

UP Propane System

August 5, 2019

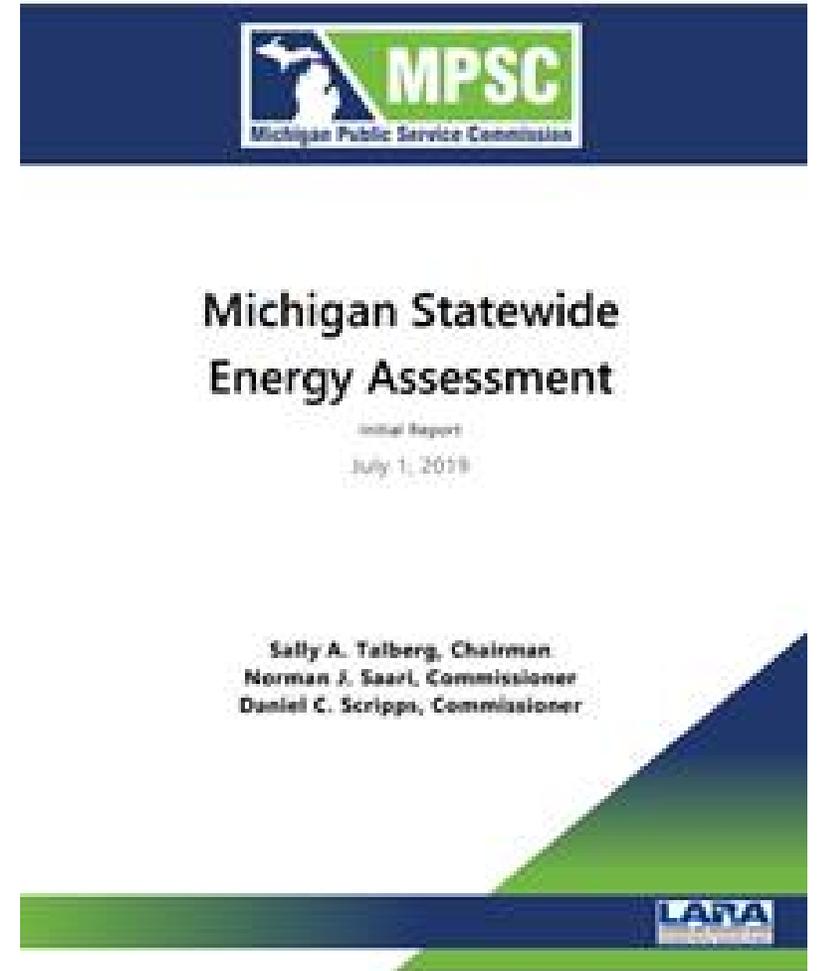
- Travis Warner – Public Utilities Engineer
 - Pipeline siting, safety, and operations
 - Oil and gas production
 - Emergency Management
- Ethyan Kramer – Economic Analyst
 - Energy market monitoring and analyses
 - State Heating Oil & Propane Program (SHOPP)
- Energy Security Section
 - Emergency Planning
 - Supply/Demand Monitoring

2016-2018

- Served on an interagency team that provided oversight and guidance for:
 - Alternatives Analysis completed by Dynamic Risk.
 - Risk Analysis completed by a team led by Michigan Tech
- Thoroughly reviewed the London Economics International (LEI) report(s) and compared with other available information.
- Provided technical support for the Pipeline Safety Advisory Board (PSAB) and presented at a 2018 meeting on market impacts of a potential Line 5 shutdown, a copy is available at mipetroleumpipelines.com as Appendix 4 to the final report:
[PSAB Final Report](#)

Statewide Energy Assessment

- Completed the Propane and Emergency Management sections of the initial Statewide Energy Assessment and Report, available at michigan.gov/mpsc:
 - [Initial Statewide Energy Assessment](#)
- Propane Section
 - Regulatory Oversight
 - Strengths
 - Vulnerabilities
 - Contingency Planning
 - Recommendations
- Emergency management
 - Roles and Responsibilities
 - Petroleum Shortage Response Plan
 - Public Information and Communication
 - Recommendations



- Michigan propane system overview – UP focused
- UP Propane System Analysis for potential Line 5 shutdown
 - Recap of work completed by independent third parties
 - Alternatives Analysis – Dynamic Risk
 - Assessment of Alternative Methods of Supplying Propane to Michigan in the Absence of Line 5 – London Economics International
 - Staff analysis:
 - Third Party reports
 - Alternatives considered
 - Price impacts
 - Resiliency impacts

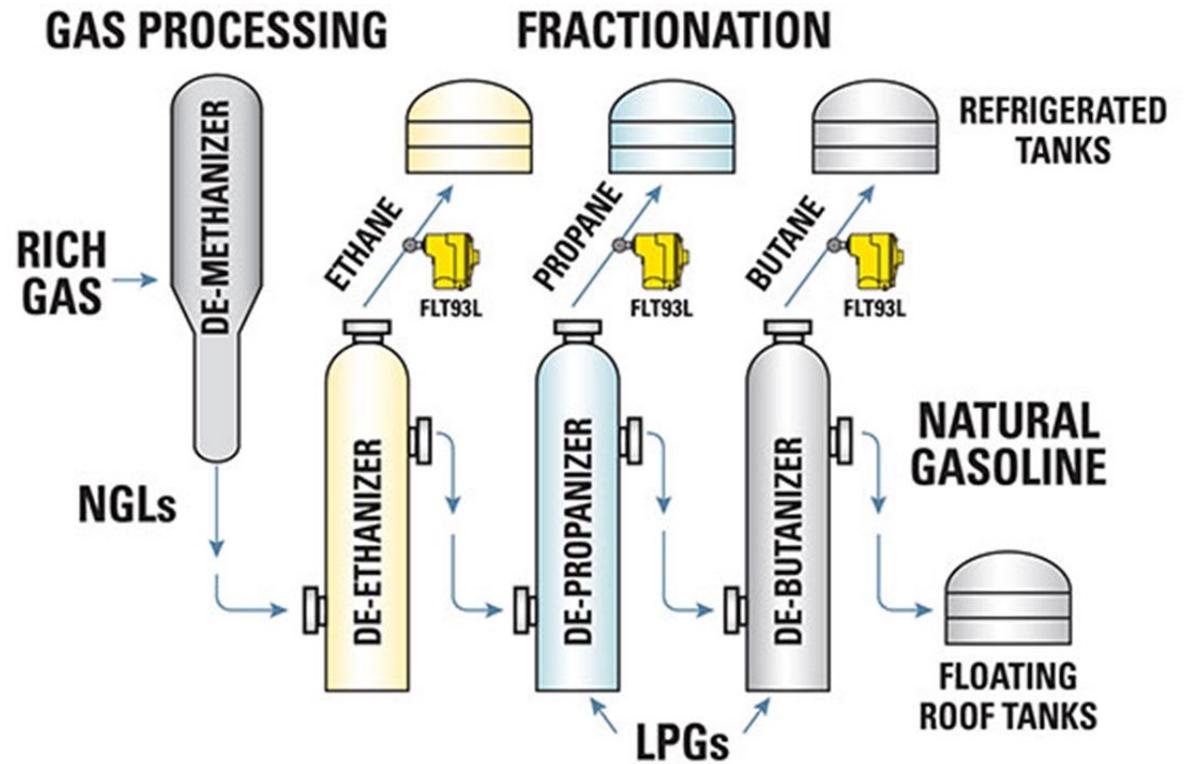
Challenges

- Specific petroleum industry data is often difficult to obtain due to the:
 - Unregulated nature of the market
 - Fungibility of product movement in regional networks
- The MPSC staff analysis for this presentation was based on various publicly available data sources.
 - Therefore, some values and figures are based on assumptions and the best judgment of Staff.
- While potential supply alternatives have been identified, if, how, and by whom these alternatives are implemented will generally be dictated by market forces.
 - Any implication that an alternative may be implemented is speculative.
- Unlike with utility services, there are no broad industry/region wide resource adequacy planning mechanisms.

Propane System Overview

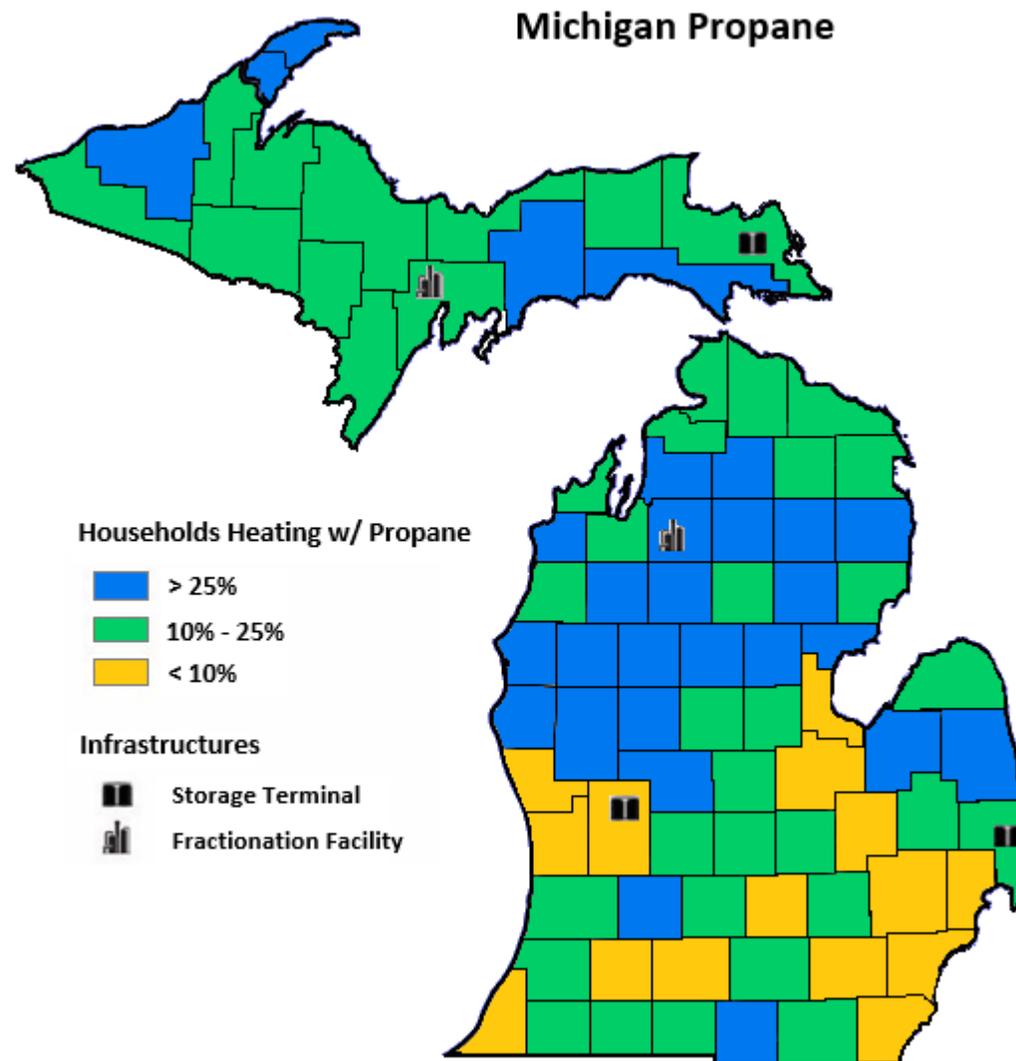
What are NGLs?

- Natural Gas Liquids:
 - Group of hydrocarbon gases including ethane, propane, normal butane, isobutane, and pentanes.
- Individual gases are separated in a sequential order based on their respective boiling points in a process called “fractionation”.



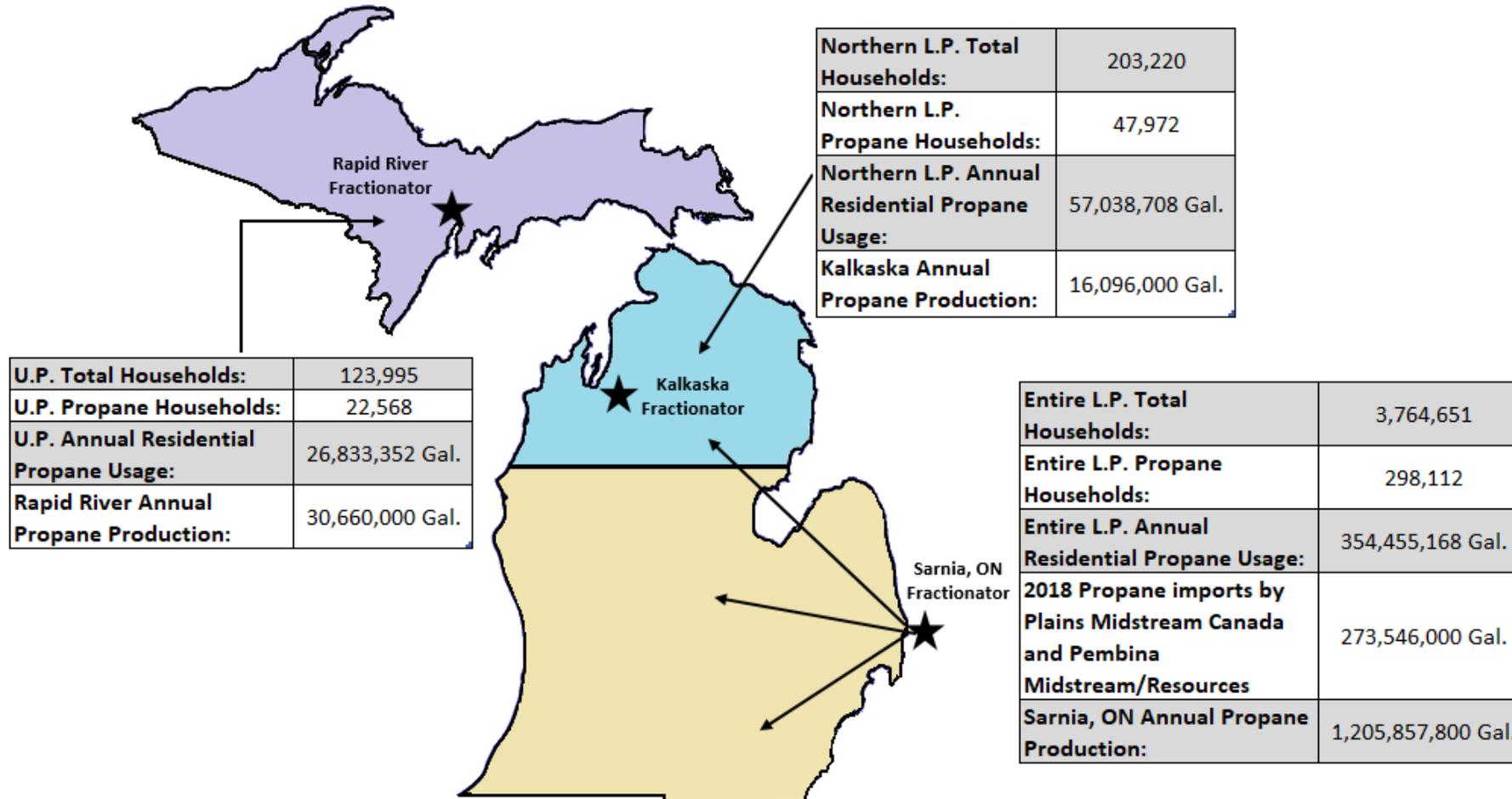
Michigan Propane Usage

- 18% of UP households (22,000) use propane as a primary heating source.
- This compares with approximately 8%, or 300,000 households, in the Lower Peninsula.



Source: American Community Survey, 2015

MI Energy Landscape - Propane

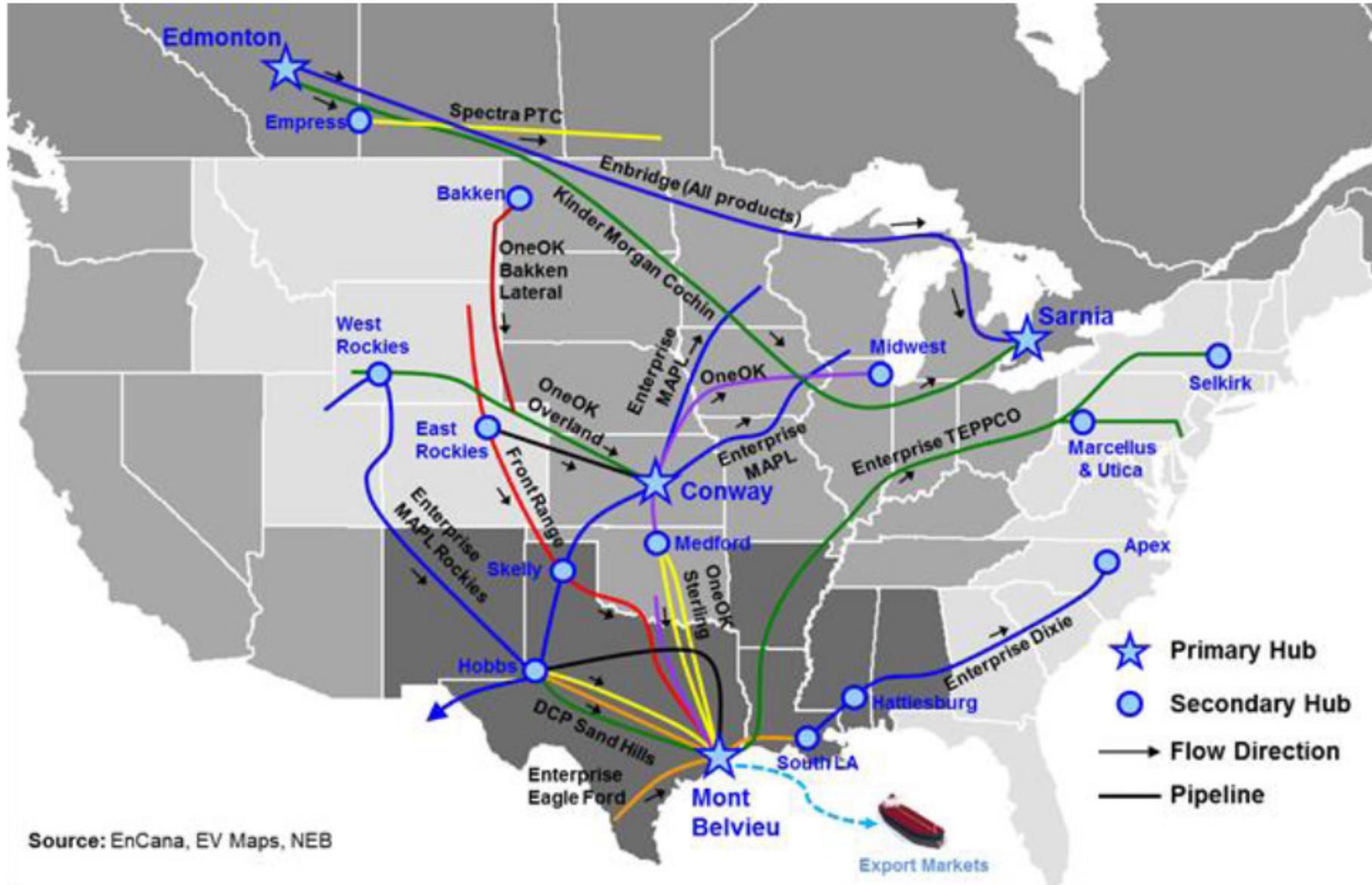


Assumptions include: An annual household usage of 1,189 gallons, Kalkaska production rate of 1,050 bpd, Rapid River production rate of 2,000 bpd, and Sarnia production rate of 114,000 bpd (95% of maximum capacity and 69% of output consisting of propane(See footnote 117)).

Sources: Energy Information Administration and American Community Survey.

Notes: Sarnia fractionator is jointly owned and operated by Plains Midstream and Pembina. Propane imports into Michigan may ultimately be consumed elsewhere.

US Propane Pipeline System

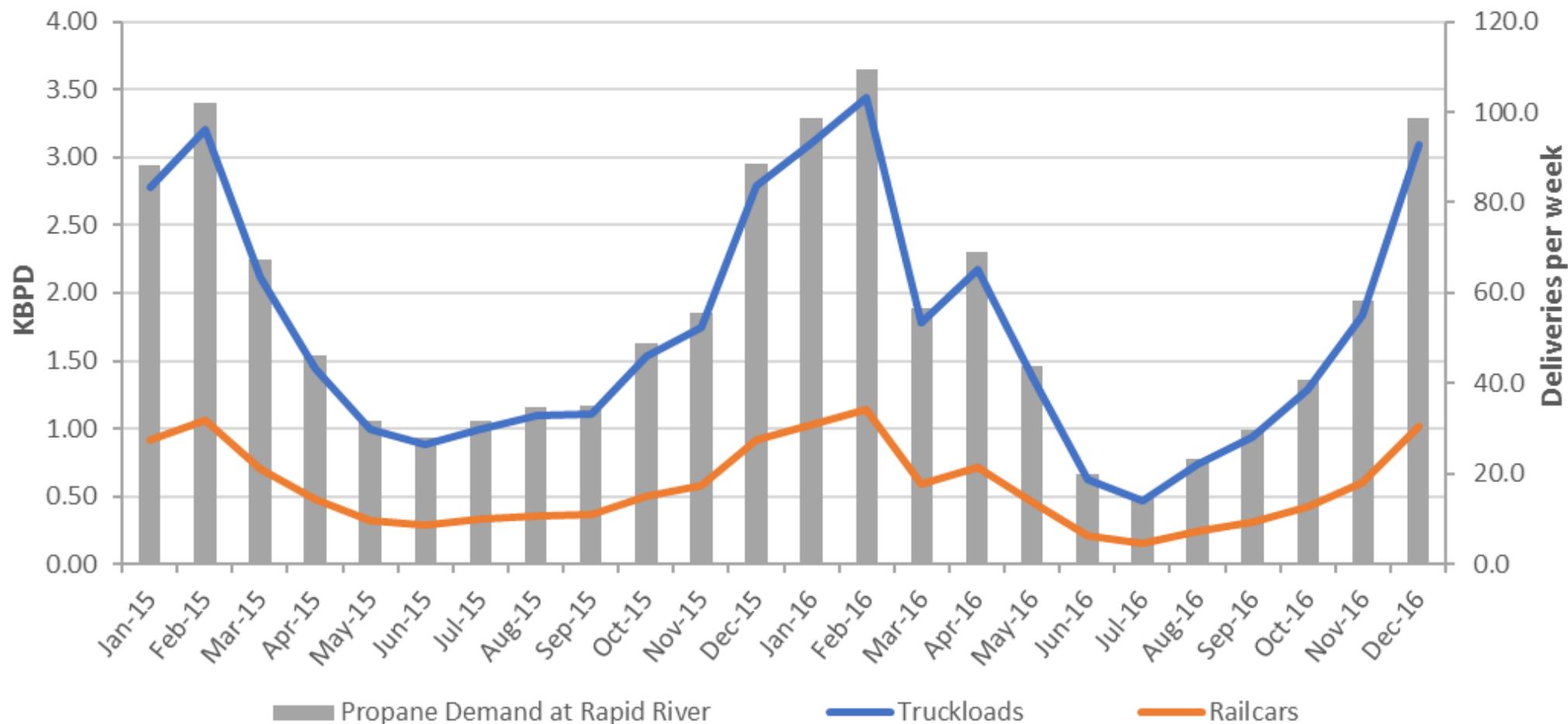




Rapid River, MI Plains LPG Services Terminal

- Receives NGL supply from Line 5 (Alberta)
- Removes propane from NGL stream and returns C4+ (butanes and heavier liquids) to Line 5
- 10,000 bpd fractionation capacity
- Propane Storage: (4) 90,000-gallon horizontal bullet tanks
- Propane production volumes closely correlated with seasonal demand

Rapid River Propane - Alternate Supply Logistics





Kincheloe, MI Plains LPG Services Terminal

- Receives propane by rail (Alberta) for loadout by truck
- (4) 30,000 – gallon horizontal bullet tanks
- Rail siding provides additional storage potential

Superior, WI Plains LPG Services Terminal

- Depropanizer: 10,000 bpd capacity
- Receives NGL supply from the Enbridge Mainline System originating in Alberta
- (6) 50,000 bbl NGL breakout storage spheres
- Propane storage: (6) 60,000 – gallon horizontal bullet tanks
- Pipeline in, truck out



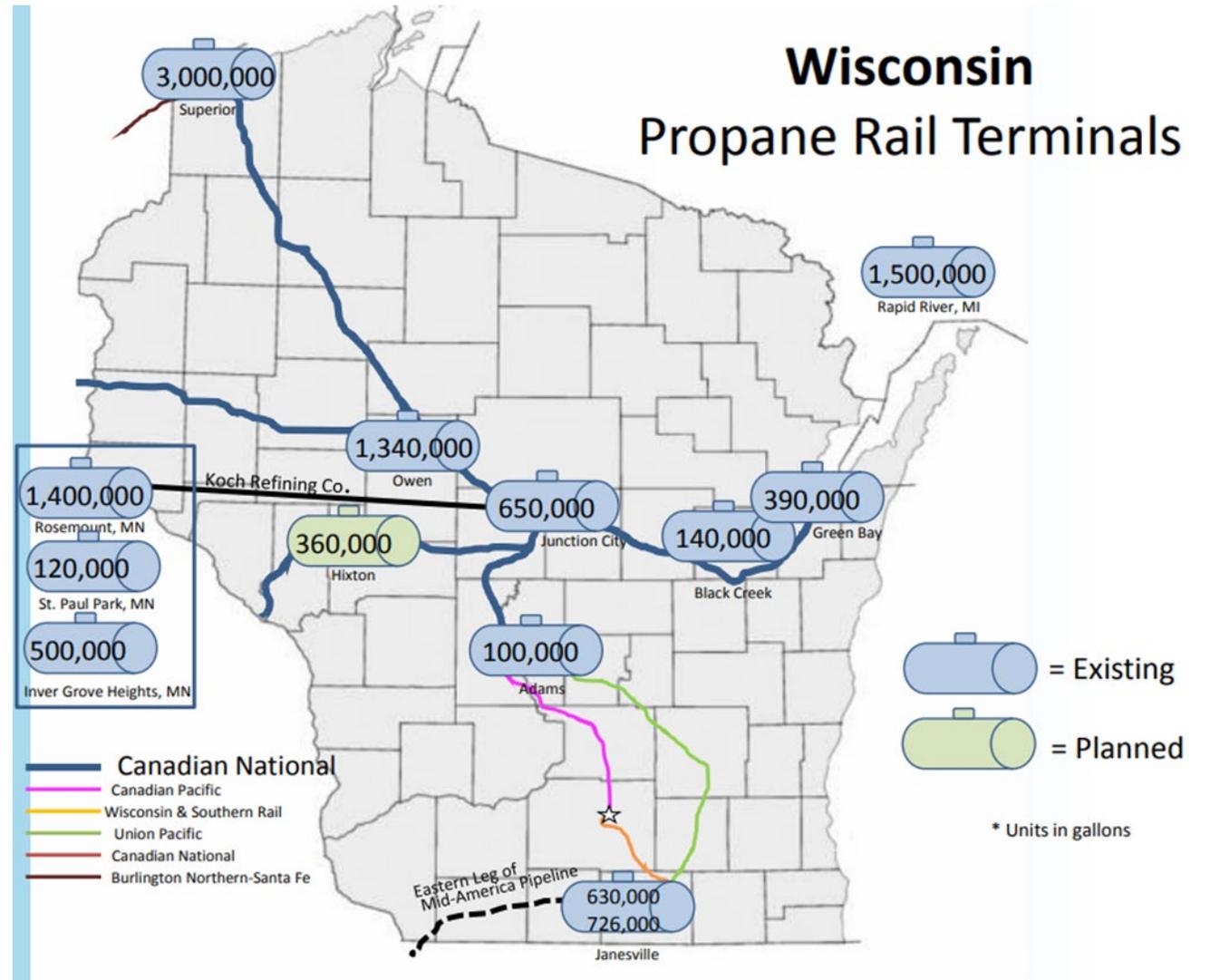


Sarnia, ON Fractionation Facility

- Receives NGL supply from Line 5
- Largest fractionator in Eastern Canada
- 120,000 bpd capacity
- Produces propane, butanes, and pentanes

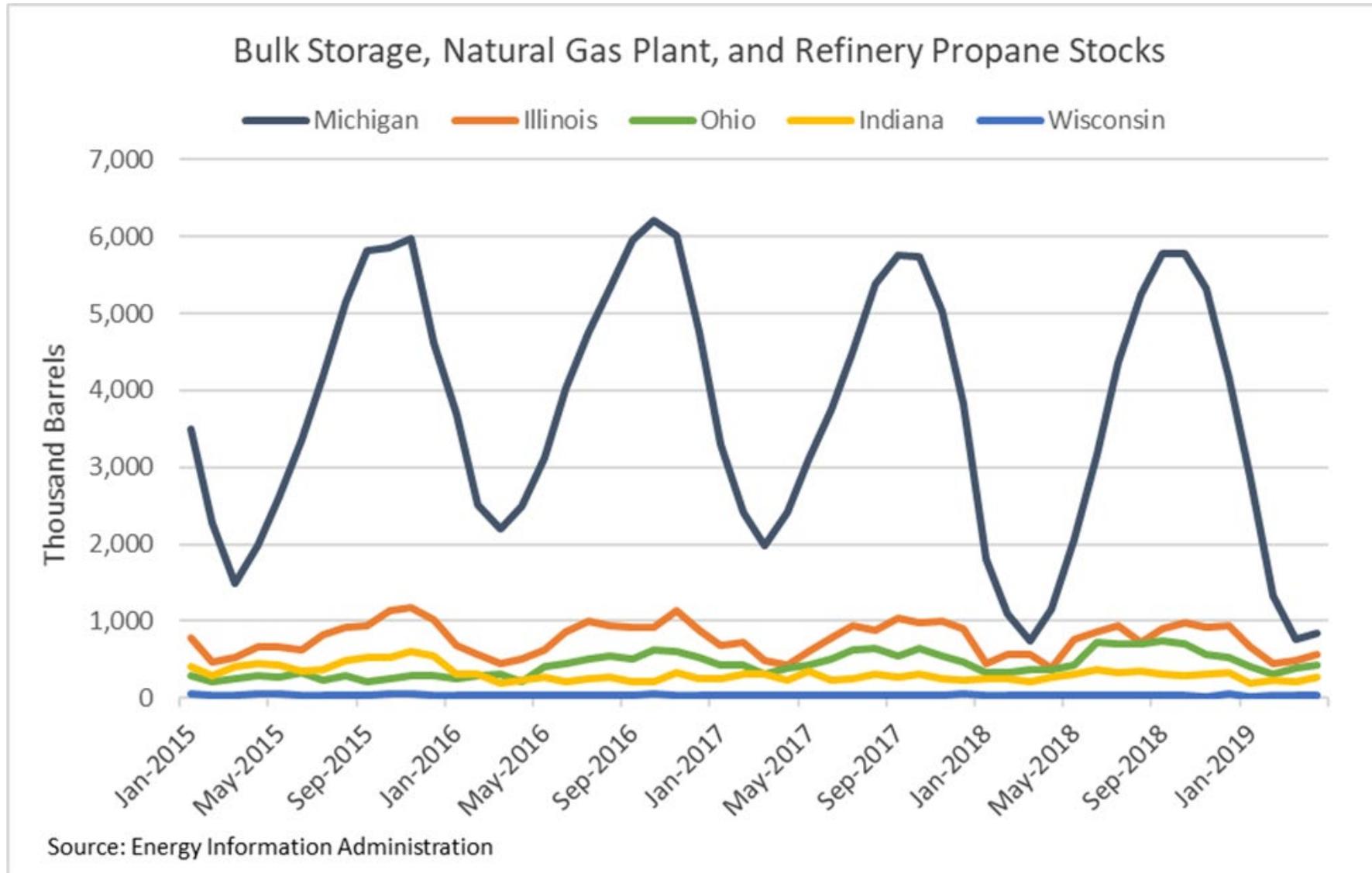
Wisconsin Propane Supply

- Unlike Michigan, no underground cavern storage capacity
- Propane Supply Sources:
 - Rail from Western Canada
 - Mid-America Pipeline (MAPL) – Eastern Leg
 - Wisconsin Pipeline



Source: Wisconsin State Energy Office – NASEO 2014/15 Winter Fuels Conference
<http://www.naseo.org/Data/Sites/1/events/winterfuels/2014/versperman.pdf>

Propane Storage Comparisons



Alternative Means to Supply Propane to the UP

Potential Line 5 Shutdown

Dynamic Risk Alternatives Analysis

- Dynamic Risk (DR) was commissioned by the State to analyze six alternatives to Line 5.
- Specific to UP propane supply, DR considered multiple scenarios to replace NGL and/or propane supply to Rapid River via:
 - The existing 30” pipeline
 - A new 4” pipeline
 - Rail with some new construction
 - Truck, four separate variations were considered
- Trucking was deemed to be the only feasible option with a range of price impacts to UP residents from 10-35 cents per gallon

DR Alternatives to Rapid River Supply

Table 4-2: Incremental Cost Summary – Average for November – March

Alternate Supply Option	Market Price Adjustment \$/gal	Rail Costs \$/gal	Trucking Costs \$/gal	Adjustment for Current Applicable Tariff \$/gal	Total Adjusted Incremental Costs \$/gal
Kincheloe, MI Rail to Kincheloe from western Canada, truck to Rapid River	N/A	0.31	0.06	-0.08	0.29
Sarnia, ON Truck from Sarnia to Rapid River	0.29	N/A	0.14	-0.08	0.35
Owen, WI Rail to Owen from Conway, truck from Owen to Rapid River	0.11	0.17	0.09	-0.08	0.29
Superior, WI Truck from Superior to Rapid River	N/A	N/A	0.11	-0.015	0.10

- Cost Considerations:

- Market Price Adjustment



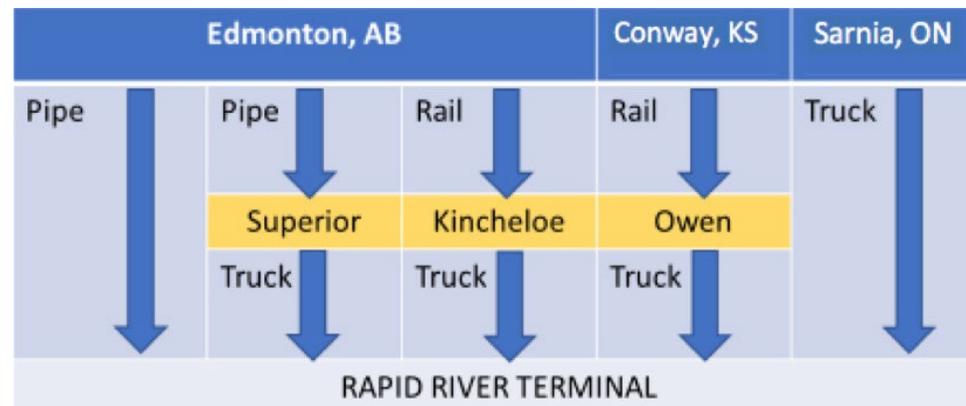
- Transport Costs (Truck & Rail)



- Current Pipeline Tariffs



- Incremental Cost Adjustment



London Economics International (LEI)

- LEI completed a supplemental study of UP propane market impacts using the Dynamic Risk report as a basis.
 - Specifically, LEI studied the option with the lowest expected price impact - trucking propane from Superior, WI
- LEI's three-step approach analyzing UP propane supply costs included:
 - 1) Examining publicly available data sources;
 - 2) Reproducing Dynamic Risk's cost calculations;
 - 3) Substituting publicly available data for cost elements and applying Dynamic Risk's methodology.
- LEI estimated a price impact of 11 cents/gal, which is similar to DR's estimate of 10 cents/gal.
 - Dynamic Risk assumed the entire incremental price increase would be borne by consumers.
 - LEI concluded that only 5 cents/gal would be borne by consumers.

Major Assumptions

- Staff identified several baseline assumptions underlying their analyses that, if incorrect, would likely alter their conclusions.
- DR and LEI assumed:
 - Sarnia fractionator would source replacement NGL supply and remain in operation
 - Rapid River facility will continue to operate as storage/distribution hub
 - Superior facility has the excess fractionation capacity, storage, and loading infrastructure to replace Rapid River production during peak demand
 - The increase in demand at Superior would not impact price

Additional Alternative Considerations

- Beyond the alternatives studied by DR and LEI, Staff believes there may be other alternatives that could be implemented to replace propane supply for UP consumers.
- Options for consideration might include:
 - Additional storage buildout at Kincheloe
 - Rail buildout to utilize existing storage capacity at Rapid River
 - New storage buildout along existing UP rail infrastructure

U.P. Rail Infrastructure



Source: Federal Railroad Administration

Propane System Resiliency Considerations

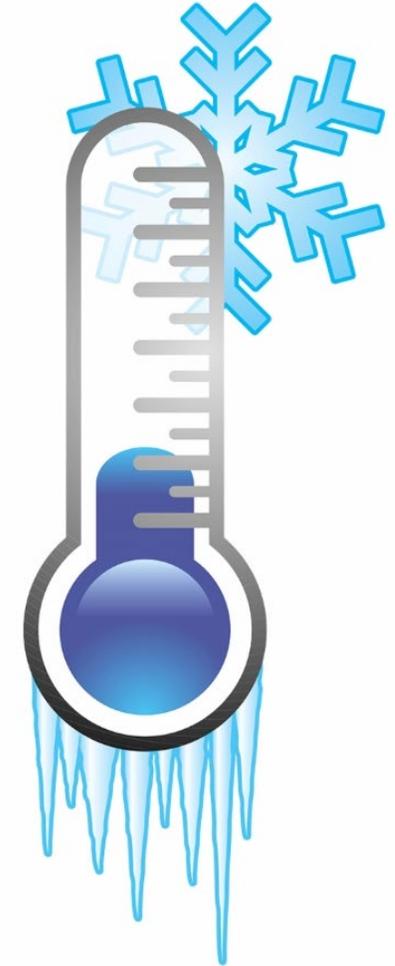
- When compared to pipelines,
 - Trucking is generally more susceptible to weather events (snow, ice, etc) and bottlenecks during peak demand periods.
 - Rail transport in extreme cold becomes more challenging and can have a higher risk of derailment.
- For the UP system, Line 5 provides a layer of supply diversity. Without pipeline supply, the UP could become dependent on a single fractionation facility (Superior) and a single mode of transportation (trucking).
- The Great Lakes region relies on Michigan storage and Sarnia production.

Market Adjustment Timing Considerations

- Market adjustment is expected to occur differently depending on the amount of time before an expected shutdown.
- Medium term planned shutdown (6-24 months) could allow:
 - Additional storage to be added
 - Rail infrastructure build out
 - Proactive acquisition of trucks and recruitment of truck drivers
- Long term planned shutdown (2-5 years) could allow:
 - Major infrastructure changes such as,
 - Pipeline product change
 - Pipeline reversals
 - New fractionation, storage, or distribution facilities
 - Pipeline construction (likely 3+ years needed)

Immediate/Unplanned disruption

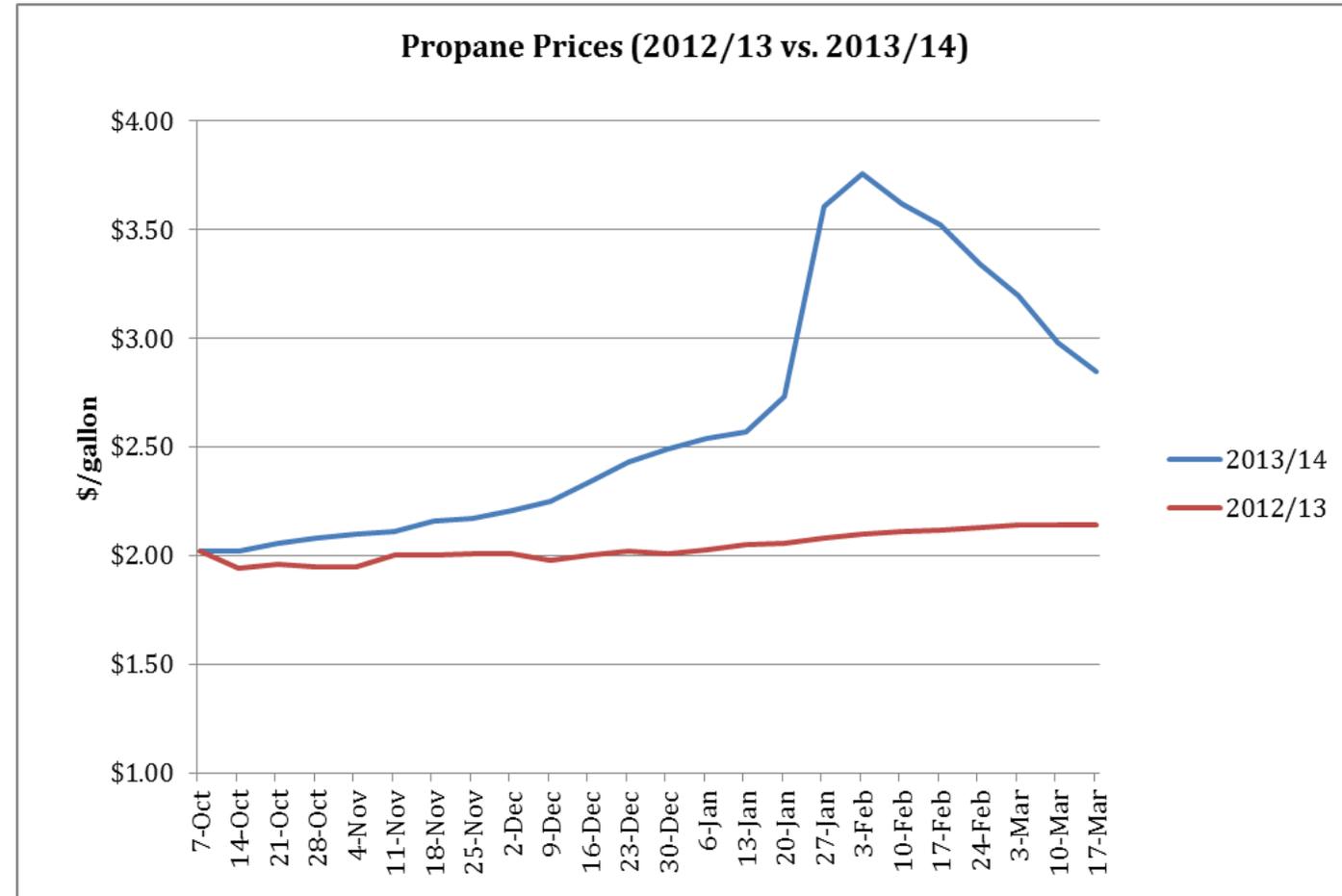
- Examples: unplanned maintenance, pipeline rupture, extreme weather
- UP/region would be dependent on existing storage levels
- Initial reaction would likely be additional truck transportation from other area supply points (Wisconsin, Conway, KS, etc)
- Current supply, weather, and driver availability would determine the severity of the disruption and whether an energy emergency would be declared.



2013-2014 Propane Emergency

Impacts:

- Average prices in Michigan spiked to \$3.76
- Shortage of transport drivers
- Energy emergencies declared in MI and throughout the Midwest



2013-14 Propane Emergency

Midwest propane movements

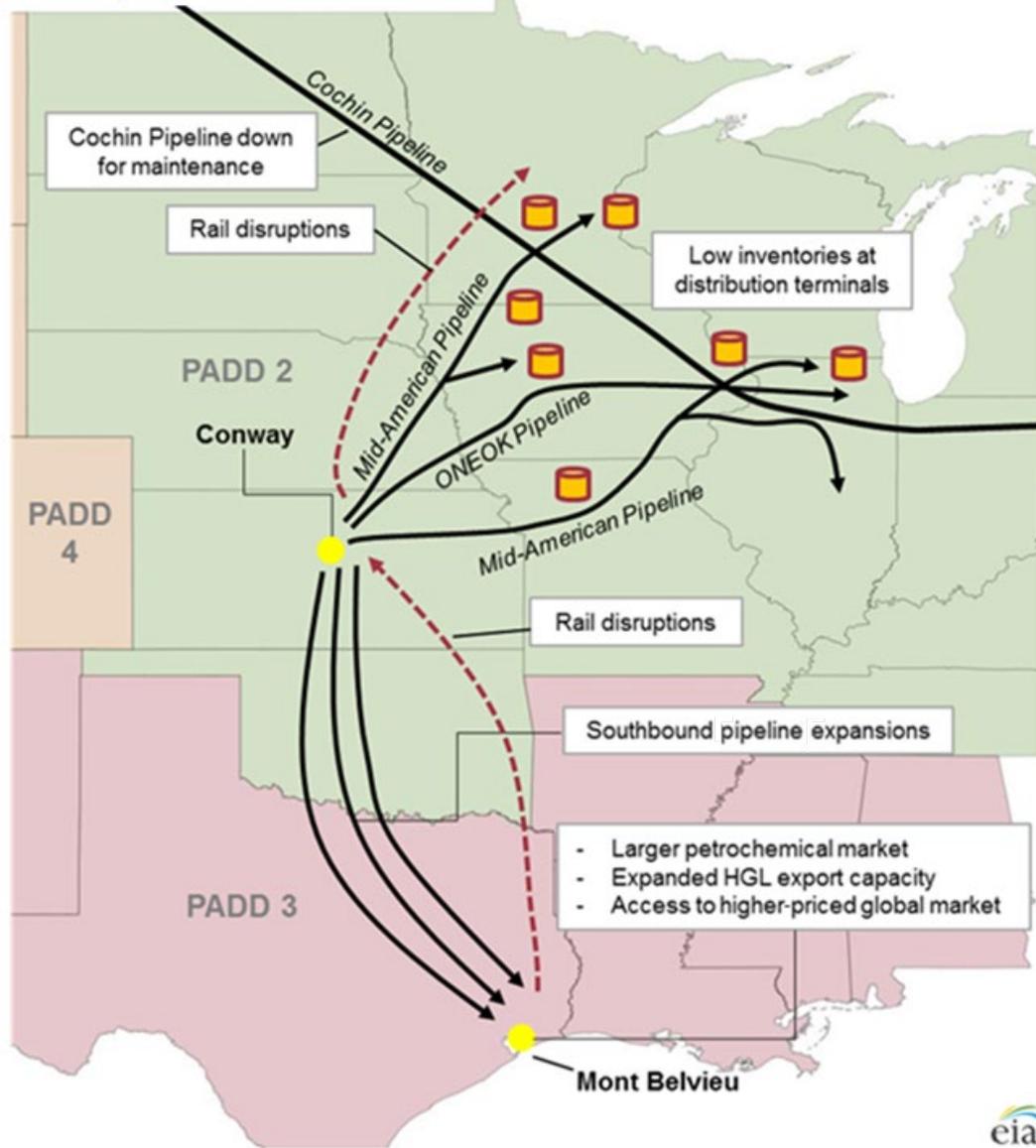
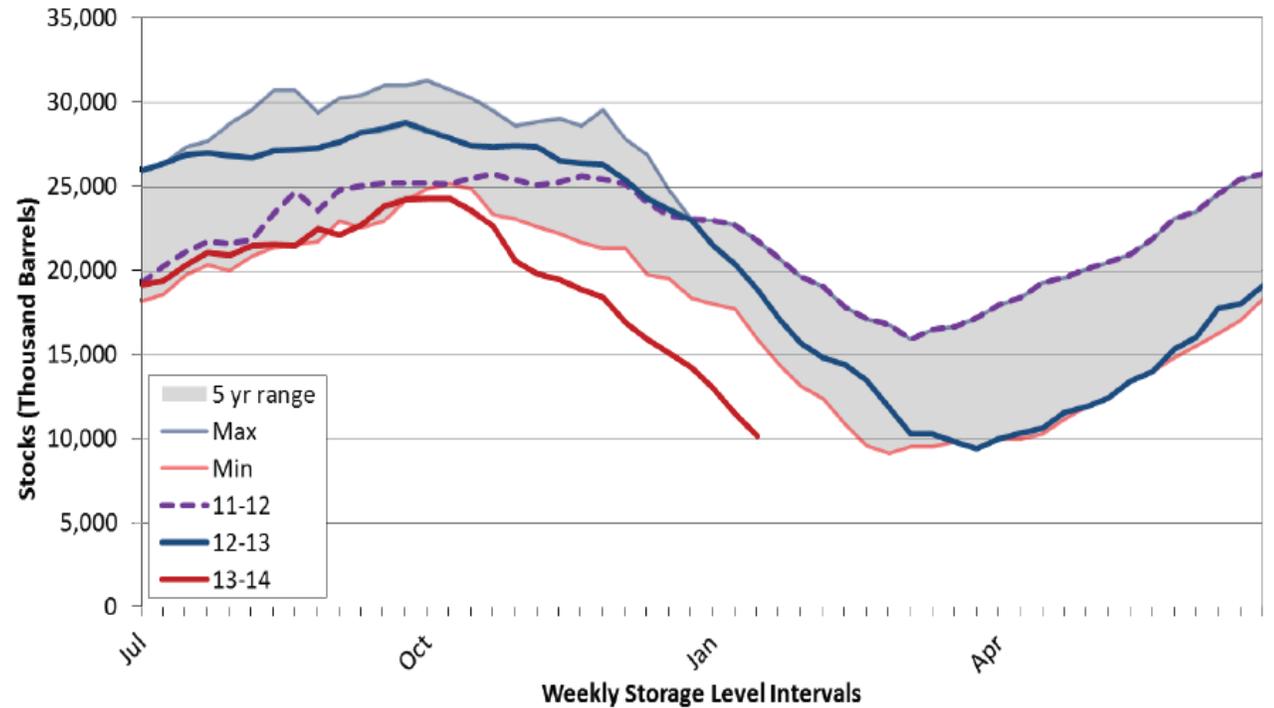


Figure 3. Midwest (PADD 2) Propane Stocks



Conclusion - Staff Observations

- UP Propane transportation costs likely to increase
- UP Propane resiliency likely to decrease
- Magnitude of cost and resiliency impacts depends on:
 - Time allowed for market to adjust prior to shutdown
 - Industry implementation
- Supply alternatives currently considered require industry investment/implementation
- Additional capital investment by industry could drive consolidation, which benefits national players over smaller local businesses and impacts resilience
- Areas for further research
 - UP Electric system cost and reliability impacts from loss of Line 5 pump station load.
 - Alternative heat sources to propane and cost implications for UP residents
 - Measures that can be implemented by the State