Emerging Issues & Trends as Viewed From Washington, D.C.

Jim Fama
Vice President, Energy Delivery

50th Annual Minnesota Power Systems Conference
Brooklyn Center, MN
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Electricity’s Share of Personal Consumption Expenditures

- On Average, the typical U.S. home now has, on average, at least 25 electronic products—99 percent of which much be plugged in or recharged.
- 1.47 percent of consumer expenditures went to electric bills last year.
- Meaning, for every dollar American consumers spent on goods and services, they spent less than a penny and a half of it on electric bills.

Source: U.S Bureau of Economic Analysis
Evolving Generation Mix

Source: DOE – Energy Information Administration.

2013 (Estimate)

- Coal: 27.5%
- Natural Gas: 39.1%
- Nuclear: 19.4%
- Oil: 0.7%
- Hydro: 6.7%
- Renewables: 6.2%
Wind Capacity Trends

Wind Power Additions Stalled in 2013, with only 1,087 MW of New Capacity Added

Source: DOE Wind and Water Program
Solar Capacity Trends

U.S. PV Installations, Q2 2010 - Q2 2014

Lessons From Germany

Germany’s Energiewende rapidly accelerated the rush to renewables and away from nuclear and fossil fuels:

- Electricity prices doubled from 18 cents/kWh in 2000 to 37 cents/kWh in 2013
- Avg. U.S. price: 10 cents/kWh
- $129 billion extra since 2000 for renewables

25% of their mix is renewable
### International Comparison

**Germany’s Retail Electric Rates Have Skyrocketed**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>AVERAGE RATE $/MWh 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>$0.091</td>
</tr>
<tr>
<td>United States</td>
<td>$0.121</td>
</tr>
<tr>
<td>OECD Total</td>
<td>$0.175</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$0.229</td>
</tr>
<tr>
<td>Japan</td>
<td>$0.243</td>
</tr>
<tr>
<td>OECD Europe</td>
<td>$0.253</td>
</tr>
<tr>
<td>Italy</td>
<td>$0.305</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td><strong>$0.388</strong></td>
</tr>
<tr>
<td>Denmark</td>
<td>$0.394</td>
</tr>
</tbody>
</table>
Interventions by Grid Operator Tennet To Stabilize the Grid (2003-2012)
The Value of Fuel Diversity
The January 2014 “Polar Vortex”

A variety of generation sources helped maintain reliability during the Polar Vortex

- Record natural gas storage withdrawals
- Used back-up oil at dual-fueled generators
- The nuclear fleet operated at 95% capacity
- Much of the coal capacity that is slated for retirement used to maintain reliability

In preparation for this winter:

- PJM- Capacity Performance Proposal
- ISO-NE- Winter Reliability Program

Image Source: NASA
Shift to More-Regulated Business Strategies

Notes: Based on year end assets.

Source: EEI Finance Department
Status of M&A Activity

- Number
  - Completed (100 total)
  - Announced (127 total)
  - Withdrawn (27 total)

Source: EEI Finance Department
Exelon-Pepco – Est. Value, $12.3B
- Geographic fit and economies of scale to realize cost savings
- Positions Exelon to maintain balanced reg/unreg earnings mix as power prices recover
- Credit benefit from incremental regulated growth and diversification
- Earnings accretion from first full year of combined operations

Wisconsin Energy-Integrys – Est. Value, $10.5B
- Geographic fit, regulatory diversification
- Majority ownership of American Transmission Co. (from 26%)
- Earnings accretion from first full year
M&A: Pending Transactions (cont’d)

- **Berkshire Hathaway Energy-AltaLink – Est. Value, $5.9B**
  - BHE acquiring large transmission-only business from SNC-Lavalin (roughly the size of ITC by assets)
  - BHE and SNC-Lavalin to pursue joint transmission projects in the U.S. and Canada
  - Potential synergies with BHE’s renewables business

- **Fortis-UNS Energy (completed) – Est. Value, $4.6B**
  - Supportive Arizona regulatory environment (cost recovery mechanisms)
  - Significant regulated growth opportunities (33% increase in rate base over two years)
  - Diversifies Fortis’s regulatory and fuel source risk (reduces coal)

- **Macquarie Cleco Corp** - Announced October 2014
M&A: Themes and Outlook

- **Common Themes in Recent Deals**
  - Diversifying regulated earnings (by jurisdiction, fuel type)
  - Increasing opportunities in transmission and renewables
  - Earnings accretion (i.e., expected to grow buyer’s EPS) in first full year

- **M&A Outlook – Analysts’ Focus**
  - More deals by IPPs and Diversified utilities for economies of scale and given low-cost financing
  - Continued regulated M&A – buy growth and diversify jurisdictional risk
  - More Diversified utilities to divest merchant generation
Notes: Total company spending of U.S. Shareholder-Owned Electric Utilities, consolidated at the parent or appropriate holding company. Projections based on publicly available information and extrapolated for companies reporting fewer than three projected years (18% of industry for 2015 and 2016).

Source: EEI Finance Department, company reports, SNL Financial (July 2014)
Snapshot 2013: Transmission Investment By Investor-Owned Utilities

*Planned total industry expenditures are preliminary and estimated from data obtained from the EEI Transmission Capital Budget & Forecast Survey, supplemented with data obtained from company 10-K reports and investor presentations. Actual expenditures are from EEI's Annual Property & Plant Capital Investment Survey and FERC Form 1 reports.

\( r = \text{revised} \)

Note: The Handy-Whitman Index of Public Utility Construction Costs used to adjust actual investment for inflation from year to year. Forecasted investment data are adjusted for inflation using the GDP Deflator.

Source: Edison Electric Institute, Business Information Group.

Updated as of November 2013.

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Transmission At A Glance

- Planned transmission investment through 2024: **$60.6 billion** (nominal)
- **Interstate Projects**: $26.2 billion
- **Integration of Renewable Resources**: $46.1 billion
- **Partnerships**: $29.8 billion
- **High Voltage Projects (345 kV +)**: $45 billion

**Bar Charts:**
- Interstate Projects: 43% Interstate, 57% Single-State
- Integration of Renewable Resources: 76% Renewable, 24% Other
- Partnerships: 49% Project Partners, 51% Single Developer
- High Voltage Projects: 75% Higher-Voltage, 25% Lower-Voltage
2014 Election Outlook
U.S. Senate

Senate seats up for election in 2014

Democrats (21)
Mark Begich (AK)
Cory Booker (NJ)
Christopher Coons (DE)
Richard Durbin (IL)
Al Franken (MN)
Kay Hagan (NC)
Tom Harkin (IA)
Tim Johnson (SD)
Mary Landrieu (LA)
Carl Levin (MI)
Edward Markey (MA)
Jeff Merkley (OR)
Mark Pryor (AR)
Jack Reed (RI)
John Rockefeller (WV)
Brian Schatz (HI)
Jeanne Shaheen (NH)
Mark Udall (CO)
Tom Udall (NM)
Amanda Curtis (MT)
Mark Warner (VA)

Republicans (15)
Lamar Alexander (TN)
Saxby Chambliss (GA)
Tom Coburn (OK)
Thad Cochran (MS)
Susan Collins (ME)
John Cornyn (TX)
Mike Enzi (WY)
Lindsey Graham (SC)
Jim Inhofe (OK)
Mike Johanns (NE)
Mitch McConnell (KY)
Jim Risch (ID)
Pat Roberts (KS)
Tim Scott (SC)
Jeff Sessions (AL)
2014 Competitive Senate Races

Projected Democrats (D) 45
Projected Republicans (R) 46
Toss-Up 9
Federal Energy Regulatory Commission

- Chairman Cheryl A. La Fleur
- Commissioner Philip D. Moeller
- Commissioner Tony Clark
- Commissioner Norman Bay (Chairman, effective April 15, 2015)
- Colette Honorable, nominated
Post- Mercury & Air Toxics Standard (MATS) Landscape

- Still in the process of complying; currently retrofitting, retiring or repowering most coal plants
  - Potential impacts on power prices, reserve margins
  - Will require significant amount of investment

- ~70 GW of coal-fired generation retirements have been announced already
  - Taking place between 2010 and 2022
  - Most will be 50-60 years old upon retirement
  - Due to fuel and/or compliance costs, consent decrees, age, etc.
  - Some will be replaced with natural gas

- And then there is climate change and carbon policy...
Clean Power Plan (CPP) Proposal

- Released on June 2, 2014
  - First attempt by EPA to regulate GHG emissions from existing power plants
- Projected to reduce national average power sector CO2 emissions approximately 30% below 2005 levels by 2030
  - State-specific interim and final goals calculated from 2012 baseline
- Compliance measured starting in 2020
- Architecture
  - State-specific emission rate goals
  - State compliance plans
Best System of Emissions Reduction (BSER)

EPA identified a strategic mix of four “building blocks.” States do not have to put in place the same mix of strategies that EPA used to set the goal.

**BSER: Combination of four “building blocks”**

- Coal-based unit-specific efficiency improvements- 6%
- Increased utilization of natural gas-based units /decreased utilization of coal-based units to 70% capacity factor (“environmental dispatch”)
- Expanded use of low- and zero-carbon generating capacity
- Expanded use of demand-side energy efficiency 1.5% annually
2030 Goals as Percent Reductions from 2012 CO₂ Emission Rates

VT and DC do not have affected units.
Some Critical Questions and Issues

- EPA used systems approach to determine goals but examined each building block in isolation
  - Not clear if system could achieve all 4 blocks together
- Interstate issues
- Compliance timeline
- Guidelines recognize but do not reward early action
- Impacts on reliability
- Impacts on Wholesale Electricity markets and prices
Emerging Themes:
• Reliability
• Compliance deadline
  • “Reliability Safety Valve”
• Transmission and natural gas infrastructure cannot be built in time
• Challenging the assumptions, including the building blocks

Of note:
• National Electric Reliability Corporation
  • Initial Reliability Impacts Review of the Proposed EPA Clean Power Plan, Section 111(d) of the Clean Air Act Special Reliability Assessment
• Southwest Power Pool
• Midcontinent System Operator
• PJM Inc.
• Electric Reliability Council of Texas
Metcalf Incident

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**The Wall Street Journal**

Assault on California Power Station Raises Alarm on Potential for Terrorism

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**USA Today**

Concern Over Power Grid Security Mounts in Congress

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**NPR**

Sniper Attack On Calif. Power Station Raises Terrorism Fears

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**E&E Publishing, LLC**

High-Powered Attack On PG&E Substation Raises Concerns About Combined Threats to Grid

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**The Wall Street Journal**

U.S. Risks National Blackout from Small-Scale Attack

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**The New York Times**

Power Grid Preparedness Falls Short, Report Says

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**National Journal**

How Safe and Reliable is America’s Electric Grid?
Industry Leadership on Physical Security

- Electric Subsector Coordinating Council
- STEP/STEP Connect
- EEI’s National Response Event (NRE) Framework
- Overall Sparing
- CIP 14
- Transportation
- Equipment other than Transformers
CIP-014 Physical Security Standard

- March 7 2014: FERC Directed Development of Physical Security Standards
- June 5: Standards proposal filed
- November/December: FERC order approving CIP-014

2015:
- Identify critical substations
- Develop physical protection plans
In place since 2006, includes 52 Utilities

- Enables the ability to recover from the loss of five critical substations.
- Commitment to share spares if a “triggering event” occurs.
- Unlike mutual assistance or voluntary programs, sharing is mandatory if a triggering event occurs, with rights to specific performance.
- Annual drills, annual obligation calculation
- Additional voltage classes can be added e.g. 138-46kV

### Current Voltage Classes
- 500 – 230kV
- 345 – 161kV
- 345 – 138kV
- 345 – 115kV
- 230 – 138kV
- 230 – 115kV
- 230 – 069kV
- 138 – 069kV
Members of SpareConnect as of October 21, 2014 by utility sector:

- 63 U.S. Investor-Owned Utilities (IOUs)
- 53 U.S. Municipally-Owned Utilities (Munis)
- 4 U.S. Federal/State Utilities
- 5 Canadian Utilities

As of October 21, 2014, there have been eight requests for assistance distributed through SpareConnect and there are 121 individual points of contact in the system.
National Response Event (NRE)

Western Region Mutual Assistance Agreement (Canada)
Barry Anderson, Pacific Gas & Electric
Doug Butler, PacifiCorp
Dana Kracke, Southern California Edison

Midwest Mutual Assistance Group
Melody Birmingham-Byrd, Duke Energy
Jim Conway, Exelon Corporation
Bruce Akin, Westar Energy, Inc.

Great Lakes Mutual Assistance Group
Tom Kirkpatrick, American Electric Power
Steve Strah, FirstEnergy
Daniel Malone, CMS Energy

Texas Mutual Assistance Group
Keith Hull, Oncor
David Baker, Centerpoint Energy, Inc.

Southeastern Electric Exchange
Manny Miranda, NextEra Energy Inc.
Greg Grillo, Entergy Corporation
Danny Glover, Southern Company

North Atlantic Mutual Assistance Group (Canada)
Bill Quinlan, Northeast Utilities
Dave Bonenberger, PPL Electric Utilities Corporation
John Donleavy, National Grid

At-Large
Carlos Torres, Consolidated Edison of New York, Inc.
Mike Sullivan, Pepco
Co-chaired by the Department of Energy and the Domestic Policy Council, Office of White House Policy, pursuant to the Presidential Memorandum, signed on January 9, 2014.

First installment of the QER, due January 2015, focusing on transmission, storage and distribution infrastructure (TS&D).

Intended to provide a multiyear roadmap; tasked with:
- Reviewing federal energy policy with regard to energy infrastructure;
- Reviewing the adequacy of existing executive and legislative actions;
- Assessing and recommending priorities for research and development to achieve innovative goals; and
- Identifying analytical tools and data to support policy development and implementation.
Key Themes in EEI Comments

EEI submitted comments on June 10th and October 10th


- Recognize the value of the Grid and ensure all beneficiaries of the Grid pay their fair share.
- Reliability and safety are critical.
- Safety and security of the Grid is best addressed through coordinated industry actions, industry-government partnerships, and recognition of federal and state authorities.
- Encourage investment, mitigate risk, and provide regulatory certainty.
- Recognize jurisdictional boundaries.
Distributed Energy Resources (DER): Factors Spurring their Adoption

- Public policies
- Declining technology costs
- Customer preferences
- New models
- New technologies
- New needs and uses
Electric Companies – Providing Cost-Effective Solar

- 2.3 gigawatts of utility-scale solar capacity in 2013

**Solar Cost Comparison**

- Utility-Scale Pv: $1.81
- Residential Rooftop Solar: $3.74

2014

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Public Policies Are Spurring Transition

State Renewable Policies

State Net Metering Policies

Source: EIA 2012
The Grid at the Center of the Transition

Services and Benefits of the Grid

<table>
<thead>
<tr>
<th>Voltage and frequency control</th>
<th>Energy transfers and transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy backup</td>
<td>Balancing supply and demand</td>
</tr>
</tbody>
</table>

Typical Energy Production and Consumption for a Small Customer with Solar PV

Source: Value of the Grid to DG Customers, Institute for Electric Innovation, October 2013
Integration, Not Just Interconnection

- DER Integration is key for Reliability and Resilience
  - DER should be integrated into the planning and operation of the Grid.
  - Incumbent utilities are best positioned to incorporate DER at strategic locations on the Grid by optimizing the overall investment and system impacts.
  - Must accommodate a high penetration of DER and two-way electricity flows while sustaining high levels of electric quality and reliability.
    - The Grid was not originally designed for this.
Utility Roles

- **Distribution System Integrator**
  - Physical asset play
  - Develops distribution asset platform required to integrate DER and support multi-directional power flows
  - Invests in the technology and infrastructure required to support open access to the distribution system by a wide range of users

- **Distribution System Operator**
  - Manages all transactions on the distribution system
  - Develops open access tariffs covering support services
  - Analogous to ISO function at the bulk power level

- **Energy Services Provider**
  - Provides a wide range of energy services on both sides of the customer’s meter
  - Enables the customer to participate in the bulk power markets