



Energy Emergency Data Analysis

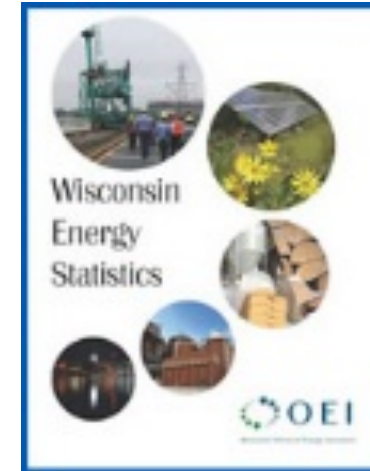
Megan Levy 12/3/2019

NASEO NARUC Energy Security Data Workshop

Data Analysis Tools

Wisconsin Energy Statistics Book

Collection of relevant energy statistics, starting in 1975.



Strategic Energy Assessment

Describes the availability, reliability, and sustainability of Wisconsin's electric energy capacity and supply.

SHOPP/ Qualitative conversations with petroleum industry

State Heating Oil Propane Pricing survey, collects retail prices from 80+ outlets

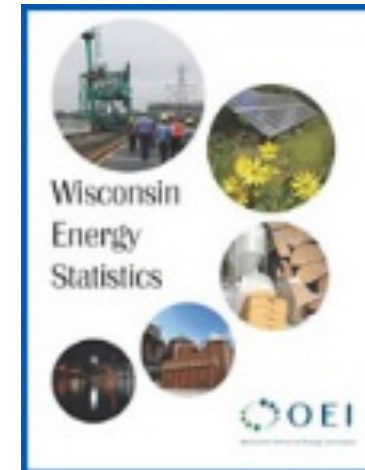
WI Energy Statistics

Summary Table of Energy Use 2017 (Trillions of Btu)

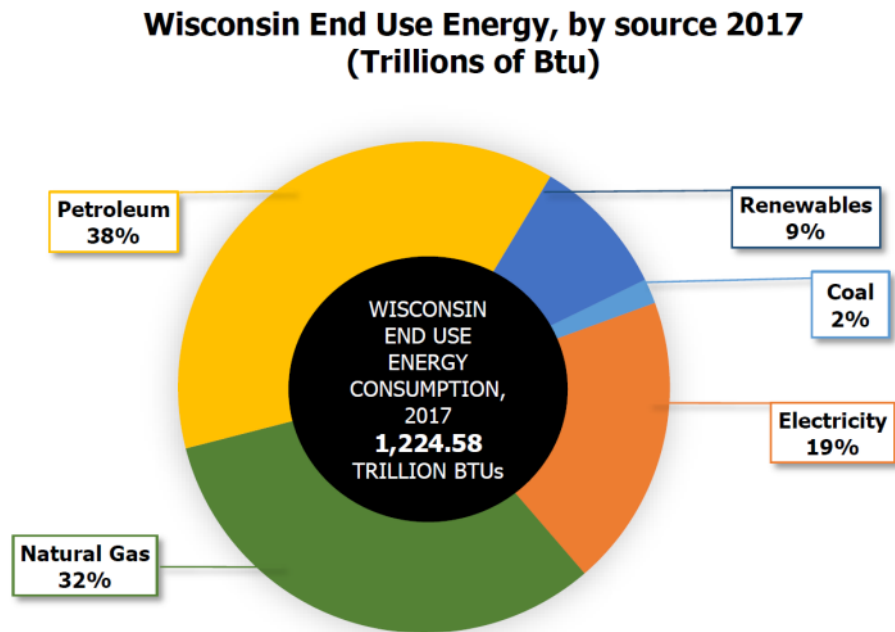
	Agricultural sector (1)	Commercial sector (2)	Industrial sector (3)	Residential sector (4)	Transportation sector (5)	End-Use Consumption (1+2+3+4+5=6)	Fuel Used for Electric Generation (7)	Total Resource Energy Use (6+7)
Natural Gas (a)	2.5	94.1	161.1	136.3	1.8	396	109	505
Nuclear (b)							104	104
Petroleum (c)	20.1	4.8	4.3	34	397.5	460.5	0.4	460.9
Renewable (d)	0	5.3	55.3	24.9	26.8	112	29	141.9
Coal (e)	0	0.5	19.7	0	0	20	368	388
Electricity (f)	3.6	80.7	81.4	70.1		235.7		
Electricity Imports							41.1	41.1
End-Use Consumption (a+b+c+d+e+f)	26.1	185.4	321.8	265.3	426	1224.2		
Fuel used for electric generation ¹ (g)	9.9	223	225.1	193.8	0		651.5	
Total Resource Energy Use (a+b+c+d+e+g)	32.4	327.8	465.5	388.8	426			1640.9
Approximate Conversion loss (Resource Use minus End-Use)	6.3	142.4	143.7	123.7	0			

¹ This is an approximation of fuel used for electric generation by that sector. It is estimated by taking the ratio of electric used by that specific sector to total electricity used by the state times total fuel used by the electric sector.

Note that fuel used for electric generation minus the conversion loss is electricity used by each sector.



WI Energy Statistics



The Energy Statistics book helps communicate how Wisconsinites use energy and displays data from a historical perspective (data collection began in 1975).

Demographic variables:

Population, housing, gender, age

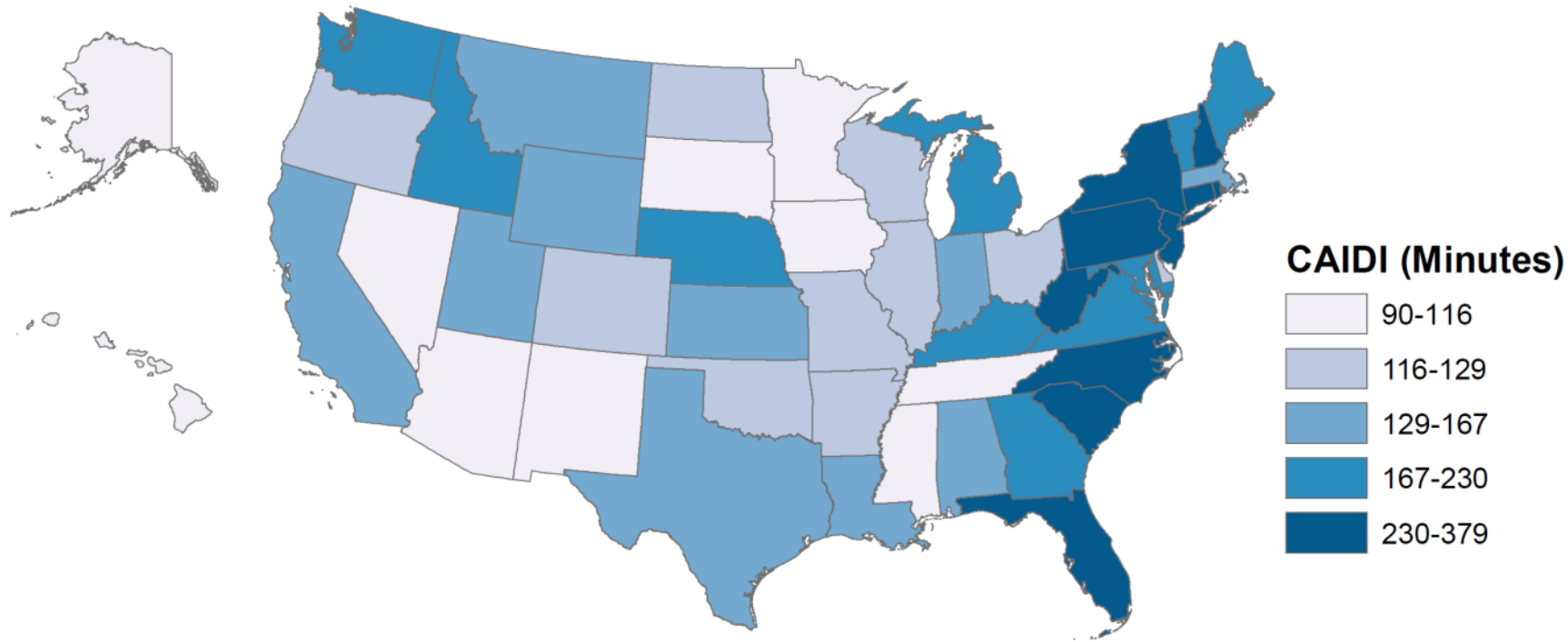
Economic variables:

GDP, Personal Income

Energy: Use by Source, Use by Sector, Prices, Generation

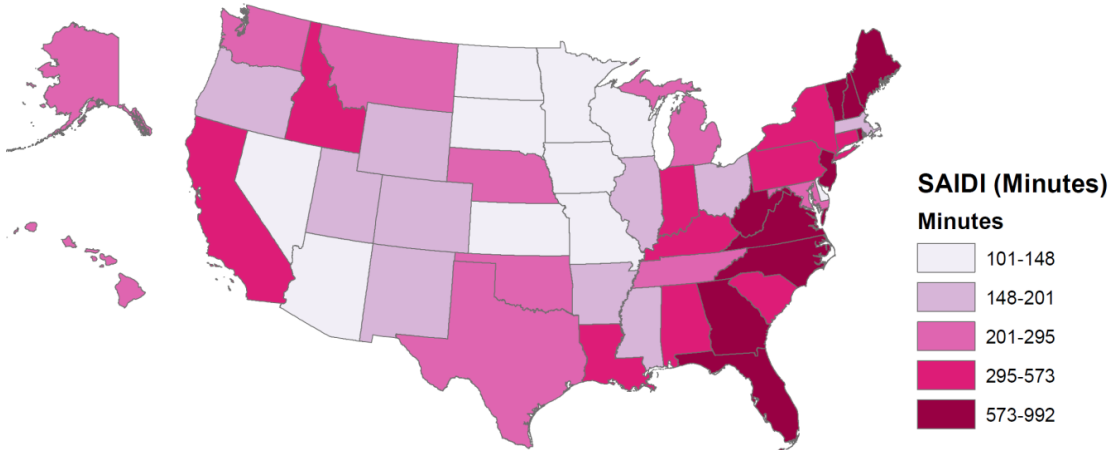
Expenditure

Data Collected by Utility Commissions

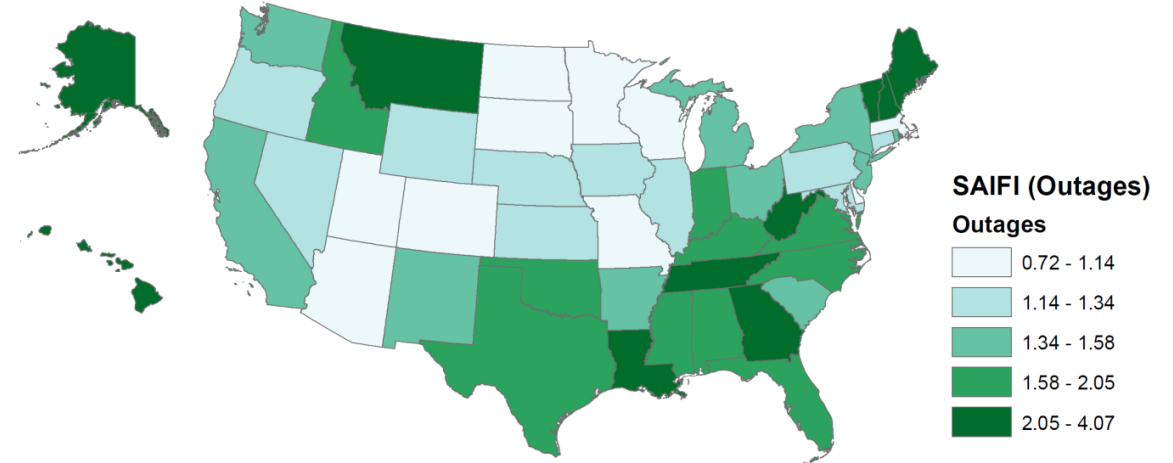


Customer Average Interruption Duration Indices

National Reliability Picture



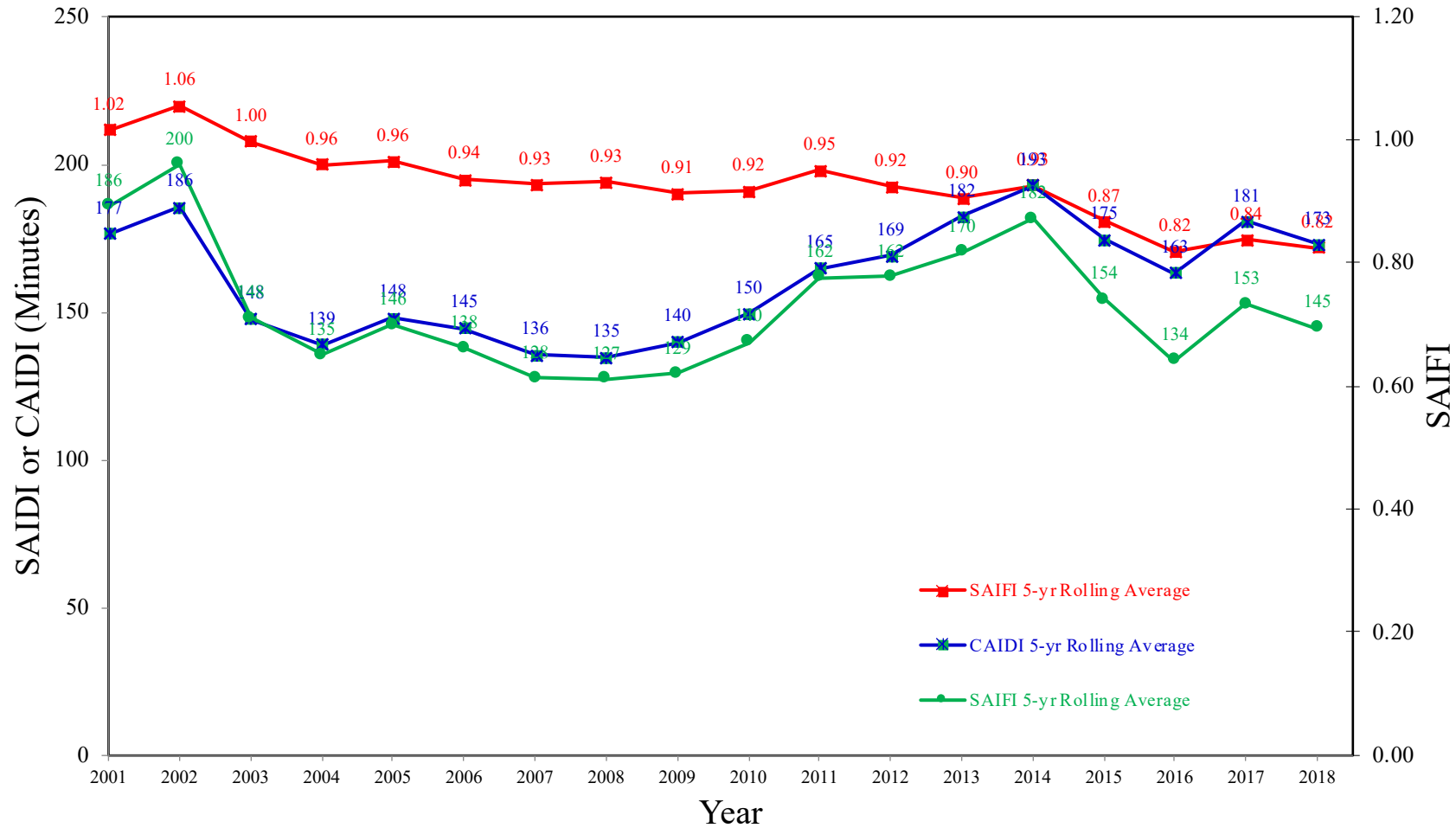
System Average Interruption Frequency Index (SAIFI)



System Average Interruption Duration Index (SAIDI)

Data collected by the Regulatory Agency

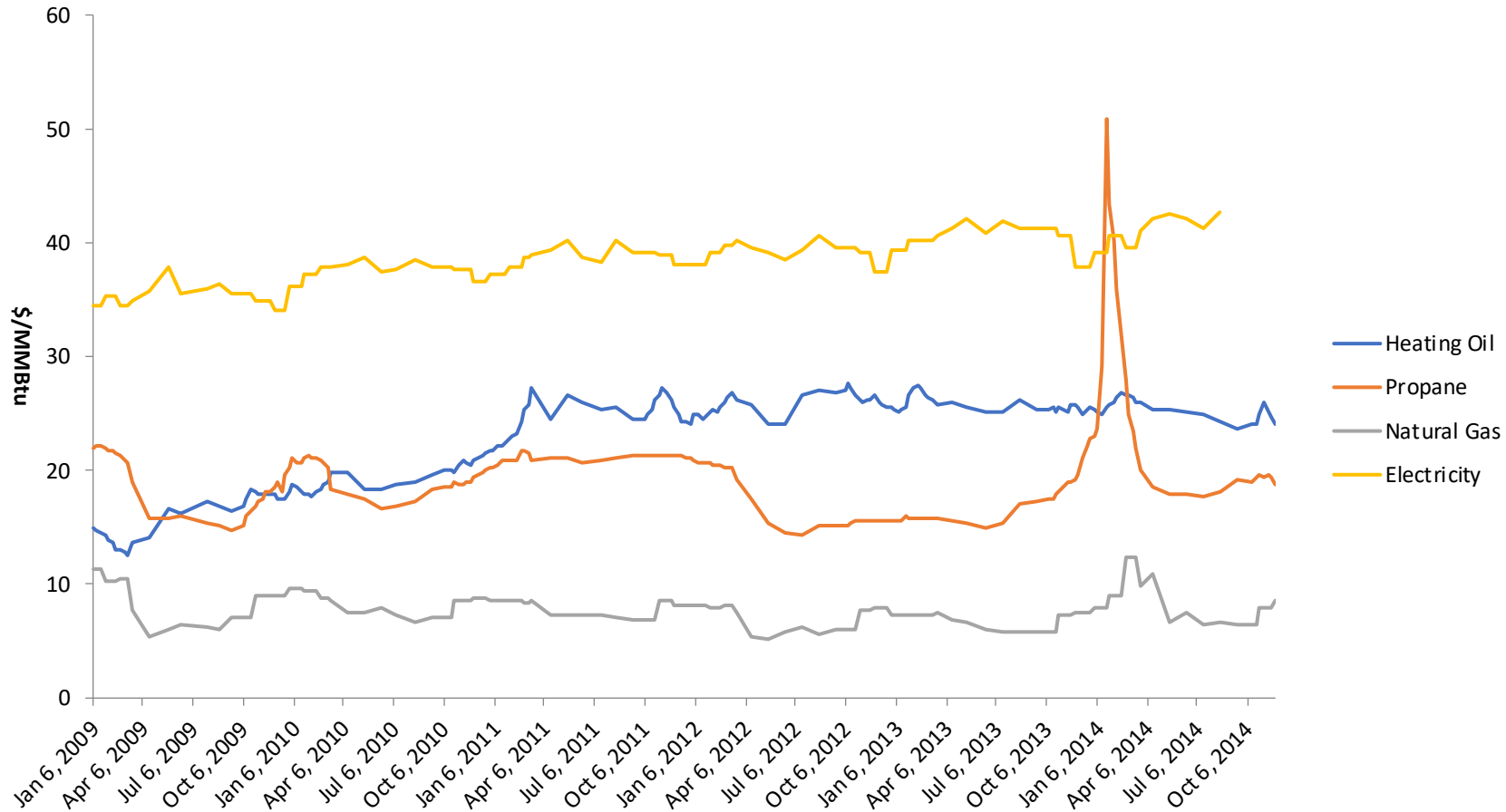
Wisconsin SAIFI, CAIDI, and SAIDI Reliability Indexes



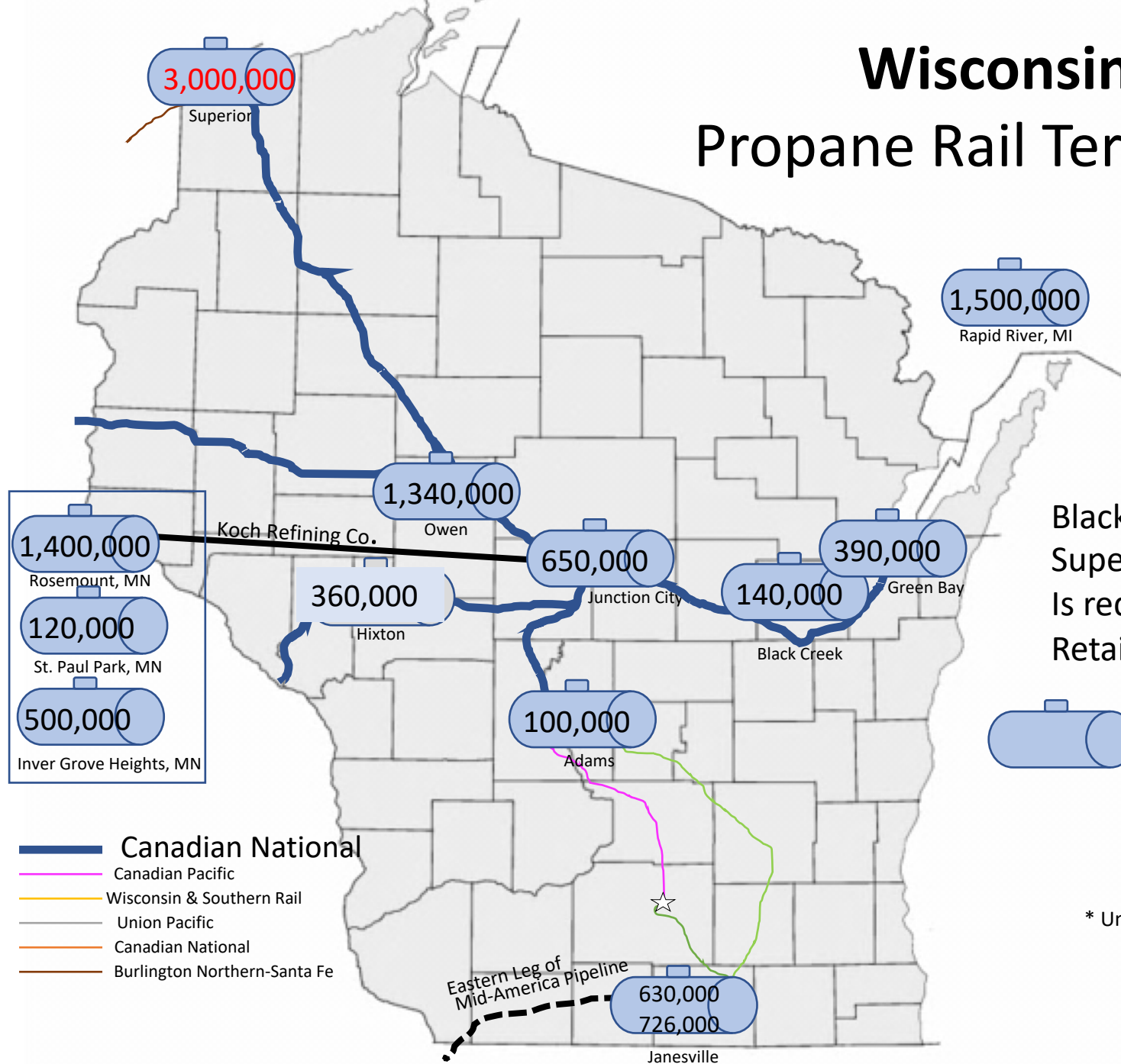
Residential Fuel Prices

January 2009 – December 1, 2014


Wisconsin Heating Fuels
Residential Prices in \$/MMBtu
January 2009 - December 1, 2014



Wisconsin Propane Rail Terminals



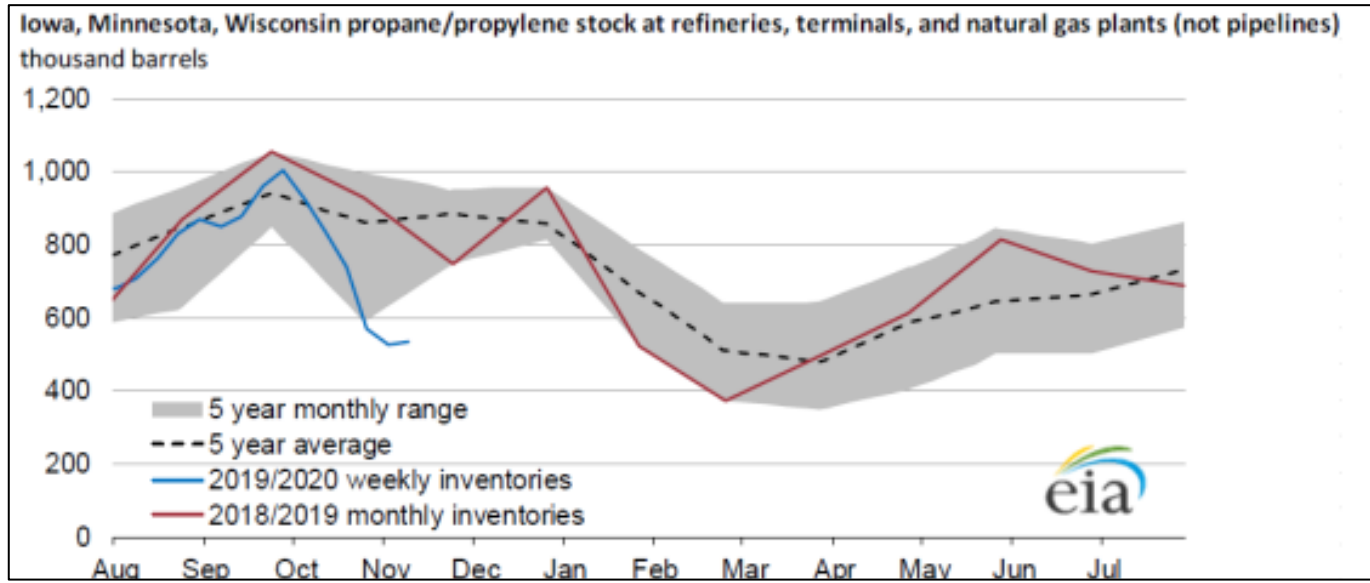
Black lines are pipelines
 Superior product storage number
 Is red due to lack of information from
 Retail or wholesale in Superior.

 = Existing

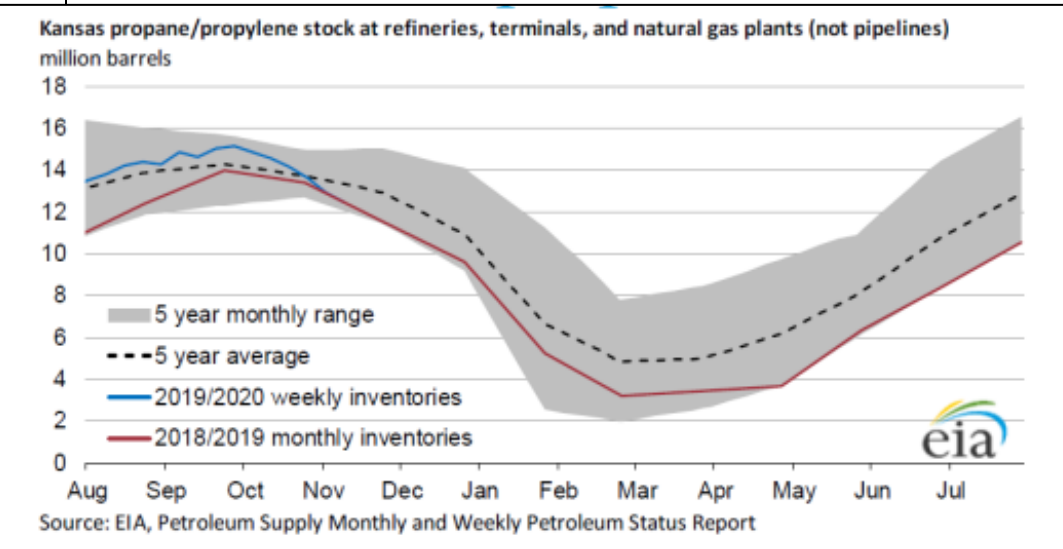
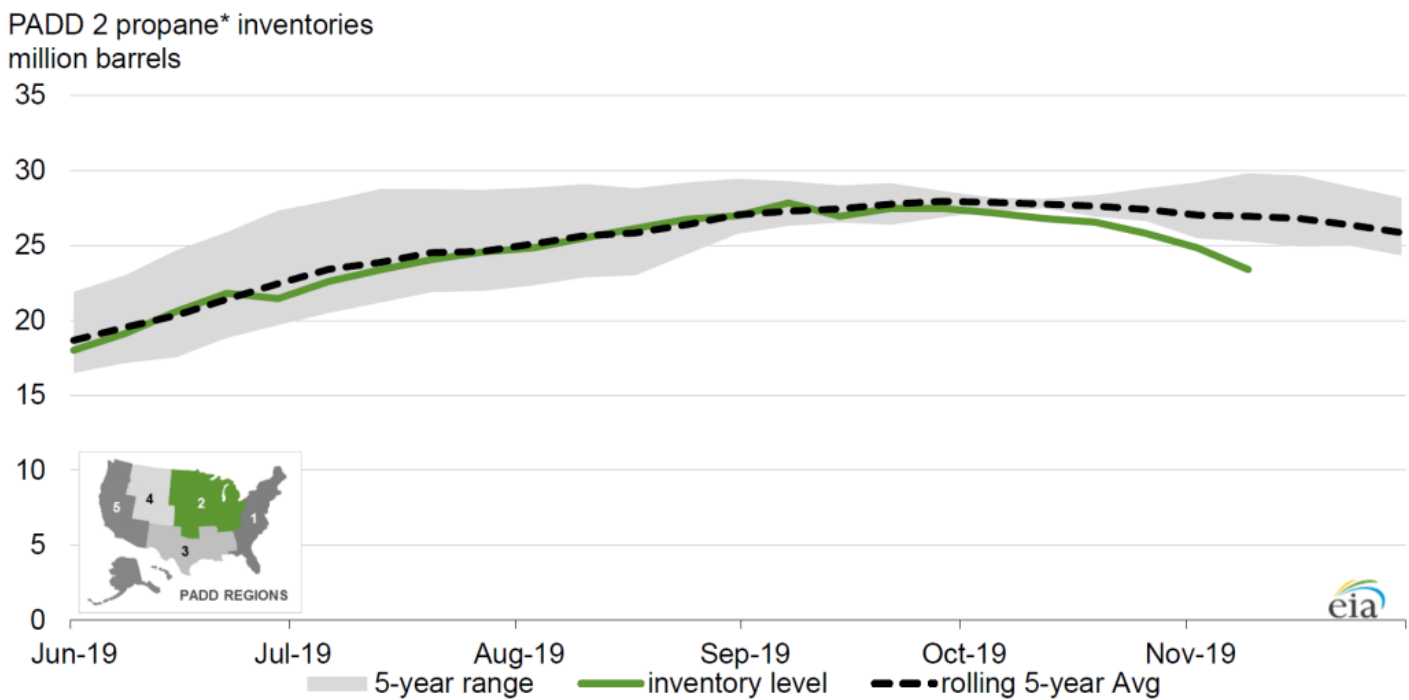
-  Canadian National
-  Canadian Pacific
-  Wisconsin & Southern Rail
-  Union Pacific
-  Canadian National
-  Burlington Northern-Santa Fe

* Units in gallons

Propane in the Midwest



PADD 2 (Midwest) propane inventories below the 5-year range

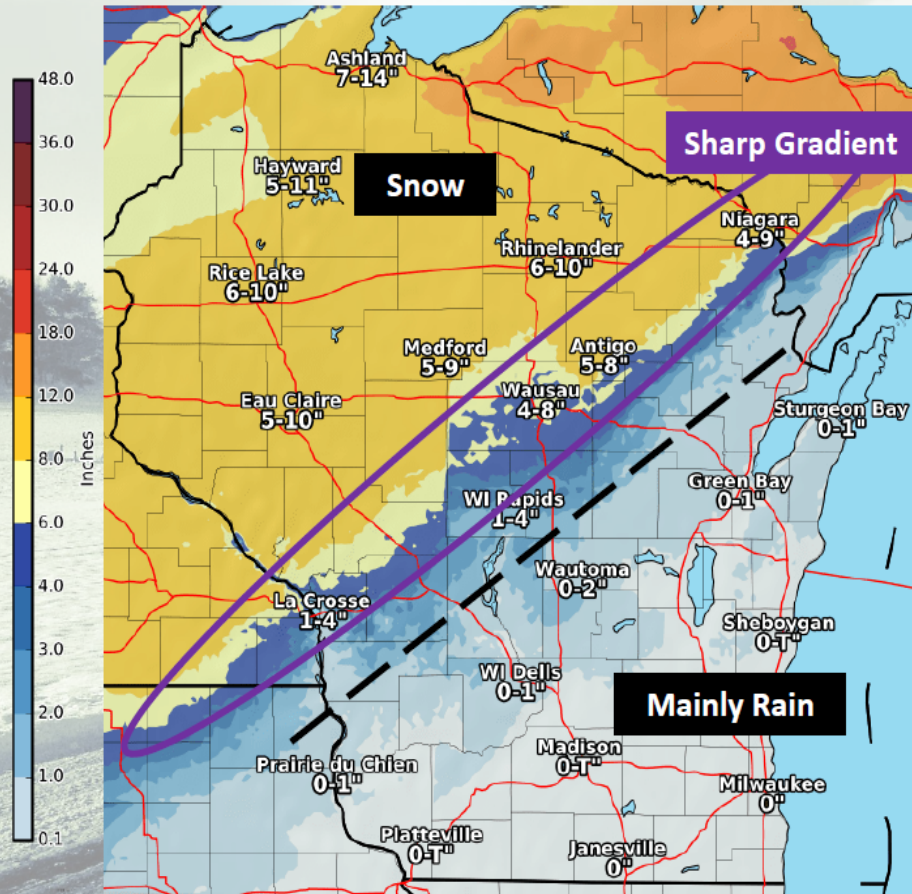


*propane/propylene for fuel use only

Weather- Precipitation & Excessive Rainfall

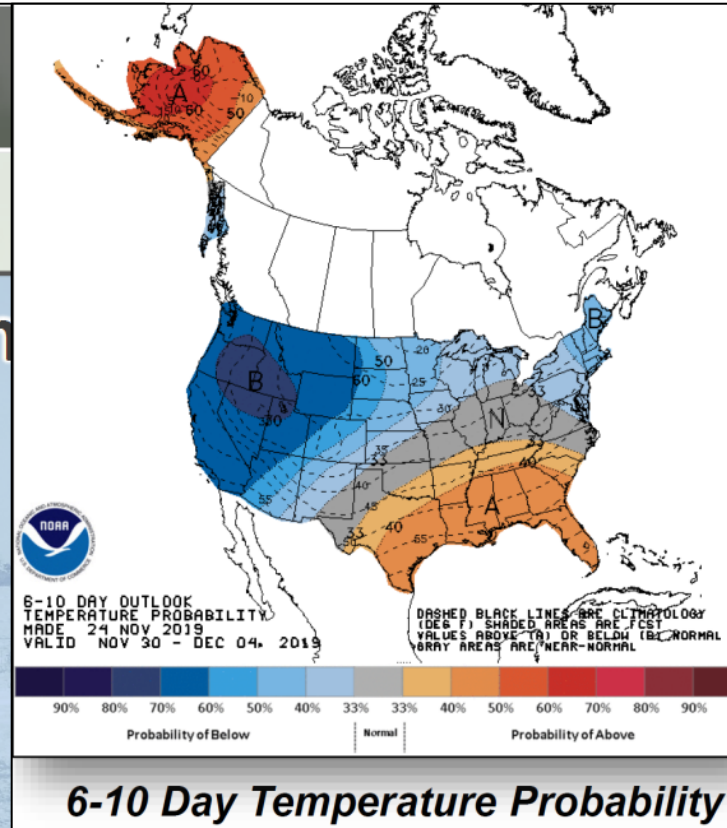


Snow Forecast

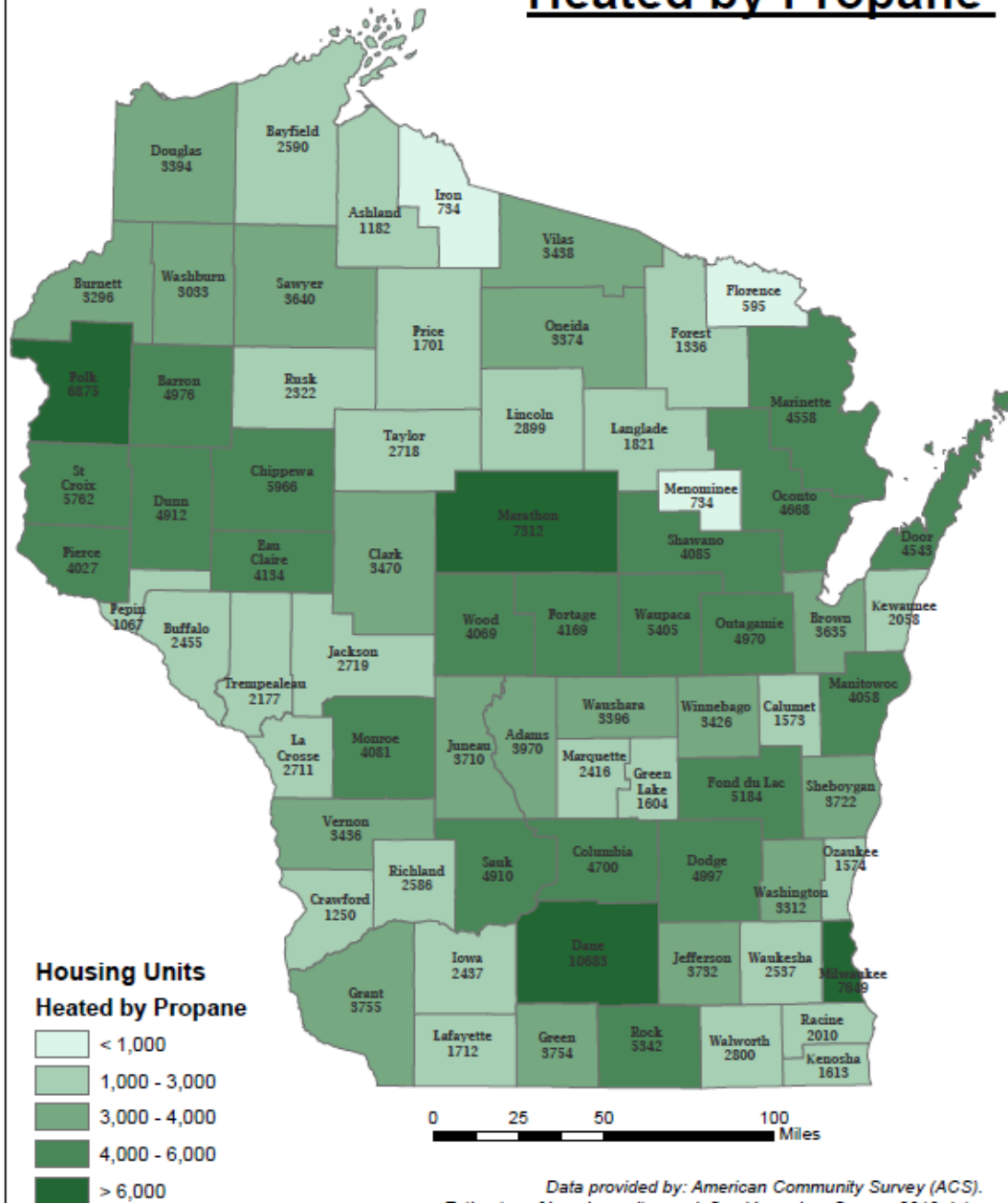


Accumulations through Thursday Morning

- Mainly rain across the south/southeast
- No significant freezing rain/ice accumulations expected
- Area of greatest concern/ heaviest snow: Central Northwoods



Number of Housing Units Heated by Propane



County	Number of Housing Units Heated by Propane
Douglas	3394
Bayfield	2590
Ashland	1182
Iron	734
Vilas	3438
Burnett	3296
Washburn	3033
Sawyer	3640
Price	1701
Oncida	3374
Forest	1336
Florence	595
Folk	6673
Saxon	4976
Rusk	2322
Lincoln	2899
Langlade	1821
Marinette	4558
St Croix	5762
Dunn	4812
Chippewa	5966
Taylor	2718
Menominee	734
Oconto	4668
Pierce	4027
Eau Claire	4134
Clark	3470
Marathon	7312
Shawano	4085
Door	4543
Pepin	1067
Buffalo	2455
Jackson	2719
Wood	4069
Portage	4169
Waupaca	5405
Outagamie	4970
Brown	3635
Kewaunee	2038
Trempealeau	2177
Manitowoc	4058
La Crosse	2711
Monroe	4081
Juneau	3710
Adams	3970
Wausara	3396
Winneshago	3426
Calumet	1573
Manitowish	4058
Green Lake	1604
Marquette	2418
Fond du Lac	5184
Sheboygan	3722
Vernon	3436
Columbia	4700
Dodge	4997
Ozaukee	1574
Richland	2586
Sauk	4910
Crawford	1250
Washington	3312
Dane	10683
Jefferson	3732
Waukesha	2537
Grant	3755
Iowa	2437
Rock	3342
Walworth	2800
Lafayette	1712
Green	3754
Walworth	2800
Racine	2010
Kenosha	1613
Illwaukee	7849

Risk Analysis

Criteria	Data/Comments
Weather	Temps dropping heavy rain/snow forecast
Lines at Terminals	Terminals on allocation, no lines reported
Conway Inventory	In 5 year range
Wholesale Price: Belvieu, TX vs. Conway, KS	Belvieu positive (2 cents per gallon more - very close to parity) Still more profitable to send propane to the Gulf of Mexico
Retail Price	Rising- in the normal range
Crop Drying Demand	High moisture corn resulting in increased demand across the Midwest. As of 11/25- most LP retailers are not allocating product to grain drying. Harvest of corn for grain is now 57% complete 22 days behind 2018, with a moisture content of 23% on average according to NASS for the week ending 11/24
Supply Infrastructure	Pipeline terminals at Janesville and Junction City have been on allocation since November 1.
PSC Call Center Volume	Normal
Railroad Deliveries	CN Suspended freight operations after strike on 11/19- all rail terminals on allocation
Roadway Status	FMCSA Hours of Service waiver through 1/10/20
Net Risk Assessment	Level 2

Criteria Descriptions

Weather – Outlook for the next 7 days. This criteria focuses mainly on temperature, but may also include significant weather events such as blizzards, which may limit the ability to transport propane.

Lines at terminals – Long lines at terminals may be an indicator of a shortage (though not always).

Conway Inventory – Supply levels at the Conway Kansas Hub are an important indicator for Midwest Propane Supply levels. About 30% of U.S. propane is stored in caverns at Conway, and much of the propane that is transported via pipeline to the Midwest, including Wisconsin comes through Conway.

Price: Belvieu vs. Conway – Propane suppliers often move more product to hubs where prices are higher. If prices at Conway are higher than at Mt. Belvieu (TX), product is more likely to move to the Midwest than the South.

Retail Price – OEI tracks the retail price of propane in Wisconsin and maintains historical data. If supply decreases, retail price increases often follow. An abnormal retail price increase may indicate a lack of supply

Criteria Continued

Crop Drying Demand – To understand the demand from corn dryers, consider that the typical home that uses propane for space heating, water heating, and cooking might use 3 to 7 gallons every day. But corn dryers are using 15,000 to 18,000 gallons every day. If crop moisture is high, and/or the harvest is delayed, farmers may need significant amounts of propane to dry their crops, potentially affecting supply for home heating.

Supply Infrastructure – Status of propane storage around the state including pipeline fed terminals at Janesville and Junction City.

PSC Call Center Volume – The PSC Consumer Affairs call center may take calls from residents who are having issues receiving propane for home heating. These calls could be a sign of a local or statewide supply issue.

Railroad Deliveries – This criteria is included to highlight any issues which may be delaying or prohibiting rail delivery of propane in Wisconsin.

Roadway Status – This criteria is included for two reasons: 1. If road beds are not frozen, it may not be possible to waive weight limits to increase movement of product. 2. If blizzard conditions are expected, haulers may not be able to deliver propane.

Level 1 (Green) – Monitor and Alert

Definition: Signals that a level 1 situation exists include price fluctuations, when increased demand or reduced supply in foreign and/or domestic markets causes prices to fluctuate in the state. A level 1 situation may be reached because of logistical issues that affect the propane or petroleum supply chain as well (including weather and unplanned outages at terminals).

Resulting Effects:

- Minor changes to normal activity occurred or are occurring, state jobbers may experience increased waiting time at terminal supply racks.
- Some gasoline stations may report increased purchasing by motorists attempting to secure the lowest price gasoline.
- Gasoline, heating oil, natural gas, and other petroleum product prices may increase.

Level 2 (Yellow) – Mild Shortage

Definition: A Mild shortage typically exists when there is a 5 to 10% reduction in petroleum throughout the state that is expected to last for one week or longer.

Resulting Effects:

- Minor changes to normal activity occurred or are occurring, state jobbers (distributors) may experience increased waiting time at terminal supply racks.
- Tight market conditions indicated by upward pressure on prices.
- Media may feature reports about higher prices.
- Gas distribution companies may curtail interruptible contract deliveries.
- National and regional oil companies may begin to hold customers to contract allocation vs. buy-as-needed.

Level 3 (Orange) – Moderate Shortage

Definition: A moderate shortage typically exists when there is a 10 to 15 percent reduction in petroleum products for three weeks or more

Resulting Effects:

- Prices for key fuels rise at a rate of 15% or more per week.
- Natural gas supplies fall and there is heavy draw upon storage. Interruptible customers may lose service. Demand for propane may increase as it is a back-up fuel used by interruptible generation units, as is fuel oil.
- Driver hours increase dramatically as fuel is drawn from terminals at more distant locations
- National media begins reporting an “energy crisis” and accusations of price gouging
- Public starts losing patience with inconvenience.
- Economic impact is felt, particularly in retail commerce.
- Low-income advocates demand assistance and volunteer programs accelerate.
- Inside the City Gate curtailment may expand beyond interruptible customers to firm customers.
- Bulk customers report allocation at terminals across the state

Level 4 (Red) – Severe Shortage

Definition: A severe shortage (level 4) typically exists when there is a greater than 20 percent reduction in petroleum products three weeks or more.

Resulting Effects:

- Local product storage is extremely low or exhausted.
- Retail motor fuel, heating oil and propane dealers receive an accelerating lower percentage of their normal fuel allocation or contract volumes and have difficulty maintaining contract delivery. Petroleum tanker trucks experience long wait times at petroleum/propane terminals or are driving longer distances to out of state terminal to obtain fuel supplies
- Firm natural gas supplies fall well below normal. All Interruptible gas customers have had their supply cut off.
- Price gouging may occur.
- Public safety agencies may be called upon to protect energy suppliers such as motor gasoline outlets or in some case tanker escorts.
- Media covers the issue daily. The public may demand mandatory conservation measures at government and commercial facilities.
- If occurring during winter, shelters may be needed to provide heat for some residents
- Tourism and discretionary shopping is severely impacted.
- Danger to vulnerable citizens if normal heating/cooling is interrupted
- Inside the City Gate curtailment may expand beyond interruptible customers to firm customers.

Additional Resources and Links

- Federal Motor Carrier Safety Administration Waivers
 - <https://www.fmcsa.dot.gov/emergency/msc-wsc-ssc-amendment-and-extension-emergency-declaration-2019-008>
- UW Extension Release on storing high-moisture corn
 - <https://fyi.extension.wisc.edu/energy/grain-drying-and-storage/>
- EIA Weekly Heating Oil & Propane Update
 - <https://www.eia.gov/petroleum/heatingoilpropane/>
- National Weather Service Decision Support Page
 - https://www.weather.gov/arx/dss_wisconsin

Questions or Comments?

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