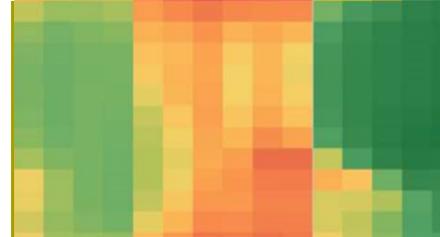




Energy Security and Data Analysis
Workshop
December 2-3, 2019
Washington D.C.

$$R = \int_{t_0}^{t_1} [100 - Q(t)] dt$$



National Association of
State Energy Officials



NARUC
National Association of
Regulatory Utility Commissioners

Transforming Raw Data into Actionable Data

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Transforming Raw Data into Actionable Data

■ **Two Examples**

- Converting energy sources in different physical units to Btu
- Calculating the number of individuals affected by a power outage.

■ **For participant discussion -- Some Suggested topics**

- Think about what experiences might you like to share of how you were able to determine consequences.

■ **Some Suggested Topics for discussion**

- How can you use the EIA 782c Prime Supplier monthly report to determine the degree of a supply interruption.
- How can you estimate the degree to which demand can be reduced for natural gas by the use of interruptible tariffs/contracts or other programs to limit used during severe cold weather.
- A pipeline is shut down. How many trucks it takes to replace a pipeline that moves 1 million gallons per day between a refinery and a metropolitan area 100 miles away using 9,000 gallon tanker trucks.
- Others?

+ **Examples of converting energy sources in different physical units to Btu**

Example 1: You have a natural gas furnace in your home that used 67,000 cubic feet of natural gas for heating last winter. Your neighbor has a furnace that burns heating oil that used 500 gallons of heating oil last winter. You can convert the natural gas and heating oil consumption data into Btu to determine which home used more energy for heating.

Natural gas -- 67,000 cubic feet (your home) x 1,036 Btu per cubic foot = 69,412,000 Btu

Heating oil -- 500 gallons (neighbor's home) x 137,381 Btu per gallon = 68,690,476 Btu

Result: You used more energy to heat your home. (*Note that many factors affect the amount of energy a household actually uses for heating.*)

Example 2: You and your neighbor want to compare the price of the fuels for heating your homes on an equal basis. You can compare the fuel prices in dollars per million Btu by dividing the price per unit of the fuels by the Btu content of the fuels in million Btu per unit.

Natural gas -- \$12.60 per thousand cubic feet ÷ 1.036 million Btu per thousand cubic feet = \$12.16 per million Btu

Heating oil -- \$3.54 per gallon ÷ 0.137381 million Btu per gallon = \$25.76 per million Btu

Result: The price per million Btu for natural gas is about half the price of heating oil per million Btu.



How many individuals are affected by a power outage?

Wisconsin 2018 Total Electric Industry- Customers

Residential 2,700,651

Commercial 354,639

Industrial 5,789

Other 1

Total 3,061,080

Source: https://www.eia.gov/electricity/sales_revenue_price/pdf/table1.pdf

Wisconsin Population 2018 = 5.814 million

Source: <https://www.census.gov/quickfacts/WI>

There are about 2.15 persons per residential customer and therefore:
A State-wide outage of 200,000 customers (times 2.15) affects about 430,000 individuals and 360,429 business and industrial customers.

Disclaimer: This has limitations: While it provide an approximation of the scope of the human and business impacts it does not capture apartments are considered commercial accounts. It only counts residential and not employees impacted because business are shut down since they are already accounted for in the population based estimate. Utilities should be able to tell you what this ratio is in their service territory.





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Participant Discussion – Some further topics to explore

1. How can you use the EIA 782c Prime Supplier monthly report to determine the degree of a petroleum supply interruption?
2. How do you estimate the degree to which demand can be reduced for natural gas by the use of interruptible tariffs/contracts or other programs to limit used during severe cold weather?
3. A petroleum pipeline is shut down. How many trucks will it takes to replace a pipeline that moves 1 million gallons per day between a refinery and a metropolitan area 100 miles away using 9,000 gallon tanker trucks?
4. How can you calculating days supply of petroleum products in storage?
5. How can you estimate the increased demand for heating fuels based on heating degree days for natural gas propane and heating oil.
6. Can you used Local Marginal Prices (LMP) to gauge the stress on the bulk electric power system?
7. Can you use the supply disruption tracking mechanisms or historical events to help gauge the consequences a current event?
8. If your Energy Assurance Plan trigger actions by the percentage of a shortage so how is this calculated?





In Conclusion:

So what did we learn?

1. You need to have the data readily available as you never know when you might need it
2. It hard to collect some information at the onset of a sudden emergency
3. You can use prior actual events that may be similar to a current energy emergency to gauge impacts
4. Exercise scenarios that have been used in the past may offer insight it to what you might expect to occur under similar conditions
5. You may need to have one than one person that can assist in quickly developing consequence assessments in an emergency
6. Other thoughts ???