Grid of The Future Symposium

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GOTF
November 1, 2016

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Success of Regional Markets and Planning…..

… However, we must look at future trends.

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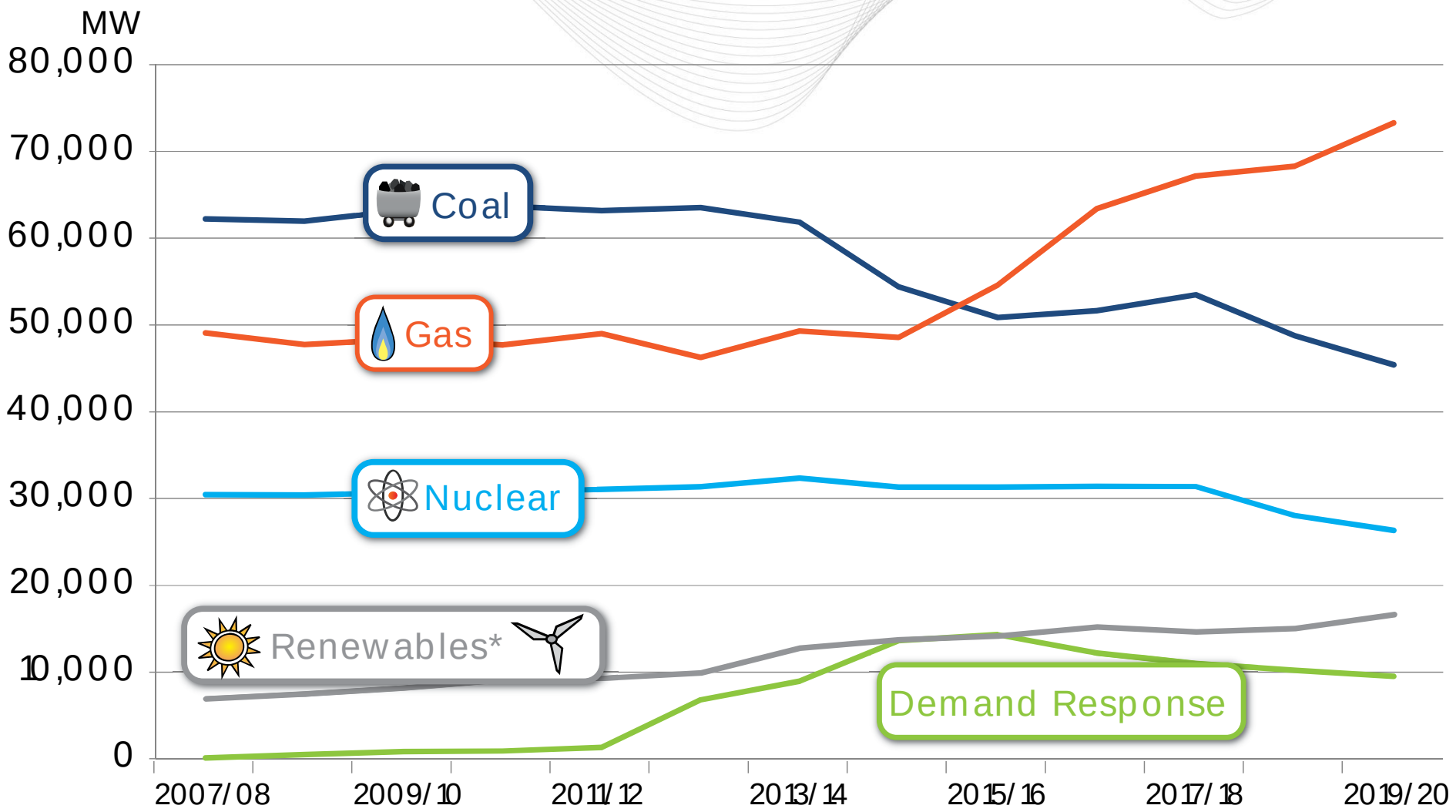
Changing Fuel Mix



*Renewables assume full energy source availbility

ICAP

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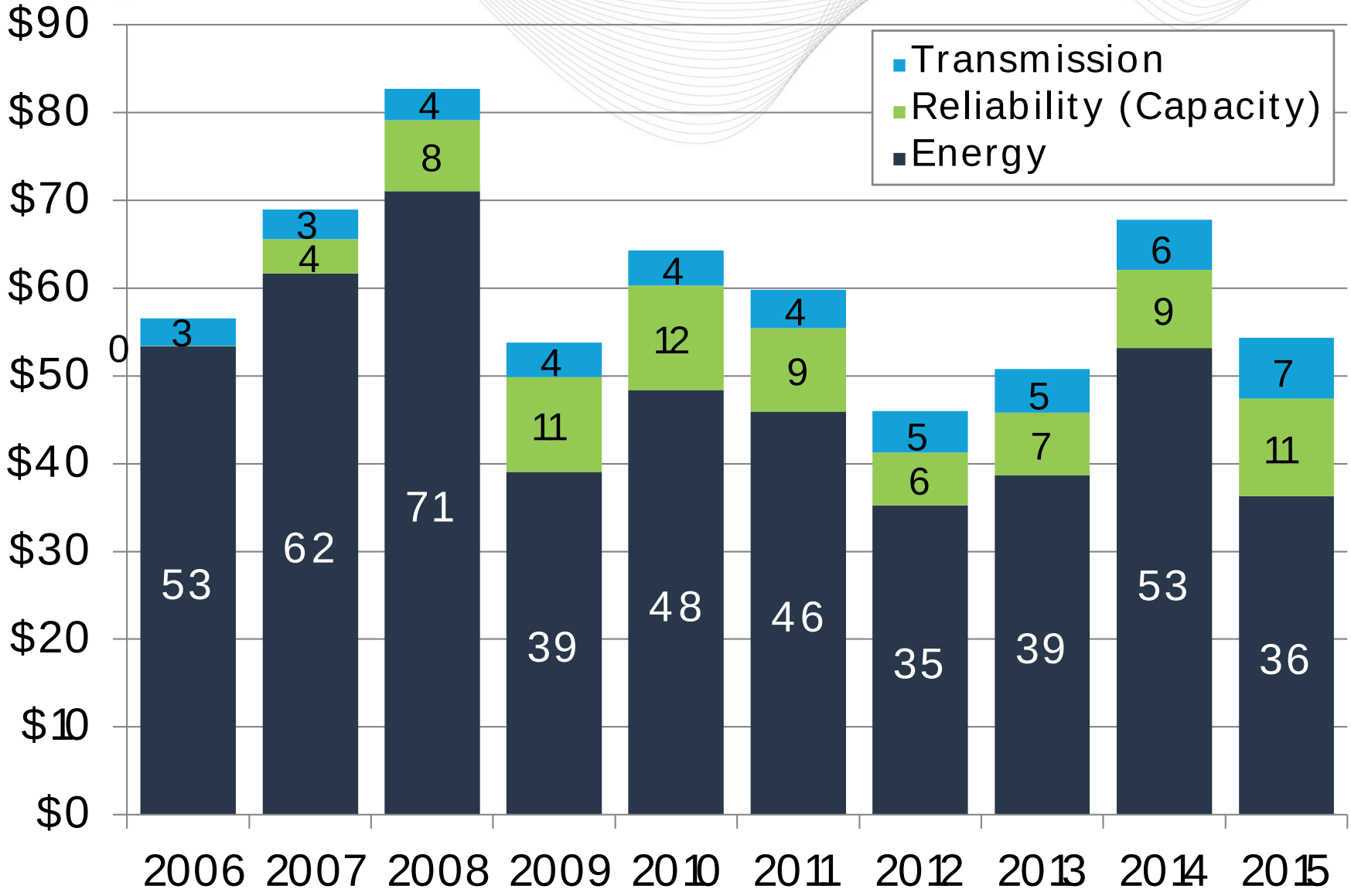
Wholesale Electricity Price Trend



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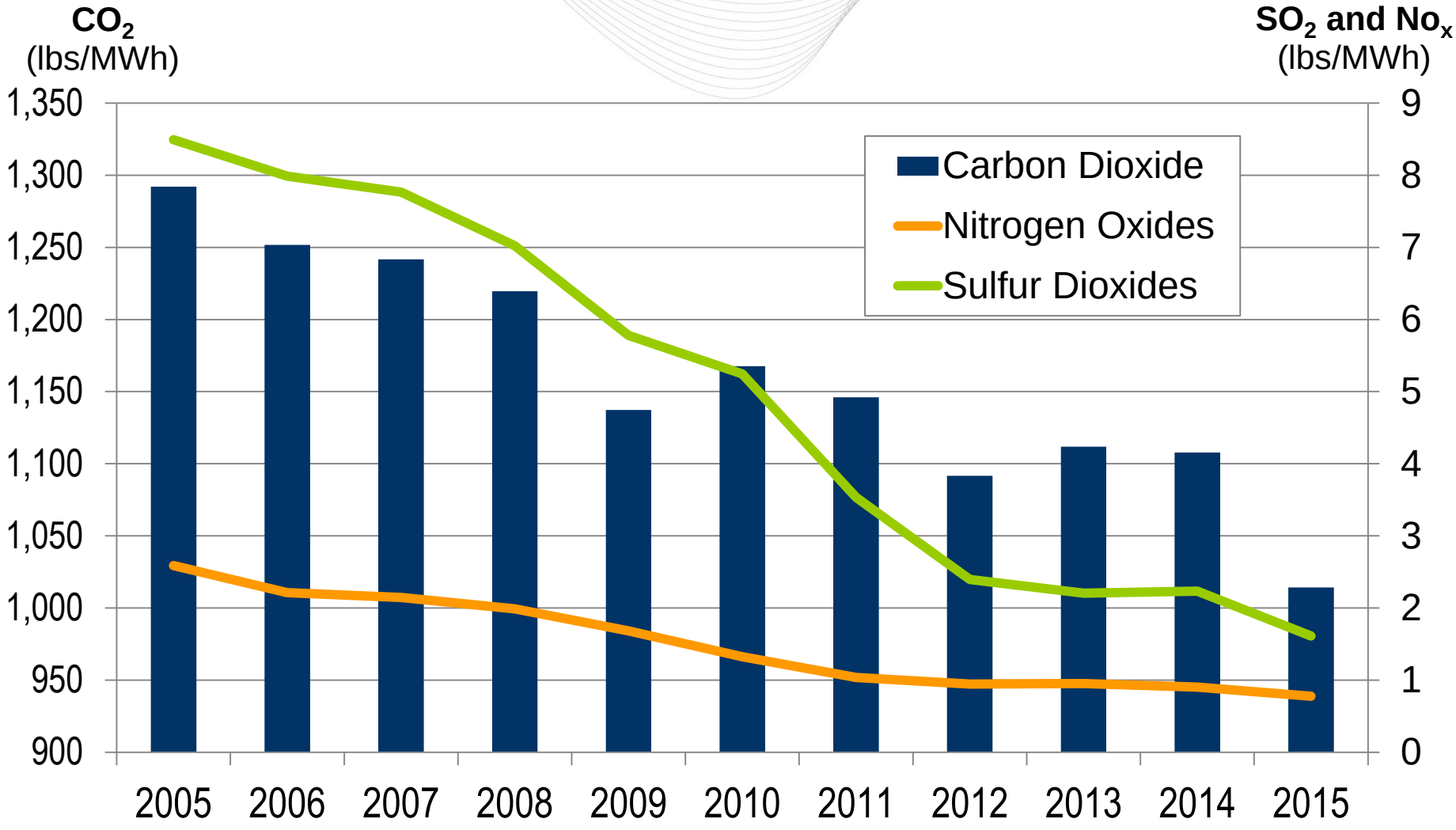
PJM - Average Emissions (lbs/MWh)

(December 31, 2015)



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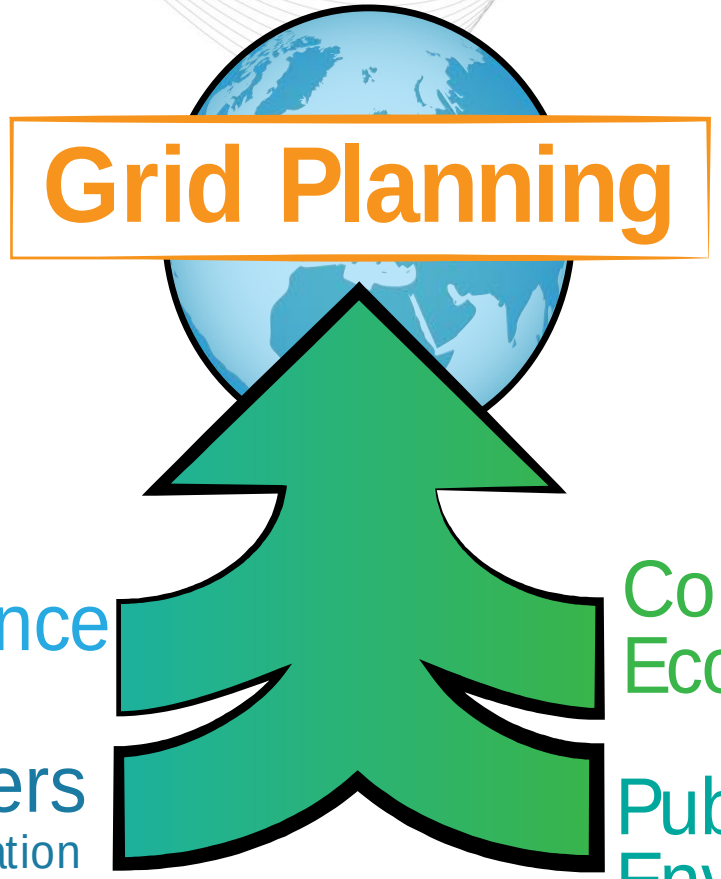

Resilience

Competition/
Economic

Traditional Drivers
Load Growth, Generation
Additions/Retirements, Reliability

Public Policy/
Environmental

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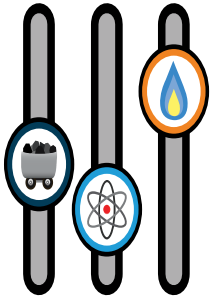
Unprecedented number of changes in the power industry

Storage technologies

Distributed energy resources

Intermittent renewables

Alternative technologies



Fuel Swap

Changes in customer expectations

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Alternative Technology Providing Services to the Grid

Frequency Regulation

296 MW of Batteries
29 MW of Demand Side Resources

~ 44% of our regulation requirement is provided by alternative technologies

Synchronized Reserves

496 MW of Demand Side Resources capable of providing synch reserve in 2016 YTD

19.5% of synch reserve actually provided by Demand Side Resources in 2016 YTD

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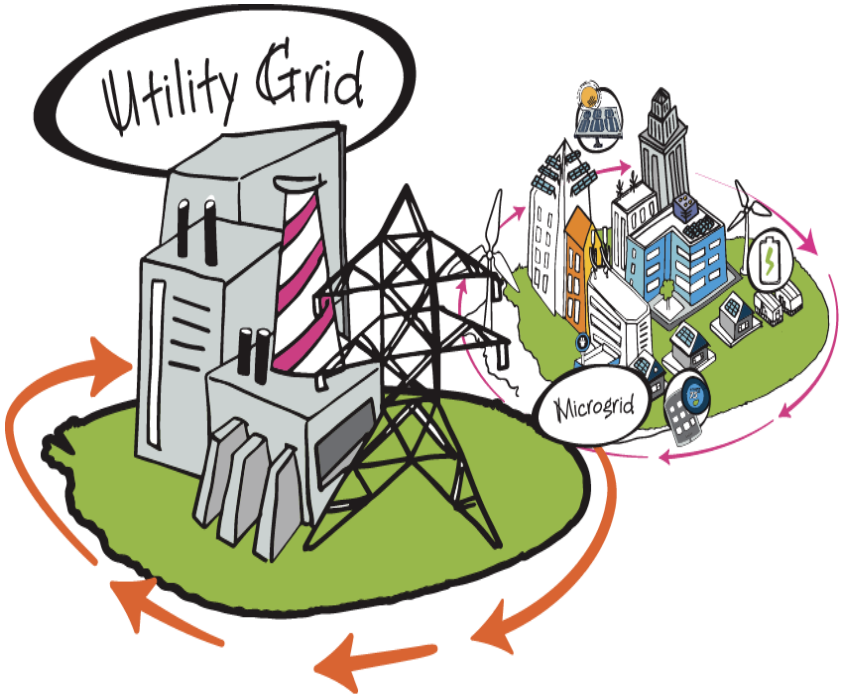
Drivers for Change: Microgrids Interacting through Markets



- Enhanced Control Systems
- Distributed Storage Technology
- Flexible Consumption

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Visualizing Grid Conditions

Dispatch Interactive Map Application (DIMA)

Current Capabilities

- Real-Time Weather
- Real-Time Transmission Line Status
- Load Management by Zip Code

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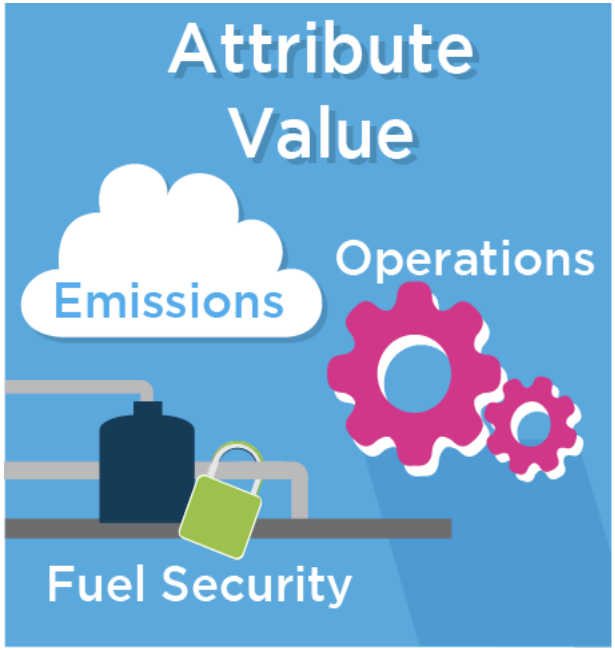
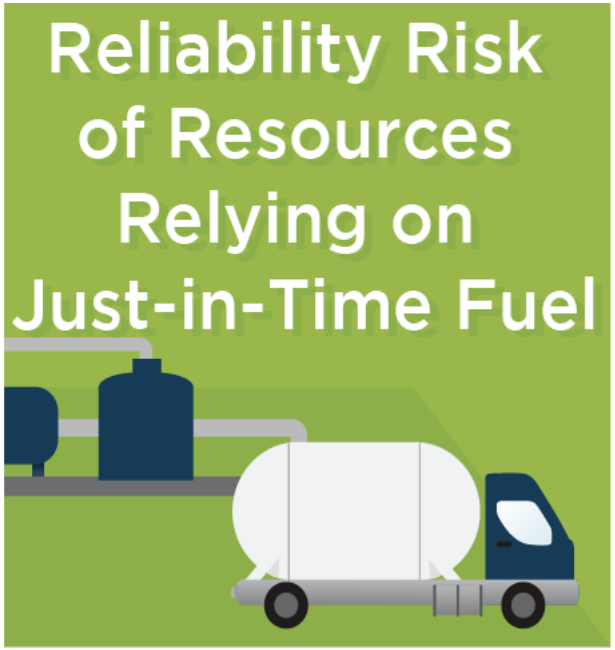
Outlook for Longer-Term Evolution





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