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2007 Long-Term Reliability Assessment

American Antitrust Institute 8th Annual Energy Roundtable

March 3, 2008

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to ensure the reliability of the bulk power system

What is the LTRA?

- Annual 10-year assessment of future bulk power system reliability in North America
- Since 1970 – 2nd as the Electric Reliability Organization
- Report identifies long-term reliability issues and makes recommendations to address them before problems occur
- Does not recommend or require specific resources or projects or make projections regarding electricity prices

Progress from 2006 Report

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Finding 1: Electric capacity margins continue to decline — action needed to avoid shortages

- 2.5% improvement over 2006
- Forward capacity markets launched in ISO-NE & PJM

Finding 2: Construction of new transmission is still slow — continues to face obstacles

- 2,000 miles have been added since 2006
- More planned transmission in coming 10 years than reported last year
- Key projects in Boston, Connecticut, the Southeast & Texas completed
- DOE Finalized 2 National Interest Electric Transmission Corridors

Finding 3: Fuel supply & delivery to electric generation important to reliability

- Florida, ISO New England, & California ISO have studied natural gas dependency & identified courses of action to manage the risks of supply or delivery interruptions
- In ISO New England, 2300 MW of gas was converted into dual-fuel

Finding 4: Aging workforce a challenge to future reliability

- Industry increased outreach through partnerships with local schools & colleges, job fairs, & increasing R&D support
- Awareness raised through thorough media coverage

2007 Assessment Highlights

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- U.S. electricity use projected to grow twice as fast as committed resources
- Canadian electricity use projected to grow slower than supply, but significant differences across provinces
- Some areas could fall below target margin levels within 2-3 years unless additional resources are brought into service
- System being operated at or near its physical limits more of the time, limiting its ability to handle severe unplanned events and extreme weather

Capacity Margins – 2007 Findings

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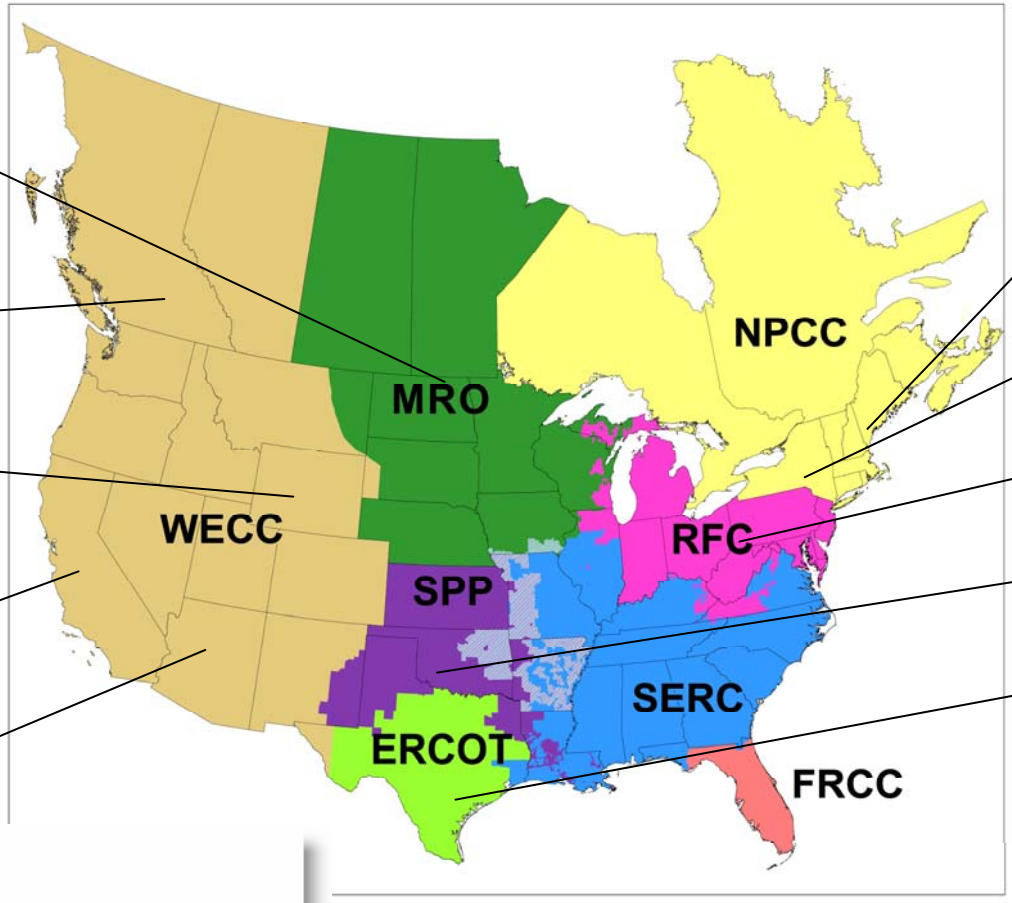

MRO
2010/2010

WECC Canada
2007/2009 (Winter Peaking)

Rocky Mtn
2009/2011

California
2009/2011

AZ/NM/SNV
2009/2011

New England
2009/2009

New York
2011/2016+

RFC
2012/2013

SPP
2015/2016+

ERCOT
2009/2016+

When resources drop below target / ...including uncommitted resources

Capacity Margins – Recommendations

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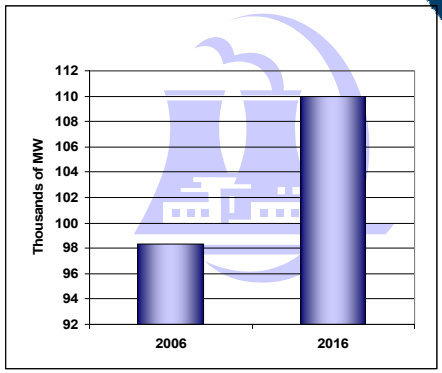
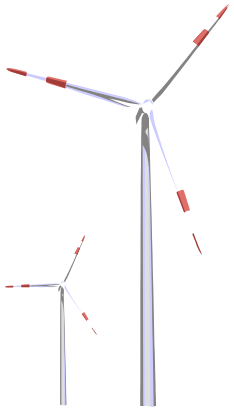
- Formal markets – continue to be proactive to ensure adequate resources are developed
- Transmission planners – recognize potential new resource additions in plans
- Regulators – encourage investment in needed resources
- NERC – clarify “uncommitted resources”

Wind, Solar & Nuclear – 2007 Findings

- Wind and solar increasingly attractive resource options
  - Fuel mix diversity and CO_2 reduction
- Require new transmission and special operating considerations
- How much of nameplate capacity to count towards meeting peak demand
- Large nuclear units require grid expansion and reinforcement





Wind, Solar & Nuclear – Recommendations

- Need active support for and investment in transmission
- Nuclear developers coordinate with transmission providers
- NERC to develop consistent approach for rating wind capacity and review special operational requirements

Transmission – 2007 Findings

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- More transmission proposed over next 10 years
  - Transmission additions of 14,500 miles in U.S. (+8.9%) and 2,000 miles in Canada (+4.8%)
- Still lags projected growth in demand and resources
- New transmission projects continue to face opposition

Transmission – Recommendations

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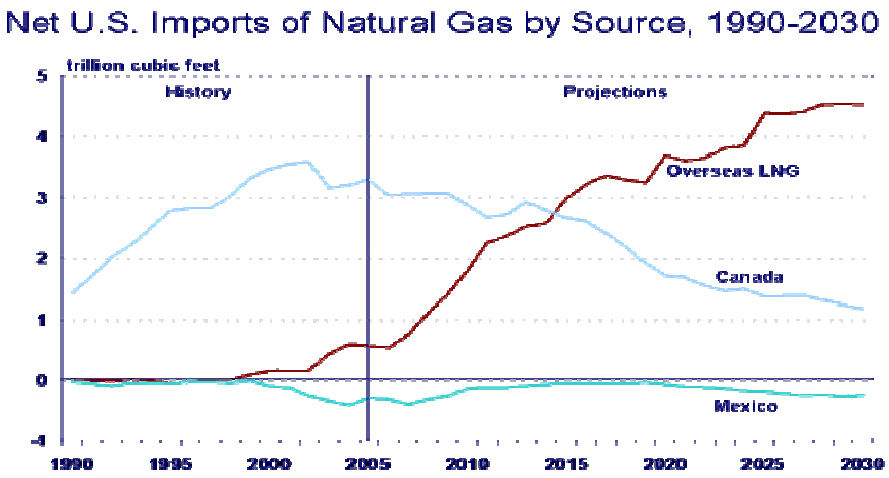
- Government agencies – recognize interstate nature of transmission and work to remove obstacles
- Utilities – education and outreach to explain benefits of transmission
- NERC – continue to support NIETC efforts

Natural Gas – 2007 Findings

- Florida, Northeast, Southern California, & Texas highly dependent on natural gas
- Increased competition for gas supply/delivery & decreased Canadian imports
- LNG is one option; siting/construction of terminals has its challenges

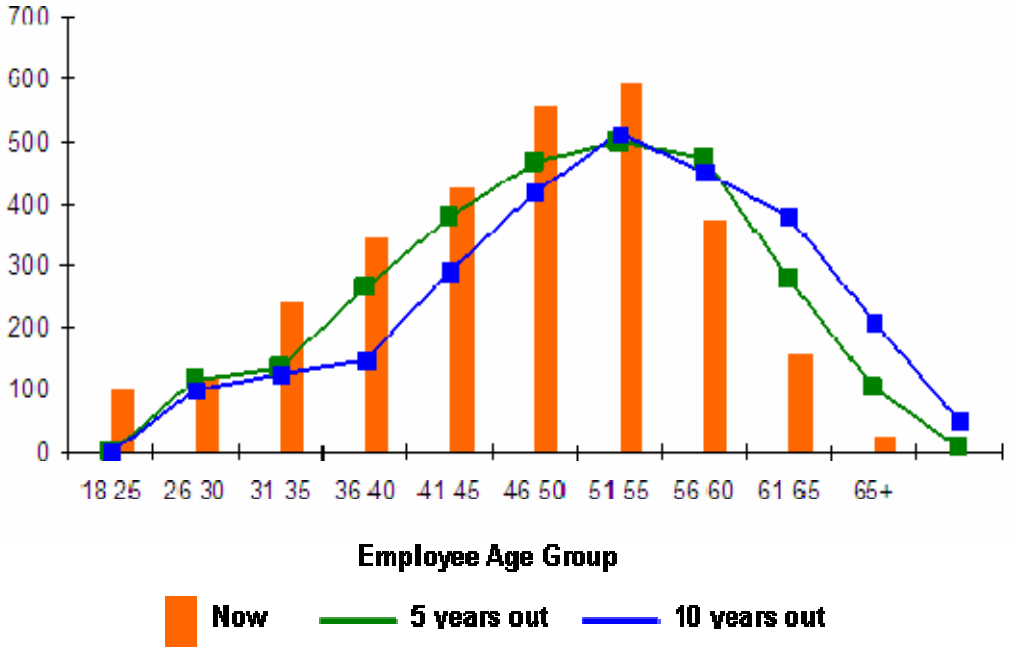


Natural Gas – Recommendations

- Resource planners and generation owners – take gas supply/delivery issues into account in resource adequacy assessments
- Resource planners – ensure fuel diversification
- Government – remove obstacles to development of new gas supply/delivery, including LNG terminals
- NERC – study fuel supply/delivery interruption scenarios

Aging Workforce – 2007 Findings

- 40% of senior electrical engineers & shift supervisors will be eligible for retirement in 2009 (Hay Group)
- 25% increase in demand for industry workers by 2015
- Number of electric power engineering programs and professors has decreased



Source: KEMA

Aging Workforce – Recommendations

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- Industry and government – support university research in power system engineering
- Industry – aggressively recruit and retain talent
- Development and funding of North American Grid Center of Excellence
- Workshop to create industry action plan in late 2007

2007 Key Findings – A Recap

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- Long-term capacity margins
- Wind, solar, and nuclear generation
- Natural gas reliance
- Transmission
- Aging workforce

Scenario Analyses for 2008

- More wind, nuclear and demand response in response to CO_2 Legislation
  - Changes in transmission system design
  - New requirements for ancillary services and operating margins
  - Need for improved predictability of demand response programs
- Increased use of natural gas
  - Increased vulnerability to interruptions in supply or delivery chain
  - Uncertainty of LNG facility development

Emerging Issues – Regulatory & Business

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- CO_2 legislation/regulation and renewable mandates
- Transmission provisions from 2005 EPAct
- Aging workforce
- Equipment delays

Emerging Issues – Demand Side

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- Demand response
- Impact of extreme weather on demand

Emerging Issues – Supply Side

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- New nuclear power plants
- Fuel supply and delivery
- Extreme weather impacts on capacity
- Integration of renewables
- EPA ruling on Clean Water Act

Emerging Issues – Transmission

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- Grid modernization
- Reactive power resources
- Advanced planning tools

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Questions and Discussion