Propane Markets Overview

For
2018 State Heating Oil and Propane Program (SHOPP) Workshop
June 6, 2018 | Washington, DC

By
Warren Wilczewski, Industry Economist
Office of Petroleum, Natural Gas, and Biofuels Analysis
EIA’s revised monthly data tables for HGL affect all natural gas liquids (alkanes) and refinery olefins (olefins)

Liquefied Petroleum Gases
- ethane
- propane
- n-butane
- isobutane

Pentanes Plus
- ethylene
- propylene
- n-butylene
- isobutylene

Ethane/Ethylene
Propane/Propylene
Normal Butane/Normal Butylene
Isobutane/Isobutylene

propane
n-butane
isobutane

Natural Gasoline
Ethane
Propane
Normal Butane
Isobutane

Alkanes = Natural Gas Liquids

+ + + +

Ethylene (net refinery production only)
Propylene
Normal Butylene
Isobutylene

Olefins = Refinery Olefins
Various days-of supply/disposition measures

U.S. weekly stocks of propane
days of supply & disposition

Note: *disposition = domestic product supplied + exports
Source: U.S. Energy Information Administration, Weekly Petroleum Status Report, data through June 1, 2018
For more information, please see EIA’s webinar on Propane Market Indicators and Measures of Supply Adequacy

Warren Wilczewski – 2018 State Heating Oil and Propane Program (SHOPP) Workshop
June 6, 2018 | Washington, DC
PADD 1A (New England) propane inventories above the 5-year average

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018

*propane/propylene for fuel use only
PADD 1B (Mid-Atlantic) propane inventories above the 5-year average

PADD1B propane* inventories
million barrels

Dec-17 Jan-18 Feb-18 Mar-18 Apr-18 May-18 Jun-18

5-year range inventory level rolling 5-year Avg

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018
*propane/propylene for fuel use only

Warren Wilczewski – 2018 State Heating Oil and Propane Program (SHOOP) Workshop
June 6, 2018 | Washington, DC
PADD 2 (Midwest) propane inventories within the 5-year range

PADD 2 propane* inventories
million barrels

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018

*propane/propylene for fuel use only

Warren Wilczewski – 2018 State Heating Oil and Propane Program (SHOPP) Workshop
June 6, 2018 | Washington, DC
PADD 2 (Midwest) propane inventories below 5-year-average levels

PADD 2 propane* inventories, difference from 5-year average

million barrels

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018

*propane/propylene for fuel use only
Selected state propane* inventories

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018

*propane/propylene for fuel use only; inventories include stocks at terminals, gas plants, and refineries only

Warren Wilczewski – 2018 State Heating Oil and Propane Program (SHOPP) Workshop
June 6, 2018 | Washington, DC
PADD 3 (Gulf Coast) propane inventories within the 5-year range

PADD 3 propane* inventories
million barrels

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018
*propane/propylene for fuel use only

Warren Wilczewski – 2018 State Heating Oil and Propane Program (SHOPP) Workshop
June 6, 2018 | Washington, DC
PADD 3 (Gulf Coast) propane inventories below the 5-year average

PADD 3 propane* inventories, difference from 5-year average

Source: EIA, Weekly Petroleum Status Report, data through June 1, 2018

*propane/propylene for fuel use only
Propane inventories in Canada coming into the heating season were at record highs. While rail challenges tapered ability to deliver out of W. Canada, E. Canadian inventories dropped to 5-year lows at close of winter.

Propane inventories in Western Canada

Propane inventories in Eastern Canada

Source: Canada’s National Energy Board, May 16, 2018
Propane spot prices above same time last year; Conway, KS discount to Mt. Belvieu, TX averaging ~15¢/gal since end of heating season

Propane spot prices (Conway, KS and Mont Belvieu, TX)
dollars per gallon

Source: EIA, Bloomberg, data through May 25, 2018
U.S. propane prices return to historical trend relative to crude and international market propane prices

U.S. propane and Brent Dated crude oil prices

$/MMBtu

-15
-10
-5
0
5
10
15
20
25

2010 2012 2014 2016 2018

Dated Brent crude price

U.S. propane spot price

U.S. propane premium to Brent crude oil

U.S. propane discount to Brent crude oil

Source: EIA, Bloomberg, data through May 25, 2018
Not all price spikes are created equal: some are caused by market imbalances rather than product shortages

Source: EIA, Bloomberg, data through May 25, 2018
With expanding capacity and volumes, U.S. exports are reaching more distant foreign markets, with bulk of exports now going to E. Asia

U.S. propane exports by destination

Source: U.S. Department of Commerce, EIA
EIA’s price projection for crude oil suggests a decline through the forecast horizon, affecting petroleum product prices

West Texas Intermediate (WTI) oil price

Note: Confidence interval derived from options market information for the 5 trading days ending May 3, 2018. Intervals not calculated for months with sparse trading in near-the-money options contracts.

Source: Short-Term Energy Outlook, May 2018, and CME Group.
Projected production growth drives increased export volumes as well as return to inventory builds.

U.S. propane production, imports, and stock draw

- Stock draw
- Imports
- Refinery production
- Ngpl production

U.S. propane consumption, exports, and stock build

- Stock build
- Exports
- Domestic consumption

Source: Short-Term Energy Outlook, May 2018.
After two years of significant draw-downs, EIA projects propane stocks to slightly build and return to 5-year average levels.

U.S. propane inventories

-deviation from normal

Note: Colored band around storage levels represents the range between the minimum and maximum from Jan. 2013- Dec. 2017.

Source: Short-Term Energy Outlook, May 2018.
Corn crop nearly all in the ground; emerged progress currently tracking a half-week behind last year

Corn crop planted
% progress, by week

Source: USDA National Agricultural Statistics Service

Corn crop emerged
% progress, by week

Source: USDA National Agricultural Statistics Service
El Niño – Southern Oscillation (ENSO) conditions in El Niño Region 1+2 are a reliable predictor of propane heating in PADDs 1 and 2.

Sources: U.S. Energy Information Administration; National Oceanic and Atmospheric Administration
NOAA’s projected temperatures: October – December 2018, and January – March 2019

- Early in the heating season NOAA projects above-normal temperatures all across the country with the exception of the South Atlantic region, where temperatures are expected to be within NOAA’s 30-year normal range.
- Further into the heating season, above-average temperatures are expected throughout the west, with equal-chance of above/below normal stretching across much of PADDs 1 and 2, as well as eastern PADD 3.

Source: NOAA, May 17, 2018
Midwest propane product supplied in the summer, an indicator of summer fill, was lower in 2017 than in past 5 summer fill seasons.

Midwest (PADD 2) product supplied of propane
1,000 b/d

Source: U.S. Energy Information Administration, Midwest (PADD 2) Product Supplied of Propane
Above-trend January 2018 propane product supplies in PADDs 1 & 2 reflected fast-rising HDDs and low start-of-season inventories

Source: EIA Propane Product Supplied; National Oceanic and Atmospheric Administration, Weighted Heating Degree Days
Generally, tariff on the TEPPCO* pipeline sets the ceiling in the Northeast, unless supplies come from overseas, as was the case this past winter.

*TEPPCO = Enterprise TE Products Pipeline Company LLC

Source: EIA, Bloomberg, data through May 25, 2018; Enterprise Products Partners L.P., Effective Tariffs, FERC No. 54.42.0
With heating season over, Edmonton to Conway spread is back to the cost of rail

propane spot prices
dollars per gallon

propane price spread
dollars per gallon

Mar-16 Jun-16 Sep-16 Dec-16 Mar-17 Jun-17 Sep-17 Dec-17 Mar-18

Edmonton to Conway spread (RS)

approx. AB-KS rail (RS)

Conway, KS
Edmonton, AB

Source: EIA, Bloomberg, data through May 25, 2018
State Heating Oil and Propane Program (SHOPP) updates

• SHOPP is a collaborative program between states and EIA that provides weekly wholesale and retail prices for heating oil and propane at the state level

• EIA has extended SHOPP (beginning October 2014) to include 14 additional states in propane price data collection

• 10 new states were added to the wholesale propane price survey in 2016. This should be taken into consideration when comparing the average prices for last year (2015-2016 season) for the U.S., PADD 1, PADD 1B, PADD 1C, and PADD 2 averages

• EIA is providing more granular inventory data to states on a weekly basis since the 2016/2017 heating season

• New winter fuels page provides easier access to state-level information: www.eia.gov/special/heatingfuels
Maps of states participating in Winter Fuels Survey

**Petroleum Administration for Defense Districts**

Winter Heating Fuels Survey — PADD 1 and 2 represented States

**HEATING OIL**

<table>
<thead>
<tr>
<th>PADD 1: East Coast</th>
<th>PADD 2: Midwest</th>
<th>PADD 3: Gulf Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>Indiana, Iowa,</td>
<td>Delaware, District</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>Michigan</td>
<td>of Columbia, New</td>
</tr>
<tr>
<td>Maine</td>
<td>Minnesota</td>
<td>York, Pennsylvania</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>Kentucky</td>
<td></td>
</tr>
<tr>
<td>Massachusetts</td>
<td>Nebraska, Ohio</td>
<td></td>
</tr>
<tr>
<td>Vermont</td>
<td>Wisconsin</td>
<td></td>
</tr>
<tr>
<td>North Carolina</td>
<td>Virginia</td>
<td></td>
</tr>
</tbody>
</table>

**PROpane**

<table>
<thead>
<tr>
<th>PADD 1: East Coast</th>
<th>PADD 2: Midwest</th>
<th>PADD 3: Gulf Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>New England</td>
<td>Illinois, Indiana, Iowa</td>
<td>Nebraska, North Dakota, Ohio</td>
</tr>
<tr>
<td>Connecticut</td>
<td>Kansas, Kentucky</td>
<td>Oklahoma, South Dakota, Tennessee</td>
</tr>
<tr>
<td>Maine</td>
<td>Florida, Georgia</td>
<td>Mississippi, Wisconsin</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>Kansas</td>
<td></td>
</tr>
<tr>
<td>New Hampshire</td>
<td>New Jersey</td>
<td></td>
</tr>
<tr>
<td>Rhode Island</td>
<td>New York</td>
<td></td>
</tr>
<tr>
<td>Vermont</td>
<td>Pennsylvania</td>
<td></td>
</tr>
</tbody>
</table>

Source: EIA, *Heating Oil and Propane Update*
Retail propane prices this heating season in PADD 1 and PADD 2 are above prices reported for the same week last year.

Source: State Heating Oil and Propane Program, data through March 27, 2018.
Propane-oriented infrastructure getting more complex / diversified

Increased focus on moving volumes south

Production to Mont Belvieu for fractionation and storage

More in-region storage at retail level; more rail-receipt capacity

Increasing Northeast production seeking storage

Increasing rail from Canada

Rockies & Bakken production flows to Gulf Coast through Conway

UT storage dominates PADD 4

AZ storage serves PADD 5

Production to Mont Belvieu for fractionation and storage

More in-region storage at retail level; more rail-receipt capacity

Increasing Northeast production seeking storage

Legend

- Market hub
- Propane pipeline flow
- Y-grade pipeline flow
- Y-grade & propane pipeline flow
- Rail

Source: EIA, public company filings

Tampa terminal occasionally ships and receives

Newington, NH
New England’s sole remaining import terminal

Chesapeake butane exports and occasional propane imports

Marcus Hook
Exports and storage at Marcus Hook

Mont Belvieu
Most infrastructure buildout focused on Gulf Coast

UT storage dominates PADD 4

AZ storage serves PADD 5

Increasing focus on moving volumes south

Production to Mont Belvieu for fractionation and storage

More in-region storage at retail level; more rail-receipt capacity

Increasing Northeast production seeking storage

Legend

- Market hub
- Propane pipeline flow
- Y-grade pipeline flow
- Y-grade & propane pipeline flow
- Rail

Source: EIA, public company filings
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><strong>To Canada</strong></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><strong>To U.S. Gulf Coast</strong></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><strong>To overseas export markets</strong></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><strong>To local market</strong></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
PADD 1, now a major producer, is both a source of supply and a major consumer of propane

PADD 1 net receipts of propane by mode

Source: EIA, Movements by Tanker and Barge between PAD Districts, Movements of Propane by Rail between PAD Districts, Movements by Pipeline between PAD Districts
For more information


State Energy Portal | www.eia.gov/state

Winter Heating Fuels Site | www.eia.gov/special/heatingfuels/

Movements of Propane by Rail | http://www.eia.gov/dnav/pet/pet_move_railNA_a_EPLLPA_RAIL_mbbl_m.htm

Today in Energy | www.eia.gov/todayinenergy

Short-Term Energy Outlook | www.eia.gov/steo


Annual Energy Outlook | www.eia.gov/aeo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer