Report to NASEO: 
Propane Supply and Infrastructure Study

Based on a Report to PERC by
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Propane Supply and Infrastructure Study

» Overview, Production
» NGL/Propane Infrastructure Developments
» U.S. Propane Market Analysis
  ▪ Supply/Demand Scenarios and Drivers
  ▪ Exports, Terminal Contracts, LPG Shipping, International Markets
  ▪ Seasonal Model and Demand Sensitivities
  ▪ Price Outlook
» Conclusions and Recommendations
PADD Level Study

1

2

3

4

5
The Perfect Storm: Propane 2013-14

- Propane exports almost double from 2H 2012 to 2H 2013 (180 Mb/d to 350 Mb/d)
- 2013 Bumper crop of very ‘wet’ corn; Record volumes of propane needed for grain drying
- Cochin pipeline flows cut due to reversal work
- Hess Tioga, ND plant shut down from late Nov. 2013 to Mar. 2014 for expansion
- Shortages of propane in the Midwest; Several governors declare emergencies, exempt truck transportation from hours of service rules
- Polar vortex cold wave grips the country for the initial weeks of 2015
- PADD 2 propane inventories drop to decade lows
- Conway propane prices spike to $4.30/gallon
- Retail customers complain of severe shortages
The Perfect Storm: Propane 2013-14

PADD II

PADD I

Agriculture
Residential and Commercial
Propane Supply and Infrastructure Study

» Propane production has doubled

» New propane production is closer to major market areas

» New pipeline, storage, export and rail infrastructure = market more interconnected

» Near term outlook for residential/commercial propane demand is relatively flat

» Propane exports have rapidly expanded; more price exposure to global markets

» New propane production is primarily transported via rail

» Regional markets will see market impact from disruptions in other regions

» Longer term retail propane demand will be pressured by population shifts, fuel competition and efficiency
Annual Propane Production and Consumer Demand

Projected 2015 Consumer Demand

- PADD 1: 33%
- PADD 2: 44%
- PADD 3: 9%
- PADD 4: 5%
- PADD 5: 9%

PADD 1
- Consumer Market: 500, 400, 300, 200, 100, 0
- Production-Curtailment: 500, 400, 300, 200, 100, 0
- Production-Growth: 500, 400, 300, 200, 100, 0

PADD 2
- Consumer Market: 500, 400, 300, 200, 100, 0
- Production-Curtailment: 500, 400, 300, 200, 100, 0
- Production-Growth: 500, 400, 300, 200, 100, 0

PADD 3
- Consumer Market: 1,000, 800, 600, 400, 200, 0
- Production-Curtailment: 1,000, 800, 600, 400, 200, 0
- Production-Growth: 1,000, 800, 600, 400, 200, 0

PADD 4
- Consumer Market: 500, 400, 300, 200, 100, 0
- Production-Curtailment: 500, 400, 300, 200, 100, 0
- Production-Growth: 500, 400, 300, 200, 100, 0

PADD 5
- Consumer Market: 500, 400, 300, 200, 100, 0
- Production-Curtailment: 500, 400, 300, 200, 100, 0
- Production-Growth: 500, 400, 300, 200, 100, 0

Lft Axis - Bbl/d
Rt - Billions g/y
Most New Propane Production from Natural Gas
If all capacity is built and fully utilized it would add another 200 Mb/d of propane, or about 3 billion gallons per year.
U.S. Fractionators – 1,050 Mb/d Expansions 2015-18

- PADD 2 Bakken: 85 Mb/d
- PADD 4 Mb/d: 85 Mb/d
- PADD 2 non-Bakken: 700 Mb/d
- PADD 2: +25 Mb/d
- PADD 1 & Utica: 525+275 Mb/d
- PADD 5 Mb/d: 50 Mb/d
- PADD 3,300+750 Mb/d
- PADD 2 non-Bakken: 700 Mb/d
NGL Pipelines- 2014 (New Builds & Expansions)

- **ONEOK** - Bakken Expansion (+75) 135 Mb/d
- **Sunoco** - Mariner West New Build 50 Mb/d
- **Pennant Midstream** (Columbia PL/ Hilcorp) New Build 90 Mbl/d
- **EnLink** - Cajun-Sibon Expansion (+50) 120 Mb/d
- **Pembina** - Vantage New Build 40 Mb/d
- **Enterprise** - MAPL Expansion (+75) 350 Mb/d
- **ONEOK** - Sterling III New Build 193 Mb/d
- **Anadarko/DCP/EPP** - Front Range New Build 150 Mb/d
- **Sunoco** - Mariner East New Build 70 Mb/d
- **Pembina** - Vantage New Build 40 Mb/d
NGL Pipelines 2015-18 (PADD 1 & 2 Connected)
U.S. LPG Terminals

- Ferndale, WA - Petrogas
- Corpus Christi – Oxy, Trafigura
- Port Aransas - Martin
- Sea-3 - Newington, NH
- DCP - Providence, RI
- ETP/Sunoco - Marcus Hook
- DCP - Chesapeake Bay, VA
- Sea-3 - Tampa
- Other Terminals:
  - Marathon – Garyville, LA
  - Dow – Plaquemine, LA
  - Dow – Freeport, TX

Gulf Coast LPG Export Capacity

- ETC Mariner South - 2015
- Oxy - 2015
- Phillips - 2016

Pre-Existing
- Enterprise
- Targa
- ETP Mariner South

Other
- Unannounced

Billions g/y

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Retail Propane vs. International Exports

Impact of Crude Oil Price Scenarios

- Consumer Demand
- Exports (Growth)
- Exports (Contraction)

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U.S. LPG Exports

All LPG/Ethane Exports

- Propane
- Butane
- Ethane
- Isobutane

Source: EIA/Ship Loadings/Schedule
VLGC Fleet (60,000-85,000 CBM)

- Fleet: 170 units
- Fleet age 25+: 4%
- Orderbook: 96 units
» Production growth adjacent to and within the Northeast demand region will shift primary supply to local sources

» A higher proportion of supply will be delivered by rail

» Dixie and Teppco will continue to be important sources of supply; Teppco volumes will be increasingly sourced from Marcellus/Utica production

» Retailers should focus on local supplies for ratable volumes, supplemented by seasonal purchases from pipeline, rail and local storage

» The intermittent nature of rail deliveries will require more planning/scheduling to avoid supply interruption

» Retailers can maximize rail flexibility through the use of trans-flow units (mobile railcar to bobtail vehicles)

» It will be increasingly important for retailers to carefully monitor export markets, export volumes and local production trends
» Propane markets in the upper Midwest will increasingly be supplied by Bakken and other PADD 2 production, much delivered by rail

» Retailers previously served by Cochin, or near new rail terminals will need to plan for the more intermittent nature of rail deliveries

» Retailers served from the MAPL and Oneok pipeline systems can continue to rely on consistent deliveries from those sources

» It will be increasingly important for retailers to carefully monitor export markets, export volumes and PADD 3 petrochemical demand
» PADD 3 exports have become a huge gateway to the global propane market

» Pricing in global markets will increasingly impact pricing in U.S. markets, and vice versa

» Supplies to meet PADD 3 export commitments will come from production within the PADD, and significant receipts of PADD 2 and 4 volumes

» Additional base load demand will come from new PDH units

» It will be increasingly important for retailers to carefully monitor export markets, export volumes and PADD 3 petrochemical demand
With increasing production near demand regions, better connectivity from both pipeline and rail, and export volumes that can be bid away from global markets, the U.S. propane industry is in much better position to handle a Perfect Storm of events than it was in the Winter of 2013-14.

But all supply is local. Retailers must continue to diligently prepare for short-term market events that can disrupt the supply chain.

Through careful planning, operational best practices and prudent contracting, the retail propane industry is in an excellent position to navigate the uncertain waters of today’s energy markets.