How is the Electricity Sector Changing?
Computing in the 1960s
Electricity is Undergoing a Similar Transition

Power delivery that is treated as a long extension cord

Transactive network – market maker for innovative, clean, distributed technologies
Today, Technology Innovation is Changing Power Delivery and Customer Engagement

- Greater customer engagement
- High DER penetration
- New products and services
- Two-Way Energy Flows
- Greater focus on value vs. cost
- Digitalization of the Grid

Source: Navigant, 2015
Expectations of What the Grid Can Deliver Are Changing

Core Attributes
- Universal access
- Safety
- Reliability
- Affordability

Emerging Attributes
- Environmental sustainability
- Resiliency
- Adaptability/flexibility
- Greater customer control & service options

Additional Pressures
- Aging infrastructure (rising costs)
- Flat/declining load growth (falling revenues)
- Variable renewable energy integration
- Cyber and data security
Management of the Grid is Changing

Used to build capacity to meet demand
• Fit with utility revenue model
• Assumed constantly growing demand

Now load is managed to match resources
• New technologies enable optimization
• Deferred investments = ratepayer savings
Costs of Energy Resources are Changing


Source: Lazard’s Levelized Cost of Energy Analysis, version 10.0 (2016) and 6.0 (2012).
Customer-sited Technologies Can Be a Cost-Effective Part of the 21st Century Grid, but…

Utilities get a regulated return based on assets. Fewer assets = less profit.
Emerging Opportunities at the Grid Edge

- Storage
- Integrated Distributed Energy Resources
- Demand Response
- Transportation Electrification
Potential Contributions of Battery Storage
Peak Shaving and Demand Response

![Graph showing energy and demand analysis with values: Energy 7.9 MWh, Demand 496 kW, -163 kW]
Integrated Distributed Energy Resources

Harnessing the Power of Thousands of Customer Resources
Transportation Electrification
Thank you!

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