Growth in Appalachian hydrocarbon gas liquids production leads to downstream investment

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EIA products help to shape the conversation

- EIA's Energy Mapping System provides data on U.S. energy infrastructure, including pipelines, terminals, refineries, gas plants, and petrochemical crackers.

- EIA's tabulation of production data enables tracking of growth in natural gas and natural gas plant liquids (NGPL) production in the region and around the country.

- Forecasting products, including the Short Term Energy Outlook (STEO) and the Annual Energy Outlook (AEO), provide insights into future trends and opportunities for consideration in long-term planning and investment.

- EIA data tabulation of movements by pipelines, barges, and rail illustrate how the U.S. energy market balances production with demand.

- Providing state-level supply and consumption data and estimates make more granular information available to consumers and local decision-makers.

- Today In Energy articles educate and bring issues into focus, like our series on Appalachia natural gas developments.
Key takeaways

• EIA’s coverage of Appalachian production growth is comprehensive
  – Current analytical and modeling work includes detailed well data
  – Monthly production statistics for natural gas and crude oil are collected and reported at the state level
  – Tables splitting out alkanes and olefins in hydrocarbon gas liquids (HGL) data provide clearer picture of the market
  – HGL-by-rail movements at the PADD level generate improved balances

• Improved forecasting tools round out the regional picture
  – AEO2018 features projections for region-level NGPL production
  – Drilling Productivity Report provides near-term outlook for drilling activity and production
The Appalachian basin has favorable geological characteristics to remain a producing region for the long haul.

Marcellus wells through February 2018 and thermal maturity

Utica-Point Pleasant wells through February 2018 and thermal maturity

WV drilling data through Dec. 2016 only; annual data released 7 months after year-end.
OH drilling data through Dec. 2017; quarterly data released 3 months after quarter end.
Sources: EIA; DrillingInfo, Inc.; Appalachian Oil & Natural Gas Research Consortium; U.S. Geological Survey
Since January 2012, the Appalachia region has accounted for 65% of increases in natural gas production from major shale regions

cumulative change in natural gas production since January 2012
billion cubic feet per day

Source: U.S. Energy Information Administration, Drilling Productivity Report, May 14, 2018
Moving dry gas out of the Appalachian region is becoming easier, with outbound pipeline capacity rising four-fold since 2010.

Natural gas pipelines in the northeastern United States built to move natural gas out of the producing region.
Since January 2010, NGPL production doubled in the U.S. and grew six-fold in Appalachia

Source: U.S. Natural Gas Plant Field Production; Appalachian No. 1 NGP Field Production + IN,IL,KY NGP Field Production, data to Mar. 2018
Significant midstream investment in the region allows production to grow

**Natural gas processing capacity**

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (Bcfd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1.1</td>
</tr>
<tr>
<td>2019</td>
<td>12.5</td>
</tr>
</tbody>
</table>

**Fractionation capacity**

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity (mil. b/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>0.04</td>
</tr>
<tr>
<td>2019</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: U.S. Energy Information Administration EIA-757 Data; Company public filings and press releases; Appalachian natural gas processing capacity key to increasing natural gas, NGPL production
Projects to ship HGL out precede development of in-region demand

<table>
<thead>
<tr>
<th>HGL pipeline</th>
<th>Throughput (1,000 b/d)</th>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>To Canada</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mariner West</td>
<td>50</td>
<td>2013 Q4</td>
</tr>
<tr>
<td>Utopia East</td>
<td>50</td>
<td>2018 Q1</td>
</tr>
<tr>
<td>To U.S. Gulf Coast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATEX</td>
<td>125</td>
<td>2014 Q1</td>
</tr>
<tr>
<td>ATEX expansion</td>
<td>25</td>
<td>2017 Q4</td>
</tr>
<tr>
<td>UMTP</td>
<td>430</td>
<td>2019+</td>
</tr>
<tr>
<td>To overseas export markets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mariner East</td>
<td>70</td>
<td>2015 Q3</td>
</tr>
<tr>
<td>Mariner East II</td>
<td>275</td>
<td>2018 Q3</td>
</tr>
<tr>
<td>Mariner East IIx</td>
<td>250</td>
<td>2019 Q2</td>
</tr>
<tr>
<td>To local market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teppco</td>
<td>60</td>
<td>2014 Q1</td>
</tr>
<tr>
<td>Cornerstone</td>
<td>100</td>
<td>2016 Q4</td>
</tr>
<tr>
<td>Falcon (Shell)</td>
<td>107 ±2020</td>
<td></td>
</tr>
</tbody>
</table>

Source: EIA, company filings and public announcements
Gas quality data suggests the resource potential, especially for ethane, is above rates of current Appalachian production.

Source: EIA Heat Content of Natural Gas Consumed; Natural Gas Gross Withdrawals and Production; Natural Gas Plant Field Production
EIA’s AEO projects the East region to produce 35% of total U.S. NGPL production, with ethane accounting for half of that production.
For further reading…

Today in Energy

Energy by rail data
https://www.eia.gov/dnav/pet/pet_move_railNA_a_EPLLPA_RAIL_mbbl_m.htm

**Short-Term Energy Outlook (STEO)**
https://www.eia.gov/outlooks/steo/

Energy Explained: *Hydrocarbon Gas Liquids*
http://www.eia.gov/energyexplained/index.cfm?page=hgls_home

State Energy Data Portal
https://www.eia.gov/state/

*Drilling Productivity Report*
http://www.eia.gov/petroleum/drilling/

EIA Annual Conference
https://www.eia.gov/conference/2018/