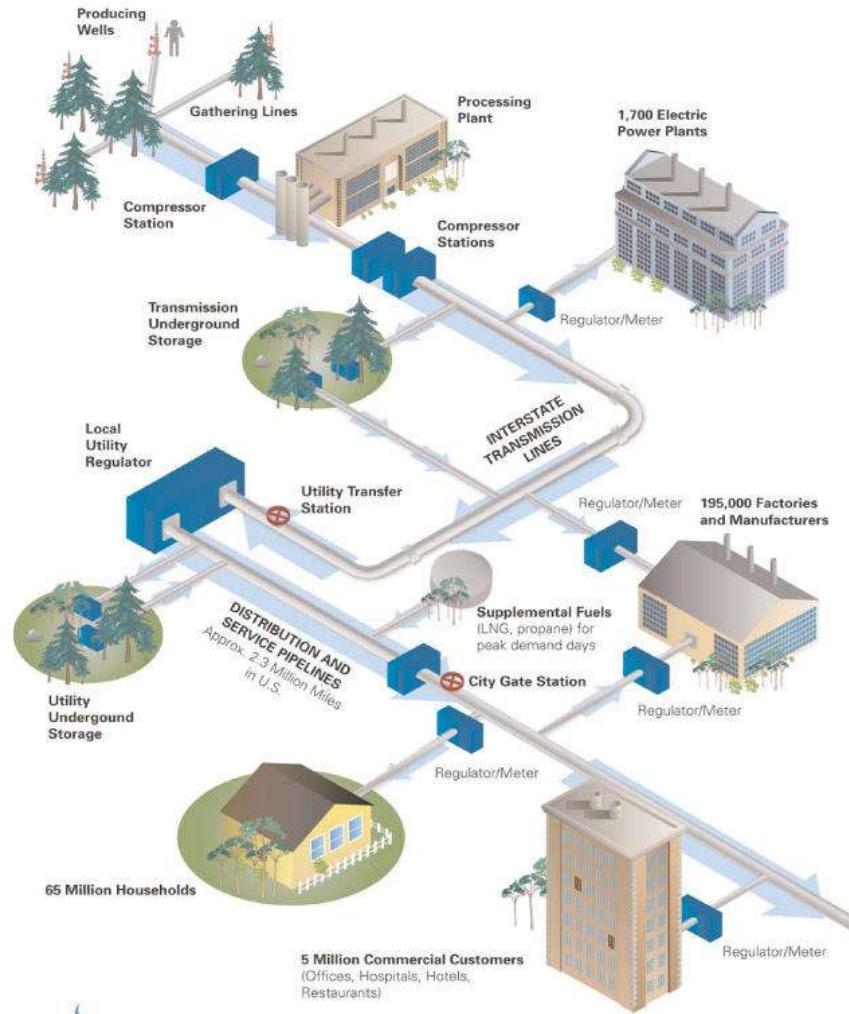
Distributing natural gas to over three million residential, commercial and industrial customers in Pennsylvania



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*

NATURAL GAS DELIVERY SYSTEM



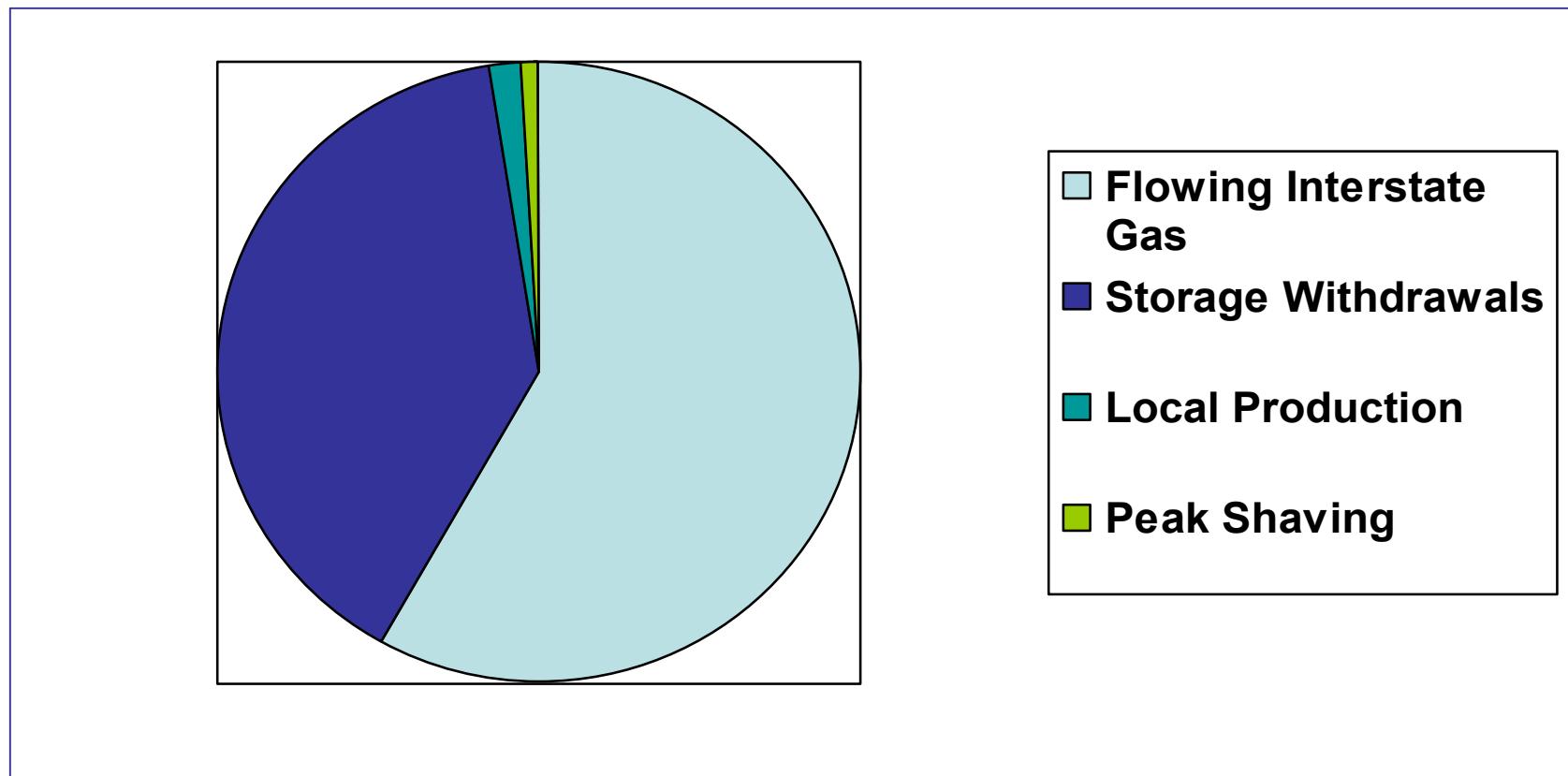
Supply and Demand

Winter 2019-2020 *(all natural gas volumes in billions of cubic feet)*

Expected Demand	223.8 Bcf
Expected Supply	
Flowing Interstate Gas	130.1
Storage Withdrawals	88.3
Local Production	3.5
Peak Shaving	1.9
TOTAL	223.8

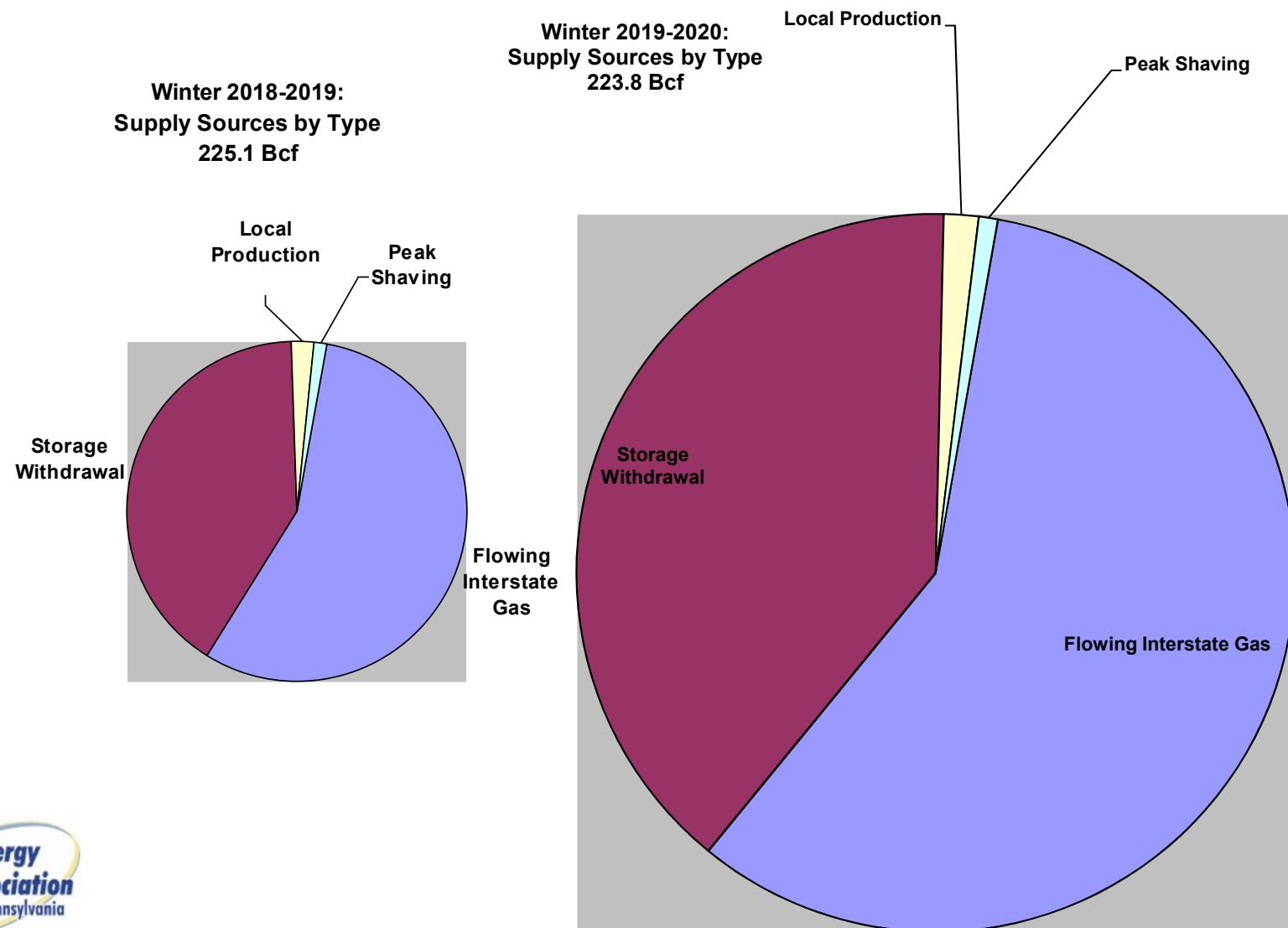


Winter 2019-2020: Supply Sources



* 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



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



System Planning Strategies

Capacity and Supply Assets: 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



System Planning Strategies - Production

- According to the year end 2018 Potential Gas Committee's (PGC) natural gas resources assessment, the U.S. possesses a total mean technically recoverable resource base of 3,374 trillion cubic feet (Tcf) which is the highest resource evaluation in the Committee's 54 year history. The increase resulted, in part, from reassessments of shale gas resources in the Atlantic and Mid-Continent areas. The record gas resources assessed by the PGC, in addition to record reserves and record production reported by the US Energy Information Administration (EIA), display a picture of strong supply of natural gas in the U.S. for many years to come.
- High natural gas production is helping to ensure that adequate supplies of natural gas are available. U.S. natural gas production set a new monthly record in August 2019 and a new record of 91.9 billion cubic feet (Bcf) per day was set on September 29, 2019.
- U.S. natural gas production increased by 7.1 billion cubic feet (Bcf) per day (8%) between August 2018 and August 2019, led by production gains primarily in the Northeast, especially from the Appalachia region. Natural gas flows out of the Northeast region into the rest of the United States averaged more than 16 billion cubic feet per day (Bcf/d) during September—between 1 Bcf/d and 2 Bcf/d more than in previous months, according to data from Genscape. States driving this increase are Pennsylvania and Ohio. The United States has experienced a rapid increase in natural gas production from the robust influx of Marcellus and Utica shale resources.
- Gross production of natural gas has generally been increasing for more than a decade. The EIA forecasts that annual dry natural gas (consumer-grade natural gas) production will average 91.6 Bcf per day in 2019, up 10% from the 2018 average. EIA also forecasts that natural gas production in 2020 will average 93.5 Bcf per day.
- Production has increased in part because of new drilling techniques. The combination of two technologies —horizontal drilling and hydraulic fracturing — has made it possible to produce shale gas economically. Improvements in drilling technology and more efficient hydraulic fracturing techniques have allowed, and are likely to continue to allow, the expansion of shale gas production. Advances, such as longer well laterals, allow producers to recover greater volumes from a single well.

(US Energy Information Administration (EIA) Today in Energy, release date 10/4/18, 8/28/18, 9/12/19; US EIA Short-Term Energy Outlook, release date 9/10/19, 10/8/19; American Gas Association (AGA) Natural Gas Market Indicators, 9/30/19; Potential Supply of Natural Gas in the United States, Report of the Potential Gas Committee, released 12/31/18, www.potentialgas.org)

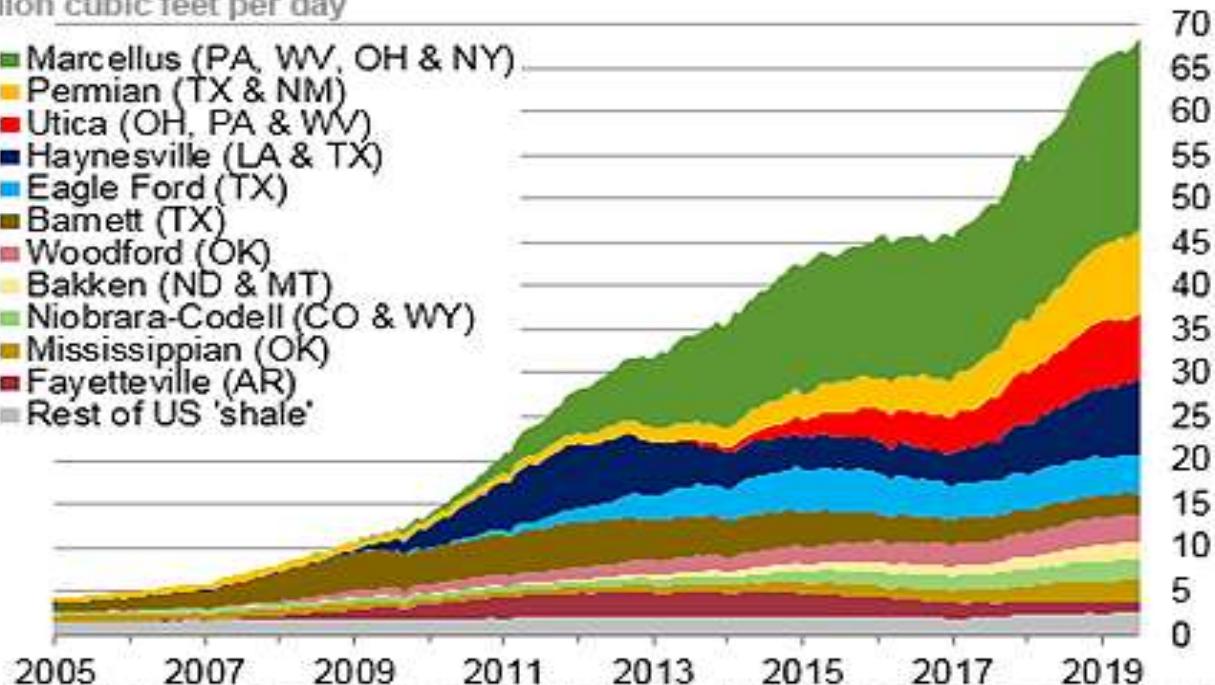


System Planning Strategies - Production

Monthly dry shale gas production

billion cubic feet per day

- Marcellus (PA, WV, OH & NY)
- Permian (TX & NM)
- Utica (OH, PA & WV)
- Haynesville (LA & TX)
- Eagle Ford (TX)
- Barnett (TX)
- Woodford (OK)
- Bakken (ND & MT)
- Niobrara-Codell (CO & WY)
- Mississippian (OK)
- Fayetteville (AR)
- Rest of US 'shale'



Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through July 2019 and represent EIA's official tight gas estimates, but are not survey data. State abbreviations indicate primary state(s).



(US Energy Information Administration (EIA) Natural Gas Weekly Update, released 8/15/19)

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 23, 2019, the Henry Hub spot price was \$2.28 per MMBtu (million British thermal units).
- With regard to natural gas spot prices at Northeast regional trading hubs, the price on 10/23/19 was \$1.95/MMBtu at the Transcontinental Pipeline Zone 6 (New York).
- U.S. natural gas prices have fallen in 2019 because of strong supply growth that has enabled natural gas inventories to build more than average during the April through October injection season. As natural gas spot prices have declined in the Northeast, and as production in Appalachia has continued to grow, the movement of natural gas has increased.
- According to the US Energy Information Administration (EIA), Henry Hub natural gas spot prices are forecast to average \$2.56 MMBtu this winter, which is a 24% decrease from last winter because of higher inventory levels.
- On average across the United States, households can expect heating expenditures this winter to be lower than last winter, according to the EIA's *Winter Fuels Outlook*. The forecast largely reflects warmer than expected winter temperatures compared with last winter.
- Significant regional variation exists in natural gas price changes compared with last winter. EIA forecasts residential natural gas prices in the Northeast to be 6% lower than last winter.

(US Energy Information Administration (EIA) Short-Term Energy Outlook, released October 8, 2019; <https://www.eia.gov/outlooks/report/winterfuels.php>; US EIA Natural Gas Weekly Update, released 10/24/19; US EIA Winter Fuels Outlook released October 8, 2019)



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. Additional pipeline capacity brought into service since June 2017 has enabled production increases, including the Leach XPress, the Rover Pipeline, and Phase 1 of Atlantic Sunrise, all of which transport natural gas out of the Northeast region. EIA expects construction of new natural gas pipeline capacity to continue, in particular in the northeastern United States. As new pipeline projects come online, they create an outlet for increased production, providing natural gas to demand markets in the Midwest, the Southeast, eastern Canada, and the Gulf Coast.

(US EIA Today in Energy, released 5/18/18, 10/4/18; 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)



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**
- Pursuant to recent Texas Eastern communications, there is a potential for Texas Eastern firm service restrictions this winter resulting from voluntary operating pressure reductions and ongoing system assessments. Mitigation and contingency planning by impacted NGDCs, in coordination with impacted NGSSs, are ongoing and anticipated to address full firm service reliability requirements at this time



Storage Management

- Inventories must be maintained at the levels necessary to fulfill obligations per planning criteria. Aggregate projected storage levels on Nov. 1, 2019 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



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.
- Throughout the 2019 refill season (April through October), injections of natural gas into storage in the United States have outpaced the previous five-year (2014-2018) average as a result of rising natural gas production. The average rate of net injections into storage is 27% higher than the five-year average so far in the refill season.
- For the week ending October 4th, working gas inventory levels at underground storage fields were 16 percent above year-ago levels. The EIA expects working gas inventories two percent higher than the five-year average to begin the winter.
- It appears the gas market is well-positioned in terms of supply as we head into the winter.

(American Gas Association (AGA) Natural Gas Market Indicators –10/15/19; US Energy Information Administration (EIA) Short Term Energy Outlook, released 10/8/19; US EIA Weekly Natural Gas Storage Report, released 10/24/19; US EIA Natural Gas Weekly Update, released 10/24/19)



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: 4.6 Bcf
- PECO anticipates using LNG to meet 1% of winter day requirements, PGW anticipates using LNG to meet 3% of winter requirements
- Management of LNG facilities is primarily a matter of preparedness



Gas Price Volatility: Hedging

- Based on a weighted average of the members, 48.2% 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



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.

