

# 10<sup>th</sup> Annual Nebraska Wind and Solar Conference

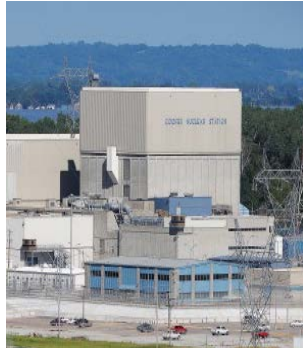
## Nebraska Wind & the Southwest Power Pool (SPP) Marketplace

Ron Thompson  
Energy Manager  
Nebraska Public Power District (NPPD)

# Energy mix for customers in 2016



Wind



Nuclear



Hydro



Coal

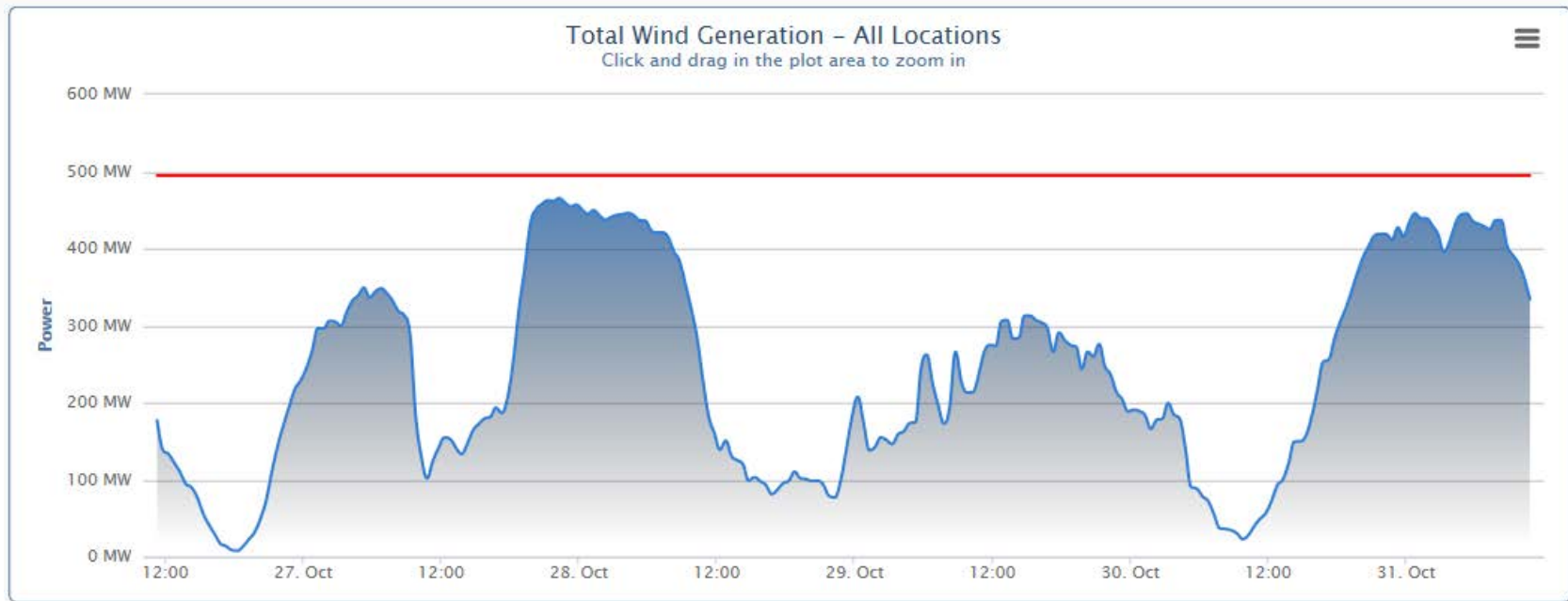


Nat. Gas/Peaking

**>60%**  
Carbon-free

**<40%**

# Wind Generation for NPPD



<u>NPPD Involved Wind Projects</u>	<u>Project size (Total MWs)</u>	<u>NPPD Share (MWs)</u>
(1) Ainsworth Wind Energy Facility	59.4	41.4
(2) Elkhorn Ridge	80	40
(3) Laredo Ridge	80	61
(4) Bluestem, LLC	3	3
(5) Crofton Bluffs	42	21
(6) Broken Bow	80	51
(7) Steele Flats	75	75
(8) Broken Bow II	73	29.2

492.4MWs

321.6MWs

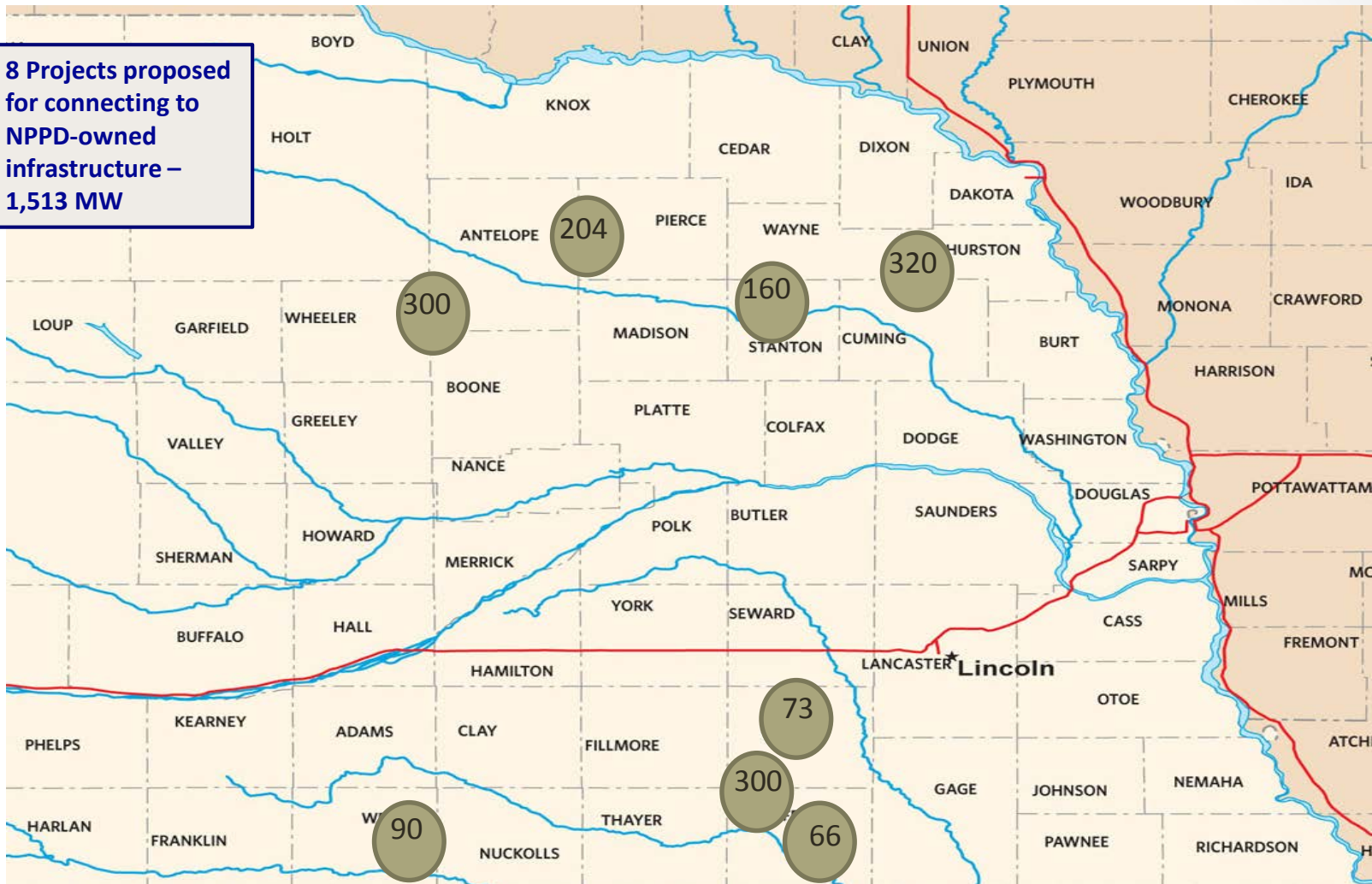
**Click a Location**

- Ainsworth
- Broken Bow 1
- Broken Bow 2
- Crofton
- Elkhorn Ridge
- Laredo Ridge
- Springview
- Steele Flats



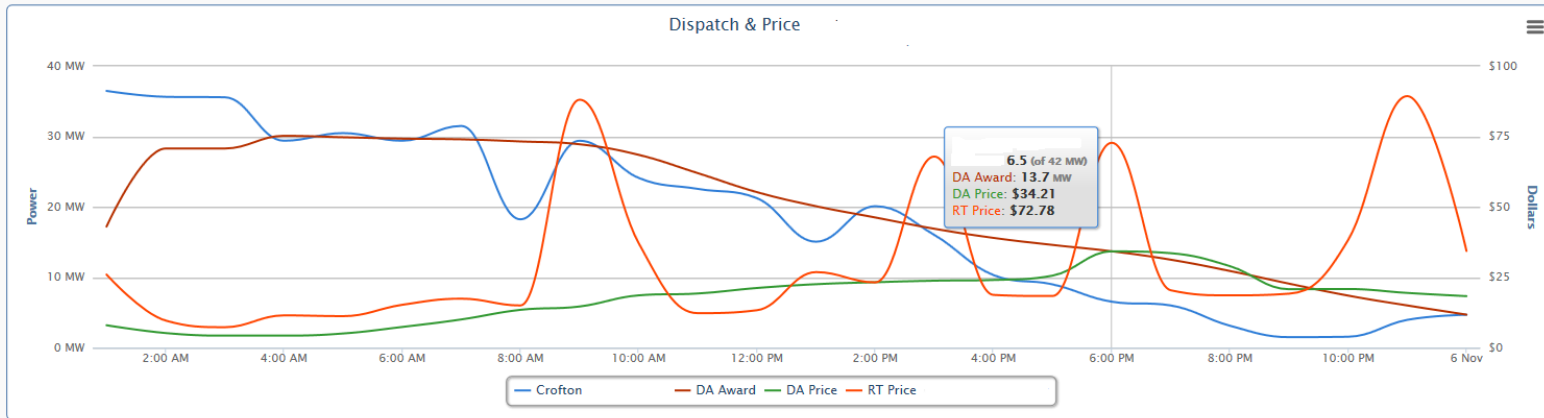
# Wind projects in the design or construction phase with SPP

- 8 Projects proposed for connecting to NPPD-owned infrastructure – 1,513 MW



# DA vs RT Market Prices

Start Date: 11/05/2017 to End Date: 11/05/2017



## Wind Generation Forecasts are done by 0930 the day before

- Actual Wind generation varies from forecasts
- Large changes in Wind is difficult to forecast
- See “Scarcity” prices at times
- You pay or get paid the difference between DA and RT
- Other resources are moving in response to the changing Wind

# Wind Generation Impacts to NPPD

- **Reliability concerns**
  - Voltage needs
  - What is needed when Wind Generation is down
  - Due to low market price a potential of not having dispatchable Units available
- **Scarcity Prices**
  - Wind has a impact on price spikes when does not come in a projected
- **NPPD Resources Cycling increasing**
  - Min to max
  - Offline – Some units do not come back next day
  - DA Market basically looks one day out
  - Multi-day Market is needed and being discussed in SPP
  - Higher Maintenance costs and Risks



# Wind Generation Impacts to NPPD

- **Additional Ancillary Service costs**
  - Additional Resources that can move are needed at times to manage intermittent resources
  - See higher Reg Dn Prices during high wind periods
- **Transmission Flowgate Congestion Risk is highest when wind output is high during low load periods**
  - Negative prices seen for entire market at times
  - One five-minute pricing period could impact entire day
  - Spring and Fall Maintenance periods are impacted
  - SPP Wind Generation is curtailed for Economics and/or Reliability

# Future

- **Renewables increasing which has positives and risks**
  - Lower energy prices for load-serving entities
  - More risk to generators
  - Increase in volatile prices
- **Lower prices with potential of negative prices**
  - Impacted by Production Tax Credits (PTC)
  - Good for load but not so good for units needed for Reliability
- **More Unit outages and retirements**
  - What units are needed and who picks up the cost?
- **Increase in Risks to conventional resources**
  - Increasing in Cycling Units has a risk and cost
- **Increase in Ancillary Services**
  - Could see units put on line just to manage uncertainties and will need to be made whole



# Questions

