

***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

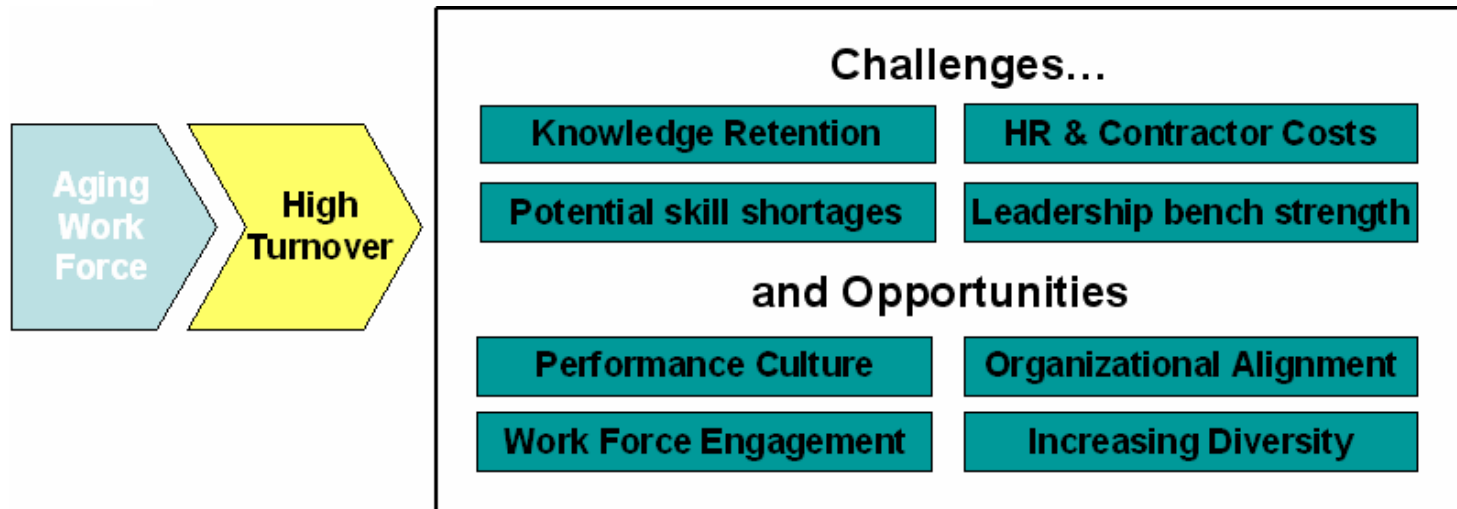
Our recent survey confirmed that the aging WF is a top-of-mind concern that is related with other top HR issues

HR Issues Identified		Response Rank (n = 65)					Total	Rank-Weighted Index
		1	2	3	4	5		
Top-Tier	Aging Work Force	48	8	4	1		61	88
	Skilled Work Force	11	18	16	6	1	52	58
	Cost of Employee Benefits	11	18	16	2	3	50	56
	Leadership Development	2	11	4	3	6	26	24
Mid-Tier	Transition to Performance Culture	1	2	9	9	5	26	19
	Increasing Work Force Diversity		4	2	10	4	20	14
	Constructive Labor Partnerships		1	1	8	5	15	9
	HR Technology & Management			3	5	3	11	7
	Work Force Engagement			4	3	2	9	6
	Organization Design/Alignment		1	2	2	2	7	5
Lower-Tier	Productivity Improvement			1	2	4	7	3
	Governance and Compliance				2	2	4	2
	Labor Cost Control			1		1	2	1
	Homeland Security				2		2	1
	Other				1	1	2	1

(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

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