

Pennsylvania Public Utility Commission

Annual Winter Reliability Assessment

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October 23, 2018
Harrisburg, PA



Introduction

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

Member Natural Gas Distribution Companies:

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

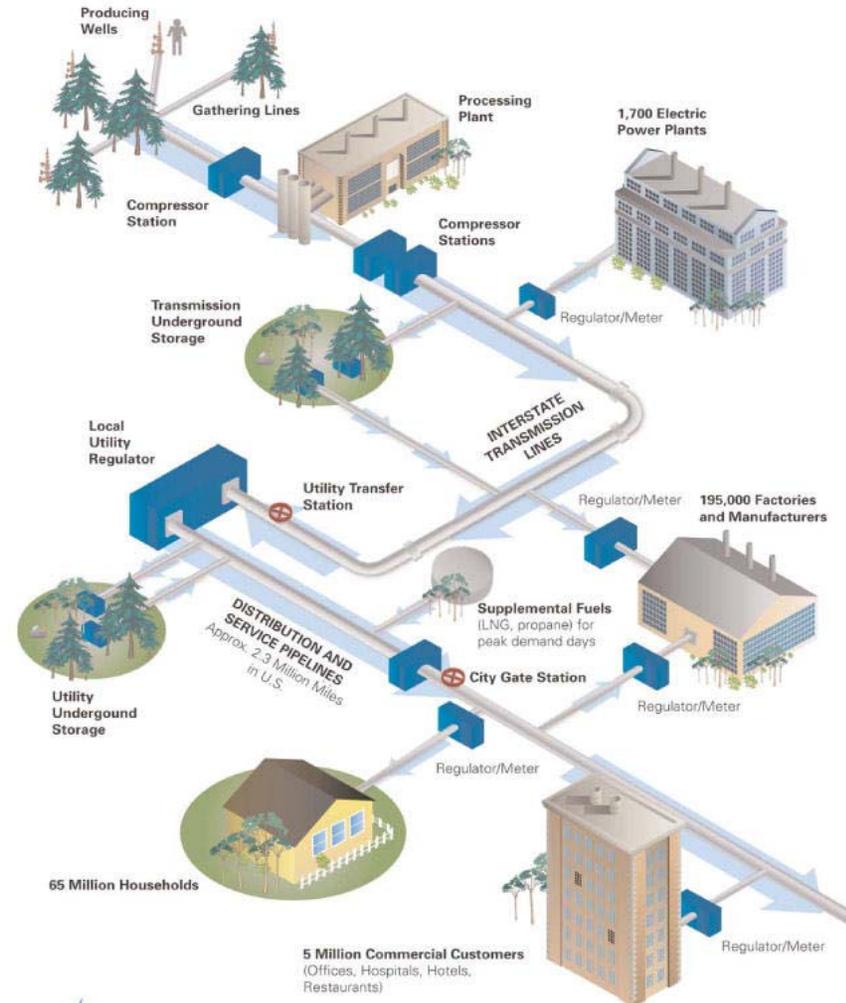
Distributing natural gas to just over three million residential, commercial and industrial customers in Pennsylvania



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

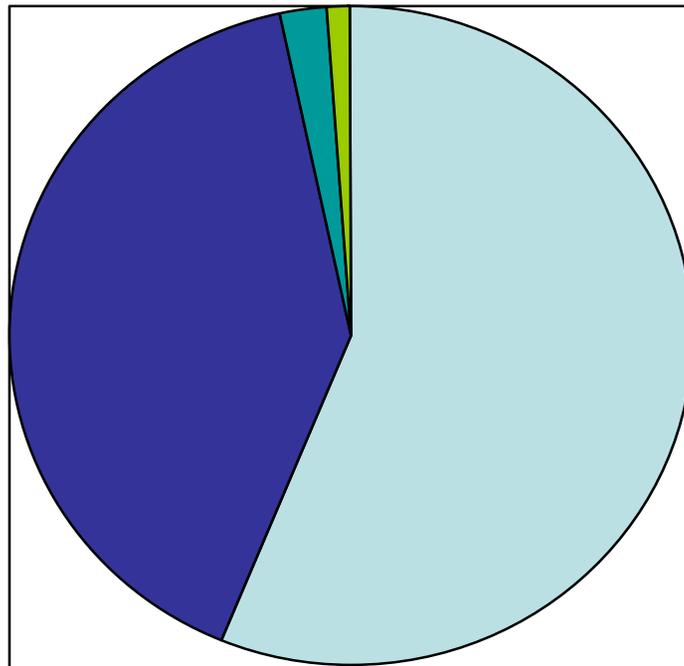
Winter 2018-2019

(all natural gas volumes in billions of cubic feet)

Expected Demand	225.1 Bcf
Expected Supply	
Flowing Interstate Gas	126.4
Storage Withdrawals	91.0
Local Production	5.3
Peak Shaving	2.4
TOTAL	225.1



Winter 2018-2019: Supply Sources



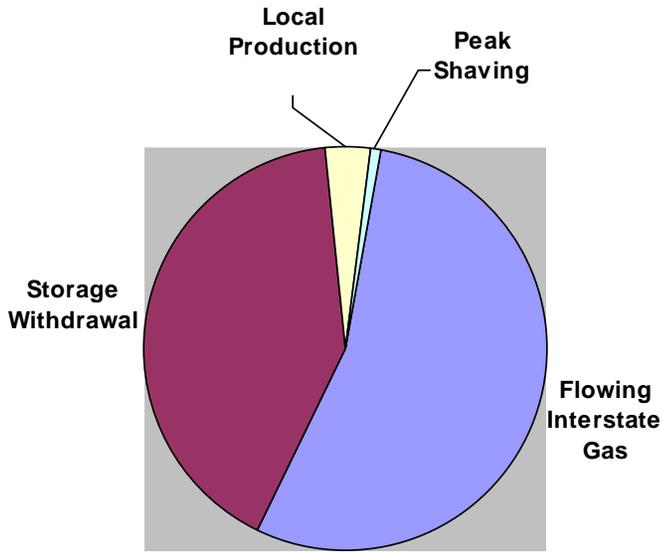
- Flowing Interstate Gas
- Storage Withdrawals
- Local Production
- Peak Shaving



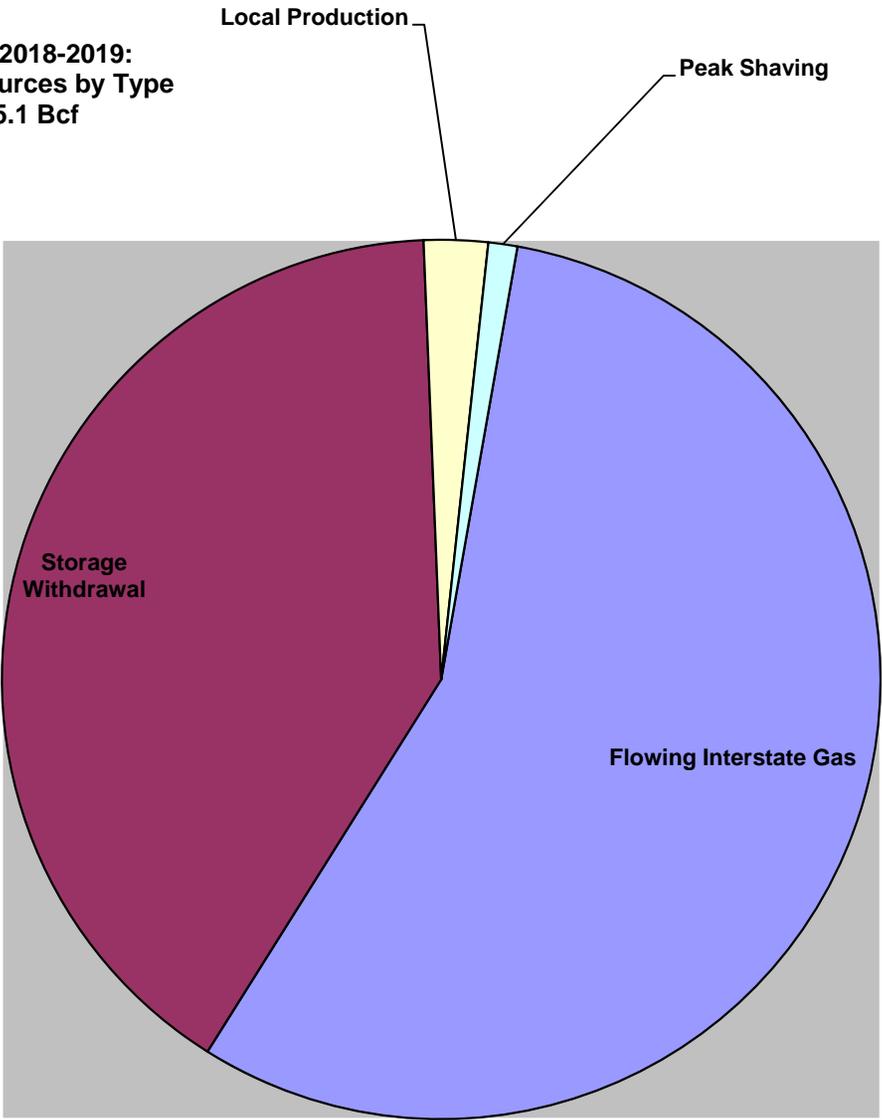
* Note: gas flowing on interstate pipelines can be sourced from Pennsylvania production connected to those interstate pipelines.

Comparison of Forecasts Last Winter and This Winter

Winter 2017-2018:
Supply Sources by Type
224.1 Bcf



Winter 2018-2019:
Supply Sources by Type
225.1 Bcf



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

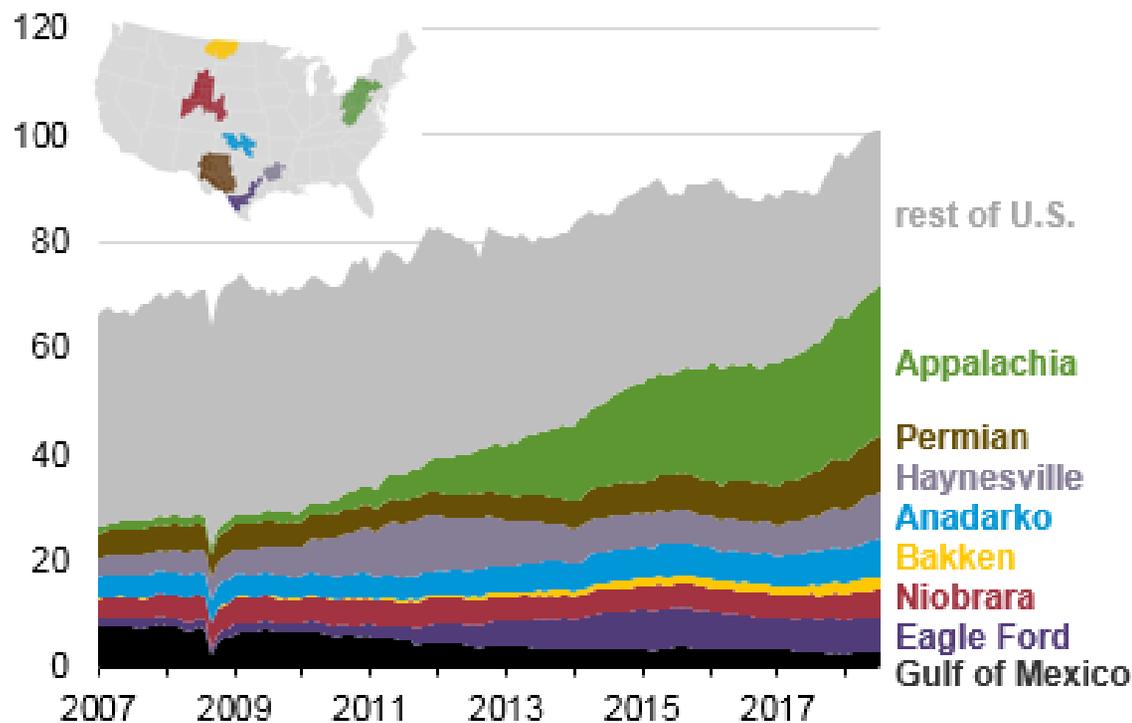
- Total supply of U.S. natural gas averaged 93.3 billion cubic feet (Bcf) per day during the first half of 2018, a 12% increase from the first half of 2017. The increase in natural gas supply was driven by production, especially from the Appalachian region in the Northeast. States driving this increase 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. High natural gas production is helping to ensure that adequate supplies of natural gas are available.
- 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. Such advances will allow producers to recover greater volumes from a single well.
- The US Energy Information Administration (EIA) forecasts that dry natural gas (consumer-grade natural gas) production will average 82.7 Bcf per day in 2018, up by 7.9 Bcf/d from 2017 and establishing a new record high. U.S. dry gas production has averaged 83.4 Bcf/d in October, up 14 percent year over year.
- Gross production of natural gas in the United States has generally been increasing for more than a decade. According to EIA, natural gas production is expected to continue to rise in 2019 to an average of 87.7 Bcf/d.

(US Energy Information Administration (EIA) Today in Energy, release date 10/4/18, 8/28/18; US EIA Short-Term Energy Outlook, release date 10/10/18; American Gas Association (AGA) Natural Gas Market Indicators, 10/12/18, 9/14/17)

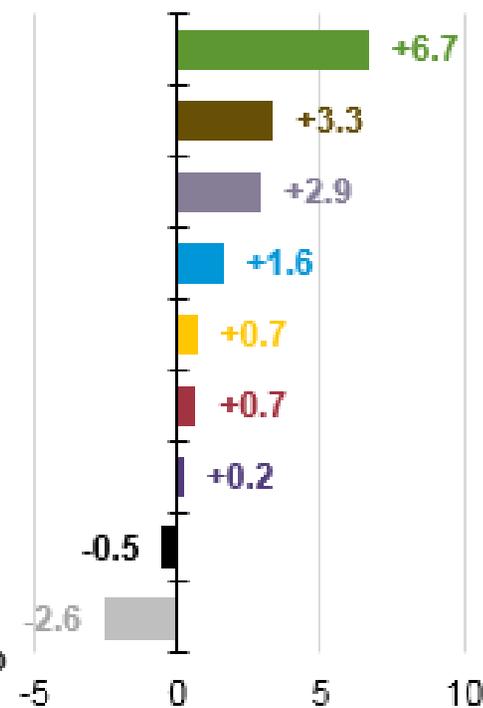


System Planning Strategies - Production

U.S. natural gas production (Jan 2007 - July 2018)
billion cubic feet per day



Change since July 2016
billion cubic feet per day

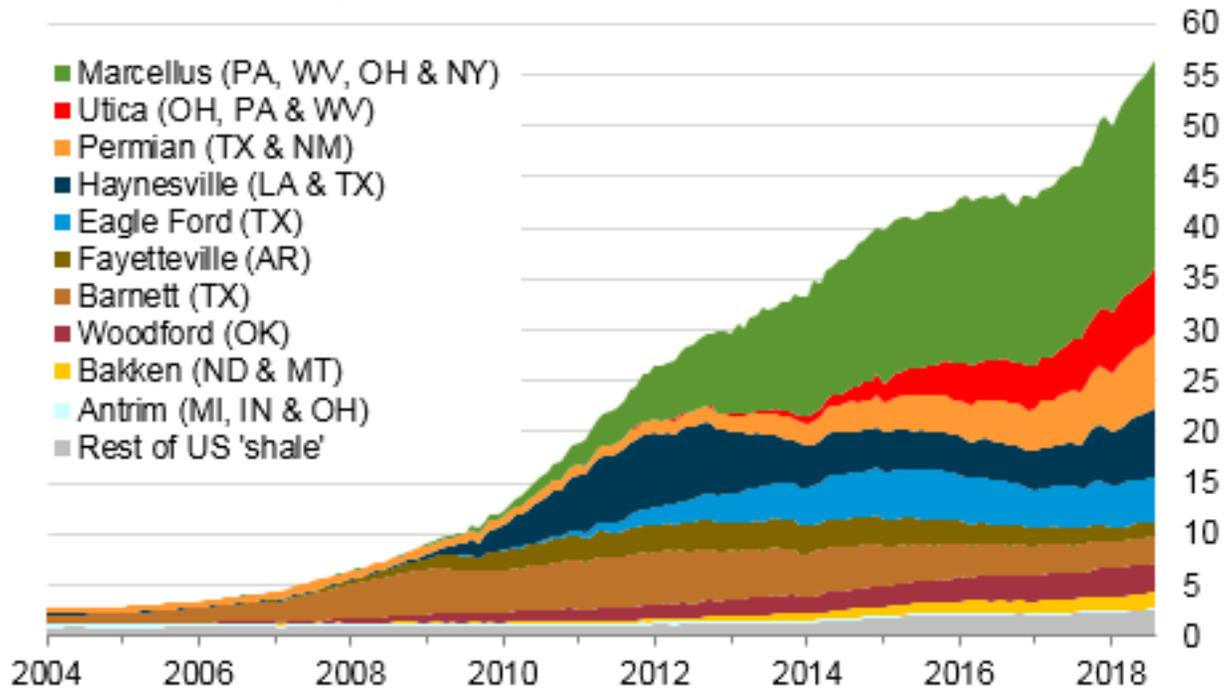


(US Energy Information Administration (EIA) Today in Energy, 9/28/18; Drilling Productivity Report, released 9/17/18; Short Term Energy Outlook, released 10/10/18)

System Planning Strategies - Production

Monthly dry shale gas production

billion cubic feet per day



Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through August 2018 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 10/4/18)

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 10, 2018, the Henry Hub spot price was \$3.37 per MMBtu (million British thermal units)
- With regard to natural gas spot prices at Northeast regional trading hubs, the price on 10/10/18 was \$2.93/MMBtu at the Transcontinental Pipeline Zone 6 (New York).
- According to EIA's *Winter Fuels Outlook*, Henry Hub natural gas spot prices will average \$3.20 MMBtu this winter, which is 8% higher than last winter. This higher forecast Henry Hub price reflects increased natural gas use in the electric power sector, growing natural gas exports from liquefied natural gas (LNG) liquefaction facilities, and lower-than-average inventory levels. Increases in natural gas spot market prices generally pass through to residential prices over a long period of time.
- Because of higher forecast energy prices, EIA expects households heating primarily with natural gas to spend about \$30 (5%) more this winter compared with last winter.

(US Energy Information Administration (EIA) Short-Term Energy Outlook, released October 10, 2018; <https://www.eia.gov/outlooks/steo/report/winterfuels.php>; US EIA Natural Gas Weekly Update, released 10/11/18)



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. 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.
- EIA expects construction of new natural gas pipeline capacity to continue. According to EIA, if all projects come online by their scheduled service dates, more than 23 Bcf/d of takeaway capacity will be online out of the Northeast by the end of 2018, up from an estimated 16.7 Bcf/d at the end of 2017. This represents more than three times the takeaway capacity at the end of 2014.

(US EIA Today in Energy, released 5/18/18, 1/28/16; 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**



Storage Management

- Inventories must be maintained at the levels necessary to fulfill obligations per planning criteria. Aggregate projected storage levels on Nov. 1, 2018 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
- U.S. storage inventories are lagging compared to past injection seasons. EIA forecasts that U.S. natural gas storage inventories will total 3.3 trillion cubic feet (Tcf) at the end of October. This level would be 14% lower than both the 2017 end-of-October level and the five year average for the end of October.
- October can be a pivotal month for adjusting seasonal natural gas storage levels. Cooler weather in October should moderate natural gas needs to generate electricity to meet air conditioning load and potentially make more natural gas available to inject into storage. Current lower than typical inventory levels at underground storage fields means that spare capacity is available for increased injections.
- For the week ending October 5th, net injections into storage matched the five year average.

(American Gas Association (AGA) Natural Gas Market Indicators –8/30/18, 9/27/18; US Energy Information Administration (EIA) Short Term Energy Outlook, released 10/10/18; US EIA Natural Gas Storage Dashboard – 10/4/18; US EIA Natural Gas Weekly Update, released 10/11/18)



Injections into Liquefied 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: 4.3 Bcf
- PECO anticipates using LNG to meet 1% of winter day requirements, PGW anticipates using LNG to meet 4% 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, 49.5% 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.

