Market impacts on grid operations and utility industry

Ascend Analytics
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WAPA: Who we are

- Part of Department of Energy
- Wholesale electricity supplier
- Serve 40 million Americans in the West
- 15-state footprint, 1.4 million square miles
- ~700 customers
- Top-10 largest transmission utility in country
WAPA: What we do

- Federal Hydropower
  - Market 10,503 MW of power from 56 dams
  - Buy and sell power to provide firm electric service

- Transmission System & Service
  - 17,000+ miles of transmission lines
  - Operate 3 balancing areas
  - 15-state operating region

- Transmission Infrastructure Program
  - Separate $3.25 B borrowing authority
  - Projects must facilitate renewables
  - Projects must have a terminus in WAPA's footprint
Me and my perspective

• 30 years in electric industry (plus gas, oil and water)
• Eight years at Electric Power Research Institute
• Certified technology nerd
• Published author
• Utility, venture capital, private equity and consulting background
• A DOUG
Fundamental change

The challenge for the utility of today is not only what is real but what is perceived as real.
Change is upon us

WIND-PENETRATION RECORD
54.22% AT 00:55
ON MARCH 19, 2017
Operational challenges
Market impact on pricing

Source: CAISO market price map
Oahe generation - 2015

April 9th Comparison for Oahe Generation

4-second data for hours ending 1 - 24

2015
Oahe generation - 2016

April 9th Comparison for Oahe Generation

- MWs
- April 9th data for hours ending 1-24
  - 2015
  - 2016
Oahe generation - 2017

April 9th Comparison for Oahe Generation

MWs

4-second data for hours ending 1 - 24

2015 2016 2017
Eclipse operations
Eclipse operations

Solar generation production drop
~3,500 – 4,000 MW
Eclipse operations

• Replacement energy came from the following:
  • Interties (~3,200 MW)
  • Hydro (~800 MW)
  • Thermal (~1,600 MW)
  • EIM transfers (~350 MW)
• No manual intervention during the eclipse
Eclipse operations – The Surprise

![Graph showing various data trends over time.](image-url)
Reliability: PJM’s perspective

- PJM: determine how different resources can provide ERS
- More work is needed to fully define, value, procure, and compensate ERS

Source: DOE Energy Policy, Office of Electricity
Reliability: Changing “net load” shapes

- RTOs/ISOs are integrating growing levels of VRE, which shift the time of peak load
- They also introduce more hourly and intra-hourly variability

Source: DOE Energy Policy, Office of Electricity
Retirement tranches by size, ownership

Source: DOE Energy Policy, Office of Electricity
Economic challenge

How can we manage in a Twitter–centric world?
And over in Germany...

- Energiewende aims to eliminate coal and nuclear as a social policy
- Wholesale prices down steadily while consumers bear the impact: 40 cents per Kwh
- Blown up the utility business
- 800-900 DSOs
- 4 TSOs (owned by foreign entities)
- 1.8 million generators
- Relies heavily on assets of other countries
What are we doing about it?
Shift in strategic thinking

- Broader perspective
- Data-driven decisions
- Industry impacts to customers
Radical thoughts ...

- kWh is dead
- All-you-can-eat electricity
- Time-of-purchase rates NOT time-of-use rates
- Utility is the network provider
- Markets replace IRPs
Key takeaways

*Change is everywhere.*

*Focus on value and business excellence.*

*Continue delivering on mission.*
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