Natural Gas Fundamentals
November 2023
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# U.S. Natural Gas Outlook

## Current

### Production Outlook
- Impact from rig declines and more exposure to high decline basins yet to materialize

### Excess Storage Shrinking
- 370 Bcf excess above 5-year average declined to ~200 Bcf

### Record Power Burns
- On average, U.S. power burn has increased 1.3 Bcf/d each year since 2013

### Elevated Storage Levels
- 7% above 5-year average due to warm 2022 winter and downtime at largest LNG export facility

## 2024+

### Meaningful Rig Reductions and Inventory Fatigue Will Limit Future Production Growth
- U.S. gas rig count has declined by 38 rigs, or 25% YTD

### Lowest cost basin (Appalachia) is capacity constrained
- Produces ~1/3 of U.S. supply; high-cost basins are now the “marginal supplier”

### Significant Export Growth
- 6 Bcf/d of LNG export capacity through 2025 and growing Mexican demand

### Renewables underperformance
- Low capacity factors = projected to only displace coal retirements, not increase in the % of generation stack
U.S. Demand Outpaces Supply Through YE 2025

U.S. Natural Gas Demand Growth
(Bcf/d from YE23 to YE25)

- LNG Exports
  - New Fortress
  - Golden Pass
  - Plaquemines
  - Corpus Christi
  Growth: +5.9

- Mexico Res/com and LNG
  Growth: +1.7

- Powerburn & Industrials
  Growth: +0.4

- Total Demand Growth
  YE23-YE25: +8.0

U.S. Natural Gas Supply Growth
(Bcf/d from YE23 to YE25)

- Appalachian (Constrained)
  Growth: +1.0

- Haynesville (Moderated)
  Growth: +0.3

- Permian (Assumes pipelines 100% full)
  Growth: +2.5

- Total Supply Growth
  YE23 - YE25: +3.8

4.2 Bcf/d short of Demand

- LNG Exports
  - New Fortress
  - Golden Pass
  - Plaquemines
  - Corpus Christi

- Mexico Res/com and LNG

- Powerburn & Industrials

- Total Demand Growth
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- Total Supply Growth
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Storage Level Trend Points to Strong 2024 Gas Prices

NYMEX Natural Gas Price and Gas Storage Surplus/Deficit vs. 5-year Avg.

Since 2020, the average NYMEX Henry Hub price has been ~$4.00/MMBtu when storage levels have been neutral with the 5-year average.

Source: EIA as of 11/10/2023.
Dramatic Reduction in Activity Will Limit Production Growth

U.S. Natural Gas Basin Drilling Rigs (Appalachia + Haynesville)

- **160**
- **140**
- **120**
- **100**
- **80**
- **60**
- **40**
- **20**
- **0**

**Jan-18**  **|**  **Apr-18**  **|**  **Jul-18**  **|**  **Oct-18**  **|**  **Jan-19**  **|**  **Apr-19**  **|**  **Jul-19**  **|**  **Oct-19**  **|**  **Jan-20**  **|**  **Apr-20**  **|**  **Jul-20**  **|**  **Oct-20**  **|**  **Jan-21**  **|**  **Apr-21**  **|**  **Jul-21**  **|**  **Oct-21**  **|**  **Jan-22**  **|**  **Apr-22**  **|**  **Jul-22**  **|**  **Oct-22**  **|**  **Jan-23**  **|**  **Apr-23**  **|**  **Jul-23**  **|**  **Oct-23**

- **53% Decline in rigs**

**2019 / 2020:**
- Primarily Appalachia rigs with lower base decline

**2023:**
- Primarily Haynesville rigs with higher base decline

U.S. Natural Gas Production (Bcf/d)

- **110**
- **100**
- **90**
- **80**
- **70**

**Jan-18**  **|**  **Apr-18**  **|**  **Jul-18**  **|**  **Oct-18**  **|**  **Jan-19**  **|**  **Apr-19**  **|**  **Jul-19**  **|**  **Oct-19**  **|**  **Jan-20**  **|**  **Apr-20**  **|**  **Jul-20**  **|**  **Oct-20**  **|**  **Jan-21**  **|**  **Apr-21**  **|**  **Jul-21**  **|**  **Oct-21**  **|**  **Jan-22**  **|**  **Apr-22**  **|**  **Jul-22**  **|**  **Oct-22**  **|**  **Jan-23**  **|**  **Apr-23**  **|**  **Jul-23**  **|**  **Oct-23**

- **6-12 Month Lag**

**2019 / 2020:**
- (5)-(10)% decline in natural gas production

**Current:**
- Impact from rig declines and high decline basins yet to materialize

Source: Platts Analytics.
On average, U.S. power burn has increased 1.3 Bcf/d each year since 2013

U.S. Natural Gas Demand From Power Burn (2013-2023)

(Bcf/d)

2013: 22.6
2014: 22.7
2015: 26.4
2016: 27.1
2017: 25.5
2018: 29.0
2019: 30.9
2020: 31.7
2021: 31.0
2022: 33.1
2023: 35.6

Source: S&P Global Platts.
Natural Gas Dominates Power Generation Mix

In 2023, natural Gas power generation grew by ~3.0 Bcfe/d, or 9% from the prior year while all other categories declined by ~3.0 Bcfe/d

Source: EIA.
Natural gas remains the most reliable energy source for power generation, offsetting declines in coal, wind and water.

Power Generation Mix Change Year-Over-Year

Average Daily Generation Changes 2022 Vs 2023
GWH

- Nat Gas: 386 GWH
- Solar: 81 GWH
- Coal: (410) GWH
- Wind: (57) GWH
- Nuclear: 0 GWH
- Water: (23) GWH
- Other: 19 GWH
- Total Change: (23) GWH

Source: EIA.
Despite Summer 2023 being cooler than 2021, power burn demand has continued to set records and has grown 6 Bcf/d from 2021.

**Average Power Burn Demand**

- 2021: 31
- 2022: 33
- 2023 YTD: 37

**Increase: +6 Bcf/d**

**Source:** S&P Global Platts.
**Note:** Population-weighted cooling degree day rankings reflect 10 year history.
AR is a top U.S. LNG supplier with the ability to deliver into the growing demand

U.S. LNG Capacity Through 2027 (Bcf/d)

- In Service: 14.5 Bcf/d
- Under Construction: 6.1 Bcf/d
- FID Approved: 5.0 Bcf/d
- Waiting on FID (The Big Three Only): 3.6 Bcf/d

Total = 29.1 Bcf/d

+ 6 Bcf/d by 4Q25

New Fortress
- First cargo to be exported in October 2023
- 14.5 Bcf/d now in service

Golden Pass
- Golden Pass remains on track to start 2Q 2024

Plaquemines
- Venture Global has received FERC approval to boost workforce to 6,000 people on a 24/7 basis to keep project on schedule

Demand: Growing Global LNG Market

AR is a top U.S. LNG supplier with the ability to deliver into the growing demand.
U.S. LNG feed gas hit record highs in November of 2023

U.S. LNG Feed Gas

(Bcf/d)

- YTD 2023 vs. 2022
  - Daily Record 14.9 Bcf/d
  - Forecasted Nameplate Capacity 14.7 Bcf/d

2023 YTD 12.9 Bcf/d
2022 Avg. 11.8 Bcf/d

Source: S&P Global Platts.
Not All Transport to the U.S. Gulf Coast is Equal

LNG Fairway Transport and Tiered Price Map

Tier 1: 90%

Tier 2: 67%

Tier 2:
Cal '25: ($0.19)
Cal '26: ($0.18)

Tier 3:
Cal '25: ($0.24)
Cal '26: ($0.24)

Cal '25: $0.06
Cal '26: $0.04

Cal '25: $0.25
Cal '26: $0.29

Antero Firm Transport Delivery Locations

Source: ICE data 2024-2026 strip pricing as of 10/24/2023.
1) Peers include CNX, CHK, EQT, RRC and SWN.
United States Exports to Mexico Rise

Rising Mexico Power Burn Demand...

1.6 Bcf/d Rise Since 2018

Combined with Flat Production...

0.4 Bcf/d Decline Since 2018

Drives Increase in U.S. Mexico Exports

1.4 Bcf/d Increase Forecasted by 2025

Source: S&P Global Platts and EIA Data.
Mexico LNG Export Capacity Growth

U.S. supply will support 3.5 Bcf/d of LNG export capacity growth expected by 2028

Source: S&P Global Platts and company filings.
While U.S. gas storage remains elevated relative to historical levels, days of supply are slightly above the 5-year average as U.S. demand has increased ~5% over the last 5 years.
Coal Plant Retirements

Large amounts of coal plant retirements provide upside to natural gas power generation through 2030

Coal Plant Capacity Retirements (2022-2030)

Source: U.S. Energy Information Administration (EIA).
Supply: Permian Takeaway Capacity Increasing

Permian Takeaway Capacity Additions

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity Additions</th>
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<tbody>
<tr>
<td>2021</td>
<td>+1.9 Bcf/d</td>
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<tr>
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<td>+1.2 Bcf/d</td>
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<tr>
<td>2025</td>
<td>+0.9 Bcf/d</td>
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Final Investment Decision ("FID")
- Whistler Expansion: +0.50 Bcf/d
- Permian Highway Expansion: +0.60 Bcf/d
- Matterhorn Express: +2.50 Bcf/d
- Total: +3.60 Bcf/d

Source: S&P Global Platts

1) Mexico capacity includes Comanche Trail, Roadrunner and Trans-Pecos pipelines; Capacity shown reflects single-day high of 1.7 Bcf/d flowed from Permian to Mexico.
Supply: Moderated Growth Expected Once Capacity is Online

Haynesville Takeaway Capacity Additions

<table>
<thead>
<tr>
<th>Year</th>
<th>Legacy</th>
<th>Acadian</th>
<th>Local Demand</th>
<th>CJ Express</th>
<th>LA Xpress</th>
<th>NGGG</th>
<th>LEAP Phase 2</th>
<th>LEAP Phase 3</th>
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<td>-1.00</td>
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<td>+0.40</td>
<td>+0.20</td>
<td>+1.80</td>
<td>+3.90</td>
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~3.6 Bcf/d of legacy capacity to Houston Ship Channel expected to be constrained as new Permian pipelines to the East are placed in service.
Canada Net Imports

Net imports are expected to grow modestly through 2025 peaking at 5.7 Bcf/d. Net imports are then forecasted to decline as Canadian LNG exports ramp and production growth slows.

Canada Net Imports (2020 – 2025)

Source: S&P Global Platts

1) Platts CellCAST Forecast.
Supply: Appalachia is Constrained

Appalachia Takeaway Capacity Additions

- Appalachian Basis “Blowout” (1)
- Potential Future Capacity (2)
- Basin Transport Capacity
- Basin Dry Gas Production
- Marketed Dry Gas Production Forecast
- Blended Appalachian Differential to NYMEX

Source: S&P Global Platts. In-basin differentials represent an average of TETCO M2 and Eastern Gas South differentials to NYMEX Henry Hub.

1) Basin capacity based on pipeline flow data scrapes.
2) Production forecast and Mountain Valley Pipeline (MVP) Estimated In-Service date based on Platt’s Project Tracker.
3) East Daley: Assumes MVP utilization of 35%

Essentially flat due to constrained takeaway capacity

Appalachian differentials through 2025 have widened due to uncertainty of future takeaway projects
While Appalachia, Permian and Haynesville lead future U.S. production growth, legacy U.S. shale basins and GOM are forecasted to decline.

Rest of U.S. Includes: Eagle Ford, DJ, Gulf Coast/GOM, SCOOP/STACK, Bakken, Green River, Barnett, Anadarko

Source: S&P Global Platts.  
1) Historical and forecast volumes from Platts Analytics. Decline and Forecast volumes as of November 2023.
As producers test the limits of takeaway capacity, Haynesville basis expected to remain susceptible to wide differentials until new pipelines and LNG projects are placed in service.

- Basin Transport Capacity
- Basin Dry Gas Production
- Marketed Dry Gas Production Forecast
- TGT Z1 Differential to NYMEX
- TGT Z1 Basis “Blowout”
- Potential Future Capacity

3.9 Bcf/d of new transport capacity FID’d

~3.6 Bcf/d of legacy capacity to Houston Ship Channel expected to be constrained as new Permian pipelines to the East are placed in service.

Record high dry gas production, lack of new transport capacity leads to largest basis blowout on record in 2022.

With limited eastbound capacity in the near term, steady westbound flows, and crude-oil-driven economics, Waha basis is expected to remain wide in 2024.

- **May 2019**: Record Waha basis widens to ($2.83)
- **October 2022**: Permian prices enter negative territory for first time since 2020
- **Winter Storm Uri**: February 2021
- **3.6 Bcf/d of new transport capacity FID’d**
- **Matterhorn Express**
- **PHP Expansion**
- **Whistler Expansion**

Waha basis expected to remain wide until Matterhorn is placed in service.

Permian prices enter negative territory for first time since 2020.