Energy Emergency Data Analysis

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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
## Summary Table of Energy Use 2017 (Trillions of Btu)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Agricultural sector (1)</th>
<th>Commercial sector (2)</th>
<th>Industrial sector (3)</th>
<th>Residential sector (4)</th>
<th>Transportation sector (5)</th>
<th>End-Use Consumption 1+2+3+4+(5)=8</th>
<th>Fuel Used for Electric Generation (7)</th>
<th>Total Resource Energy Use 6+7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas (a)</td>
<td>2.5</td>
<td>94.1</td>
<td>161.1</td>
<td>136.3</td>
<td>1.8</td>
<td>396</td>
<td>109</td>
<td>505</td>
</tr>
<tr>
<td>Nuclear (b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>Petroleum (c)</td>
<td>20.1</td>
<td>4.8</td>
<td>4.3</td>
<td>34</td>
<td>397.5</td>
<td>460.5</td>
<td>0.4</td>
<td>460.9</td>
</tr>
<tr>
<td>Renewable (d)</td>
<td>0</td>
<td>5.3</td>
<td>55.3</td>
<td>24.9</td>
<td>26.8</td>
<td>112</td>
<td>29</td>
<td>141.9</td>
</tr>
<tr>
<td>Coal (e)</td>
<td>0</td>
<td>0.5</td>
<td>19.7</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>368</td>
<td>388</td>
</tr>
<tr>
<td>Electricity (f)</td>
<td>3.6</td>
<td>80.7</td>
<td>81.4</td>
<td>70.1</td>
<td></td>
<td>235.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End-Use Consumption a+b+c+d+e+f</td>
<td>26.1</td>
<td>185.4</td>
<td>321.8</td>
<td>265.3</td>
<td>426</td>
<td>1224.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel used for electric generation 1 (g)</td>
<td>9.9</td>
<td>223</td>
<td>225.1</td>
<td>193.8</td>
<td>0</td>
<td></td>
<td>651.5</td>
<td></td>
</tr>
<tr>
<td>Total Resource Energy Use a+b+c+d+e+f</td>
<td>32.4</td>
<td>327.8</td>
<td>465.5</td>
<td>388.8</td>
<td>426</td>
<td></td>
<td>1640.9</td>
<td></td>
</tr>
</tbody>
</table>

### Notes:

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.
The Energy Statistics book helps communicate how Wisconsinites use energy and displays data from a historical perspective (data collection began in 19750.

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

CAIDI (Minutes)
- 90-116
- 116-129
- 129-167
- 167-230
- 230-379
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

Year

SAIDI or CAIDI (Minutes)

SAIFI 5-yr Rolling Average

CAIDI 5-yr Rolling Average

SAIFI 5-yr Rolling Average

SAIFI

CAIDI

SAIDI
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.

- **Units in gallons**
  - 3,000,000: Superior, MN
  - 1,500,000: Rapid River, MI
  - 1,340,000: Hixton
  - 650,000: Junction City
  - 140,000: Green Bay
  - 390,000: Black Creek
  - 100,000: Adams
  - 360,000: Hixton
  - 120,000: St. Paul Park, MN
  - 500,000: Inver Grove Heights, MN
  - 1,400,000: Koch Refining Co., Rosemount, MN
  - 630,000: Middle of America Pipeline
  - 626,000: Janesville
  - 120,000: St. Paul Park, MN
  - 500,000: Inver Grove Heights, MN

* * Units in gallons
Propane in the Midwest

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

Source: EIA, Weekly Petroleum Status Report, data through November 15, 2019

*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
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Data/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>Temps dropping heavy rain/snow forecast</td>
</tr>
<tr>
<td>Lines at Terminals</td>
<td>Terminals on allocation, no lines reported</td>
</tr>
<tr>
<td>Conway Inventory</td>
<td>In 5 year range</td>
</tr>
<tr>
<td>Wholesale Price: Belvieu, TX vs. Conway, KS</td>
<td>Belvieu positive (2 cents per gallon more - very close to parity) Still more profitable to send propane to the Gulf of Mexico</td>
</tr>
<tr>
<td>Retail Price</td>
<td>Rising - in the normal range</td>
</tr>
<tr>
<td>Crop Drying Demand</td>
<td>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</td>
</tr>
<tr>
<td>Supply Infrastructure</td>
<td>Pipeline terminals at Janesville and Junction City have been on allocation since November 1.</td>
</tr>
<tr>
<td>PSC Call Center Volume</td>
<td>Normal</td>
</tr>
<tr>
<td>Railroad Deliveries</td>
<td>CN Suspended freight operations after strike on 11/19- all rail terminals on allocation</td>
</tr>
<tr>
<td>Roadway Status</td>
<td>FMCSA Hours of Service waiver through 1/10/20</td>
</tr>
<tr>
<td>Net Risk Assessment</td>
<td><strong>Level 2</strong></td>
</tr>
</tbody>
</table>

See next slide for descriptions of each criteria.
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.
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

• 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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