The Effect of Deregulation on Investment in R&D, Equipment, and Human Capital

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Investment Under Regulation

• Incentive to invest too much (return on assets greater than borrowing cost) => excess generation & transmission capacity, e.g. 345 KV line

• Operations costs not scrutinized carefully => ample personnel & training

• PUC generally allowed R&D expenditures, but most R&D done by suppliers. Investment small relative to technology payoff; most utilities not interested in R&D.
Investment Under De-Regulation

Threat of dereg => shedding 100,000 jobs
• Dereg threat => slashing R&D
• allowed vast investment in NGCC after 1999 => excess capacity & high gas prices
• Thereafter, little investment in generation or transmission
• Investment continues in regulated states
Investment Under Deregulation

• Unwillingness to take risks on new technologies: IGCC & nuclear investment more likely in regulated states
• Existing owners not happy about investment in new generation => lower prices
• FTR haven’t attracted transmission investment – existing owners content
• Capacity market hasn’t promoted investment
Human Resources Problems

• Many utilities have 50% + workers eligible for retirement within five years.
• Excess capacity in 1980s & threat of dereg in 1990s led to hiring freezes & layoffs
• Will there be enough workers to run the equipment?
• Will the company lose it operating competence as workers retire?
# The Problem

Our recent survey confirmed that the aging WF is a top-of-mind concern that is related with other top HR issues.

<table>
<thead>
<tr>
<th>HR Issues Identified</th>
<th>Response Rank (n = 65)</th>
<th>Total</th>
<th>Rank-Weighted Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top-Tier</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Aging Work Force</td>
<td>48 8 4 1</td>
<td>61</td>
<td>88</td>
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<tr>
<td>Skilled Work Force</td>
<td>11 18 16 6 1</td>
<td>52</td>
<td>58</td>
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<tr>
<td>Cost of Employee Benefits</td>
<td>11 18 16 2 3</td>
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<td>56</td>
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<tr>
<td>Leadership Development</td>
<td>2 11 4 3 6</td>
<td>26</td>
<td>24</td>
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<tr>
<td>Mid-Tier</td>
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<td></td>
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<tr>
<td>Transition to Performance Culture</td>
<td>1 2 9 9 5</td>
<td>26</td>
<td>19</td>
</tr>
<tr>
<td>Increasing Work Force Diversity</td>
<td>4 2 10 4 4</td>
<td>20</td>
<td>14</td>
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<tr>
<td>Constructive Labor Partnerships</td>
<td>1 1 8 5 15</td>
<td>15</td>
<td>9</td>
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<tr>
<td>HR Technology &amp; Management</td>
<td>1 3 5 3</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Work Force Engagement</td>
<td>4 3 2</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Organization Design/Alignment</td>
<td>1 2 2 2 2</td>
<td>7 5</td>
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<tr>
<td>Lower-Tier</td>
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<tr>
<td>Productivity Improvement</td>
<td>1 2 4</td>
<td>7</td>
<td>3</td>
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<tr>
<td>Governance and Compliance</td>
<td>2 2 4</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Labor Cost Control</td>
<td>1 1 2</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Homeland Security</td>
<td>2 2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>1 1 2</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

(Source: Ashworth 2005)
The Problem

- The immediate issue is the expected high turnover and resultant knowledge loss

- Knowledge loss associated with waves of retirement is both a productivity issue and a potential reliability risk

Challenges...

<table>
<thead>
<tr>
<th>Knowledge Retention</th>
<th>HR &amp; Contractor Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential skill shortages</td>
<td>Leadership bench strength</td>
</tr>
<tr>
<td>Performance Culture</td>
<td>Organizational Alignment</td>
</tr>
<tr>
<td>Work Force Engagement</td>
<td>Increasing Diversity</td>
</tr>
</tbody>
</table>

Source: Michael Ashworth
Recognizing Problem => Panic

• Threat of blackouts can induce panic
• Re-regulation in Virginia, high rates in Texas
• Is there enough time to build needed capacity?
• Will summers get hotter, increasing demand?
• Will miners produce enough coal? Will railroads deliver the needed coal?
• Supply of natural gas?
Dereg Portfolio Issues

• Regulated utility charged with delivering electricity reliably – no excuses
• Under dereg, no one is charged with getting the right portfolio of fuels & technologies
• Who is charged with system risk management?
• RTO doesn’t own anything & cannot build anything. Provide adequate incentives?
• What is FERC’s role? Detailed regulation?
Uncertainty Inhibits Investment

- Fuel prices volatile: What fuel-technology should you choose for next 30-60 years?
- Environmental issues: After mercury?
- Carbon management: when & how much?
- NIMBY: Where can you locate generators & transmission lines?
- Some companies are trying to resolve uncertainty by embracing carbon policy
• Are you Depressed Yet?
What Can We Do? Workforce:

- Subsidize training- On the job vs. community college - forgivable loans
- Modify tasks: Less strength required for older workers, women
- Lower training level acceptable since real time communication with experts
- Non traditional recruits (Wabash x-navy)
- Work groups that share knowledge
- 3-6 months of overlap with retiring workers
What Can We Do? Conservation

• California almost stopped per capita electricity growth – carbon portfolio standard better than renewable PS
• Real Time Pricing to flatten usage pattern
• Figure out cost of additional KWh and charge it to customers
• Pay for productive programs & verify
• PAY LSE for satisfying customers, not selling KWh, e.g., California
What Can We Do? R&D:

• FERC: Wires charge for R&D: Companies can invest it in in-house capacity, EPRI, DOE, universities, or others
• Encourage companies to share results with companies that have productive programs
• 20% of collected funds must be focused on long-term issues
• 1-2% of $300 billion for R&D?
What Can We Do? Transmission:

• Merchant transmission – decentralized decision making cannot work – green mail, disruption, Grid too interconnected

• Need FERC or RTO planning & incentives: FERC 679 & 890 - get lines where needed

• Regulated wires companies whose profits depend on meeting performance goals

• Problem: Economic development goals
What Can We Do? **Generation:**

- Goal: Get generators to sign “long-term” contracts that specify fixed & variable prices
- Ability to sign life-of-plant contracts to get desired mix & location of generation
- RTO dispatches generators to minimize total cost, paying bid costs, not market-clearing price
- RTO – regulated by FERC – specifies fuel-technology portfolio, ensures reliability
Role of RTO- Expanded

• Specifies needed transmission, provides **sufficient** incentives to get it built: pays for meeting performance goals
• Specifies generation portfolio, gets long-term contracts & dispatches generation: pays for meeting performance goals
• Long-term planning for load & location
• Short-term planning for hourly load
Pricing

• Real-time pricing for large customers: 10% of meters serve 50% plus of load
• Customers select reliability levels for contracts: Higher price for higher reliability
• RTO specifies reliability in contracts with transmission & generation companies to set their compensation
• Gens & wires get serious estimating reliability since they are paid for meeting it, paying customers for unreliability
Conclusion

• The electricity industry faced formidable problems concerning investment in R&D, equipment, & human capital
• Deregulation has worsened the problems, but is not the sole cause
• Vast uncertainty concerning fuel prices, technology, environmental regulations
• Some recommendations are already in place – but they are tentative
• Structural changes are needed to deal with the problems