Committee on Electricity
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Data Centers: Beneficial Load or Energy Hogs?
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Moderator: Hon. John Rosales, Ill.

Speakers:
Eduardo Balbis, Accenture
Sheila Owens, ComEd
Anne Kaiser, Georgia Power
Data Centers: Beneficial Load or Energy Hogs?

July 18, 2017
Northern Illinois Market

✓ ComEd Data Center Customers
  • 70+ data centers in service with aggregate demand of over ~200MW
  • ComEd’s 15 largest data center customers have a YOY growth rate of 20%

✓ Multiple Data Center Submarkets
  • Downtown Chicago
  • O’Hare & Western Suburbs

✓ Data Center Hub
  • Convergence of fiber networks – ‘Best in Class’ Electric Reliability – Minimal Risk from Natural Disasters – Competitive and low carbon electricity
Heroes in Energy Efficiency

✓ Leaders in ComEd’s Energy Efficiency Program
  • 80 projects achieving over 90,000,000kWh in savings (2008-Present)
  • Combined have earned $6.3M in incentive dollars (2008-Present)

✓ Energy Efficiency Trends
  • Automation of all data center processes
  • Increased efficiency of air-cooled chillers
  • Server technology improvements
Continued Growth and Trends

Data Center Attraction
• Rapid Response Team
• Data Center Express/Intersect Illinois/EDOs
• Line Extension Policy

Win Some; Lose Some
• Water consumption
• Space
• Jobs; Jobs; Jobs
• Incentives

Trends
• Focus on “campus” style sites
• Higher power density
• Reserve Capacity tariffs/minimum bill
Wrap up and Questions

- Sheila Owens
  Vice President, Economic & Business Development
  ComEd
  Three Lincoln Centre
  Oakbrook Terrace, IL 60181
  sheila.owens@comed.com

From Marketing and Collaboration to Capacity Build Out
DATA CENTERS  What Happens in an Internet Minute?

- 2.78 MILLION Video Views
- 701,389 Facebook logins
- 20.8 MILLION+ WhatsApp Messages
- 347,222 New Tweets
- 150 MILLION Emails Sent
- 69,444 Hours watched
- 527,760 Photos Shared
- 1,389 Uber Rides
- 51,000 App Downloads From Apple
- $203,596 In sales
- 972,222 Tinder Swipes
- 2.4 MILLION Google Search Queries
- 38,194 Vine Posts to Instagram
- 1,04 MILLION Vine Loops
- 120+ New LinkedIn Accounts
DATA CENTERS – THEN AND NOW

FROM $1 M to > $100B

WHERE WE WERE

WHERE WE ARE HEADED TO THE INTERNET OF EVERYTHING
FLEXIBILITY: Rotating between asphalt, grass and PV cells, spaces can dynamically shift from city street park to change energy source.
RENEWABLE AND COST-FRIENDLY STATE

- Georgia Power offers electricity rates averaging 13% the national average
- Competitive pricing
- Georgia Power plans to build or procure 1.6 GW of renewable energy by 2021
  - Georgia Power reached 855 MW of Solar resources in 2017 – an increase from 15MW from 2010
  - Largest voluntary renewable portfolio in the country
  - 25% clean energy including nuclear
- Energy Efficiency Rebate Programs
IMAGINE

ROOM TO BREATHE

More tree coverage in Atlanta than any other major U.S. city

CHOOSE ATL

ChooseATL.com #ChooseATL
Lunch Break!
Back by 1:30
Electricity Committee & Subcommittee on Clean Coal and Carbon Management
Hon. Jeremy Oden, Alabama Chair, Subcommittee on Clean Coal & Carbon Management

Report on Meeting with National Energy Technology Laboratory
Clean Coal Site Visit to Morgantown, WV
Clean Coal Site Visit to Morgantown, WV
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Petra Nova Site Visit

September 22, 2017: site visit to Petra Nova project in Houston, TX

• First successful carbon capture for enhanced oil recovery (CO2-EOR) facility
• Began operating December 2016
• Captures over 5,000 tons of CO2 per day from 240 MW coal unit

Travel assistance available on first-come, first-serve basis for commissioners!
Coal Ash Issues

Moderator: Hon. Jeremy Oden, Alabama

Speakers:
Frank Holleman, SELC
Jimmy Knowles, The SEFA Group
Ann Loomis, Dominion Resources
Cindy Menhorn, MCR Performance Solutions
COAL ASH ISSUES - CLOSURE OPTIONS

Jimmy Knowles | VP of Research and Development

Tuesday, July 18th
Closure by Removal requires that the coal ash be excavated, moved, and then reburied in a lined landfill. Closure by Removal reduces environmental risk, but costs 3 to 6 times as much as Cap In Place.

Cap in Place is the minimum requirement allowed by US EPA. Cap in Place is the lowest cost option.

Environmental Benefits
- Eliminates the Coal Ash
- Lowers Global CO₂
- Longer-lasting Public Infrastructure
- Lower Cost of Concrete

NO LONG TERM ENVIRONMENTAL RISK

Beneficial Use In Concrete
Requires excavation, but rather than re-burying the ash, it is processed and used to make concrete.

Using the coal ash in concrete eliminates all the environmental risk from the ash. The ash is permanently removed from the environment as it is transformed into the “glue” that holds the concrete together.

The cost will be more than Cap In Place, but less than Closure by Removal.

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The cost will be more than Cap In Place, but less than Closure by Removal.
<table>
<thead>
<tr>
<th>TYPE OF CLOSURE</th>
<th>SCOPE OF WORK</th>
<th>ENVIRONMENTAL BENEFIT</th>
<th>RELATIVE COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Cap In Place&quot;</td>
<td>▶ Dewater pond&lt;br&gt;▶ Install impervious liner system on top of ash&lt;br&gt;▶ Long-term, post-closure monitoring</td>
<td>Coal Ash is left where it is</td>
<td>$</td>
</tr>
<tr>
<td>(1 - 2 Years)</td>
<td></td>
<td></td>
<td>Baseline Cost&lt;br&gt;Varies according to size of pond</td>
</tr>
<tr>
<td>Closure by Removal</td>
<td>▶ Dewater pond&lt;br&gt;▶ Install impervious liner system on top of ash&lt;br&gt;▶ Long-term, post closure monitoring&lt;br&gt;▶ Permit and construct new CCR Landfill&lt;br&gt;▶ Excavate all pond ash&lt;br&gt;▶ Transport all pond ash to CCR Landfill&lt;br&gt;▶ Place and compact ash in CCR Landfill</td>
<td>Coal Ash is moved to a landfill</td>
<td>$$$$$$$</td>
</tr>
<tr>
<td>(3 - 5+ years)</td>
<td></td>
<td></td>
<td>3 - 6X the cost of &quot;Cap in Place&quot;</td>
</tr>
<tr>
<td>Excavation with Beneficial Use in Concrete</td>
<td>▶ Dewater pond&lt;br&gt;▶ Excavate all pond ash&lt;br&gt;▶ Transport all pond ash to beneficiation plant&lt;br&gt;▶Beneficiate and use ash in concrete production</td>
<td>Coal Ash is permanently removed from the environment</td>
<td>$$$</td>
</tr>
<tr>
<td>(10 - 20+ years)</td>
<td></td>
<td></td>
<td>1½ - 3X the cost of &quot;Cap in Place&quot;</td>
</tr>
</tbody>
</table>

*Information prepared by The SEFA Group, a marketer and producer of specification grade fly ash sold to the concrete industry*
ANY QUESTIONS?

Contact Jimmy Knowles
jknowles@sefagroup.com
Dominion Energy’s Commitment to Safe Coal Ash Management

Ann Loomis
Senior Director, Federal Affairs and Environmental Policy
July 18, 2017
Coal Ash Management

- Closing 11 coal ash ponds at 4 Virginia power stations
- 7 ponds closed by removal
- Water permits issued for 3 of 4 Virginia power stations
- Wet to dry ash management and construction of a new landfill at Chesterfield Power Station
- Assessment of closure plans ongoing per new Virginia statute
Coal Ash Pond Closure Study
Report due to Virginia General Assembly December 1, 2017

- Virginia statute enacted in 2017 requires a study of closure alternatives for ash ponds submitted to DEQ.


- Includes a study of recycling, excavation, surface water and groundwater conditions, corrective actions and safety for the ponds at the four stations.

- Study reviews prior evaluation of pond closures and will supplement as needed.
Closure Alternatives

- Closure alternatives include:
  - Closure in place
  - Closure by removal
    - Removal and beneficial reuse
    - Removal and consolidation
    - Removal and disposal on or off-site.

- Industry Assessment
  - 432 Ponds Polled
  - 62% Closure in Place
  - 38% Closure by Removal
In 2016, Dominion Energy recycled just over 20% of the CCR material it produced.
Environmental Liability Risk Transfer Overview
Summer NARUC Meeting

Cindy Menhorn
VP, Regulatory Services
July 18, 2017
What is Environmental Liability Risk Transfer?

- Risk transfer allows the utility (Seller) to transfer title of the real estate and all environmental obligations to a third party (Purchaser).
- Costs to achieve a regulatory closure are negotiated between the Purchaser and Seller.
- Purchaser provides a highly collateralized indemnity to Seller as protection.
Risk Transfer Option – Key Points of Consideration for Utilities

- Clearly defined exit strategy
- Post closure re-development plan
- Accretive to shareholder value
- Comprehensive closure plan deemed reasonable and prudent
- Access to environmental insurance instruments
## Differences: Closure Managed by Utility vs. Risk Transfer Company

<table>
<thead>
<tr>
<th></th>
<th>Utility</th>
<th>Risk Transfer Company</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Stays with utility</td>
<td>Takes title of property and assumes liabilities</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>Discussed same issues as before closure</td>
<td>Produces options for redevelopment, more jobs and tax base increase</td>
</tr>
<tr>
<td><strong>Insurability</strong></td>
<td>Has limited options</td>
<td>Provides more options for insurance products</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td>Retains risk</td>
<td>Assumes risk, which is covered by insurance</td>
</tr>
</tbody>
</table>
## Sample Risk Transfer Transaction – What’s Covered and How?

<table>
<thead>
<tr>
<th>ENVIRONMENTAL RISK EXAMPLE</th>
<th>PURCHASER</th>
<th>ESCROW</th>
<th>BONDS</th>
<th>PLL</th>
<th>EXCESS INDEMNITY</th>
<th>LETTER OF CREDIT</th>
<th>PURCHASED ASSETS (LAND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of remedial work for known conditions on or emanating from the site</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cost over run for remedial work known conditions</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Cost of asbestos abatement, plant dismantlement</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost overrun AD&amp;D work</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>New contamination discovered on or emanating from the site</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Regulations change - more expensive remedial action</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Regulatory reopener post closure</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Offsite natural resources damages - occurred pre-closing, claim post closing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite generator liability for pre-closing activities by seller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjoining property sues for personal injury because their well is contaminated (Toxic Tort)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offsite property damage claims from pre-closing site conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
</tbody>
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