2012 is shaping up to be a year of important questions and intense soul-searching for the energy industry. What will be the electric generation mix of tomorrow in light of uncertainty within the nuclear industry and increasing challenges for coal-fired generation? What are the prospects for renewable generation development in the face of expiring federal incentives and stalled cap and trade initiatives? How will North American Electric Reliability Corporation’s (NERC’s) evolving approach to standards development and enforcement affect the industry? How will EPA’s new air pollution rules impact markets, rates and system reliability? What impacts will the shale gas revolution have on the natural gas industry and pipeline infrastructure? How will transmission development progress in the coming years? The Sixty-Sixth Annual Meeting program addresses all these issues and more, with insightful speakers from across the spectrum of industry and government.

<table>
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<th>THURSDAY, APRIL 26, 2012</th>
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<td>8:00 a.m.</td>
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<td>8:20 a.m.</td>
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| Derek A. Dyson  
President, Energy Bar Association  
Duncan, Weinberg, Genzer, & Pembroke, P.C. |
| 8:30 - 9:15 a.m. | KEYNOTE ADDRESS |
| William D. Nordhaus  
Sterling Professor of Economics  
Yale University |
| 9:30 - 11:00 a.m. | Tomorrow's Generation: Business Prospects and Regulatory Implications |
| Ongoing uncertainty over the future of electric generation reflects challenges to renewable development, the promising but still uncertain future for the nuclear industry and gathering challenges to coal-fired generation. This panel will address generation sector prospects and the legal implications for transmission planning, development and rates. |
| Moderator: Joseph T. Kelliher  
Executive Vice President  
NextEra Energy |
| Speakers: Christi Tezak  
Director  
Robert W. Baird & Co. |
| 11:00 - 11:15 a.m. | NETWORKING BREAK |
| 11:15 a.m. - 12:45 p.m. | Evolving Electric Reliability Regulation |
| NERC's approach to standards development, compliance and enforcement is undergoing substantial change, as NERC, the industry and FERC make an effort to adjust procedures that have triggered unanticipated costs and delay. At the same time, NERC’s relationship with FERC continues to evolve as parties seek an effective balance under Federal Power Act Section 215. Work on substantive standards that have a broad impact on the industry continues, including standards revisions addressing generator lead-lines that potentially expose many generator owners and operators to additional liability associated with requirements traditionally applicable to transmission owners and operators. NERC is also working to refine the definition of the “bulk electric system,” the scope of which is critical to the scope of its jurisdiction, while revamping its cybersecurity standards. This panel will explore these and other legal issues and their implications for the electric industry. |
| Mike Rutkowski  
Managing Director  
Navigant Consulting |
| Ralph Luciani  
Vice President  
Charles River Associates |
| Mauricio Del Valle  
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Morgan Stanley |
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<thead>
<tr>
<th>Session:</th>
<th>Session A: EPA Regulation of Generator Emissions: Dark Skies and Gloom or Sunshine and Lollipops?</th>
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<td>Last year, the EPA issued its controversial Mercury and Air Toxics Standards and Cross-State Air Pollution Rule, requiring significant reductions in hazardous emissions from coal-fired power plants. Some in the industry believe that these requirements and the compliance deadlines set by the EPA will threaten system reliability. Others in the industry believe these fears to be overblown and support the EPA rules. Regardless, the EPA rules are likely to have a significant impact on markets and rates. This panel will discuss the status of the EPA rules and the practical impacts they may have.</td>
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<th>Session:</th>
<th>Session B: Rough Headwinds: Challenges Facing Renewable Development</th>
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<td>The President of the United States committed that he would not walk away from the promise of clean energy in his State of the Union address, but renewable developers face numerous challenges in 2012. The DOE loan guarantee program has expired, the window for starting construction has closed for cash-in-lieu of tax credit grants, and the federal renewable production tax credit is set to expire at the end of the year. Federal cap and trade legislation is on indefinite hold, and significant uncertainty surrounds implementation of state cap and trade programs. At the same time, some markets may reach saturation points with large-scale projects in the near to medium term as state RPS targets are met and ratepayer backlash against higher rates grows. Can renewable developers sustain their projects without government incentives? Can markets support additional growth in renewable generation and is future growth likely to come from large-scale or small-scale projects? Is there need for RPS reform at the state level? This panel will explore these challenges facing the renewable energy industry.</td>
<td></td>
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Session A: Impact of the Shale Gas Revolution

The implications of the development of the myriad shale plays throughout the continent are far reaching. The growing level of shale gas production will affect virtually every aspect of the natural gas industry. This panel will address several important and topical issues that flow directly from the shale gas revolution. Safety and environmental issues; the implication of lower gas prices on the regulatory and economic practicalities of electric generation; the development of LNG exports of domestic gas production; and the significant pipeline infrastructure issues created by the production of shale gas are just some of the important topics this panel of experts will explore.

Moderator: Brian D. O’Neill
Partner
Dewey & LeBoeuf LLP

 Speakers: James D. Johnston
Associate General Counsel
El Paso Corporation

Richard G. Smead
Director
Navigant Consulting

Lopa B. Parikh
Director, Federal Regulatory Affairs
Edison Electric Institute

John R. Hanger
Special Counsel
Eckert Seamans Cherin & Mellott, LLC

Session B: Transmission Development in an Evolving Marketplace

Independent of the transmission cost allocation and planning discussion triggered by Order 1000, work proceeds nationwide on transmission development, and a host of related regulatory and legal issues. This panel will focus on the state of ongoing merchant and utility-based projects, the challenges associated with state-based siting issues, projections for transmission needs, the status of the DOE/FERC siting backstop and associated congestion study, and the potential for a multistate compact. The panelists will also address FERC’s evolving open access policy as applied to merchant transmission and participant-funded projects.

Moderator: Paul Hibbard
Vice President
Analysis Group

 Speakers: Suedeen G. Kelly
Patton Boggs LLP

Kathryn L. Patton
Vice President and General Counsel
Clean Line Energy Partners LLC

John Lucas
General Manager - Transmission Policy and Services
Southern Company Services, Inc.

Steven R. Herling
Vice President, Planning
PJM Interconnection, L.L.C.

5:30 p.m.
BUSINESS MEETING

5:45 - 7:00 p.m.
RECEPTION

7:00 p.m.
DINNER & DINNER SPEAKER

Speaker: The Honorable Cheryl A. LaFleur
Commissioner
Federal Energy Regulatory Commission
April 26, 2012

Dear Annual Meeting Participants:

Welcome to the Energy Bar Association’s Sixty-Sixth Annual Meeting. I hope that you find the program both informative and enjoyable. Please be sure to place your electronic devices to silent mode and try to refrain from extemporaneous conversations during the program to allow everyone to benefit from program.

Thank you to our Keynote Speaker, William D. Nordhaus, Sterling Professor of Economics at Yale University, and our Dinner Speaker, Federal Energy Regulatory (FERC) Commissioner Cheryl LaFleur, who have so graciously taken time from their busy schedules to share with us their thoughts on the pressing issues facing our industry.

I wish to thank each of our distinguished speakers, including our panelists and moderators, who will share with us their experiences and expertise today. We are honored by their presence.

We ask that each of you join us for a very special luncheon tribute today for our Executive Director, Lorna Wilson. Lorna will be retiring after twenty-five years of service to the Association.

Immediately following our program at 5:30 p.m. today, we will hold EBA’s annual business meeting, receive the reports of the Association and its Foundations on the year’s activities, and vote for our new officers and board. I urge you to attend and participate in this meeting.

A reception for all attendees, speakers, and guests will begin at 5:45 p.m. today, and the annual dinner will follow. Please join us for this evening of good cheer and camaraderie.

For those who can stay through tomorrow, we hope you will join us at the Ninth Annual Charity Golf Tournament for the benefit of the Charitable Foundation and its grantees. Please contact Michele Duehring (at the front desk) today for more information.
As the Association’s year ends, I express my deep appreciation to our program chairs, Jonathan Schneider and Jane Rueger, for all of their hard work in shepherding the Mid-Year and Annual Meetings from inception to reality. They have devoted many hours throughout the year to these most visible and crucial tasks that the Association performs.

Similarly, I thank the many members who have organized the various programs provided by our Chapters and Committees this year. The volunteer efforts of these members are greatly appreciated and should be respected by all.

A very special thank you to the officers and board members of the Association, each of its six chapters, the Foundation of the Energy Law Journal and the Charitable Foundation. On behalf of the Association Board and myself, I also want to thank our committee chairs and vice chairs for their time, dedication and leadership, and our outstanding professional staff – Lorna Johnston Wilson, Marlo Brown-Carpenter, Michele Duehring and Mary Singletary – for their tireless efforts, continuing dedication and good cheer. We also encourage you to greet, welcome and introduce yourselves to our new Executive Director, Lisa Levine. Without our professional staff, all of our volunteers’ good ideas would come to naught.

Many thanks to all of the dedicated volunteers that enabled the Association, the Charitable Foundation, the FELJ and the *Energy Law Journal* to carry out their missions through financial contributions and the contribution of their time and effort. I am pleased to include with this material the lists of members who have provided financial support to the Foundations this year. Those continued contributions are greatly appreciated.

I recognize that I am leaving office with a renewed appreciation of the great work that the members give to EBA, Charitable Foundation and the FELJ. I thank each of you for opportunity to serve as the President of the Association this past year. I look forward to continuing the valuable volunteer work of members in growing and improving the Association.

Sincerely,

Derek A. Dyson
President
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Jacolyn A. Simmons *  James Valleau
Daniel R. Simon  James B. Vasile
Julie Simon  Mary K. Vasile *
Kenneth M. Simon  Ben F. Vaughan, III
Richard G. Smed  Steve Vavrik
Dina L. Smedick  Steven I. Venezia
Marek Smigielski  Michael D. Vhay
Meghan Smigo  William R. Viglor
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Roger E. Smith  Susan H. Vrahoretis
William H. Smith, Jr.  Thomas George Wagner
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Linda G. Soucy  David B. Ward
Andrew K. Soto  Wendy Barrett Warren
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Janice H. Spicer  Richard J. Wasserman
Joseph J. Staszowski  Jeffrey D. (Dan) Watkiss
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Stephen A. Stolze  Ambrea Watts
Penny M. Storms  David Watts
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Mary Anne Sullivan  Richard Wesley Webb
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Robert M. Taylor, III  Paul F. Wight
Robert K. Temple  D. Gideon Wiginton
Renee Terry  Thomas R. Wildman
David G. Tewksbury  John Wilhelm
Christine L. Tezak  John P. Williams
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Glen R. Thomas  Mark C. Williams *
Felicia Thomas-Friel  Robert C. Williams
Carolyn Y. Thompson  William A. Williams
Michael J. Thompson  Lorna Johnston Wilson
Shirley J. Thurston  James F. Wilson
Wallace F. Tillman  Kristine R. Wilson
Eric Todderud  Dallas Winslow
Sarah E. Tomalty  Dennis J. Withee
Kelly A. Tomblin  Walter F. Wolf
Thomas C. Trauger  Andrea C. Wolfman
Jennifer H. Tribulski  Julia Scarpino Wood
John C. Twearg  Linda G. Wood
Sheila R. Tweed  Shawn Wooden
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Sara L. Zagorski
Albert Zakarian
Nadia Zakir
Katherine C. Zeitlin
Bryan D. Zumwalt
Charles A. Zielinski
Keynote Address
Climate Change Science and Economics: The Continuing Drama*

Energy Bar Association
Washington, D.C.
April 26, 2012

William D. Nordhaus
Yale University

* I am Professor of Economics at Yale University. I have received support for research on the economics of climate change during the last decade from the National Science Foundation, the Department of Energy, and the Glaser Foundation. Other than research associated with these and any future grants, I declare no conflict of interest.
Questions to consider

1. The flat earth problem
2. What is the economists’ bottom line on climate policy?
3. Cap and trade v. carbon taxes
4. Where do we go from here?
The flat earth problem
Skeptics: “Global warming is a hoax”
Many exhibits on climate change science

• $\text{CO}_2$ concentrations
• Global temperature
• Polar amplification of temperature
• Stratospheric cooling
• Conformity to models
Temperature: proxy and instrumental through 2011 (°C)

Long-term temperature records

- Mann's proxy (based on tree rings, bore holes, etc.)
- Instrumental record (average of 3)
What is the economist’s take on global warming?

- Climate change is a global externality.
- As with other externalities, need to internalize costs.
- Only realistic device to coordinate actions is to have emissions prices on CO$_2$ and other GHGs that reflect the social cost of emissions.
- Special twist here: Need an internationally harmonized price to be efficient and effective.
- Difficulties because of time lags and great uncertainties.
Major Policy Approaches for Global Warming

1. Do nothing
2. Regulation
3. Cap and trade
4. Carbon tax
Economist’s Preferred Approach: Harmonized Carbon Taxes

• Levies tax on fossil fuel proportional to carbon content (fuels not establishments)
• All countries would have a harmonized tax at the same rate.
• Countries would keep all revenues for domestic purposes (such as fiscal substitution for other taxes)
• Level of tax set to meet target (such as keep $\Delta T \leq 2$ °C)
• Carbon tax would rise sharply over time
Example of a tax of $25 per ton CO₂

<table>
<thead>
<tr>
<th>Example</th>
<th>Tons of CO₂</th>
<th>Amount of tax at $25 per ton</th>
<th>Percentage increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year's electricity use</td>
<td>9.34</td>
<td>$233.4</td>
<td>19.45%</td>
</tr>
<tr>
<td>Year's driving</td>
<td>4.68</td>
<td>$116.9</td>
<td>7.79%</td>
</tr>
<tr>
<td>Economy class</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transcontinental flight</td>
<td>0.67</td>
<td>$16.8</td>
<td>5.61%</td>
</tr>
<tr>
<td>One year's household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communication services</td>
<td>0.01</td>
<td>0.36</td>
<td>0.04%</td>
</tr>
<tr>
<td>financial services</td>
<td>0.02</td>
<td>0.41</td>
<td>0.04%</td>
</tr>
<tr>
<td>consumption</td>
<td>29.48</td>
<td>$737.0</td>
<td>0.92%</td>
</tr>
</tbody>
</table>
Cap and trade v. Carbon taxes

These are the two effective approaches because they can tackle all emissions.

To first approximation, they have same effect on emissions and carbon prices.

But many subtle and important side effects.
It is important for governments to capture the revenues (either through 100% auctions or taxes):

• to raise revenues for both domestic and international distributional concerns, and
• because recycling of revenues reduces the efficiency losses from taxation.

Note that carbon taxes could play substantial role in reducing the budget deficit using an efficient tax (next slide)
Carbon tax and the debt

Projected carbon tax revenues

<table>
<thead>
<tr>
<th>Year</th>
<th>Tax rate ($/ton CO2)</th>
<th>Emissions (billions, tons CO2)</th>
<th>Revenues (billions, current)</th>
<th>Revenues (percent of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>0.0</td>
<td>6.1</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>2015</td>
<td>25.0</td>
<td>4.9</td>
<td>123</td>
<td>0.63</td>
</tr>
<tr>
<td>2020</td>
<td>39.7</td>
<td>4.6</td>
<td>184</td>
<td>0.74</td>
</tr>
<tr>
<td>2025</td>
<td>63.0</td>
<td>4.5</td>
<td>282</td>
<td>0.91</td>
</tr>
<tr>
<td>2030</td>
<td>89.8</td>
<td>4.3</td>
<td>386</td>
<td>1.00</td>
</tr>
<tr>
<td>2035</td>
<td>128.1</td>
<td>4.1</td>
<td>528</td>
<td>1.09</td>
</tr>
</tbody>
</table>

Assumptions:
1. Inflation at 2.5 percent per year
2. Long-term real GDP growth at 2.5 percent per year
Excessive volatility in cap and trade: EU-ETS
Most recent data on ETS CO\textsubscript{2} prices

![Graph showing ETS CO\textsubscript{2} prices over time, highlighting the Financial crisis period.](graph.png)
Hybrid: Cap plus tax

- Hybrids may be superior to either extreme, although more difficult to understand
- Cap-plus-tax: Quantitative limits are buttressed by a carbon tax along with a safety valve
- Example:
  - Auction permits corresponding to economic or environmental target
  - Backstop with a $20-per-ton carbon tax
  - Provide ability to purchase additional permits at a penalty price of $30 per ton of carbon.
Where do we go from here?

1. Hurdles to effective action:
   • Obstructionism, nationalism, myopia, economic self-interests.

2. Dangers of inefficient mitigation:
   • High costs or perverse results (the case of the ethanol subsidies).

3. What will turn the tide?
   • Probably dramatic events like wildfires, melting of summer polar icecap, sinking in permafrost

4. What role for the Energy Bar?
   • Help design efficient national and international policies (carbon taxes and effective border trade adjustments)
   • Speak out!
NOTES
Tomorrow’s Generation:
Business Prospects and Regulatory Implications
EBA’s 66th Annual Meeting
Tomorrow's Generation: Business Prospects and Regulatory Implications

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Please refer to Appendix – Important Disclosures and Analyst Certification on page 12.
Introduction

- 90-year heritage of helping clients achieve their investment banking, asset management and private equity goals
- Employee-owned since 2004, headquartered in Milwaukee, WI
- 2400 employees in 100 offices worldwide
- $73.1 billion in M&A advisory value since 1995
- $83.1 billion in equity raised since 1995
- Almost 700 stocks under coverage
- No. 1 ranked institutional research and sales (Greenwich Associates)
- $75 billion in assets under management
Adding Value with Policy Analysis

- Federal legislation, regulations, and politics impact public and private companies
  - Shapes/changes assumptions
  - Increases/transfers costs
  - Limits/drives growth
  - Creates problems/opportunities

- Top-down, macro approach complements bottoms-up fundamental research
  - Utilities
  - Clean Technology
  - Upstream Oil and Natural Gas
  - Engineering and Construction
What’s Shaping Energy Markets?

- Global Commodity Prices
- Financial Markets
- Tax Policy
- Economic Regulation (FERC)
- Environmental Regulation (EPA)
- Legislation (Congress)
- Energy Market Investment
- Commodity Access
- Slow/Recovering Economy
- Aging Infrastructure

Source: R.W. Baird & Co.
April 26, 2012
The U.S. EPA and Coal

- “Push to Undo Bush” Agenda
- Legislation to establish cap-and-trade program for greenhouse gases (GHGs) failed.
- Environmental Protection Agency (EPA) still views GHG emissions as a problem.
  - Seeks to lower oil consumption
    - Corporate average fuel economy standards
    - Renewable fuels standards
  - Seeks to lower coal consumption
    - More aggressive mining regulation
    - More aggressive electric utility regulation
EPA Aims at Coal as Input

- EPA’s veto of Mingo Logan permit overturned
  - Court rules EPA was out of line
- “Guidance” slows mine permitting
  - Litigation underway
  - Industry won initial round in October
  - National Mining Association and state regulators allege that EPA has made rulemaking via guidance
  - Even if industry prevails, does that help permitting pace
- Coal has tighter price correlation with oil in global markets, natural gas structurally lower
EPA Has NatGas on Radar

- Guidance on fracking fluid containing diesel in development (still)
- NSPS finalized (more lenient than expected)
- EPA action on water management uncertain (injection and wastewaters)
  - Dimock, Pa. response under Superfund
  - Pavillion study may be inconclusive
  - States making moves
  - Seismic worries
  - New effluent guidelines after the election
- Bottom line
  - Natural gas looks to be affordable for a while, but concerns about volatility in the future persist
EPA Regulations – Some Clarity

- No GHG legislation
  - But EPA sees significant GHG reductions as it reduces conventional pollutants (NO\textsubscript{x}, SO\textsubscript{2}, and PM\textsubscript{2.5})
  - NSPS for GHGs at new power plants proposed, MATS upgrades escape

- Significant retirements expected beginning April 2015
  - *Utility MATS* finalized December 21 (motions due in appeals April 27)
  - *CSAPR* stayed December 30, decision on petitions this summer
  - Coal combustion residuals rule (proposed)
  - Cooling water intake rule (proposed)
FERC – Keeping the Lights On

- Buyer versus seller market power
  - State regulators are worried about reliability
  - Are capacity markets broken, or functioning *precisely* as designed?

- Is demand response helping or hurting market structure/function?

- Transmission ROEs under pressure!
  - How will generation rotation be accommodated?
  - Lower growth rate projections compress the range
  - 3 ROE complaints now lodged
  - Duke draws a 206 in move to PJM from MISO
  - Base rates under pressure in 205 cases
### Influences on Power Markets

<table>
<thead>
<tr>
<th>Factor</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Cheap&quot; shale gas</td>
<td>Offsets higher coal prices</td>
</tr>
<tr>
<td>EPA regulations on generation</td>
<td>Retirements tighten capacity</td>
</tr>
<tr>
<td>Pollution control investment</td>
<td>Higher costs, tighter capacity</td>
</tr>
<tr>
<td>Replacement generation</td>
<td>New plant costs more than old</td>
</tr>
<tr>
<td>Sluggish economy</td>
<td>Lower/slower-growing demand</td>
</tr>
<tr>
<td>Energy efficiency policies</td>
<td>Lower/slower-growing demand</td>
</tr>
<tr>
<td>Litigation risk</td>
<td>Slower implementation timelines</td>
</tr>
<tr>
<td>Political pushback</td>
<td>Slower implementation timelines</td>
</tr>
<tr>
<td>Potential regulator “flexibility”</td>
<td>Slower implementation timelines</td>
</tr>
<tr>
<td>2012 elections</td>
<td>Lighter or more aggressive regulation?</td>
</tr>
</tbody>
</table>
Congress: Helping or Hurting?

- More coalescence around delaying Industrial Boiler MACT than *Utility MATS*…
  - If *CSAPR* gets rewritten and pushed behind *Utility MATS*, does that help and how much?
  - Coal ash rule resolution looked promising, now unclear, environmentalists litigating
  - EPA willing to battle in court as Congress remains paralyzed, winning some, losing some

- Is the GOP overplaying its hand in the Keystone XL pipeline fight?
- Bush tax cut resolution not even on horizon yet (dividend/cap gains rates)
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Energy Bar Association Panel Discussion

Generation Decision-Making Under Uncertainty

April 26, 2012
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April 26, 2012
Current Situation for Generation Owners/Developers

» Generation owners and developers face a variety of uncertainties in making asset investment (build/modify/retire) decisions.
  – Federal EPA regulations (air, water, combustion by-products)
  – State-level mandates, targets, and Integrated Resource Plan (IRP) requirements
  – Federal incentives and subsidies (e.g., wind production tax credit, DOE nuclear loan guarantees)
  – Fuel price uncertainty (coal and natural gas)
  – Market structure and associated revenue impact (regulated vs. deregulated)
  – Construction costs (especially for new technologies)
  – Transmission availability

» Inconsistent time horizons exist for generation investment price signals
  – Tenor of capacity markets (1-3 years) vs. useful life of generating plant (20, 30, even 60 years)
  – Tenor of Power Purchase Agreements for utility “provider of last resort” (1-3 years)
  – Tenor of Renewable Energy Certificate (REC) procurements (1-3 years)
  – Permanence (or lack thereof) of incentives/subsidies

These issues vary dramatically by state and ISO. Without consistency and clarity, the generation build-out is likely to remain choppy.
EPA regulations play a significant role in power generation investment decisions.

» EPA has finalized and proposed eight rules and rule revisions that directly affect coal-fired power generation.

1. Utility Maximum Achievable Control Technology; now referred to as the Mercury and Air Toxics Standard - MATS (Finalized Rule, although being challenged by several parties)
2. New Source Performance Standards - NSPS (Finalized Revisions)
3. Cross-State Air Pollution - CSAPR (Finalized Rule, recently stayed by DC Circuit Court)
4. Cooling Water Intake - CWA 316b (Proposed Rule)
5. Coal Combustion Residuals - CCR (Proposed Rule)
6. National Ambient Air Quality Standards - NAAQS (Proposed Rule)
7. Regional Haze/Best Available Retrofit Technology – Regional Haze BART (Finalized Rule)
8. Boiler MACT/Commercial and Industrial Solid Waste Incineration Units – Boiler MACT and CISWI (Proposed Rule)

» EPA is considering other rules that could affect coal and gas-fired power generation directly and indirectly.

2. Groundwater Contamination
The potential impact of these EPA regulations on coal plant retirements is widely reported; it is likely to be manageable overall but large in locales.

Generation owners have already announced approximately 25 GW of coal plant retirements for the 2011-2020 period.

Source: Power Magazine, SNL
Policy, market, and technology uncertainty make coal plant investment/retirement decisions extremely complex.

--- Illustrative Coal Plant Retirement Decision Tree ---

While generation owners seek a least cost/least risk solution, alternative outcomes can number in the millions; preserving optionality and leveraging learning is key.
State-level mandates and market structure also influence generation investment decisions.

--- Illustrative State Comparison: Illinois vs. Indiana ---

<table>
<thead>
<tr>
<th>Market Structure:</th>
<th>Illinois</th>
<th>Indiana</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Deregulated (non-rate base generation)</td>
<td>Regulated (rate-base generation)</td>
</tr>
<tr>
<td>ISO's:</td>
<td>PJM, MISO</td>
<td>PJM, MISO</td>
</tr>
<tr>
<td>IRP Requirement:</td>
<td>None</td>
<td>Required every 2 years</td>
</tr>
<tr>
<td>State-level Environmental Rules</td>
<td>Combined Pollutant Standards (CPS) for mercury, SO2, and NOx</td>
<td>None</td>
</tr>
<tr>
<td>Renewable Portfolio Standard/Goal</td>
<td>25% by 2025 (standard)</td>
<td>10% by 2025 (goal)</td>
</tr>
<tr>
<td>Other Incentives</td>
<td>Clean Coal Portfolio Standard</td>
<td>IURC support for Indiana Gasification Plant</td>
</tr>
</tbody>
</table>

While many projections of generation build-out are made at the national or regional level, generation development and investment decisions are made locally.
Wind generation developers face uncertainty regarding the continuation of the production tax credit (PTC).

**Navigant Conclusions from Recent AWEA Study:**

» With no PTC extension, the U.S. wind market will shrink significantly in 2013.
  - Annual installations will be 2 GW in 2013, down from >8 GW in 2012.
  - Total wind supported jobs will drop by nearly half, from 78,000 in 2012 to 41,000 in 2013.
  - Total wind investment will drop by nearly two-thirds, from $15.6 billion in 2012 to $5.5 billion in 2013.

» With a 4 year PTC extension, the U.S. wind market will grow through 2016.
  - Annual installations will be 8-10 GW through 2016.
  - Total wind supported jobs will grow to 95,000 by 2016.
  - Total wind investment will grow to $16.3 billion in 2016.

- Wind investment has dramatically declined when PTC lapses.
- Currently, the PTC is set to expire on December 31, 2012.
Fuel price volatility plays an important role in generation investment decisions.

--- Cost of Natural Gas for Electricity Generators ---

» In 2002, outlook was for $2-$3 gas for the long-term

» Today, the generally accepted outlook is in the $4-$5 range (or lower)

While shale gas production has fundamentally changed the supply outlook, ...

“Never say Never”.

Source: Frontier Group, April 2011
In the past few years, we have moved from a “nuclear renaissance” to a “nuclear wait-and-see”.

<table>
<thead>
<tr>
<th>“Nuclear Renaissance” (~2008/9)</th>
<th>“Nuclear Wait-and-See” (today)</th>
</tr>
</thead>
<tbody>
<tr>
<td>» Several technology vendors seeking design certification competing for market share</td>
<td>» 2 combined construction and operating licenses issued</td>
</tr>
<tr>
<td>(Westinghouse, GE, Areva, MNES)</td>
<td>(Vogtle, V.C. Summer)</td>
</tr>
<tr>
<td>» Loan guarantee program ($18.5 billion) widely applied for</td>
<td>» Loan guarantees largely committed, no new funding</td>
</tr>
<tr>
<td>» Focus on climate change, potential for cap-and-trade</td>
<td>» Fukushima disaster, and response in other countries</td>
</tr>
<tr>
<td>» “New designs and lessons learned will reduce costs”</td>
<td>» $2 B cost overrun for TVA Watts Bar 2 re-construction</td>
</tr>
<tr>
<td>» Minor issue – spent fuel disposal</td>
<td>» Still no resolution on spent fuel disposal</td>
</tr>
</tbody>
</table>
The tenor of generation investment price signals differs from that required for long-term investment.

--- Tenor of Price Signals vs. Generation Asset Life---

<table>
<thead>
<tr>
<th>Price Signals</th>
<th>Life of Generation Asset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve Requirements</td>
<td>~1 yr</td>
</tr>
<tr>
<td>Capacity Markets</td>
<td>~3 years</td>
</tr>
<tr>
<td>REC Procurements</td>
<td>~3 years</td>
</tr>
<tr>
<td>Wind</td>
<td>10-20 years</td>
</tr>
<tr>
<td>Coal and Natural Gas</td>
<td>20-30 years</td>
</tr>
<tr>
<td>Nuclear</td>
<td>40-60 years</td>
</tr>
</tbody>
</table>

This mismatch (and the regional complexities) can lead to inefficient and sometimes lagging generation investment.
Looking Forward …

» Coal generation will continue to be a significant part of the generation supply mix, yet very few (if any) new coal plants will be built.

» Excess natural gas generating capacity from the merchant boom will be quickly utilized; new natural gas generation will be built to meet resource adequacy gaps.

» Renewable generation will continue down a choppy, localized path unless long-term certainty and consistency exists on incentives.

» A few (2-3) new nuclear plants will be built this decade.

» State rules and ISO market structures will continue to evolve and become more efficient, yet remain complex, causing a lag in new generation investment.

» Demand response will play a larger role, although a “shake-out” will likely occur after the first significant call on those resources.
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Interconnection-Wide Planning Process of the Eastern Interconnection Planning Collaborative ("EIPC")

Ralph L. Luciani
EBA Annual Meeting
April 26, 2012

The results presented herein use modeling assumptions developed by EIPC, EIPC stakeholders and CRA for purposes of EIPC capacity expansion modeling. As such, these results do not necessarily reflect the opinions or views of CRA or any individual EIPC stakeholder.
EIPC Overview

- **The EIPC represents a first-of-its-kind effort** to involve Planning Authorities in the Eastern Interconnection in modeling the impact on the grid of various policy options of interest to state/federal policy makers and other stakeholders.
  - Coordinated interregional analysis for the entire Eastern Interconnection guided by an open and transparent stakeholder process.
  - Funded by the U.S. Department of Energy in 2010

- EIPC Stakeholder Steering Committee (SSC) includes representatives from:
  - States and Canada, End Users, Public Power, NGOs
  - Generation and Transmission Owners/Developers, Other Suppliers

- CRA is performing the economic modeling for the EIPC.

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Eight Futures Were Formulated in Phase I

1. “Business as Usual”
2. Federal Carbon Constraint: *National Implementation*
3. Federal Carbon Constraint: *Regional Implementation*
4. Aggressive Demand Side Management
5. National RPS: *National Implementation*
6. National RPS: *Regional Implementation*
7. Nuclear Resurgence

– 80 Scenarios were modeled by CRA within these eight Futures
Three Scenarios Were Selected for Evaluation in Phase 2

1. “Business As Usual”
   No new EPA regulations, RPS, or regulations on carbon.

2. “National RPS”
   Meet 30% of the nation’s electricity needs from renewables by 2030.

   - Reduce economy-wide carbon emissions by 50% by 2030.
   - Meet 30% of the nation’s electricity needs from renewables by 2030.
   - Aggressive demand side management.

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Phase I Modeling Results for Three Selected Scenarios

Generation by Major Technology Type, Energy Demand, and CO₂ Emissions for the EI in 2030

<table>
<thead>
<tr>
<th>Major Gen Type:</th>
<th>Business As Usual</th>
<th>National RPS</th>
<th>Combined Climate and Energy Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>25%</td>
<td>13%</td>
<td>26%</td>
</tr>
<tr>
<td>Coal</td>
<td>38%</td>
<td>33%</td>
<td>0%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>22%</td>
<td>23%</td>
<td>35%</td>
</tr>
<tr>
<td>On-Shore Wind</td>
<td>5%</td>
<td>13%</td>
<td>27%</td>
</tr>
<tr>
<td>Off-Shore Wind</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
</tr>
<tr>
<td>Hydro</td>
<td>5%</td>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>96%</td>
<td>91%</td>
<td>96%</td>
</tr>
</tbody>
</table>

| Demand (TWh)            | 3702              | 3609         | 3008                              |
| Change from BAU         | -3%               | -19%         | -19%                              |

| CO₂ (MlMetricTons)      | 1716              | 1316         | 264                               |
| Change from BAU         | -23%              | -85%         | -85%                              |

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Phase 2 Plan for 2012

• The Study Year is 2030
  – *Transmission required to meet reliability standards for the three scenarios*
  – *Focus on 230kV and above*
  – *Consider HVAC and HVDC solutions*

• Perform a Production Cost Run for Each Scenario

• Estimate the Costs for Generation and Transmission Expansion

• Final Report December 2012

*The results presented herein use modeling assumptions developed by EIPC, EIPC stakeholders and CRA for purposes of EIPC capacity expansion modeling. As such, these results do not necessarily reflect the opinions or views of CRA or any individual EIPC stakeholder.*
Tomorrow’s Generation: Business Prospects and Regulatory Implications

April 26, 2012

Mauricio Del Valle
Morgan Stanley
Executive Director, Global Power & Utility Group
Agenda

- Generation Evolution of the U.S. Fuel Mix
- Drivers of Future Generation Mix
- Takeaways
## Electric Generation Mix Evolution

<table>
<thead>
<tr>
<th></th>
<th>1990</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GW Installed</td>
<td>Bn kWh</td>
</tr>
<tr>
<td>Total</td>
<td>10,861</td>
<td>2,809</td>
</tr>
<tr>
<td>Coal</td>
<td>38%</td>
<td>56%</td>
</tr>
<tr>
<td>Gas</td>
<td>19%</td>
<td>9%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>13%</td>
<td>21%</td>
</tr>
<tr>
<td>Hydro</td>
<td>18%</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>12%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Source: Ventyx
Key Drivers of Future Generation Mix

- Economic stability / growth and demand

- Plant Economics
  - Commodity Prices

- Regulations / Policy
  - Government support / subsidies

- Technology

Morgan Stanley
What is Expected… Given What We Know Today

- Nuclear
- Gas
- Coal
- Wind
- Solar
Commodities Are Cyclical

Henry Hub Natural Gas
January 1, 1991 to Date
($/MMbtu)

Source: Bloomberg
Is the Forward Curve a Good Price Predictor?

Source: Bloomberg

Morgan Stanley
Illustrative Cost per Fuel Technology

Illustrative Overnight Capital Costs
(2011 $/kw)

- Gas - CT: 660
- Gas - CC: 970
- Wind: 1,845
- Coal: 2,660
- Biomass: 3,010
- Geothermal: 4,245
- Solar - PV: 4,935
- Nuclear: 5,870

Source: Ventyx
Impact of Policy Uncertainty

Policy Dynamics…

Complex, Evolving Rules
Timing Uncertainty

Federal, State, Other Agencies

Weigh Heavily on Industry

Long Lead Times

Sizeable Capital Investments

System Reliability

Transmission Requirements

Morgan Stanley
Technology Evolution

- Efficiency Curtailing Demand Growth
- Clean Coal
- New Nuclear / Small Reactors
- Battery / Storage
- Other Renewable Breakthroughs
- Distributed Generation Revolution
- Reconfiguration of the system as we know it
Key Takeaways

- Generation mix has changed and will continue to evolve

- Commodities: Cyclical, volatile and difficult to predict

- Current prices, policy, and demand expectations do not support new build

- Policy will continue to weigh heavily in our industry

- Clean Tech: More to come

- Change will create opportunities to optimize infrastructure – M&A / other tools

Morgan Stanley
NOTES
Evolving Electric Reliability Regulation
Energy Bar Association Annual Meeting:
Evolving Electric Reliability Regulation

David N. Cook, Senior Vice President & General Counsel

April 26, 2012
This session will explore NERC’s evolving approach with respect to:

- Coordinated action with FERC
- Compliance Enforcement Initiative (CEI)
- Standards development and prioritization
- Major standards development projects
Coordinated action with FERC

• Joint FERC 1b investigations and NERC Compliance
  - February 2011 Southwest Cold Snap Event
  - September 8, 2011 Southwest Power Outage
  - October 29, 2011 Northeast Snowstorm

• Joint Inquiries: Key Findings and Recommendations – not a compliance determination or enforcement action

Investigations: Enforcement proceedings, with penalties to date

- Florida Power & Light
- WECC Reliability Coordinator
- Grand River Dam Authority
- PacifiCorp
- PacifiCorp
Compliance Enforcement Initiative

- Refocus efforts on reliability excellence
  - Differentiate issues of noncompliance based on the level of risk to the reliability of the bulk power system
  - Continue to identify, correct and report all instances of noncompliance
- Three possible enforcement tracks:
  - Dismissal
  - Find, Fix, Track and Report spreadsheet, and
  - Notices of Penalty – Full and Spreadsheet formats
- Encourage continued timely and thorough self-assessments, self-reporting and mitigation
- CEI order issued on March 15, 2012
• FFT program modifications
  o Minimal risk possible violations are eligible
  o Registered entities must have an officer certify that an issue has been mitigated
  o FFT informational filings publicly identify the registered entity with a Possible Violation
  o Finality-- violations are final 60 days after submittal to FERC if no further review

• Guidance on Risk Assessments
• Compliance and Informational Filings-May 2012 & March 2013
• Annual FFT survey by FERC
Next Steps

- Work to ensure sustainability and expandability of CEI
  - CEA compliance field staff, auditors and investigators will make determinations in addition to CEA enforcement staff in 2013
  - Ongoing training for CEA compliance staff and CEA enforcement staff
  - Continued industry education and outreach
  - Evaluate and implement improvements to ensure CEI process is effective and efficient
Standards Development

• Prioritization and Progress in Addressing FERC Directives
  ▪ NERC and the Standards Committee prioritize projects annually, factoring in impact to reliability, regulatory deadlines, and need for clarity in existing standards
  ▪ 721 directives issued since 2007
  ▪ NERC has addressed 58% of these directives, focusing first on those with greatest impact to reliability

• Quality Review (QR) of Standards
  ▪ All standards now go through QR before initial posting
  ▪ Utilizes industry lawyers and compliance staff in QR process
Meeting Representative Committee’s Standards Development, cont’d

- Process Input Group

- Looking at ways to improve efficiency and effectiveness in the standards development process

- Will propose high-level recommendations to the NERC Board of Trustees for consideration in May

- Goal is to implement high-level recommendations by end of 2012
Removal of Requirements

• **CEI Order P 81:**
  
  “...some current requirements likely provide little protection for Bulk-Power System reliability or may be redundant. The Commission is interested in obtaining views on whether such requirements could be removed from the Reliability Standards with little effect on reliability and an increase in efficiency of the ERO compliance program.”

• NERC will meet with industry and Regional Entity representatives to determine a “short list” of requirements that may be eligible for removal.
• Bulk Electric System Definition
  - Includes clear, objective, transparent and uniformly applicable criteria for exempting facilities from the BES definition
  - Filed with FERC January 25, 2012

• CIP Version 5
  - CIP-002-5 requires the categorization of BES Cyber Systems according to bright-line criteria that characterize their impact on Reliability Operations
  - Scheduled for NERC Board of Trustees Approval by end of 2012
More Information

- [www.nerc.com](http://www.nerc.com)
- Atlanta office: 404.446.2560
- DC office: 202.400.3000
Evolving Electric Reliability Regulation
Barbara A. Hindin

Energy Bar Association Annual Meeting
April 26, 2012
EEI’s Role in Reliability

- EEI is the association of shareholder-owned utilities
- Worked on legislation that became section 215 and on subsequent rulemakings
- EEI members are the largest single group of NERC registered entities -- active member involvement
- Members actively participate on SDTs and NERC committees
- EEI works closely with other trade associations; many joint filings to NERC and FERC
Agenda

- Standards
  - FERC review of standards
    - Directives – “Due weight”
    - BES order template for review

- Compliance
  - CANs
  - FFTR – NERC compliance/enforcement initiatives
  - Rules of Procedure
FERC Review of Standards

- Section 215(d)(2) standard:
  - “just, reasonable, not unduly discriminatory or preferential and in the public interest”
  - “The Commission shall give due weight to the technical expertise of the [ERO] with respect to the content of a proposed standard or modification of a standard”

- Section 215(d)(5): The Commission may order the ERO to submit to the Commission a proposed reliability standard or modification to a standard that “addresses a specific matter if the Commission considers such new or modified reliability standard appropriate to carry out this section.”
FERC Review of Standards

- March 18, 2010 -- 8 reliability orders and Penalty Guidelines issued – coordinated industry pushback
- Many directives issued – no “due weight”, too specific?
- FERC has issued 721 directives since 2007
- NERC has addressed about 58% of these directives
- Number of directives impacts priorities and workload for NERC standard-setting process
- “If everything is a priority, nothing is a priority.”
FERC Review of Standards – An Example

- RM10-6 – NOPR Regarding Interpretation of Reliability Standard TPL-002-0
  - FERC proposed to reject the interpretation developed through the NERC standards process and proposed its own interpretation

- Trade Associations filed extensive comments
  - Legal argument regarding “due weight”
  - Affidavit of system protection expert
  - Meeting with FERC staff in 2011
RM10-6: Order No. 754 issued, 136 FERC ¶ 61,186 (Sept. 15, 2011)

FERC accepted NERC interpretation and declined to adopt the NOPR proposal

Agreed with Trade Associations that there may be a system protection issue that merits further exploration by technical experts “single point of failure”

NERC project working on it -- [http://www.nerc.com/filez/standards/order_754.html](http://www.nerc.com/filez/standards/order_754.html)
FERC Review – New Approach

- Definition of Bulk Electric System -- Order No. 743, 133 FERC ¶ 61,150 (2010); order on reh’g, Order No. 743-A, 134 FERC ¶ 61, 210 (2011)
- FERC believes best way to address is to eliminate regional discretion and maintain bright line of 100 kV
- ERO may develop an alternative proposal – must be as effective or more effective in addressing the identified technical and other concerns and may not result in reduction in reliability (P 31)
- Industry generally thinks the BES order template for review has been working well
NERC’s view: CANs created to provide guidance to Compliance Enforcement Authority (CEA) staff when applying reliability standards

- Designed to establish consistency across ERO and to provide industry with transparency for audit preparation and development of effective internal controls
CANs – Industry View

- CANs seem more like interpretations, which must be developed through SDT, not by NERC staff.
- What is guidance vs new requirement?
- Management challenges – how do you respond in an audit?
  - Number of CANs increasing – response takes resources.
- What was the original question? Did staff change it? What is the basis for accepting a CAN request? Priorities?
- Lack of transparency -- Stakeholder comments/response should be posted.
CAN High-Level Appeals by Trades

- 8/2011 -- NERC BOT approved reforms to CAN process, including opportunity for appeal and high level review
- CAN-0016: CIP-001 sabotage reporting applicability to non-BES facilities – CAN remanded, then withdrawn (2/14/2012)
- CAN-0008: Basis for first maintenance and testing date– Can NERC request documentation before June 18, 2007
  - Remanded to staff to revise to allow registered entities to provide estimated last dates of maintenance pre-June 18, 2007
  - CEAs in best position to consider individual circumstances with regard to maintenance intervals of newly-added equipment
Next Steps?

- Are CANs needed? Alternatives?
- NERC enhancing Reliability Audit Worksheets (RSAW) by integrating the SDT’s intent, obtaining broader industry input and resolving compliance monitoring approaches.
- Objective is to reduce any gap between drafting team’s intent for the standard and compliance expectations
  - How will NERC get SDT’s intent?
  - What is the process for getting industry input?
- RSAW for COM-002 out for comment
Trades Associations have long urged NERC to streamline the compliance and enforcement process to enable both registered entities and NERC to focus on issues that have more impact on reliability.

- Trades supported NERC CEI/FFTR filing in 2011.
- Companies devoting large amount of resources on documentation.
- TECO example: 14 settlements since 2007; believe most would have been FFT.
Violation Examples

**PER-002 (OPS Training)**
An ESO didn’t receive 5 days of annual emergency operations training (only had 4.5 days)

**CIP-004 (Cyber Training)**
An employee didn’t receive training within 90 days of being granted access (15 days late)

**PRC-005 (Protection System Maintenance and Testing)**
Current program documentation compliant but not past documentation

**CIP-004 (Physical Access)**
Father/Son – same first and last name – background check missing on “son”

**PRC-008 (UFLS Relay Testing)**
Missed test date for 4 relays; several mitigating factors

“If you do not meet all applicable Requirements 100% and sub-Requirements of a standard, you will be found in possible violation of the standard”
Compliance Cost Survey Request

- Full year 2011 costs actual/projected
- Incremental cost of “compliance” for NERC
  - Would you do this if not for NERC? Cost of compliance, not reliability
- Specify CIP vs non-CIP
- Estimate capital vs O&M
- Internal labor cost including benefits
- Non-internal labor
### Cost Survey Results

TECO 2011 NERC Compliance Cost Survey

- Oct 25, 2011
- Results presented as information to the FRCC BOD Trustees on
- $8,685,000 - 70% CIP related
- $16,930/mile of transmission (>100 kV)
- Approximately 40 FTEs
- Mostly managerial and administrative overhead expense to support NERC compliance and enforcement processes
2011 Total NERC Compliance Costs ($000)

Consulting/Legal: $1,631
Capital Construction: $641
NERC/FERC assessments: $758
Software/Hardware: $613
Other: $45

Total Costs: $8,685
Total Costs - $2,554

2011 NERC Non-CLP Compliance Costs ($000)

- Consulting/Legal: $948
- Capital/Construction: $227
- Other: $25
- NERC/FRCC Assessments: $1,354
- Software/Hardware: $25
2011 NERC CIP Compliance Costs ($000)

- Consulting/Legal: $683
- Capital Construction: $641
- NERC/FRCC assessments: $531
- Software/Hardware: $613
- Other: $20
- Labor: $3,644

Total Costs: $6,132
Stakeholder Views

- Strong support for proposal to exercise discretion to deal with lesser risk matters – direct resources to matters that pose great risk to BPS reliability
- Appreciate FERC approval and 60-day review period --finality
- Focus on Phase II and next steps – auditor training
- Significant variation in regional implementation. All regions need to commit to using FFT
- Ongoing communication between NERC, regions and registered entities essential
FFT predicated on view that many violations of requirements currently in Reliability Standards pose lesser risk to BPS. If so, some requirements likely provide little protection for BPS or may be redundant.

FERC seeks views on whether such requirements could be “removed from the Reliability Standards with little effect on reliability and increase in efficiency of the ERO compliance program.” P 81
FFT Order – Eliminate standards?

- If NERC believes some standards or requirements should be revised or removed, FERC invites specific proposals to do so with detailed technical basis for request.
- In addition or alternative, FERC invites NERC, regions and other interested entities to propose “appropriate mechanisms to identify and remove ... unnecessary or redundant requirements.” Entities should coordinate.
- Trade associations and NERC have begun discussing a process to take advantage of this opportunity.
Extensive revisions to the Rules of Procedure posted November 2011. Comments filed December 23

Revisions include changes to CMEP, special procedure when RTO/ISO seeks to allocate a NERC penalty to another party, events analysis, penalty for failure to produce documents

Trades raised many concerns
  - Lack of authority for penalty provision
  - Lack of transparency, reason for changes not given
Rules of Procedure

- NERC made some changes
- BOT delayed action until March because of extensive stakeholder comment.
- ROP revisions were approved but with process improvements going forward, including more transparency and notice to stakeholders.
- Stakeholders hope this is part of greater effort toward transparency
Questions?

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Energy Bar Association
Sixty-Sixth Annual Meeting

Panel on
Evolving Electric Reliability Regulation

April 26, 2012
Barry R. Lawson
Washington, DC
Overview

- Standard development process changes
- Cost of implementing standards
- CIP/cyber security standards update
- BES definition update and issues
- FERC performance audits
NRECA Info

- National trade association for electric cooperatives
- 930 members - G&Ts and distribution cooperatives
- In 47 states serving 42 million consumers
- 12% of retail electric sales in US
- Participate in NERC standards development and other activities
America’s Electric Cooperative Network
Standard Development Process Changes

- Work underway at NERC and industry to increase efficiency of current process
- Always room for improvement, but specific problem identification is not clear
- Considerable work ahead for 2012
Standard Development Process Changes

Efforts focusing on key areas:

- Comment process
- Ballot process
- Requiring standards to be results-based
- Maintain ANSI accreditation
- Cost/benefit analysis

Goal to have package to NERC BOT for its November 2012 meeting
Reliability Standard Cost Concerns

- Current process does not require cost/benefit analysis of standard
- Does a standard really improve BES reliability or does it just require millions to be spent on compliance activities?
- NERC beginning to examine this
- Standard development process work focusing on this as well
NERC CIP Standards

Current Status

V3 standards currently in-force

- Permits self-determined risk-based methodology to identify Critical Assets (CAs) and Critical Cyber Assets (CCAs)

- If you have CCAs then many CIP standards apply
CIP Standards V4

- Filed for approval with FERC on Feb. 10
- Addressed one key FERC directive from V3 approval order
- Developed bright-line criteria for determining CCAs
- No other changes to CIP standards
- On FERC’s April 19 agenda
CIP Standards V5

- Work is under way to develop V5
- Wholesale revision to CIP standards
- Bright-line criteria for determining applicability
  - High, Medium and Low categorization
- Addressing all remaining FERC directives

CIP Standards V5

- First comment period and ballot took place at end of 2011
- Second comment period and ballot underway now
- Many revisions made in response to comments
- File w/FERC late 2012 or early 2013
CIP Standards
Implementation Plan Issues

- Complications and confusion with going from V3 to V4 to V5
- Unnecessary costs
- Compliance and audit challenges
- Can V4 be skipped???
- Timing of industry approval, filing with FERC, and FERC orders will impact these issues
Current BES Definition

- As defined by the Regional Reliability Organization, the electrical generation resources, transmission lines, interconnections with neighboring systems, and associated equipment, generally operated at voltages of 100 kV or higher. Radial transmission facilities serving only load with one transmission source are generally not included in this definition.
Current BES Definition Status

- Still the in-effect definition
- Provides REs ability to apply definition as they see fit
- Some REs have been aggressive in applying definition to entity registration
- NERC reliability standards apply to BES and facilities that support reliable operation of the BES
Revised BES Definition

- Filed for approval with FERC on Jan. 25
- Solid industry support – over 80% approval in ballot
- Expect FERC action in next several months
- Exception process in NERC ROP
Revised BES Definition

- Three part definition – Core, Inclusions and Exclusions
- Core
  - Unless modified by the lists shown below, all Transmission Elements operative at 100 kV or higher and Real Power and Reactive Power resources connected at 100 kV or higher. This does not include facilities used in the local distribution of electric energy.
Revised BES Definition

- Transformers
- Generating resources
- Blackstart Resources
- Dispersed power producing resources
- Static or dynamic devices
Revised BES Definition

◆ Exclusions
  – Radial systems
    • Serving only load
    • Only including generation resources
    • Serves load and includes generation resources
    • Normally open switching device between radials
  – Customer-owned generation
  – Local Networks
  – Reactive Power devices
BES Definition Phase 2

- Work is just starting
- Will focus on further technical justification of definition
- May be changes forthcoming
- Work to take 18 months or so
FERC Performance Audits

- Office of Enforcement conducting reliability performance audits
- In addition to NERC/RE audits
- Looking at reliability standards and more
- Not certain of FERC’s reason for and direction with these audits
FERC Performance Audits

❖ PJM, SPP, BPA and Salt River Project are among those being audited
❖ PJM’s audit is at 18 months long and continuing
❖ Potentially lengthy, staff-intensive and costly process without clear understanding of BES reliability benefit
❖ Not sure what final FERC action will be
Questions?

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NOTES
EPA Regulation of Generator Emissions: Dark Skies and Gloom or Sunshine and Lollipops?
EPA Regulation of Generator Emissions – Key Market Issues

EBA Annual Meeting
Jonathan A. Lesser, PhD
April 26, 2012
Compliance Impacts

• Regardless of how the costs and benefits of the EPA regulations compare, the regulations will affect markets

• Electric markets
  – Generator retirements: shuttering baseload generation will mean higher market prices, both spot market and capacity markets
  – How high?
  – Offsetting impacts from lower natural gas prices
  – Investment uncertainty – better or worse?

• Natural gas markets
  – Increased demand for natural gas will mean higher market prices – but increasing shale gas supplies counterbalance
  – Need for new pipeline capacity

Like most regulation, new EPA regulations will create “winners” and “losers”
Electric Market impacts

• Will be region-specific
  – MISO, PJM impacts likely larger than regions will little coal (Pacific Northwest)
  – Even in MISO, PJM, spot market impacts estimated between $3/MWh to $7/MWh
    • This sounds small, but real dollars.
    • 2010 PJM load about 750 Million MWh
    • $3/MWh - $7/MWh $2.2 - $5.2 billion increase in cost

• Fortunately, lower natural gas prices offsetting increased electric prices

Electric prices will increase, but the increases will be partially offset by lower natural gas prices, improved generation efficiency, and lower production costs
Natural Gas Market Impacts

- Natural gas is becoming the fuel of choice
- Shale gas production has reduced wellhead natural gas prices significantly (see next slide)
- Even **without** new EPA regulations, coal-fired plant economics are faltering
- Cannot “blame” EPA for all coal-plant closures
  - Coal-plant owners are struggling because the delivered price of coal has increased, while the delivered price of natural gas has dropped
  - Combined-cycle technologies more fuel efficient than coal plants (7000 Btus/kWh v. 10-12,000 Btus/kWh)
Estimated Impact of Shale Gas Production on US Wellhead Natural Gas Prices

Estimated Impact of Shale Gas Production on PJM RTO Prices 2010

Avg. price reduction from shale gas, about $2/MWh in 2010

Source: Continental Economics research
Increased natural gas demand means new pipeline capacity must be developed

• Siting and permitting of intrastate and interstate pipelines is not trivial
  – Supply-push or demand-pull pipelines?
  – Depends on shale gas production increases
  – Environmental opposition
    • Example: Many in New York State want to shut down the Indian Point Nuclear Plant in Southeast NY. Siting new pipeline capacity in that region will be problematic

• Who will bear the risks of building new pipeline capacity?
  – Interstate pipelines already struggling with changing market environment and greater pipe-on-pipe competition
  – How much new capacity can be built in the next 4-5 years?
Regulatory Issues – FERC and state utility commissions

• Reliability Must Run (RMR) Applications to FERC
  – Some generators will likely be designated as RMR units to ensure system reliability is maintained
  – Key issue for owners of RMR units: what level of compensation will they receive?
  – This has been controversial in the past [See e.g., Bridgeport Energy, LLC, 118 FERC ¶ 61,243 (2007); Norwalk Power, LLC, 120 FERC ¶ 61,048 (2007) ]
  – Differences between organized markets (e.g., MISO, PJM, ISO-NE) and unorganized markets, such as in the Southeast and West
  – State Regulatory Treatment – Vertically Integrated Utilities
  – How will state regulators address needed environmental investments for existing generating plants v. construction of new plants?
Regulatory Issues – Other Environmental Regulations

• Environmental regulations that restrict hydraulic fracturing regulations
  – Will new state and federal environmental regulations kill the golden goose?
  – If so, natural gas prices will increase, potentially a lot
  – Would likely increase gas price volatility

• New Source Review
  – If enacted, EPA’s proposed emissions limits on new coal plants (1,000 pounds / MWh) mean no new coal plants w/o carbon-capture can be built
    • Effectively means no coal at all
  – Does retrofitting old coal plants to comply with MATS, Air Transport, and/or Cooling Water Quality Rules trigger NSPS?
    • EPA draft CO2 rule says not anticipated at this time
Regulatory Issues - Nuclear Power?

• Nuclear power licensing
  – Some form of baseload generation is required
  – If coal is no longer economic, how about nuclear, especially if natural gas prices begin to increase?
  – Will there be too much reliance on natural gas?

• EPA regulations on cooling water discharge may have adverse impacts on nuclear (and fossil fuel) power operation
  – consider the universe of environmental regulations, and how they will impact generators, rather than considering them individually
EPA Regulation of Generator Emissions: Dark Skies and Gloom or Sunshine and Lollipops?

Presentation by Ed Comer
General Counsel
Energy Bar Association
April 26, 2012
Can you comply within 3 years?

How do you coordinate compliance plans with neighboring generators and system operators?

What are the relevant competitive considerations?
If you need more than 4 years to comply?
What risks do you face if you need for longer than 4 years?
Can EPA extend the Compliance Period?
If you need 4 years, what is the process and information needed for approval by the state permitting agency?
What definition of “reliability” will be used?

What is the role of the NERC-approved Planning Authority?

What is the role of the state Public Utility Commission?
What is the role of FERC?

What is the role of NERC?

Should you seek a Presidential Exemption?
Dark Skies and Gloom or Sunshine and Lollipops?
Reducing Toxic Pollution from Power Plants

Joel Beauvais
Special Counsel to the Office of the Administrator
Office of General Counsel
U.S. Environmental Protection Agency

For the Energy Bar Association Annual Meeting
April 26, 2012
Overview of MATS Rule

- On December 16, EPA finalized the Mercury and Air Toxics Standards, **the first national standards** to reduce emissions of mercury and other toxic air pollutants from new and existing coal- and oil-fired power plants.

- **Fulfills requirements established over two decades ago** by the 1990 amendments to the Clean Air Act.

- Standards will reduce emissions of:
  - **Metals**, including mercury (Hg), arsenic, chromium, and nickel.
  - **Acid gases**, including hydrogen chloride (HCl) and hydrogen fluoride (HF).
  - **Particulate matter**.

- Air toxic pollutants are linked to cancer, IQ loss, neurological damage, heart disease, lung disease, and premature death.
MATS Covers Approximately 1100 Coal- and 300 Oil-fired Units > 25 MW at about 600 Power Plants Nationwide.
Power Plants Are Big Emitters and Many Lack Advanced Controls

About 40\% of coal-burning units don’t use add-on controls such as scrubbers

Over 50\% of coal-burning units are over 40 years old

Sources: Portion of pollution -- NEI Trends Data (2009) and IPM (2010) (SO\textsubscript{2}, NO\textsubscript{X}); MATS rule modeling platform, based on inventory used for 2005 NATA (Hg); Inventory used for 2005 NATA (other toxics). Percent of units: EPA Base Case v. 4.10 PTR
Emission Standards

Existing source standards: Clean Air Act requires EPA to set the emission standards for existing sources at a level that is at least as stringent as the emission reductions achieved by the average of the best performing 12% of sources in the category.

The rule sets a few standards (for mercury, acid gases, non-mercury metal air toxics, and organic air toxics) to limit emissions of these pollutants.

- Most of these standards are numeric emissions limits; the standard for organic air toxics is a work practice standard.
- In some cases, these standards are “surrogates” for a number of pollutants. (e.g. setting a numeric HCl emissions limit to control all acid gases).
- For many standards, sources can choose to meet the primary standard or an alternate standard (e.g. MATS also sets a numeric SO₂ emissions limit as an alternate surrogate for acid gases).
- Some subcategorization of coal- and oil-fired units

Separate new source standards
Health Benefits

- The value of the improvements to health alone total $37 billion to $90 billion each year.

- The estimated annual costs of this final rule are $9.6 billion, about a billion dollars less than the proposed standards. This means that for every dollar spent to reduce this pollution, we will get $3-$9 in health benefits.

- Each year the rule is fully implemented, the rule will prevent serious health effects, including:
  - 4,200 – 11,000 premature deaths
  - 4,700 heart attacks
  - 130,000 asthma attacks
  - 540,000 missed work or “sick” days

Source: EPA Regulatory Impact Analysis
Sources Can Achieve These Standards

- Proven control technologies to reduce these emissions such as scrubbers, fabric filters, and activated carbon injection are widely available.
- Many units already use one or more of these technologies.
- As a result of this standard, some power plants will upgrade existing controls (especially particulate matter controls like electrostatic precipitators).
- Power plants may also install new controls (such as fabric filters, dry sorbent injection, or activated carbon injection).

Retrofit pollution control installations on coal-fired capacity (by technology) with the base case and with the final MATS, 2015 (measured in GW capacity). Source: Integrated Planning Model run by EPA, 2011

FGD: flu gas desulfurization (scrubber)  SCR: selective catalytic reduction
DSI: dry sorbent injection  ACI: activated carbon injection
FF: fabric filter
Maintaining Electric Reliability

• Market forces – including low natural gas prices and low demand growth – are putting substantial economic pressure on marginal coal-fired units, leading to business decisions to retire such units and to changes in fleet composition and dispatch.

• EPA analysis indicates that MATS and the Cross-State Rule will not adversely affect resource adequacy in any region of the country.
  – EPA analysis projects less than 5 GW in total capacity reduction attributable to MATS.
  – Collectively, MATS and the Cross-State Rule are projected to result in approximately 9 GW of total capacity reductions - less than one percent of total generating capacity.
  – Most of this capacity is decades old, is less efficient and does not have modern pollution controls installed.
  – Target reserve margins maintained in every region of the country

• DOE's December 2011 report reached consistent conclusions regarding resource adequacy. DOE also concluded that, assuming prompt action by regulators and generators, timelines associated with new construction and retrofit installations are generally comparable to regulatory compliance timelines.

• If localized reliability challenges emerge, utilities, grid planners and operators, and State and Federal regulators have a broad range of tools to address any such challenges.
Timing Overview

• EPA expects most facilities will comply with this rule through a range of strategies, including the use of existing emission controls, upgrades to existing emission controls, installation of new pollution controls, and fuel switching.

• Existing sources generally will have up to 4 years if they need it to comply with MATS.
  – This includes the 3 year period provided for by the Clean Air Act. EPA’s analysis continues to demonstrate that this will be sufficient time for most, if not all, sources to comply.
  – Under the Clean Air Act, state permitting authorities can also grant an additional year (to April 2016) as needed for technology installation. EPA expects this option to be broadly available.

• EPA is also providing a clear pathway for reliability critical units to obtain a schedule with up to an additional year to achieve compliance. This pathway is described in a separate enforcement policy document that can be found at http://cfpub.epa.gov/compliance/resources/policies/civil/erp/. The EPA believes there will be few, if any situations, in which this pathway will be needed.
4th Year

- CAA section 112(i)(3)(B) authorizes Title V permitting authorities (generally states) to grant a permit providing up to an additional year for compliance where necessary for the installation of controls.

- EPA has provided guidance indicating that this 4th year should be broadly available. MATS preamble discusses a range of illustrative scenarios:
  - Installation of controls or construction of on-site replacement power.
  - Retiring unit needed for reliability reasons until (1) another unit can install controls, (2) offsite replacement power can be constructed, or (3) transmission upgrades can be completed.

- Where a unit is retiring or deactivating, permitting authorities should consider information regarding reliability impacts that are the basis of the request.

- EPA will provide outreach to and support for state permitting authorities to support broad availability and expeditious implementation.
OECA Policy Memorandum

- Describes EPA's "intended approach regarding the use of section 113(a) administrative orders ('AOs') with respect to sources that must operate in noncompliance with the MATS for up to a year to address a specific and documented reliability concern."

- A source that qualifies for 1-year extension under section 112(i)(3)(B) (4th year) may also qualify for an AO at the end of this extension.

- EPA will "rely for identification and/or analysis of reliability risks upon the advice and counsel of reliability experts including" FERC, RTOs and other planning authorities, NERC and the regional entities, and public utility commissions (PUCs).

- Memo identifies process for and elements of a request for an AO and discusses EPA’s intended approach to consultation and response.
Coordination and Stakeholder Engagement

• On December 21, 2011, the President issued a Memorandum entitled "Flexible Implementation of the Mercury and Air Toxics Standards Rule"

• The Memorandum directs EPA to:
  – Work with state and local permitting authorities to make the additional year under Section 112(i)(3)(B) broadly available
  – Promote early, coordinated, and orderly planning of measures needed to implement MATS, including engagement and coordination with DOE, FERC, PUCs, RTOs and other planning authorities, NERC and regional entities, utilities and other stakeholders
  – Make available relevant information on timing-related authorities

• EPA, in coordination with DOE and FERC, is involved in extensive outreach and engagement with a broad range of affected stakeholders.
MEMORANDUM

SUBJECT: The Environmental Protection Agency’s Enforcement Response Policy For Use Of Clean Air Act Section 113(a) Administrative Orders In Relation To Electric Reliability And The Mercury and Air Toxics Standard

FROM: Cynthia Giles, Assistant Administrator of the Office of Enforcement and Compliance Assurance

TO: Regional Administrators (EPA Regions I-X)  
Regional Counsel (EPA Regions I-X)  
Regional Enforcement Division Directors (EPA Regions I-X)  
Air Division Directors (EPA Headquarters and Regions I-X)

I. STATEMENT OF POLICY

It is the EPA’s obligation to ensure compliance with environmental laws designed to protect public health and welfare. Where there is a conflict between timely compliance with a particular requirement and electric reliability, the EPA intends to carefully exercise its authorities to ensure compliance with environmental standards while addressing genuine risks to reliability in a manner that protects public health and welfare.

Pursuant to Section 112 of the Clean Air Act ("CAA"), the EPA finalized national emission standards for hazardous air pollutants ("NESHAP") from electric generating units ("EGUs") in December 2011. These standards, commonly known as the "Mercury and Air Toxics Standards" ("MATS"), adopt emission limits on mercury, acid gases and other toxic pollutants for affected coal and oil-fired EGUs. Many existing sources will comply with the MATS by controlling their emissions, while others (typically older, smaller, less efficient units) may choose to cease operations rather than install control technologies.

The EPA believes that all affected sources will be able to comply with the MATS within the compliance period specified by Section 112(i)(3) of the CAA (including, as applicable, any
extensions permitted under Section 112(i)(3)(B)) (the “MATS Compliance Date”). The EPA's analysis projects only a modest level of retirements, and the Agency does not anticipate that such retirements will lead to resource constraints that would adversely affect electric reliability.

Nonetheless, the EPA acknowledges that there may be isolated instances in which the deactivation or retirement of a unit or a delay in installation of controls due to factors beyond the owner's/operator's control could have an adverse, localized impact on electric reliability that cannot be predicted or planned for with specificity at the present time. In such instances, sources could find themselves in the position of either operating in noncompliance with the MATS or halting operations and thereby potentially impacting electric reliability.

The EPA is issuing this policy memorandum to describe its intended approach regarding the use of Section 113(a) administrative orders (“AOS”) with respect to sources that must operate in noncompliance with the MATS for up to a year to address a specific and documented reliability concern. This enforcement policy is limited in application to units that are critical for reliability purposes. Some sources will be able obtain a broadly available one-year extension pursuant to Section 112(i)(3)(B). A source that qualifies for a one year extension from its permitting authority may also qualify for an AO at the end of its extension, provided that it falls within the terms of this policy. The EPA believes that there are likely to be few, if any, cases in which it is not possible to mitigate a reliability issue within four years, and that there are likely to be fewer, if any, cases in which it is not possible to mitigate a reliability issue within the further year contemplated under this policy.

This policy does not address situations where a reliability critical unit needs more than one year to come into compliance after the MATS Compliance Date. The policy also does not address delays in installations of controls and/or other instances of noncompliance with the MATS for units that are not reliability critical. The EPA intends to handle such scenarios as it has in the past, by assessing each situation on a case-by-case basis, at the appropriate time, to determine the appropriate enforcement response and resolution.

As set forth below, in light of the complexity of the electric system and the local nature of many reliability issues, the EPA will, for purposes of using its Section 113(a) AO authority in this context, rely for identification and/or analysis of reliability risks upon the advice and counsel of reliability experts, including, but not limited to, the Federal Energy Regulatory Commission (“FERC”), Regional Transmission Operators (“RTOs”), Independent System Operators (“ISOs”) and other Planning Authorities as identified herein, the North American Electric Reliability Corporation (“NERC”) and affiliated regional entities, and state public service commissions (“PSCs”) and public utility commissions (“PUCs”). The EPA will work with these and other organizations, as appropriate, to ensure that any claims of reliability risks are properly characterized and evaluated.

The EPA is committed to achieving compliance with the MATS while ensuring electric reliability.
The policies established in this document supplement other applicable policies, and are intended to assist government personnel in determining the appropriate response to noncompliance. These policies and procedures are not intended to, nor do they, constitute a rulemaking by the EPA. These policies and procedures do not create a right or a benefit, substantive or procedural, that is enforceable at law or in equity by any person. The EPA reserves the right to act at variance with these policies and to change them at any time without public notice. Further, nothing in this document should be construed to affect the EPA’s analysis of, or reaction to, an imminent and substantial endangerment to human health.

II. SUMMARY OF LEGAL REQUIREMENTS AND AUTHORITIES

Section 112 of the CAA establishes compliance deadlines for existing sources to meet standards promulgated under that provision, such as those included in the MATS rule. Specifically, Section 112(i)(3)(A) provides:

After the effective date of any emissions standard, limitation or regulation promulgated under this section and applicable to a source, no person may operate such source in violation of such standard, limitation or regulation except, in the case of an existing source, the Administrator shall establish a compliance date or dates for each category or subcategory of existing sources, which shall provide for compliance as expeditiously as practicable, but in no event later than 3 years after the effective date of such standard.

See, also 40 CFR 63.9984.

The CAA and its implementing regulations provide specific conditions under which extensions may be granted to this three year compliance period and under which other compliance time periods may apply. See, e.g., Section 112(i)(3)(B), (4)-(6). In particular, Section 112(i)(3)(B) provides:

The Administrator (or a State with a program approved under subchapter V of this chapter) may issue a permit that grants an extension permitting an existing source up to 1 additional year to comply with standards under subsection (d) of this section if such additional period is necessary for the installation of controls.

Section 113 of the CAA authorizes the Administrator to bring enforcement actions against sources in violation of CAA requirements, seeking injunctive relief, civil penalties and, in certain circumstances, other appropriate relief. The EPA also has the discretion to agree to negotiated

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1 Except as otherwise provided under Section 112(i)(3)(B), the MATS requires compliance within three years of the effective date, the statutory maximum.
resolutions including, for example, expeditious compliance schedules with enforceable compliance milestones.

III. THE EPA’S ENFORCEMENT RESPONSE TO BRING RELIABILITY-CRITICAL UNITS INTO COMPLIANCE

The EPA generally does not speak publicly to the intended scope of its enforcement efforts, particularly years in advance of the date when a violation may occur. The Agency is doing so now with respect to the MATS to provide confidence with respect to electric reliability. EGUs may be needed to operate to maintain the reliability of the electric grid when they would prefer, or could be required, to halt operations temporarily (until controls can be installed) or indefinitely (through deactivation of a unit). This policy describes the EPA’s intended enforcement response in such instances. The policy is informed, as are our enforcement actions in general, by the need to find an appropriate balance between critical public interests, bearing in mind the resources and process time required for any enforcement response.

Some sources may take all steps necessary to comply with the MATS, but may nevertheless be needed to operate in noncompliance with the MATS to address concerns with electric reliability. In the event that such sources are interested in receiving a schedule to come into compliance while operating, the EPA intends, where necessary to avoid a serious risk to electric reliability, and provided the criteria set forth herein are met, to issue an expeditious case-specific AO to bring a source into compliance within one year. See Section 113(a). Any such AOs would be issued on or after (not before) the MATS Compliance Date and would be limited to units that are required to run for reliability purposes that (A) would otherwise be deactivated, or (B) due to factors beyond the control of the owner/operator, have a delay in installation of controls or need to operate because another unit has had such a delay.²

The Agency is cognizant that early planning will play a key role in allowing for the identification, and timely mitigation, of any potential reliability issues. The EPA expects that owners/operators will begin compliance planning early, and will provide early notice of their compliance plans to the appropriate reliability entities. We further expect that entities with responsibility for reliability planning and coordination will develop and maintain system-wide reliability plans for the units within their purview, and that this regional reliability planning will provide early identification of units that are critical for reliability purposes. Early notice and planning can discourage delays in coming into compliance, encourage timely action to avoid or mitigate reliability concerns, and minimize the need for issuance of AOs of the type described herein.

² The EPA does not intend to seek civil penalties for violations of the MATS that occur as a result of operation for up to one year in conformity with an AO issued in connection with this policy, unless there are misrepresentations in the materials submitted in a request for an AO.
The EPA also recognizes the need for advance planning with regard to the future availability of any reliability critical EGUs to operate as needed to maintain electric reliability. Accordingly, although an AO cannot be issued under Section 113(a) prior to the MATS Compliance Date, the EPA intends – where the owner/operator has timely submitted a complete request and has provided appropriate cooperation – to give the owner/operator as much advance written notice as practicable of the Agency’s plans with regard to such an AO.

To qualify for an AO in connection with this policy, an owner/operator should, at a minimum, take the following steps.³⁴

A. Provide early notice of compliance plans. Within one year after the effective date of the MATS, an owner/operator should provide written notice of its compliance plans, with regard to each EGU it owns or operates, that identifies (a) the units it plans to deactivate and the anticipated dates of deactivation and (b) the units for which it intends to install pollution control equipment or otherwise retrofit and the anticipated schedule for completion of that work, to the Planning Authority for the area in which the relevant EGU or EGUs are located.⁵

B. Timely request an AO for a unit that may affect reliability due to deactivation. In addition to the elements identified in III(A) above, for a unit that is required to run for reliability purposes that would otherwise be deactivated:

1. An owner/operator should, no less than 180 days prior to the MATS Compliance Date, submit electronically to (a) the Director of the Air Enforcement Division in the EPA’s Office of Enforcement and Compliance Assurance, and (b) the Regional Administrator of the EPA Region in which the EGU is located, with a copy to FERC, at an office of its designation, (collectively, “AO Request Recipients”) a written request for an enforceable compliance schedule in an AO for the unit, which includes information responsive to each of the elements specified in III(D) below.

2. At the same time the unit owner/operator submits its request for an AO, an owner/operator should also provide notice that it is seeking such an AO to (a) the Planning Authority, (b) any state PUCs/PSCs with regulatory jurisdiction with

³ The EPA will evaluate each request for an AO for a unit that is required to run for reliability purposes on a case-by-case basis.
⁴ Any notice, request or other submission discussed in this memorandum should conform to the standard business practice of the receiving entity for the submission of information, including any requirements governing submission of Confidential Business Information and/or other confidential information.
⁵ Planning Authority is the entity defined as such in the “Glossary of Terms Used in NERC Reliability Standards,” available at: http://www.nerc.com/docs/standards/rs/Reliability_Standards_Complete_Set.pdf, or any successor term thereto approved by FERC, and includes, in relevant jurisdictions, RTOs and ISOs.
regard to the relevant EGU,\(^6\) (c) any state, tribal or local environmental agency with permitting authority under Titles I and V of the CAA, and any tribal environmental agency that does not have such authority, with jurisdiction over the area in which the EGU is located (collectively, "AO Notice Recipients").

C. **Timely request an AO for a unit that may affect reliability due to delays related to the installation of controls.** In addition to the elements identified in III(A) above, for a unit that that is required to run for reliability purposes that, due to factors beyond the control of the owner/operator, has a delay in installation of controls or needs to operate because another unit has had such a delay:

1. An owner/operator should, within a reasonable time of learning of a delay that it believes may result in a unit being unable to comply by the MATS Compliance Date, provide to the Planning Authority for the area in which the relevant EGU or EGUs are located, written notice of the units impacted by the delay, the cause of the delay, an estimate of the length of time of the delay, and the timeframe during which it contemplates operation in noncompliance with the MATS.

2. An owner/operator should, within a reasonable time of learning that it is critical to reliability to operate a unit described in the preceding paragraph in noncompliance with the MATS after the MATS Compliance Date, submit electronically to the AO Request Recipients a written request for an enforceable compliance schedule in an AO for the unit, which includes information responsive to as many of the elements specified in III(D) below as it is possible to provide at that time.

3. At the same time the unit owner/operator submits its request for an AO, an owner/operator should also provide notice that it is seeking such an AO to the AO Notice Recipients.

D. **Submit a complete request for an AO.** The following elements should be included in a request for an AO in connection with this policy:\(^7\)

1. Copies of the early notice provided to the Planning Authority pursuant to III(A) or an explanation of why it was not practicable to have provided such notice and a demonstration that such notice was provided as soon as it was practicable.

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\(^6\) PUCs/PSCs may also wish to obtain the information identified in III(A), either by requesting that an owner/operator over which the PUC/PSC has jurisdiction provide such information directly, or by requesting such information from the relevant Planning Authority.

\(^7\) The EPA may request additional information from the unit owner/operator. The speed with which the EPA evaluates a request and its ultimate response will be related to the timeliness, completeness, and quality of the submittal.
2. Written analysis of the reliability risk if the unit were not in operation, which demonstrates that operation of the unit after the MATS Compliance Date is critical to maintaining electric reliability, and that failure to operate the unit would: (a) result in the violation of at least one of the reliability criteria required to be filed with FERC, and, in the case of the Electric Reliability Council of Texas ("ERCOT"), with the Texas PUC, or (b) cause reserves to fall below the required system reserve margin.

3. Written concurrence with the analysis in III(D)(2) by, or a separate and equivalent analysis by, the Planning Authority for the area in which the relevant EGU or EGUs are located, or, in the alternative, a written explanation of why such concurrence or separate and equivalent analysis cannot be provided; and, where practicable, any related system wide analysis by such entity.

4. Copies of any written comments from third parties directed to, and received by, the owner/operator in favor of, or opposed to, operation of the unit after the MATS Compliance Date.

5. A plan to achieve compliance with the MATS no later than one year after the MATS Compliance Date, and, where practicable, a written demonstration of the plan to resolve the underlying reliability problem and the steps and timeframe for implementing it, which demonstrates that such resolution cannot be effected on or before the MATS Compliance Date.

6. An identification of the level of operation of the unit that is required to avoid the documented reliability risk in III(D)(2) and, consistent with that level, a proposal for operational limits and/or work practices to minimize or mitigate any HAP emissions to the extent practicable during any operation not in full compliance with the MATS.

In evaluating a request for an AO submitted in contemplation of this policy, although the EPA’s issuance of an AO is not conditioned upon the approval or concurrence of any entity, the EPA intends to consult, as necessary or appropriate on a case-by-case basis, with FERC and/or other entities with relevant reliability expertise.

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8 Because ERCOT oversees intrastate transmission of electricity solely within Texas and does not provide for interstate transmission, ERCOT files reliability criteria with the Texas PUC.
EPA Regulations: Balancing Reliability, Affordability and Environmental Protection

Energy Bar Association Meeting
Kurt Bilas, Midwest ISO
Executive Director, Government Relations
April 26, 2012
EPA compliance issue is complex

• Stakeholders will face challenges to achieve compliance within specified timeframes
  – Ability to secure timely outages is critical
  – Availability of options (retire, retrofit, coal to gas conversion) may be limited by supply chain or gas infrastructure sufficiency

• Operations procedures will strive to maintain reliability despite uncertainty
  – Generators are not expected to operate in non-compliance

• MISO is focused on
  – developing improved tariff rules and processes to manage risks
  – providing information to policy makers and asset owners to facilitate coordination and minimize negative impacts
EPA compliance schedule

MATS Schedule
MATS = Mercury and air toxics standards

Retrofit schedule by technology*
DSI = dry sorbent injection
ACI = Activated carbon injection
FBD = flue gas desulfurization

Off-peak outage windows

Gas pipeline expansion schedule**

* DOE Resource Adequacy Implications of Forthcoming EPA Air Quality Regulations, Dec 2011
** Gas and Electric Infrastructure Interdependency Analysis, Feb 2012
*** MISO EPA Impact Analysis
Natural gas availability issues center around need for additional gas storage and pipeline infrastructure

- MISO commissioned an initial gas and electric interdependency study. [http://tinyurl.com/cb5vloz](http://tinyurl.com/cb5vloz) Key findings include:
  - Gas supply availability at the wellhead is not an issue
  - Additional gas storage, either underground or on-site, will be needed to provide firm winter generation capability.
  - New pipeline infrastructure is needed to manage volatility and ensure reliability if retiring units are replaced with gas units
    - ~$2 billion investment in new main lines needed
    - ~$1 billion investment in lateral lines (lines from the main line to the power plant) will be needed
  - Timing for pipeline build may preclude fuel switching as a viable compliance option
    - Planning, regulatory, design and construction schedules for pipeline development is nominally 5 years or greater
- Analysis of gas supply to support increased usage of current fleet indicates limited ability to increase existing gas-fired unit capacity factors
Equipment supply chain work is underway

• Study Intent - test the hypothesis that supply chain capability to meet the anticipated demand will be significantly challenged as a result of the EPA MATS rule
  • Raising cost of compliance significantly, or
  • Making compliance schedules unachievable for some units

• Deliverables
  – Report describing the supply chain capabilities and limitations to meet the demands of anticipated retirements and retrofits
  – Determine ability to coordinate the maintenance outage schedules and material and labor for these retrofits within outage constraints
  – Reports to be complete by end of April
MISO outage management is under further review

- Generators being retrofitted will require extended outages
- Given the limited number of maintenance seasons and the length of construction schedules prior to the deadline (Spring 2015) MISO expects significant levels of outage requests in each season
- MISO’s current Generator Outage Coordination Process
  - Analysis of local constraints to ensure system reliability
  - Coordinate with generation/transmission entities to reschedule requested outages as needed
- MISO is reviewing its outage management processes and tariff authority to identify and manage the risk of supply shortfalls
  - Expanding reliability monitoring to include sub-regional constraint impacts
  - Add a sub-regional supply sufficiency check based on monthly loss-of-load expectation analysis
  - Enhancing coordination processes with neighboring entities
2012 MISO projected outage limits (maintenance margin)

February 2012 Maintenance Margin by Zone - MW

2012 Aggregate Maintenance Margin by Month - MW

Required outage durations will determine how many outage windows are required.

Typical outages are anticipated to be 12 weeks requiring as many as six outage windows spanning three years.
Resource adequacy remains a key focus for MISO and its stakeholders

- Unit Retirements may result in localized load pockets and localized capacity shortages
- Demand Response and Behind the Meter Generation qualification requirements and deployment procedures will be reviewed given the potential increase in use
- Potential fuel delivery issues may necessitate the need for more stringent requirements (i.e. that qualification requirements include firm gas contracts)
- Increases importance of State planning processes and value of broad regional view provided by MISO planning and resource adequacy mechanisms
- Potential need for greater utilization of Capacity Shortage (load management) procedures
  - Unit maintenance and less dispatch flexibility could drive greater reliance on emergency procedures, including during non-summer peak periods
Resource adequacy: 5.0 GW of capacity need to be added by 2015 to maintain a planning reserve margin (PRM) of 15.1 percent.
MISO efforts continue in areas of planning, reliability and market operations

- MISO’s leadership and direction on issue has focused on analysis of EPA impacts to generation
  - EPA impact study (http://tinyurl.com/c5xq2yc)
  - Natural gas infrastructure study (http://tinyurl.com/cb5vloz)

- Given dynamic nature of issues surrounding EPA compliance, continued emphasis must be placed on ensuring both short and long-term system reliability
  - Outage management
  - Unit commitment
  - Resource adequacy and generation retirement
  - Emissions tracking

- MISO collaboration with stakeholders as they work to comply remains a critical component
These rules will create significant system impacts…

EPA Rules

1. Cross State Air Pollution
   - Currently under stay
2. Mercury and Air Toxins Standard
   - Effective March 2015

Impacts

1. $33 billion of total costs to the system
2. Average energy prices could increase by $1 to $5/MWh.
3. 12.65 GW retirements would erode installed reserve margins by 12 percentage points

Coal Resources Affected

- Total Coal: 70,569 MW
- Total Affected: 60,800 MW
- Uneconomic / Replace: 27,921 MW

- Fabric Filters (Baghouse) only: 66 Units
- Other Compliance Method*: 69 Units
- 23 Units No Action Required
- 286 Units
- 151 Units

* Includes combinations of Dry Sorbent Injection, Activated Carbon Injection, Flue Gas Desulfurization and Baghouses
...and considerable challenges for Asset Owners and MISO processes to address in the target compliance timeframe

<table>
<thead>
<tr>
<th>Structural</th>
<th>Process /Tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Natural Gas Fuel and Transportation Sufficiency</td>
<td></td>
</tr>
<tr>
<td>– Fuel diversity philosophies</td>
<td></td>
</tr>
<tr>
<td>• Supply Chain Availability</td>
<td>• Generation and Transmission Outage Management</td>
</tr>
<tr>
<td>• Regulatory uncertainty</td>
<td>• Retirement Requests</td>
</tr>
<tr>
<td>– Green house Gas regulations</td>
<td>• Resource Adequacy Impacts</td>
</tr>
<tr>
<td></td>
<td>• Unit Commitment Approach</td>
</tr>
<tr>
<td></td>
<td>• Congestion Management Approach</td>
</tr>
</tbody>
</table>
Uncertainty About Compliance Plans Increases Risk Given Limited Compliance Timeframe

- MISO surveyed asset owners on the intent to retire units

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of Units</th>
<th>Total Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>134</td>
<td>44,318</td>
</tr>
<tr>
<td>TBD</td>
<td>32</td>
<td>4,440</td>
</tr>
<tr>
<td>Not for MATS</td>
<td>21</td>
<td>3,374</td>
</tr>
<tr>
<td>Scheduled to be suspended</td>
<td>7</td>
<td>958</td>
</tr>
<tr>
<td>Likely</td>
<td>8</td>
<td>961</td>
</tr>
<tr>
<td>Yes</td>
<td>27</td>
<td>2,312</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
<td><strong>229</strong></td>
<td><strong>56,363</strong></td>
</tr>
</tbody>
</table>

- Non-“No” responses account for 95 units representing 12,045 MW
- MISO EPA Rule Impact Analysis identified 12,652 MW at-risk for retirement
Uncertainty About Compliance Plans Increases Risk Given Limited Compliance Timeframe, (cont.)

- MISO surveyed asset owners on equipment to be added for compliance

<table>
<thead>
<tr>
<th>Response</th>
<th>ACI</th>
<th>Baghouse/Fabric Filter</th>
<th>FGD</th>
<th>SCR/SNCR</th>
<th>DSI</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>47</td>
<td>20</td>
<td>19</td>
<td>12</td>
<td>41</td>
<td>19</td>
</tr>
<tr>
<td>No Response</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>TBD</td>
<td>59</td>
<td>61</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
</tr>
</tbody>
</table>

- Through the survey, some asset owners have provided potential outage windows for retrofits from late 2012 through 2017. Many more responses expressed uncertainty on dates.

ACI – Activated Carbon Injection
SCR – Selective Catalytic Reduction
DSI – Dry Sorbent Injection
FGD – Flue-Gas Desulfurization
SNCR - Selective Non-Catalytic Reduction
Emission tracking

• To provide operations with foresight on what units may adjust their bidding strategies to manage emission production and thus creating new issues to manage
• To project potential congestion areas within the footprint not historically seen because of the change in bidding
• To project potential units that may reduce operation availability in an effort to manage emission production which will help project potential areas where a lack of available generation may cause operational issues within the footprint.
• If deemed valuable, provide aggregate information to stakeholders
NOTES
Rough Headwinds:
Challenges Facing Renewable Development
“Rough Headwinds: Challenges Facing Renewable Development”

Energy Bar Association Annual Meeting
April 26, 2012

Daniel M. Adamson
VP, Regulatory Affairs & Counsel
About SEIA

• Founded in 1974
• U.S. National Trade Association for Solar Energy
  • 1,000+ member companies from around the world
  • Members from across 50 states
  • Largest companies in the world as well as small installers
• All Solar Technologies
  • Photovoltaic
  • Concentrating Solar Power
  • Solar Heating and Cooling
• All Sizes and Markets
  • Residential, Commercial, Rooftop, Ground Mounted
  • Distributed Generation
  • Central Station
  • Wholesale and Retail Markets
Solar in America: Strong and Getting Stronger

- 100,000 American workers in solar – double the number in 2009 – at 5,600 companies across the country
- One of the fastest growing sectors of the U.S. economy – with 109% growth in PV installations in 2011.
- More than 4,460 MW of installed solar electric capacity
Industry Overview

- The value of solar installations grew to $8.4 billion in 2011
- Solar employment more than doubled from 2009 to 2011, topping 100,000 American workers

---

**Value of PV Installations**

- 2006: $0.0 billion
- 2007: $1.0 billion
- 2008: $2.0 billion
- 2009: $3.0 billion
- 2010: $5.0 billion
- 2011: $8.4 billion

**U.S. Solar Workforce**

- 2006: 20,000
- 2007: 40,000
- 2008: 60,000
- 2009: 80,000
- 2010: 100,000
- 2011: 120,000

---

SEIA/GTM Research U.S. Solar Market Insight: Year In Review

SEIA Estimate  SEIA/GTM Research

SEIA Estimate  The Solar Foundation
U.S. Solar Business Locations in 2011

US Solar Company Locations

1387 Manufacturer
2909 Contractor/Installer
2216 Other
6512 Solar Company Locations

WWW.SEIA.ORG

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What the Future Holds—Looking Ahead

• In 2012, we’ll see near-term challenges for the industry, especially for manufacturers
• Since the beginning of 2010, 52 new U.S. solar manufacturing facilities have begun operations across America
• By 2014, the U.S. is projected to become one of the world’s largest solar markets
Solar Market Insight: Year in Review 2011

- Detailed data on markets in top 23 states available in full report.
- Free executive summary provides national aggregate data on installations, pricing, manufacturing and demand forecasts.
- Full report for sale (50% discount to SEIA members) includes detailed market segment and state data.
U.S. Solar Industry Continues Strong Growth

- PV demand grew 109% in 2011

Source: SEIA/GTM Research Solar Market Insight, "2011 Year In Review"
PV System Prices Falling Dramatically

Average Installed Price of PV

Source: SEIA/GTM Research Solar Market Insight, “2011 Year In Review”
U.S. to Lead in CSP

- California, Arizona and Nevada are leading states
- The current CSP pipeline contains over 5,000 MW of projects with signed PPAs

**CSP & CPV Forecast**

*Source: SEIA/GTM Research Solar Market Insight, "2011 Year In Review*
U.S. PV Demand Forecast to Grow 53% in 2012 to Over 2.8 GW

**U.S. PV Installations Forecast**

Source: SEIA/GTM Research Solar Market Insight, "2011 Year In Review"
Status of Market Diversity

2011 PV Installations by Major Market

<table>
<thead>
<tr>
<th>State</th>
<th>2011 Annual Installations</th>
<th>2011 Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>542.2</td>
<td>1</td>
</tr>
<tr>
<td>New Jersey</td>
<td>313.3</td>
<td>2</td>
</tr>
<tr>
<td>Arizona</td>
<td>273.2</td>
<td>3</td>
</tr>
<tr>
<td>New Mexico</td>
<td>115.8</td>
<td>4</td>
</tr>
<tr>
<td>Colorado</td>
<td>90.8</td>
<td>5</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>87.9</td>
<td>6</td>
</tr>
<tr>
<td>New York</td>
<td>59.9</td>
<td>7</td>
</tr>
<tr>
<td>North Carolina</td>
<td>54.8</td>
<td>8</td>
</tr>
<tr>
<td>Texas</td>
<td>47.1</td>
<td>9</td>
</tr>
<tr>
<td>Nevada</td>
<td>43.6</td>
<td>10</td>
</tr>
</tbody>
</table>

© 2012 SEIA
PV Manufacturing Across the U.S.
Growing Importance of U.S. Solar Market

U.S. PV Installations and Global Market Share

Source: SEIA/GTM Research Solar Market Insight, "2011 Year In Review"
International PV Forecast

Annual Installed PV Capacity Projections

Source: SEIA/GTM Research
Conclusion

Questions?

Daniel M. Adamson
VP, Regulatory Affairs & Counsel
Solar Energy Industries Association
dadamson@seia.org
Rough Headwinds: Challenges Facing Renewable Development

“A View From the States”
Nation’s Energy Supply

- Petroleum: 36%
- Natural Gas: 25%
- Coal: 20%
- Nuclear Electric Power: 10%
- Renewable Energy: 9%

Source: Renewable Energy Consumption and Electricity Preliminary Statistics
Renewable Generation Nation Energy Supply

- Renewables Account for Almost 10% of Generation in MegaWatts

- Sources of Renewable Energy and Percentage of Renewable Supply
  - Hydro: 57%
  - Wind: 22%
  - Geothermal: 3%
  - Biomass: 6%
  - Wood/Wood Waste: 11%
  - Solar: 1%
2011 State Renewable Energy Legislation

- Financing Projects (10 states)
- Tax Incentives (9 states)
- Grants (3 states)
- RPS and Enhancements to RECs (11 states)
- Favorable Land Use/Siting (9 states)
- Net Metering (7 states)
- “Self-Generation” Exceptions (9 states)

1Source: National Conference of State Legislation, www.ncsl.org/issues-research
Factors Driving the Development of Renewables

• Federal Tax Incentives
  – Investment Tax Credit (§1603 Cash Grant)
  – Bonus and MACRS Depreciation
  – Federal Production Tax Credit

• DOE Loan Guarantee Program

• State Programs (Loans, Grants, Tax Exemptions, Renewable Portfolio Standards, etc.)

• Declining Technology Costs
RPS Policies
www.dsireusa.org / April 2012

29 states +
DC and PR have an RPS
(8 states have goals)
Sales Tax Incentives for Renewables

www.dsireusa.org / March 2012

Notes: This map does not include sales tax incentives that apply only to geothermal heat pumps or other energy efficiency technologies.
Public Benefits Funds for Renewables

www.dsireusa.org | January 2012 (estimated collections)

18 states +
DC & PR have public benefits funds ($7.8 billion by 2017)

* Fund does not have a specified expiration date
** The Oregon Energy Trust is scheduled to expire in 2025

(Note: Slides 2-10 explain the methodology for calculating funding estimates.)
Net Metering

www.dsireusa.org / April 2012

43 states +
DC & PR have adopted a net metering policy

Note: Numbers indicate individual system capacity limit in kW. Some limits vary by customer type, technology and/or application. Other limits might also apply.
This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.
Loan Programs for Renewables

www.dsireusa.org / March 2012

38 states offer loan programs for renewables

Note: This map does not include loan programs for geothermal heat pumps or other energy efficiency technologies. The U.S. Virgin Islands also offers loans for certain renewable energy technologies.
Renewable Development Challenges

• Erosion of Government Tax Incentives and Subsidies
• Flat or Declining Electricity Prices
• Financial Pressure on State/Local Government
• Policy Scrutiny and Review of RPS
• Slow Recovery from Recession
• Ratepayer Backlash
• Less Emphasis on Environmental Benefits
Production/Investment Tax Credits

- Grant in Lieu of Credit Ended in 2011
- Wind Ends 2012
- Solar Ends 2016
Status of the §1603 Grant

Table 1. §1603 Grant Program Project Summary Data

<table>
<thead>
<tr>
<th>Technology</th>
<th>Number of Projects</th>
<th>Nameplate Electric Capacity (MW)</th>
<th>Total §1603 Funds Awarded ($ Millions)</th>
<th>Total Eligible Cost Basis ($ Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind - Large (&gt;1 MW)</td>
<td>197</td>
<td>12,810</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Wind - Small (&lt;1 MW)</td>
<td>291</td>
<td>17</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Solar - Photovoltaic (PV)</td>
<td>23,692</td>
<td>724</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Solar - Thermal</td>
<td>287</td>
<td>0</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Solar - Concentrated Solar Power (CSP)</td>
<td>11</td>
<td>216</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Solar - Concentrated Photovoltaic (CPV)</td>
<td>13</td>
<td>5</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Biomass</td>
<td>47</td>
<td>246</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Geothermal Electric</td>
<td>13</td>
<td>229</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Other</td>
<td>160</td>
<td>212</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Total</td>
<td>24,711</td>
<td>14,458</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>

Data reported reflects the §1603 program as of November 10, 2011.
Other Barriers to Renewable Development

• Cost of Certain Technologies
• Need for New Transmission Infrastructure
• Long Interconnection Queues/IC Procedures
• Complicated Utility RFP Processes
• Regulatory Approvals
RPS: Framework for Boom, Bust, Market Development?

- New Jersey and Pennsylvania Solar Markets
- Extraordinary Success or Market Development Mismanagement?
  - RPS
  - SREC Oversupply
New Jersey Solar

• 689 MWs Installed by February 2012

• 2,000 MWs in PJM Queue

• Aggressive RPS
  – Solar Set Aside
  – Favorable Legislation
  – Favorable net metering

• Solar Alternative Compliance Payment Level
New Jersey Solar (continued)

- Electric Distribution Company Programs
- Federal Tax Incentives (§1603 grant, etc.)
- Oversupply of SRECs Through Energy Year 2016
Legislature to the Rescue

- Should the Market be Left to Self-Correct?
- Acceleration of RPS?
- Management of Incentives
  - Grid Supply
  - Behind the Fence
Renewable Opportunities: Offshore Wind

• Strong Wind Supply off the East Coast, Potential for Great Lakes Area

• New Jersey Offshore Wind Economic Development Act, P.L.2010, c.57
  – Primary Funding Mechanism – ORECs (Offshore Wind RECs)
  – Projects Must Meet “Net Benefits Test”
Renewable Development With Less Federal Support?

• Attracting Investment?

• Can We Rely on Markets Alone?

• Are State Programs Enough?
  – Sustainability of State Programs
  – Regulatory Stability
Achieving Sustainable Renewable Development

- Federal Tax Incentives
- Stable, Long-Term Incentives and Programs
- Reasonable and Measured Incentives at the State Level
- Regulatory Predictability
Contact

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Chair, Energy and Public Utility Practice Group
Wilentz, Goldman & Spitzer, P.A.
hmcbride@wilentz.com or
(732) 855-6113
Pacific Gas and Electric Company (PG&E)

Company Facts
- Fortune 200 company located in San Francisco, CA
- $15B in operating revenues in 2011
- 20,000 employees

Energy Supply
- Services to 15M people:
  - 5.2M Electric accounts
  - 4.3M Natural Gas accounts
- Peak electricity demand: 20,000 MW
- Over 50% of PG&E’s electric supply comes from non-greenhouse gas emitting facilities

Service Territory
- 70,000 sq. miles with diverse topography
- 160,000 circuit miles of electric transmission and distribution lines
- 49,000 miles of natural gas transmission and distribution pipelines
“Unspecified Sources” is non-auditable electricity purchased from the market and generally reflects energy mix of the Western United States.

California Has Most Aggressive RPS Nationwide

State Renewable Portfolio Standards

www.dsireusa.org / March 2012

- WA: 15% x 2020*
- MT: 15% x 2015
- OR: 25% x 2025 (large utilities)*
- 5% - 10% x 2025 (smaller utilities)
- CA: 33% x 2020
- NV: 25% x 2025*
- CO: 30% by 2020 (IOUs)
- 10% by 2020 (co-ops & large munis)*
- AZ: 15% x 2025
- NY: 29% x 2015
- HI: 40% x 2030
- TX: 5,880 MW x 2015
- MI: 10% & 1,100 MW x 2015*
- WI: Varies by utility; ~10% x 2015 statewide
- IL: 25% x 2025
- IN: 15% x 2025*
- WV: 25% x 2025†
- VA: 25% x 2025*
- MD: 20% x 2022
- DE: 25% x 2026*
- DC: 20% x 2020
- PR: 20% x 2035
- CA: 33% x 2020
- OR: 25% x 2025 (large utilities)*
- 5% - 10% x 2025 (smaller utilities)
- NV: 25% x 2025*
- CO: 30% by 2020 (IOUs)
- 10% by 2020 (co-ops & large munis)*
- AZ: 15% x 2025
- NY: 29% x 2015
- HI: 40% x 2030
- TX: 5,880 MW x 2015
- MI: 10% & 1,100 MW x 2015*
- WI: Varies by utility; ~10% x 2015 statewide
- IL: 25% x 2025
- IN: 15% x 2025*
- WV: 25% x 2025†
- VA: 25% x 2025*
- MD: 20% x 2022
- DE: 25% x 2026*
- DC: 20% x 2020
- PR: 20% x 2035

29 states +
DC and PR have an RPS
(8 states have goals)
Renewable Procurement: Past, Present, and Future

Notes: 2011 figure is a preliminary figure, all percentages are rounded to nearest whole number
Contracting History

<table>
<thead>
<tr>
<th>Technology</th>
<th>#</th>
<th>MWs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioenergy</td>
<td>20</td>
<td>288</td>
</tr>
<tr>
<td>Geothermal</td>
<td>9</td>
<td>732</td>
</tr>
<tr>
<td>Small Hydro</td>
<td>7</td>
<td>83</td>
</tr>
<tr>
<td>Solar PV</td>
<td>28</td>
<td>2,576</td>
</tr>
<tr>
<td>Solar Thermal</td>
<td>14</td>
<td>2,735</td>
</tr>
<tr>
<td>Wind</td>
<td>39</td>
<td>3,638</td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
<td>10,051</td>
</tr>
</tbody>
</table>

Notes: Data current as of March 2012, Wave Technology contract was grouped with Small Hydro in 2007
# Renewable Energy Delivery Statistics

## Existing Facilities (includes Repowered/Restarts)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>#</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Facilities</td>
<td>73</td>
<td>7,680</td>
</tr>
<tr>
<td>Online</td>
<td>20</td>
<td>1,271</td>
</tr>
<tr>
<td>Under Construction</td>
<td>14</td>
<td>2,069</td>
</tr>
<tr>
<td>Under Development</td>
<td>24</td>
<td>2,793</td>
</tr>
<tr>
<td>Terminated/Expired</td>
<td>15</td>
<td>1,546</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>2,371</td>
</tr>
</tbody>
</table>

## New Facilities

<table>
<thead>
<tr>
<th>TYPE</th>
<th>#</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>20</td>
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<tr>
<td>Under Construction</td>
<td>14</td>
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<tr>
<td>Under Development</td>
<td>24</td>
<td>2,793</td>
</tr>
<tr>
<td>Terminated</td>
<td>15</td>
<td>1,546</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>7,680</td>
</tr>
</tbody>
</table>

## Utility Owned Generation (UOG)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>#</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Under Construction</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Under Development</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>150</td>
</tr>
</tbody>
</table>

**Note:** Data current as of April 10, 2012
Renewable Portfolio: Past, Present, and Future

2002 Actual
10.6% of total bundled retail sales

2011 Preliminary Actual
19.4% of total bundled retail sales

2020 Projected
33% of total bundled retail sales

Data Sources: PG&E’s 2002 Corporate Environmental Report and PG&E’s March 2012 RPS Compliance Report (modified to reflect notes below)
### Key Take-Aways

#### “Green Rush” seen in 2009 & 2010 unlikely to return
- Limited need for new projects
- Increased market participation
- Lower prices in the market

#### Higher project success rates than originally anticipated
- Successful navigation of permitting, transmission, and interconnection processes by developers
- Improved coordination and execution from permitting agencies (federal, state, and local)
- Access to financing and incentive programs (e.g., DOE loan guarantees, 1603 grant program)

#### Viability of projects is still a concern
- Contracting for projects that deliver far in the future
- Aggressively priced PV projects difficult to assess

#### Policy & Implementation
- Policy is moving faster than implementation
- Customers are not yet experiencing RPS rate impacts
Impact of the Shale Gas Revolution
EBA Annual Meeting
Impact of the Shale Gas Revolution

April 26, 2012
Cautionary Statement Regarding Forward-Looking Statements

This presentation includes certain forward-looking statements and projections. The company has made every reasonable effort to ensure that the information and assumptions on which these statements and projections are based are current, reasonable, and complete. However, a variety of factors could cause actual results to differ materially from the projections, anticipated results or other expectations expressed in this presentation, including, without limitation, our ability to execute our strategy of selling assets to El Paso Pipeline Partners, L.P.; our ability to pay dividends declared; volatility in, and access to, the capital markets; our ability to implement and achieve objectives in our 2011 plan and updated guidance, including achieving our earnings and cash flow targets; the effects of any changes in accounting rules and guidance; our ability to meet production volume targets in our Exploration and Production segment; the uncertainty of estimating proved reserves and unproved resources, the future level of service and capital costs, the availability and cost of financing to fund our future exploration and production operations; the success of our drilling programs with regard to proved undeveloped reserves and unproved resources; our ability to successfully identify and finance new Midstream opportunities; our ability to comply with the covenants in our various financing documents; our ability to obtain necessary governmental approvals for proposed pipeline and E&P projects and our ability to successfully construct and operate such projects; the risks associated with contracting of transportation commitments by our pipelines; regulatory uncertainties associated with associated pipeline rate cases; actions by the credit rating agencies; the successful close of our financing transactions; credit and performance risk of our lenders, trading counterparties, customers, vendors and suppliers; changes in commodity prices and basis differentials for oil, natural gas, and power; general economic and weather conditions in geographic regions or markets served by the company and its affiliates, or where operations of the company and its affiliates are located, including the risk of a global recession and negative impact on natural gas demand; the uncertainties associated with governmental regulation; political and currency risks associated with international operations of the company and its affiliates; competition; and other factors described in the company's (and its affiliates') Securities and Exchange Commission filings. While the company makes these statements and projections in good faith, neither the company nor its management can guarantee that anticipated future results will be achieved. Reference must be made to those filings for additional important factors that may affect actual results. The company assumes no obligation to publicly update or revise any forward-looking statements made herein or any other forward-looking statements made by the company, whether as a result of new information, future events, or otherwise.

Certain of the production information in this presentation include the production attributable to El Paso's 48.8 percent interest in Four Star Oil & Gas Company ("Four Star"). El Paso's Supplemental Oil and Gas disclosures, which are included in its Annual Report on Form 10-K, reflect its interest in the proved reserves of Four Star separate from its consolidated proved reserves. In addition, the proved reserves attributable to its interest in Four Star represent estimates prepared by El Paso and not those of Four Star.

Cautionary Note to U.S. Investors — In this presentation, we have disclosed our proved reserves using the SEC’s definition of proved reserves under rules effective December 31, 2009. Proved reserves are estimated quantities of hydrocarbons that geological and engineering data demonstrate with reasonable certainty to be recoverable in the future from known reservoirs under the assumed economic conditions. Although the SEC now allows companies to report probable and possible reserves, we have elected not to report on such basis in our SEC filings. In this presentation, we have provided estimates of our "risked" and "unrisked" proved reserves, which are different than probable and possible reserves as defined by the SEC. Note that we are not permitted to include or refer to our unproved resources on such a basis in any SEC filings, and these estimates of risked and unrisked unproved resources should not be construed as comparable to disclosures of our proved reserves. Risked and unrisked unproved resources are estimates of potential reserves that are made using accepted geological and engineering analytical techniques. Unrisked resources are less certain than risked resources as they do not contemplate the likelihood of a successful outcome. Investors are urged to closely consider the disclosures and risk factors in our Forms 10-K and 10-Q, available from our offices or from our website at http://www.elpaso.com, including the inherent uncertainties in estimating quantities of proved reserves.
Tennessee Gas Pipeline Co., L.L.C.

Lower 48 states shale plays

Source: Energy Information Administration based on data from various published studies. Updated: May 9, 2011.
Evolving Utica Opportunity

- Liquids rich play
- Requires processing
- First wells drilled – results strong
- Dry, wet, condensate, oil windows

Source: Wood Mackenzie Long Term View-November 2011
U.S. Shifts to Domestic, Onshore Supply

Source: El Paso November 2011 Macro Forecast ; ICF
Shale Surge Shifts Gas Trade Flows

CANADA DEMAND
- Western Canada Oil Sands
- Eastern Canada Coal Generation Retirements
- All Canada: GHG Coal Replacement Policy

CANADA SUPPLY
- WCSB Conventional
- Unconventional

LNG EXPORTS

MEXICO DEMAND
- Powergen and Industrial Growth
- Oil Conversion

MEXICO SUPPLY
- Gas Production declines as drilling shifts to oil
- LNG imports trail demand growth

Source: El Paso November 2011 Macro Forecast

1 Production + LNG imports
Flows Change as Supply/Demand Shifts

Changes 2010–2020 (Bcf/d)
INGAA’s June 2011 Infrastructure Study forecasts over $15 billion of capital expenditures for new pipeline capacity in the Northeast from 2011-2020.

**2005-2010**
- Supply Growth: ~5 Bcf/d
- Pipeline Capacity Additions:
  - > 12 Bcf/d

**2010-2015**
- Supply Growth: ~4 Bcf/d

**Northeast Demand Growth**
- 1.5 Bcf/d

**Southeast Demand Growth**
- 2.5 Bcf/d

**Proposed Pipeline Capacity Additions**
- > 12 Bcf/d

Source: EP Sep 2011 Macro / Bentek / EIA

1 Major interstate pipeline expansions only
Anecdotal evidence that 30% of Marcellus production is liquids-rich and requires processing; early results of Utica production confirm processing will likely be required.

- Need for processing varies
- Availability of processing varies
- Need for BTU solution as part of transportation needs varies
TGP’s Connectivity

- 108 delivery meters into 26 LDCs
- 42 receipt meters currently active with over 7 Bcf/d tap capacity
Legal Work

- Infrastructure investment
- Project areas
- Existing pipe
Infrastructure Investment

Graph showing actual and projected pipeline miles added from 2005 to 2012.

Table: Gas Infrastructure Additions: 2011-2020

<table>
<thead>
<tr>
<th>Infrastructure Type</th>
<th>Actual</th>
<th>Projected</th>
<th>Cost (nominal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Mainline</td>
<td>16,000 Miles</td>
<td>29 Bcf/d</td>
<td>52</td>
</tr>
<tr>
<td>Connecting Laterals</td>
<td>7,000 Miles</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Gathering Line</td>
<td>165,000 Miles</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Pipeline Compression</td>
<td>3,000,000 HP</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Gas Storage Fields</td>
<td>—</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Processing Capacity</td>
<td>18 Bcf/d</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

Source: Energy Information Administration

Source: INGAA Foundation, June 2011
Project Areas

Geographic Boundaries of United States Courts of Appeals and United States District Courts

El Paso Pipelines
El Paso E&P Resources
Existing Pipe

- New needs ➔ New services
- Old plumbing ➔ Purchases and sales
- Changes in flow ➔ Import/export flexibility ➔ Rate case implications
- Connectivity ➔ Interconnects ➔ Laterals
Thanks!
LNG Exports
Issues and Supply Responsiveness
Energy Bar Association
Annual Meeting
April 26, 2012

Richard G. Smead
Director, Navigant Consulting, Inc.

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North American LNG Exports—
14.00 Bcfd FTA Countries, 13.71 Bcfd non-FTA under consideration

<table>
<thead>
<tr>
<th>Company</th>
<th>Quantity (Bcfd)</th>
<th>FTA Applications (Docket Number)</th>
<th>Non-FTA Applications (Docket Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sabine Pass Liquefaction, LLC</td>
<td>2.2</td>
<td>Approved (10-85-LNG)</td>
<td>Approved (10-111-LNG)</td>
</tr>
<tr>
<td>Freeport LNG Expansion, L.P. and FLNG</td>
<td>1.4</td>
<td>Approved (10-160-LNG)</td>
<td>Under DOE Review (10-161-LNG)</td>
</tr>
<tr>
<td>FLNG Liquefaction, LLC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Charles Exports, LLC</td>
<td>2.0</td>
<td>Approved (11-59-LNG)</td>
<td>Under DOE Review (11-59-LNG)</td>
</tr>
<tr>
<td>Carib Energy (USA) LLC</td>
<td>0.03 Bcfd: FTA</td>
<td>Approved (11-71-LNG)</td>
<td>Under DOE Review (11-141-LNG)</td>
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<tr>
<td></td>
<td>0.01 Bcfd: non-FTA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominion Cove Point LNG, LP</td>
<td>1.0</td>
<td>Approved (11-115-LNG)</td>
<td>Under DOE Review (11-128-LNG)</td>
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<tr>
<td>Cameron LNG, LLC</td>
<td>1.7</td>
<td>Approved (11-145-LNG)</td>
<td>Under DOE Review (11-162-LNG)</td>
</tr>
<tr>
<td>Freeport LNG Expansion, L.P. and FLNG</td>
<td>1.4</td>
<td>Approved (12-06-LNG)</td>
<td>Under DOE Review (11-161-LNG)</td>
</tr>
<tr>
<td>FLNG Liquefaction, LLC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gulf Coast LNG Export, LLC</td>
<td>2.8</td>
<td>Under DOE Review (12-05-LNG)</td>
<td>n/a</td>
</tr>
<tr>
<td>Cambridge Energy, LLC</td>
<td>0.27</td>
<td>Pending Approval (12-18-LNG)</td>
<td></td>
</tr>
<tr>
<td>Total of all Applications Received</td>
<td>14.00 Bcfd</td>
<td></td>
<td>13.71 Bcfd</td>
</tr>
</tbody>
</table>

(Bcfd – billion cubic feet per day)

Office of Oil and Gas Global Security and Supply, Office of Fossil Energy, U.S. Department of Energy
North American LNG Exports—
Summary of Navigant Findings for Cove Point

- Reference Case
  - Includes Sabine at 2.0 Bcf/d and Kitimat at 0.7 Bcf/d
  - $6.00 in 2029 (2010 $)

- Cove Point Export Case
  - 2.7 plus 1.0 for Cove Point: 3.7 Bcf/d total, operating at 90% (26 MTPA)
  - $6.00 in 2027 instead of 2029, $6.61 in 2030

- Aggregate Export Case
  - Another 3.4 Bcf/d from the Other applications
  - 7.1 Bcf/d total (50 MTPA, almost as large as Australia)
  - Not a bad surrogate for where 13.71 Bcf/d of proposals might end up
  - 58¢ Higher in 2020, Flattens Later to 23¢ over prior case by 2030

- Very conservative assumptions (especially testing 90% load-factor utilization of the liquefaction trains and using already-robust forecasts of power demand)—and production assumes current technology.

- Most important element—World LNG prices never affect US prices—only US supply and demand affect US prices.

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It All Comes back to Supply—First, the Last Few Years . . .

Total U.S. Natural Gas Supplies, 2005 - 2010

Sources: U.S. Energy Information Administration, Shale production from Lippman Consulting Inc.

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How About Shale Production by Itself?

Actual Shale Production, 1990 to 2011

Bcf per Day, Dry

0.0 5.0 10.0 15.0 20.0 25.0 30.0


Actuals to 2011

©2012 Navigant Consulting, Inc.
How is Shale Doing Compared with What Producers Expected Four Years Ago?

Producer 2008 Composite Forecast

Bcf per Day, Dry

©2012 Navigant Consulting, Inc.
What Does This Mean for Total Domestic Supply?

From the Mid-50s to 78 Bcf/d in 20 Years, and an Extra 10 Bcf/d by 2020

* AEO 2011 adjusted for 2009 compendium of various producer forecasts of major plays – more recent estimates are even higher.

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• The headline-maker (prices 54 percent higher than the base case) was actually a combination of low shale supply and extremely high exports.

• EIA assumed that 12 Bcfd of exports actually happened, running at an average rate of 10 Bcfd. That’s about 78 million metric tonnes a year, which would put the United States potentially close to the top of all exporters—possibly ahead of Qatar and almost even with Australia.

• Meanwhile, EIA assumed a low supply case coupled with this large export case, in order to get the startling statistic.

• How much of the proposed exports will really happen, assuming regulatory approval, is just a question of competitive markets.
  — The Gulf Coast is a long way from Japan.—and over 80 percent of the US proposals are on the Gulf Coast.
  — British Columbia is planning to export about 5 Bcfd, with a straight shot to Asia.
  — There’s still the Alaskan gas to deal with, which may be another 4-5 Bcfd with a short path to Asia.

• So how low is the EIA’s estimate of US shale supply, compared with what we’re doing?
EIA Has Consistently Lagged the Actual Performance of Shale—by a Lot
What is the Most Likely Level of Shale Production for these Purposes?

![Graph showing U.S. Shale Gas Production (Dry)](image)

Source: EIA; Lippman/Navigant
• If Producers stay on track, there is at least 10 Bcfd of room, and probably more, to increase demand without causing excessive prices.

• Can they stay on track?—Yes, if environmental issues around development are resolved.

• What if demand grows more than the highest case or something happens to slow supply development?
  o DOE is being careful in its permitting process for non-FTA nations (the real market for LNG.
  o This caution was the reason EIA was commissioned to do its study.
  o In Sabine, DOE left room to trim back the authorization if supply/demand became too tight—that’s actually in their statutory authority.

• The questions raised by EIA’s headline-worthy numbers are not really valid—even EIA acknowledges that high exports with low domestic shale production do not make sense.

• Independent of Navigant and EIA, other analysts have found even less price impact from exports.
Impact of Shale Gas on Electric Generation

Lopa Parikh
Director of Regulatory Affairs
Edison Electric Institute

Sixty-Sixth Annual Meeting
Energy Bar Association
April 26, 2012
Washington, DC
Different Regions of the Country Use Different Fuel Mixes to Generate Electricity

*Includes generation by agricultural waste, landfill gas recovery, municipal solid waste, wood, geothermal, non-wood waste, wind, and solar.

** Includes generation by tires, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

Sum of components may not add to 100% due to independent rounding.


May 2010

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Coal Use is Declining

Sources: Department of Energy, Energy Information Administration
Retirements

- 53,000 MW of retirements or conversions of coal plants have been announced with retirement dates between 2010-2022

- Factors include:
  - Aging of the coal fleet - median construction age January 1966
  - Demand – Economy/Weather
  - EPA regulations
  - Fuel prices
## Coal Plant Retirements

<table>
<thead>
<tr>
<th>Company</th>
<th>Total MW</th>
<th>State</th>
<th>Year(s) Built</th>
<th>Year(s) Will Retire</th>
<th>Units Retiring/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEP</td>
<td>5,848</td>
<td>Various</td>
<td>1944-1980</td>
<td>2012-2014</td>
<td>26 units in 6 states (OH, WV, VA, IN, KY, TX)</td>
</tr>
<tr>
<td>AES</td>
<td>188</td>
<td>NY</td>
<td>1951, 1953</td>
<td>2011</td>
<td>2 units</td>
</tr>
<tr>
<td>Alliant</td>
<td>522</td>
<td>IA</td>
<td>1921-1968</td>
<td>2010</td>
<td>15 units</td>
</tr>
<tr>
<td>Ameren</td>
<td>1,277</td>
<td>MO, IL</td>
<td>1953-1961</td>
<td>2011, 2022</td>
<td>7 units</td>
</tr>
<tr>
<td>APS</td>
<td>634</td>
<td>AZ</td>
<td>1963, '64</td>
<td>2015</td>
<td>3 units (Four Corners)</td>
</tr>
<tr>
<td>BlackHills</td>
<td>44</td>
<td>CO</td>
<td>1955, '59</td>
<td>2013</td>
<td>2 units</td>
</tr>
<tr>
<td>Consumers</td>
<td>971</td>
<td>MI</td>
<td>1952-1958</td>
<td>2015</td>
<td>7 units</td>
</tr>
<tr>
<td>Dominion</td>
<td>2,515</td>
<td>various</td>
<td>1952-1992</td>
<td>2013-2022</td>
<td>17 units in 3 states (MA, IN, VA)</td>
</tr>
<tr>
<td>DTE</td>
<td>169</td>
<td>MI, CA</td>
<td>192, 87, 89</td>
<td>2010-2011</td>
<td>4 units</td>
</tr>
<tr>
<td>Duke</td>
<td>4,012</td>
<td>various</td>
<td>1940-1969</td>
<td>2011-2018</td>
<td>34 units in 4 states (NC, SC, IN, OH)</td>
</tr>
<tr>
<td>Dynegy</td>
<td>489</td>
<td>IL</td>
<td>1953-1959</td>
<td>2011-2013</td>
<td>4 units</td>
</tr>
<tr>
<td>Edison Int</td>
<td>1,239</td>
<td>IL</td>
<td>1955-1968</td>
<td>2010-2014</td>
<td>5 units</td>
</tr>
<tr>
<td>Empire District</td>
<td>88</td>
<td></td>
<td>190, 1954</td>
<td>2018</td>
<td>2 units</td>
</tr>
<tr>
<td>EFH</td>
<td>1,187</td>
<td>TX</td>
<td>1974-1975</td>
<td>2012</td>
<td>2 units (Luminant)</td>
</tr>
<tr>
<td>Exelon</td>
<td>895</td>
<td>PA</td>
<td>1954, 1960</td>
<td>2011-2012</td>
<td>3 units</td>
</tr>
<tr>
<td>First Energy11</td>
<td>3,797</td>
<td>various</td>
<td>1944-1972</td>
<td>2010-2012</td>
<td>24 units (MD, OH, PA, WV)</td>
</tr>
<tr>
<td>Madison G&amp;E</td>
<td>178</td>
<td>WI</td>
<td>1938-1961</td>
<td>2010-2012</td>
<td>5 units</td>
</tr>
<tr>
<td>Nisource13</td>
<td>629</td>
<td>IN</td>
<td>1950-1970</td>
<td>2010-2012</td>
<td>6 units</td>
</tr>
<tr>
<td>NRG14</td>
<td>440</td>
<td>DE</td>
<td>1951-1970</td>
<td>2010-2013</td>
<td>4 units</td>
</tr>
<tr>
<td>NV Energy</td>
<td>342</td>
<td>NV</td>
<td>1965, '68, '76</td>
<td>2016</td>
<td>3 units</td>
</tr>
<tr>
<td>OGE</td>
<td>171</td>
<td>OK</td>
<td>1956</td>
<td>2010</td>
<td>1 unit</td>
</tr>
<tr>
<td>PGE</td>
<td>601</td>
<td>OR</td>
<td>1980</td>
<td>2020</td>
<td>Will retire Boardman plant 20 years early</td>
</tr>
<tr>
<td>PPL</td>
<td>908</td>
<td>KY</td>
<td>1953-1969</td>
<td>2015</td>
<td>6 units (LG&amp;E and KU)</td>
</tr>
<tr>
<td>Progress15</td>
<td>2,532</td>
<td>NC, FL</td>
<td>1951-1972</td>
<td>2011-2020</td>
<td>13 units</td>
</tr>
<tr>
<td>Southern16</td>
<td>10,379</td>
<td>GA</td>
<td>1963-1967</td>
<td>2011-2013</td>
<td>5 units</td>
</tr>
<tr>
<td>TransAlta17</td>
<td>1,460</td>
<td>WA</td>
<td>1971</td>
<td>2019-2024</td>
<td>2 units (Centralia)</td>
</tr>
<tr>
<td>TVA18</td>
<td>4,775</td>
<td>various</td>
<td>1952-1965</td>
<td>2012-2017</td>
<td>25 units in 3 states (TN, AL, KY)</td>
</tr>
<tr>
<td>WE Energies</td>
<td>112</td>
<td>MI</td>
<td>1964, 1966</td>
<td>2010</td>
<td>2 units</td>
</tr>
<tr>
<td>Xcel Energy19</td>
<td>1,430</td>
<td>CO, MN</td>
<td>1951-1968</td>
<td>2010-2022</td>
<td>12 units</td>
</tr>
<tr>
<td>Others</td>
<td>2,031</td>
<td>various</td>
<td>1943-2004</td>
<td>2010-2022</td>
<td></td>
</tr>
<tr>
<td></td>
<td>53,353</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Environmental Regulatory Challenges: 2012 and Beyond

#### Waste & Chemical Management
- Coal Ash
- PCBs in Electrical Equipment
- HazMat Transport

#### Land & Natural Resources
- Transmission Siting and Permitting
- Avian Protection
- Endangered Species
- Vegetation Management

#### Water
- 316(b) Effluent Guidelines Limitations
- Waters of the United States
- NPDES Pesticide Permits
- Waterbody-Specific Standards

#### Climate
- NSPS- New & Modified Sources
- NSPS- Existing Sources
- BACT Permitting
- International Negotiations

#### Air
- Utility MACT
- Interstate Transport (CAIR/CSAPR)
- Regional Haze/Visibility
- Multiple NAAQS
- New Source Review (NSR)
Natural Gas Prices

Source: NYMEX
Natural Gas Trends

- Abundant shale resources
- Shale formations now account for more than 70% of total new production

Source: Department of Energy, the Energy Information Administration – AEO 2011.
U.S. Shale – A Game Changer?
Gas Production Potential

Historical Forecast

Source: Tristone Capital, Devon Energy
Rapid Growth of Shale Gas

- Shale gas as a percentage of US natural gas supply
  - 2000 -- 1%
  - 2010 -- 23%
  - 2035 -- 34%

- 650 trillion cubic feet - DOE estimate of total shale gas in US (energy equivalent = 118 billion barrels of oil)

- Shale rigs account for over 43% of total gas rigs

- Power industry is largest potential growth sector
Challenges to Gas

- 29 states plus DC have state RPS requirements
- Storage Resources
- Storage and pipeline capacity are being tested
- Demand Response and Energy Efficiency reduce demand
- Are estimates of shale gas amounts correct
- State and Federal Regulations
Shale Gas Regulations

- Disclosure of additives used in hydraulic fracturing aka fracking
  - WY, MI, TX, WVA have passed legislation requiring disclosure of fracking chemicals
  - CA, ILL, Mass, NY, PA among others are considering legislation
  - NJ and NY passed bills with a moratorium on fracking

- On April 13, White House issued an Executive Order establishing a high-level, interagency working group to facilitate Administration policy efforts to support safe and responsible unconventional domestic natural gas development

- On April 13, DOE, DOI, and EPA entered into a MOU to develop a multi-agency program directed toward a focused collaborative effort to address challenges associated with safely and prudently developing unconventional shale gas and tight oil resources.
Natural Gas Prices and Generation Investment

Henry Hub spot

Capacity Additions

Planned Additions

Coal
Gas
Nuclear
Renewables
Hydro

Henry Hub futures - Jan 12, 2012

$/MMBtu

MW

120,000
100,000
80,000
60,000
40,000
20,000
0


Natural Gas Prices and Generation Investment
Is gas the new coal?

- Due to low fuel prices, natural gas use for electric generation will probably continue to increase. EIA data shows coal’s share of electric generation dropped from 50% in 2004 to 45% in 2008 to 42% in 2011.

- Coal will continue to be used for newer more efficient plant that are still online

- Regulatory uncertainty for natural gas and coal will continue and impact construction decisions
Energy Bar Association
66th Annual Meeting

Subtitle

Presented by:
John Hanger
jhanger@eckertseamans.com

April 26, 2012
## Power Generation Trends

<table>
<thead>
<tr>
<th>Year</th>
<th>Natural Gas</th>
<th>Coal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>16%</td>
<td>52%</td>
</tr>
<tr>
<td>2008</td>
<td>20%</td>
<td>48%</td>
</tr>
<tr>
<td>2010</td>
<td>24%</td>
<td>44%</td>
</tr>
<tr>
<td>2012</td>
<td>29%</td>
<td>38%</td>
</tr>
</tbody>
</table>
1. Impact on Water from Drilling / Wastewater
   - Streams
   - Private water wells
   - Withdrawals

2. Operational Problems/Accidents
   - Spills
   - Leaks
   - Fires – Response time
   - Blow outs – Response time
   - 50 plus emergencies responses
Protecting the Environment – Issues for the Public

3. Truck Traffic Impact & Safety
   - Congestion
   - Road damage
   - Unsafe trucks

4. Gas Migration

5. Public Lands: State Forests & Parks
6. Staffing of Oil and Gas Program

7. Air Impacts
   - Nox
   - HAPs

Location
Number of Employees
Protecting the Environment – Issues for the Public

8. Seismic Impacts from Deep Well Injections - Arkansas

9. Disclosure of Chemicals - Ohio
Regulatory Response: Pennsylvania Case Study

- Review & Strengthen All Rules
  - 4 Regulatory Packages Enacted
    2. Waste Water Disposal/TDS Rule: August 2010
    4. 150 Feet Mandatory Buffer from All Development for 22,000 Miles of High Quality Steams: November 2010
Regulatory Response

- Staffing
  - 88 Positions in Oil Gas Program as of September 2008
  - Raised Fee When Applying For a Permit from $100 to as much as $10,000 for Deep Wells
  - Doubled Staff to 202 by January 2011
Regulatory Response

- Enforcement of Rules
  - 1,200 Violations Issued During 2010
  - 1,100 Violations Issued During 2011
  - Companies Pay for Clean Up of Spills, Leaks, Gas Migration
PA Water Withdrawals by Water Use*

- **Domestic Water Supply:** 152 million gallons per day
- **Public Water Supply:** 1.42 billion gallons per day
- **Irrigation:** 24.3 million gallons per day
- **Livestock:** 61.8 million gallons per day
- **Aquaculture:** 524 million gallons per day
- **Industrial:** 770 million gallons per day
- **Thermoelectric Power:** 6.43 billion gallons per day
- **Mineral:** 95.7 million gallons per day
- **Marcellus Shale Development:** 1.9 million gallons per day

*totals represent both surface water and groundwater use

Marcellus Shale Gas Development Water Use: June 1, 2008 - May 21, 2010 Susquehanna River Basin Commission basin-wide reported daily use of 0.99 MGD expanded to statewide estimate. Water sources: 29% Public water supplies, 71% Surface water withdrawals
Water Impacts From Gas Drilling Exist & Include Methane Migration to About 50 to 100 Private Water Wells

But Water Impacts of Gas Drilling Are Less Than:

- Oil Production
- Coal Production
- Biofuels
- Large Hydro
Gas Drilling Is not in Top 5 Impacts of Water in Pennsylvania

- Acid Mine Drainage
- Raw Sewage Discharges
- Nitrogen & Phosphorus from Agriculture & Other lands
- Sediment From Construction Areas
- Spills, Leaks, Accidents From Underground Takes, Transportation of Materials
# Protecting the Environment

## Four Remaining Main Environmental Issues

- **Air Emissions**
  - Smog

- **Methane Leakage**

- **Gas Migration**

- **Seismicity Associate With Injection of Wastewater in Deep Caverns**
Cases

- Dimock, PA
- Pavillion, Wyoming

Issues:
- Gas Migration
- Storage Pit Leaks
- Hydraulic Fracturing
### Environmental Challenges, Dangers & Opportunities Posed By Shale Gas Boom

- **Gas Migration**
  - Dimock
  - Pavilion
  - Duke University Study
  - Penn State University Study

- **Methane Leakage – Lifecycle Carbon**
  - Howarth
  - CMU, NETL, Worldwatch Institute, University of Maryland
  - Cornell Second Paper
  - Wigley Paper
Summary

1. Gas Is Displacing Coal Generation In USA and Producing Major Environmental Benefits
2. Shale Gas Boom Has Coincided With Renewable Energy Boom to Date
   - 29 States Mandate Increasing Portions of Electricity To Be Generated By Renewables
3. Shale Gas Production Has Had Minor Environmental Impacts
4. Shale Gas Production Is Industrial & Must Be Strongly Regulated
Transmission Development in an Evolving Marketplace
Transmission Development in an Evolving Marketplace

Energy Bar Association
Sixty-Sixth Annual Meeting

Suedeen Kelly
Patton Boggs, LLP
Washington, DC
FERC Order 1000
Non-Incumbent Transmission Developers

Core of Order No. 1000 is promotion of competition in regional transmission planning process.

Transmission providers are required to develop not unduly discriminatory regional process for project submission, evaluation and selection.
FERC Order 1000
Non-Incumbent Transmission Developers

Eliminates federal ROFR from FERC-approved tariffs and contracts.

- Applies only to facilities selected in regional plan for purposes of cost allocation.
- Does not apply to upgrades or existing rights-of-way.
- Permits (but does not require) competitive bidding.
- Does not impact state of local requirements regarding siting or construction of transmission.
- FERC is focused on process, not outcome.
FERC Order 1000
Right of First Refusal

Language:

- ROFR provisions must be removed from FERC-jurisdictional tariffs for facilities selected in a regional plan for cost allocation purposes.
- Incumbent Transmission Provider retains ROFR for:
  - A facility that is not selected in a regional plan for purposes of cost allocation;
  - Upgrades;
  - Projects on existing right of way (retention, modification, or transfer of rights-of-way remain subject to relevant law or regulation granting such rights).
- Transmission Provider can use competitive bidding to solicit transmission projects or project developers and state or local laws/regulations (e.g., siting, permitting) are not modified.
- Does not require the removal of ROFR from jurisdictional tariffs applicable to a local transmission facility.
- Does not assign any outgoing rights of a sponsorship for transmission projects.
FERC Order 1000
Right of First Refusal

• Order 1000 was not intended to circumvent any current or future state requirements.

• Legislative action would be required to address any states laws that advantage incumbents over non-incumbents.

• However, because of state concerns over Order 1000, we have seen the opposite occurring; some states are codifying the Right of First Refusal in state law to insure the incumbents continue to have exclusive (or semi-exclusive) rights to build.
FERC Order 1000
Right of First Refusal

Existing facilities:

- Since ROFR may be retained for upgrades of existing facilities and not for new facilities, where these may be alternative solutions to a problem, when this situation exists, incumbents could be incentivized to argue in favor of upgrades.
- Not a serious threat to picking the best project in areas where an RTO provides independent oversight of transmission planning.
- When a problem can be solved by upgrading existing facilities, it is already often preferred relative to a solution that requires new facilities simply because it may be lower cost, present fewer regulatory hurdles, etc.
FERC Order 1000
Right of First Refusal

Compensation for incumbents and non-incumbents:

- Potential for compensation to incumbents and non-incumbents to be identical in situations where both entities recover 100% of their revenue requirements under FERC jurisdictional tariffs.
- Even in this case, compensation may not be identical due to other factors that differ: costs, rate models and formulas, ROE, use of incentives, etc.

Transmission in retail rate base:
- In situations where an incumbent recovers significant portions of its revenue requirement through rates regulated at the individual state level, this will continue.
- There is no requirement in Order 1000 that trumps existing state rate authority.
FERC Order 1000
Right of First Refusal

Reliability standards:

- New entrants will be required to comply with the same reliability standards as incumbents.
FERC Order 1000
Right of First Refusal

Impact on RTO membership:

- The provisions of Order 1000 apply equally to utilities that aren’t in an RTO and to those that are in a RTO.
- If anything Order 1000 may incentivize RTO membership or formation of new RTOs since many of the activities required by Order 1000 are performed by RTOs today – thus a utility's compliance may be facilitated by being a member of an RTO.
FERC Order 1000
Right of First Refusal

Grid expansion:

• Yes, if the new processes are well designed and effective.
• This is particularly true in non-RTO areas where effective regional planning does not occur today and the lack of regional cost allocation mechanisms disincentivizes individual transmission owners from constructing projects that have broad benefits.
• The largest opportunities for enhancement of grid expansion from Order 1000 compliance lies in these non-RTO areas.
• The planning and cost allocation requirements in Order 1000 do more to facilitate grid expansion than ROFR elimination alone.
Transmission Development in an Evolving Marketplace

Transmission

EBA Annual Meeting
April 26, 2012

John Lucas
Points to Leave With You

- Contrary to some regions/areas – Lot of Transmission being built in Southeast.
- Reflections on Order 1000
- Challenges in Developing Transmission
- Rate Incentives/Cost Allocation Ideas
Transmission Development

• In summary:
  – For period 2007-11, Southern Companies have averaged (annually) some $560 Million in capital and $230 Million in O&M on new Transmission
  – For period 2009-11, SERC ranked second (behind WECC) in amount of new Transmission additions above 100 kV
  – SERC is 4th largest NERC Region
    • Had largest number of transmission additions in Eastern Interconnection
    • Had more new transmission than third (MRO) and fourth (SPP) regions combined

• Reflecting on Order 1000 – These indications don’t support a lack of new transmission being built in some regions
Order 1000 Implementation

- Difficult to apply many of the Reforms in our region
  - No Federal ROFR to remove from Tariff
  - Public Policy already addressed
  - Most Confounding Challenge: Southeast has a lot of new Transmission being built, but FERC feels processes are “unjust and unreasonable”
    - “Theory” appears to be: Additional planning and cost allocation requirements “may”, “could”, or will “potentially” do better job of identifying appropriate upgrades

- Compliance Requirements:
  - Complicated by lack of clear problem to be addressed
  - Just seems to add bureaucracy and create uncertainty
  - Concerned about impact to existing IRP processes (don’t need reforms to slow things down)
  - Cost allocation has traditionally not been a problem; If benefits are shown, TOs have worked out cost sharing
Challenges Getting Transmission Built

• Plans are not blueprint; Tend to by cyclical and evolve slowly
• Assumptions constantly changing
• Lot of additional bureaucracy with new Federal requirements
• Eisenhower quote:
  – “Plans are Nothing; Planning is Everything”
• The hard part of getting it built includes:
  – Permitting/Certification
  – Environmental impacts
  – Land acquisition
• Once built: Ongoing challenge of weather (hurricanes and tornadoes)!
Incentives

• FERC is under Congressional mandate to provide incentives

• Some possible improvements:
  – Better guidance on application of nexus test
  – Treat CWIP and abandoned plant cost recovery under general ratemaking principles
  – More transparency when denying/granting incentives

• Incentives reasonable in certain circumstances; Has not been an issue in our service territory
Cost Allocation

- If benefits can be demonstrated, the cost allocation should be possible
- Wish FERC had not precluded Participant Funding as a method
- Why don’t projects go forward?
  - Usually not a planning or cost allocation issue
  - Typically projects are just not economical
  - Beneficiary doesn’t want to pay
- Transmission facilities will be built when a customer commits to a power supply decision where the total delivered cost is economical
Transmission Development in PJM

Energy Bar Association
Washington, DC
April 26, 2012

Steven Herling
Vice President, Planning
PJM Interconnection
• Required June 1, 2012 service date
• Due to delays the line is not expected until June 1, 2015.
• Updated analysis using the 2011 load forecast confirmed double circuit tower line (DCTL) violations beginning in summer 2012
• Near-term Solution: Operate to the DCTL violations in real-time operation. Adjust generation and implement DR as required to maintain the reliability of the grid.
• National Park Service selected the route proposed by PS and PL as the preferred route. Official Record of Decision expected later this fall.
2011 RTEP analysis suggests the need for the line has moved several years into the future beyond 2015.

Based on these analyses the PJM Board has decided to hold the project in abeyance in the RTEP and requested that the transmission owners suspend development activities.

PJM Board directed staff to perform additional analysis using the 2012 RTEP assumptions and incorporating the results of the RPM base residual auction that will be run in May 2012.
MAPP – Mid-Atlantic Power Pathway project

- This 2011 RTEP analysis which included various generation sensitivities, suggests the need for the line has moved several years into the future beyond 2015.

- Based on the 2011 RTEP analyses, the PJM Board has decided to hold the project in abeyance in the RTEP with a 2019 – 2021 service date.

- PJM Board directed staff to perform additional analysis using the 2012 RTEP assumptions and incorporating the results of the RPM base residual auction that will be run in May 2012.
All Pending Generator Deactivations

Over 16,300 MW of Pending Deactivations
(~13,700 MW since 11/2011)
The 2012 study will build off of work done as part of the 2011 RTEP.

Study will identify the transmission impact of satisfying state RPS requirements under three sourcing scenarios:
- 7GW Offshore scenario
- 0GW Offshore scenario
- 60/40 – PJM/External Resource scenario
NOTES
BIOGRAPHIES
Dan Adamson is Vice President of Regulatory Affairs. He leads SEIA’s regulatory affairs operations and assists with certain legislative matters. Prior to joining SEIA Dan was a partner at the law firm Davis Wright Tremaine LLP where he represented clients on energy and environmental matters before Congress, FERC, agencies and the courts. Previously, Adamson was Director of the Office of Energy Projects at FERC, responsible for regulation of hydroelectric dams, natural gas pipelines and LNG facilities.

Earlier he served at the Department of Energy as an electricity policy advisor to the Secretary and as Deputy Assistant Secretary for Power Technologies.

Dan began his career with a nine year stint as a Congressional staffer, including seven years on the staff of the House Committee on Natural Resources.

Adamson holds a J.D. cum laude from the Georgetown University Law Center, an M.A. in Political Science from the University of California, Santa Barbara, and a B.Phil. from the Miami University of Ohio. He is admitted to practice in DC, Maryland, California, U.S. Court of Appeals for D.C., 9th and 4th Circuits and the U.S. Supreme Court.

Dan lives with his family in Silver Spring, Maryland in a home with a 3 kW solar system.
JOEL BEAUVAYS BIOGRAPHY

Joel Beauvais is Special Counsel to the Office of the Administrator in the U.S. Environmental Protection Agency’s Office of General Counsel. He is lead counsel to the Agency on congressional oversight and legislative matters and also provides counsel on a variety of cross-cutting legal and policy issues, including power sector and greenhouse gas regulations.

Prior to his tenure at EPA, Mr. Beauvais worked for several years on energy and environmental policy in the U.S. House of Representatives, first for the Select Committee on Energy Independence and Global Warming and then for the Committee on Energy and Commerce. While in the House, he played a key role in the negotiation and drafting a broad array of energy and climate legislation. He previously was an associate with Latham & Watkins’ Washington D.C. office and clerked for Justice Sandra Day O’Connor on the Supreme Court of the United States and for Judge Harry T. Edwards on the U.S. Court of Appeals for the D.C. Circuit.

He graduated summa cum laude New York University School of Law, and holds a B.A. in political science (magna cum laude) from Yale University, where he was Phi Beta Kappa.
Kurt Bilas CV

Kurt Bilas is the Executive Director, Government Relations for the Midwest Independent Transmission System Operator (MISO), a non-profit organization that operates the high voltage transmission lines, and energy and ancillary services markets in the Midwest. The MISO operates in all or part of 11 states and one Canadian province. He joined the MISO in April 2008.

Prior to joining the MISO, he was a counsel with the minority staff of the Energy and Commerce Committee of the U.S. House of Representatives, where his areas of responsibility included electricity, renewable energy, energy efficiency, nuclear power and climate change issues. Prior to joining the Committee, Mr. Bilas was Senior Counsel with Reliant Energy, a Texas-based independent power producer, where he focused on federal and state regulatory issues in the Western U.S., particularly California. Before joining Reliant, Mr. Bilas was an associate attorney at Skadden, Arps, Slate, Meagher and Flom, where he specialized in federal and state energy regulatory issues, mergers and acquisitions, and utility industry restructuring. Prior to Skadden, Mr. Bilas worked on power plant construction litigation and environmental matters as an associate attorney at Pillsbury, Madison and Sutro, and began his legal career as a trial attorney in the Electric and Hydroelectric Litigation office of the Federal Energy Regulatory Commission.

Mr. Bilas worked for Bechtel Power as a field civil, cost and schedule engineer on coal-fired power plants, and as a consulting engineer on construction litigation matters. He has a J.D. degree from Case Western Reserve University (Cleveland, Ohio, 1989), and a B.S. in Civil Engineering from the University of Toledo (Toledo, Ohio, 1981).
Edward H. Comer is Vice President, General Counsel, and Corporate Secretary at the Edison Electric Institute. He began at EEI as a staff attorney in 1981 and became Vice President and General Counsel in 1998. Ed was elected Corporate Secretary in September, 2011.

At EEI, Ed is responsible for all legal issues affecting EEI and its members and works directly on the critical policy issues affecting the electric industry. He represents EEI in Congress and in proceedings before federal regulatory agencies, including the Federal Energy Regulatory Commission, the Department of Energy, the Environmental Protection Agency and several others agencies. He also represents EEI before state legislative and administrative bodies and with state officials on matters of generic industry interest. Currently he is personally engaged in issues involving environmental rules, transmission siting, smart grid implementation, energy efficiency and general utility regulation.

Ed manages an active litigation practice at EEI. EEI regularly appears as an amicus or intervenor in matters of general electric utility interest in cases before the U.S. Supreme Court, federal Courts of Appeals and the highest Courts in individual states. A recent successful case is American Electric Power Co. v. Connecticut, where the U.S. Supreme Court held that federal courts lacked authority to consider common law tort claims relating to emissions of greenhouse gases.

Ed also hosts EEI's biannual Legal Conferences, which discuss legal issues of significance to the electric industry. EEI's Legal Conferences are widely regarded as an excellent source of cutting-edge information within the electric industry and are certified for Continuing Legal Education Credits in over 30 states.

Ed holds a Bachelors degree from the University of Chicago, where he specialized in Russian History, and a Law degree from the University of Pennsylvania Law School. He is an active member of the American Bar Association, the Energy Bar Association and the Association General Counsel Forum. Prior to joining EEI, he spent several years in private practice at Terris and Sunderland in Washington, D.C. Before that, he worked at the Office of Hearings and Appeals at the U.S. Department of Energy (DOE) on oil rate regulation and allocation issues.

April 2012
DAVID COOK is Senior Vice President and General Counsel of the North American Electric Reliability Corporation. He joined NERC’s predecessor, the North American Electric Reliability Council, in 1999 and led NERC’s efforts to secure passage of U.S. reliability legislation as part of the Energy Policy Act of 2005. For many years he participated with the Federal/Provincial/Territorial Assistant Deputy Ministers Working Group on Electricity as it considered reliability matters for the several Canadian jurisdictions. Following passage of the U.S. legislation, he worked with stakeholders from all sectors to gain certification of NERC as the “electric reliability organization” under the new section 215 of the Federal Power Act.

Prior to joining NERC, he spent twenty years with the U.S. Federal Energy Regulatory Commission, the last ten as Deputy General Counsel. He was a member of the Senior Executive Service and was the Commission’s representative to the Administrative Conference of the United States. Mr. Cook was heavily involved in the Commission’s restructuring efforts for both the natural gas and electric industries.

Mr. Cook began his legal career in 1972 with the Chicago law firm of Schiff Hardin & Waite, where he concentrated on commercial litigation, public utility law, and industry self-regulation of securities markets. He holds degrees from the University of Chicago Law School, the University of Chicago Divinity School, and Western Reserve University.

March 2012
Joel joined Bruder, Gentile & Marcoux, L.L.P. as a partner on September 1, 2011. Joel will help oversee the firm’s already robust practice in the area of regulatory compliance and audits. Joel served as the Director of Compliance Enforcement for the North American Electric Reliability Corporation (NERC) since February 2010. In that capacity, he managed the enforcement of Reliability Standards by NERC and its eight regional organizations across North America. While maintaining NERC’s rigorous compliance enforcement objectives, Joel focused on helping to improve efficiency in processing violations by focusing resources on risks deemed most significant to the reliability of the bulk power system, while reducing administrative burdens in connection with violations having less onerous reliability risks. Joel previously served as the Director of Regional Operations in NERC’s compliance and enforcement program. He had operational oversight of the NERC regional organizations with respect to their delegated functions and facilitated improvements in coordination between NERC and the regional organizations. One of Joel’s priorities was to promote consistency in auditing and other compliance monitoring methods.

Before joining NERC in 2009, Joel was Assistant General Counsel for Federal Regulation at National Grid. In that position, he oversaw National Grid’s legal activity at FERC and the Department of Energy. On National Grid’s behalf, Joel had an active role in the development of FERC policy on electric transmission issues, including tariffs, pricing, siting, interconnection, regional transmission organizations and regional planning, and in FERC’s implementation of the Energy Policy Act of 2005, including policies on mergers, and repeal of the Public Utility Holding Company Act of 1935. From 2006 to 2008, Joel also served as National Grid’s representative to and Vice President of the Working Group for Investment in Reliable and Economic Electric Systems (WIRES), a trade group dedicated to advancing electric transmission development.

Prior to joining National Grid, Joel was Vice President of Regulatory Affairs at a telecommunications firm specializing in broadband joint ventures with public utilities. He also held Counsel and Associate positions at a Washington, D.C. law firm that focused on regulation in the electricity, natural gas and telecommunication fields.

Joel received his J.D. from the University of Chicago Law School in 1990 and a B.A. in Government with distinction in all subjects from Cornell University in 1987.
Mauricio del Valle

Mauricio del Valle is an Executive Director in the Global Power and Utility Group at Morgan Stanley and has over ten years of experience in Investment Banking. Mr. del Valle works with corporate clients on a range of financing and strategic advisory assignments, and specializes in the unregulated generation and electric utilities sectors in the United States of America.

Selected transactions include Constellation Energy’s $11.5Bn merger with Exelon, PNM’s sale of First Choice Power to Direct Energy (Centrica), Constellation Energy’s sale of UniStar to EDF and the restructuring of Constellation Energy’s partnership with EDF, RRI Energy’s merger with Mirant, Pepco’s sale of Conectiv to Calpine, the defense of NRG Energy from Exelon’s unsolicited bid, the sale of 49.99% of Constellation Energy Nuclear Group to EDF, RRI Energy’s sale of Reliant retail to NRG Energy, NRG Energy’s acquisition of Texas Genco (and related $10.3Bn in financings), and numerous debt and equity financings for Calpine, NRG Energy, PSEG, Pepco Holdings Inc, and Progress Energy among others.

Mr. del Valle graduated from the Instituto Tecnologico Autonomo de Mexico (“ITAM”) in Mexico City with a Bachelor’s degree in Actuarial Science. He also holds a Masters in Finance from ITAM and an MBA from the University of Virginia’s Darden School of Business. Mr. del Valle serves on the Board of Trustees of the Brooklyn Conservatory of Music in Brooklyn, New York.
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John Hanger supports Eckert Seamans’ practices in the areas of energy, utility and environment, concentrating in alternative energy, clean transportation infrastructure, energy efficiency, competitive energy markets and smartgrid. Prior to entering private practice, he served as the Secretary of the Pennsylvania Department of Environmental Protection for over two years under former Governor Edward G. Rendell. John is also a former Commissioner of the Pennsylvania Public Utility Commission, making him one of the few leaders with major policy making authority in both utility and energy as well as environmental agencies.

John is a nationally recognized expert on environment, energy, gas drilling and green economy issues who has unique experience in government and in the private sector. He is one of a two Pennsylvanians who have served both as a Secretary of the Department of Environmental Protection and as a Commissioner of the Pennsylvania Public Utility Commission.

John has written leading utility and environmental regulatory decisions, enacted major environmental and utility rules, and played a pivotal role in writing and passing major legislation such as Pennsylvania's 1996 Electricity Generation Competition and Customer Choice Act, the 2004 Alternative Energy Portfolio Standards Act, the 2005 Growing Greener 2 legislation, the 2007 Net Metering statute, the 2008 Act 129 initiating major electricity conservation programs, the 2008 Act 70 requiring DEP to write a climate change action plan, the 2008 Alternative Fuels Act, the 2010 Recycling Fee extension, and others.

John has testified to the United States Senate, the United States House of Representatives and many state legislatures. He has been interviewed thousands of times by media outlets including the New York Times, Wall Street Journal, CNN, NBC Evening News, CBS Evening News, BBC, and many more.

John served from 2008 to 2011 as the Secretary of the Pennsylvania Department of Environmental Protection (DEP), the Chair of the Pennsylvania Energy Development Authority, the Chair of the Environmental Quality Board, Vice Chairman of the Pennsylvania Infrastructure and Investment Authority, and a Commissioner of the Susquehanna River Basin Commission. He also chaired the Pennsylvania Mine Safety Board. In 2010, for the first time in Pennsylvania’s history, no miners died on the job.

As Secretary of the Department of Environmental Protection, John was in charge of permitting and regulation of gas drilling in Pennsylvania. He led a complete review of regulations governing gas drilling and enacted major new rules governing drilling of wells as well as the withdrawal of water for drilling and the disposal of drilling wastewater. John also led Pennsylvania's alternative energy development with the equivalent of the Pennsylvania Energy office reporting to him. He played a crucial role in assisting thousands of clean energy projects
become a reality and attracting $2.5 billion of private investment in just 2010 to Pennsylvania for clean energy investment. John also led Pennsylvania's implementation of the energy and water infrastructure portions of the American Recovery and Reinvestment Act (ARRA). Pennsylvania ranked second in the nation in ARRA energy implementation, completing 20,000 energy projects. Pennsylvania received directly $136 million of ARRA energy funds that were then leveraged with more than $670 million of private matching investment.

John was also instrumental in directing the Department of Environmental Protection's work on the Chesapeake Bay clean up, climate change, including overseeing the writing of Pennsylvania's Climate Change Action Plan, recycling and waste, mining and mine reclamation, air regulation, radiation protection, and many more matters.

John was the founding President of Citizens of Pennsylvania's Future or PennFuture from 1998 to 2008, the leading public interest organization working to improve the environment and economy.

John also served as a Commissioner of the Pennsylvania Public Utility Commission from 1993 to 1998 where he became the architect of Pennsylvania's successful law that ended electric generation monopolies and allowed consumers to choose their electric generation suppliers or build their own power supply. He was also a proponent of competition in the natural gas and telecommunications industries. John also championed programs that assisted low-income customers to avoid utility shut-offs and energy efficiency.

John began his legal career in the Energy Project at Community Legal Services in Philadelphia where he became the appointed Public Advocate representing 500,000 customers of the Philadelphia Gas Works and the Philadelphia Water Department in rate cases and other proceedings.

Thanks substantially to the leadership of John, Pennsylvania built 1,200 megawatts of renewable energy since 2003, including 20 wind farms, more than 4,000 solar projects, 43 landfill gas projects, and many more clean energy projects. As a result of Act 129, Pennsylvania now is a top five state in energy efficiency projects.

Pennsylvania's booming green economy now includes approximately 200,000 jobs with 52,000 people employed in recycling companies, at least 86,000 jobs in energy efficiency, and 41,000 jobs in renewable energy. Pennsylvania's unemployment rate has been consistently about 1% below the national average for the last eight years.

**Practice Groups**

Energy
Litigation
Utilities and Telecommunications

**Education**

J.D., University of Pennsylvania School of Law, 1984
B.A., Duke University, 1979

**Admissions**

Pennsylvania
U.S. District Court for the Middle District of Pennsylvania
U.S. Court of Appeals for the Third Circuit
BARBARA A. HINDIN

Barbara A. Hindin is Associate General Counsel at the Edison Electric Institute (EEI), where she concentrates on a broad range of federal legislative and regulatory issues primarily in the areas of transmission and reliability. She was part of EEI’s team working on the passage of the Energy Policy Act of 2005 (EPAct), particularly the mandatory reliability standards provision. Following the passage of EPAct, she worked with EEI member companies on the implementation of the Electric Reliability Organization (ERO), including certification of the ERO and regional entities, approval of mandatory reliability standards and development of the ERO’s Compliance Monitoring and Enforcement Program (CMEP). Since then, she has been actively involved in EEI’s advocacy on reliability issues, with both FERC and NERC.

She also works on transmission issues, including transmission planning, rate incentives, and open access issues. She also led EEI’s advocacy efforts on FERC’s Standards of Conduct and is responsible for EEI’s online training programs on the FERC Standards of Conduct and Anti-Market Manipulation rules. She is a founding member of the National Energy Compliance Forum (NECF), a group of electric utility compliance professionals who share best practices on compliance issues.

Prior to joining EEI in 1994, Barbara held positions in law firms and in-house legal departments, including the Atlantic Richfield Company and the Chemical Manufacturers Association.

Ms. Hindin received her undergraduate degree from the University of Wisconsin (Madison) and her law degree from UCLA. She is admitted to practice in the District of Columbia and California.

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April 2012
Suedeen Kelly is an internationally-recognized energy industry veteran and former Commissioner with the Federal Energy Regulatory Commission (FERC) from 2003 - 2009. She represents a variety of clients in the electric and natural gas industries on business, regulatory, litigation and policy matters. In addition to her time at FERC, Ms. Kelly was a law professor at the University Of New Mexico School Of Law where she taught energy law, utility regulation, administrative law and legislative process. She also served as chairwoman and commissioner for the Public Service Commission of New Mexico, in the private practice of law in New Mexico (Modrall; Sheehan, Sheehan & Stelzner; Luebben, Hughes & Kelly) and Washington, DC (Ruckelshaus, Beveridge Fairbanks and Diamond) and as an attorney for the Natural Resources Defense Council.

Currently, Ms. Kelly is a Partner at Patton Boggs, LLP practicing energy law where she also holds the position of co-chair of the Public Policy and Regulatory Department.
Martin Kirkwood is Principal Reliability Counsel at the Federal Energy Regulatory Commission. In this role, Martin oversees the work of the Office of General Counsel on reliability issues and coordinates with the Office of Electric Reliability in advising the Commissioners, their assistants and other Commission staff.

Prior to his current position, Martin was a Legal Advisor to FERC Commissioner Marc Spitzer, where he advised the Commissioner on electric, enforcement and policy matters.

Prior to joining Commissioner Spitzer’s staff, Martin was an attorney with Jones Day in Washington, D.C. At Jones Day, Martin represented electric utilities and interstate natural gas pipelines before the FERC, DOE, and the appellate courts.
BIO FOR BARRY LAWSON – ASSOCIATE DIRECTOR, POWER DELIVERY & RELIABILITY, NRECA

Barry Lawson joined the National Rural Electric Cooperative Association (NRECA) in April 2001. His current focus is on FERC and NERC polices related to reliability, including standards development and compliance issues, DOE and FERC transmission pricing, congestion and access initiatives, and he is also very involved in critical infrastructure protection policy issues. In addition, Barry is currently a member of DOE’s Electricity Advisory Committee.

Prior to joining NRECA, Barry performed transmission policy consulting work for two years with KEMA Consulting in Fairfax, VA. Prior to that, for two years he was a Regulatory Associate for the interstate natural gas pipeline company Columbia Gas Transmission. Barry also spent four years with the Edison Electric Institute (EEI) in Washington, DC as a Senior Analyst in their Power Supply Policy group. Before entering the policy side of the utility industry, Barry spent 10 years with Virginia Power in the distribution engineering and customers service areas. Barry has a BS in Civil Engineering Technology from Old Dominion University in Norfolk, VA.

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JONATHAN A. LESSER, PhD

Dr. Jonathan Lesser is the President of Continental Economics, Inc., and has over 25 years of experience working for regulated utilities, governments, and as an economic consultant. He has extensive experience in valuation and damages analysis, from estimating the damages associated with breaking commercial leases to valuing nuclear power plants. Dr. Lesser has performed due diligence studies for investment banks, testified on generating plant stranded costs, assessed damages in commercial litigation cases, and performed statistical analysis for class certification. He has also served as an arbiter in commercial damages proceedings.

He has analyzed economic and regulatory issues affecting the energy industry, including cost-benefit analysis of transmission, generation, and distribution investment, gas and electric utility structure and operations, generating asset valuation under uncertainty, mergers and acquisitions, cost allocation and rate design, resource investment decision strategies, cost of capital, depreciation, risk management, incentive regulation, economic impact studies of energy infrastructure development, and general regulatory policy.

Dr. Lesser has prepared expert testimony and reports in cases before utility commissions in many U.S. states; before the Federal Energy Regulatory Commission (FERC); before international regulators in Latin America and the Caribbean; in commercial litigation cases; and before legislative committees in numerous states. He has also served as an independent arbiter in disputes involving regulatory treatment of utilities and valuation of energy generation assets.

Biography – John E. Lucas
General Manager, Transmission Policy and Services
Southern Company Transmission

Mr. Lucas joined Southern Company Services, Inc. (SCS) in 1977 and has worked in the areas of System Planning, Bulk Power Markets and Bulk Power Operations. In 1995, as the industry began dealing with the Commission’s initiatives on open access transmission service, John began work in the newly created Transmission Services function. In his current role as General Manager - Transmission Policy and Services, Mr. Lucas has responsibility for overall management, development and implementation of transmission and interconnection policy and for the administration of Southern Companies’ Open Access Transmission Tariff (Tariff).

Mr. Lucas participated as a charter member of the Commercial Practices Working Group (CPWG) before the group was established as the NERC Market Interface Committee (MIC). Mr. Lucas served for over two years as the SERC representative on the MIC during which time the MIC developed, filed and implemented the OASIS Business Practices accepted by FERC in Order 638. Mr. Lucas served on the North American Energy Standards Board (NAESB) from June 2005 through December 31, 2010 representing the Transmission IOU segment.
Ralph L. Luciani
Vice President
Charles River Associates (CRA)

Ralph Luciani has more than 20 years of consulting experience analyzing economic and financial issues affecting regulated industries. He has had a special focus on the electricity industry, where he has assisted electric utilities and merchant generating companies with business planning and restructuring, resource planning, power solicitations, ratemaking, fuel and power supply contract negotiations, and environmental compliance strategy. He has conducted numerous cost benefit studies for utilities examining the costs and benefits of joining an RTO, and is currently leading the economic modeling work on behalf of the Eastern Interconnection Planning Collaborative.

Mr. Luciani has assisted clients and their legal counsel in the management of numerous complex litigation matters, including electric utility prudence and rate cases, and assessments of economic damages in commercial disputes. He has assisted many clients in reaching agreements in settlement processes administered by the Federal Energy Regulatory Commission, and has appeared as an expert witness in a number of regulatory proceedings. Mr. Luciani holds a BS in Electrical Engineering and Economics and a MS in Industrial Administration from Carnegie Mellon University.
Hesser G. McBride, Jr.

**Practice Areas:** Energy Law, Public Utility Law, Telecommunications, Local Government Public Procurement and State Tax Law


**Bar Admission:** New Jersey, 1987
United States District Court for the District of New Jersey, 1987

**Education:**
J.D., Seton Hall University School of Law, 1987
B.S., Seton Hall University, 1982

**Clerkship:**
Law Clerk, Hon. Henry H. Wiley
Superior Court of New Jersey, Chancery Division, General Equity

**Biographical Information:**
Hesser G. McBride, Jr., is a shareholder with Wilentz, Goldman & Spitzer, P.A. and chair of its Energy, Telecommunications and Public Utilities Law practice group. Mr. McBride’s practice is concentrated primarily in the areas of energy regulation, renewable energy, energy competition, telecommunications law, cable television law, public utility law, local government procurement law and State tax matters. On behalf of corporations, municipal entities, public entities, and individuals, Mr. McBride appears before State administrative agencies in connection with regulatory approval, regulatory compliance and regulatory enforcement proceedings. Mr. McBride also devotes a portion of his practice to public utility rights-of-way issues and litigation, including the siting of utility facilities and compliance with the New Jersey Underground Fault Protection Act (“One Call”).

Mr. McBride regularly represents clients in connection with the development of renewable energy projects, including solar photovoltaic energy projects and drafts and negotiates power purchase agreements (PPAs) and engineering, procurement and construction (EPC) contracts. Mr. McBride negotiates third-party energy supplier agreements and regularly provides advice to governmental entities regarding energy procurement issues, including the development of energy generation and efficiency projects.

Mr. McBride regularly works in a local counsel capacity with attorneys from other states in connection with New Jersey energy projects.

Mr. McBride is a member of the American Bar Association’s Public Utility Law Section, a member of the New Jersey Bar Association Renewable Energy and Clean Technology Committee, an Officer of the New Jersey State Bar Association’s Public Utility Law Section, a member of the Federal Energy Bar Association, a member of the Association
of the Bar of the City of New York, Telecommunications Law Committee, and the Federal Communications Bar Association. Mr. McBride has an “AV” Martindale-Hubbell Peer Review Rating, and for several years has been recognized by Best Lawyers in America in “Energy Law” and as a “Super Lawyer” in New Jersey Monthly magazine.

Mr. McBride regularly lectures and writes articles on energy law, public utility law and telecommunications law.

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William D. Nordhaus is Sterling Professor of Economics at Yale University, New Haven, Connecticut, USA. He was born in Albuquerque, New Mexico (which is part of the United States). He completed his undergraduate work at Yale University in 1963 and received his Ph.D. in Economics in 1967 from the Massachusetts Institute of Technology, Cambridge, USA. He has been on the faculty of Yale University since 1967 and has been Full Professor of Economics since 1973. He is also Professor in Yale’s School of Forestry and Environmental Studies. Professor Nordhaus lives in downtown New Haven with his wife Barbara, who works at the Yale Child Study Center.

Nordhaus is a member of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences. He is on the research staff of the National Bureau of Economic Research, the Cowles Foundation for Research, and has been a member and senior advisor of the Brookings Panel on Economic Activity, Washington, D.C. since 1972. Professor Nordhaus is current or past editor of several scientific journals and has served on the Executive Committees of the American Economic Association and the Eastern Economic Association. He serves on the Congressional Budget Office Panel of Economic Experts and was the first Chairman of the Advisory Committee for the Bureau of Economic Analysis. He was the first Chairman of the newly formed American Economic Association Committee on Federal Statistics. In 2004, he was awarded the prize of “Distinguished Fellow” by the American Economic Association.

From 1977 to 1979, he was a Member of the President's Council of Economic Advisers. From 1986 to 1988, he served as the Provost of Yale University. He has served on several committees of the National Academy of Sciences including the Committee on Nuclear and Alternative Energy Systems, the Panel on Policy Implications of Greenhouse Warming, the Committee on National Statistics, and the Committee on the Implications for Science and Society of Abrupt Climate Change. He recently chaired a Panel of the National Academy of Sciences that produced a report, Nature's Numbers, that recommended approaches to integrate environmental and other non-market activity into the national economic accounts.

He is the author of many books, among them Invention, Growth and Welfare, Is Growth Obsolete?, The Efficient Use of Energy Resources, Reforming Federal Regulation, Managing the Global Commons, Warming the World, and (joint with Paul Samuelson) the classic textbook, Economics, whose nineteenth edition was published in 2009. His research has focused on economic growth and natural resources, the economics of climate change, as well as the resource constraints on economic growth. Since the 1970s, he has developed economic approaches to global warming, including the construction of integrated economic and scientific models (the DICE and RICE models) to determine the efficient path for coping with climate change. The latest vintage, DICE-2007, published in A Question of Balance (Yale University Press, 2008). A new version of the regional model (RICE) is available in “beta” draft. Professor Nordhaus has also studied wage and price behavior, health economics, augmented national accounting, the political business cycle, and productivity. His 1996 study of the economic history of lighting back to Babylonian times found that the measurement of long-term economic growth has been significantly underestimated. He returned to Mesopotamian economics with a study, published in 2002 before the war, of the costs of the U.S. war in Iraq, projecting a cost as high as $2 trillion.
Lopa Parikh  
Director, Federal Regulatory Affairs for Energy Supply  
Edison Electric Institute  

Lopa Parikh is Director of Federal Regulatory Affairs for Energy Supply for Edison Electric Institute (“EEI”). In that role, she is responsible for identifying and assessing key policy issues of interest to EEI’s members and helps direct the development of EEI industry positions at the Commodity Futures Trading Commission and the Federal Energy Regulatory Commission on issues involving energy supply and deliverability. Prior to joining EEI, Ms. Parikh was Director of RTO and Regulatory Affairs at Old Dominion Electric Cooperative as well as Assistant People’s Counsel in the District of Columbia and Assistant Consumer’s Counsel in Ohio. In these positions, Ms. Parikh worked on a variety of issues in the retail and wholesale electric markets and represented retail ratepayers before the Federal Energy Regulatory Commission and other regulatory agencies. Prior to joining the energy industry, Ms. Parikh worked as a county prosecutor in Ohio.

Ms. Parikh received her Juris Doctor from the Ohio State University College of Law and her Bachelor of Science from the University of Akron.
Mr. Strother has more than years of private practice experience exclusively in electric power, natural gas, hydroelectric, and energy-related economic, financing, and environmental regulatory concerns. He has represented local distribution companies, customers, suppliers, marketers, and other parties in utility and other energy-related matters before the Federal Energy Regulatory Commission, other federal agencies, and state commissions and regulatory agencies, as well as state and federal courts.

He was Co-Chair of the Energy Bar Association Committee for the Spring 2011 Seminar, “Impending EPA Regulations Affecting the Power Sector,” and moderated its panel “Response of the Power Sector and the Investment Community.” He has spoken on various energy topics, and has been active in various roles and through various offices within the EBA and its sister organizations.

In recent years, he has been extensively involved in ISO/RTO matters, and ancillary matters, regarding transmission and supply-related concerns, as well as other energy-related matters.

He graduated from the University of Virginia School of Law in 1977, and has an undergraduate degree from its College of Arts and Science.

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