Managing Regional Electricity Market Risks:
A New England Perspective

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Topics

- Background on ISO New England
- Regional Operator's Perspective on Risks
- New England Experience and Examples
- Using Demand Response to Address Risks

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ISO New England Inc.

- A private, not-for-profit corporation created in 1997 to oversee and manage New England's deregulated wholesale electric power system
- Responsible for:
  - Power system reliability
  - Market operations
  - Regional system planning
- Regional Transmission Organization:
  - Independent of companies doing business in the market
  - Owns no market assets

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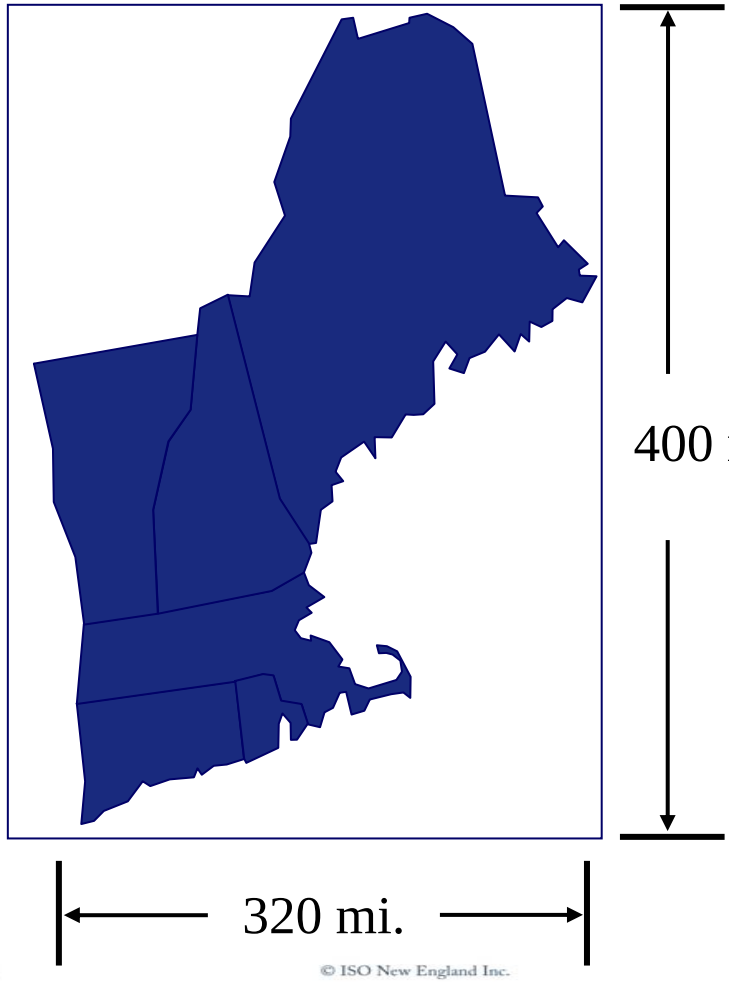
New England's Electric Power System

- 14 million people; 6.5 million households and businesses
- 350+ generators/power plants
- 31,000 MW total supply
- 8,000+ miles of transmission lines
- Interconnections to three neighboring systems
- Peak demand: ~25,500 MW
- System serves six states, but is regulated by the FERC



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The Regional Operator's Ideal Power System

Objective / Function	Reliability	Economy
Operations (short-run)	(1) Sufficient resources and services are available for reliable system operation in real time	(2) Most of the time, markets clear at marginal cost; consumers respond to prices especially during scarcity conditions
Planning (long-run)	(3) Sufficient investment being made far enough in advance to achieve reliable system operation in real time	(4) A balanced portfolio of resources that address uncertainties in resource performance, input prices (e.g., fuel), etc.

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Risks From a Regional Operator's Perspective

Objective / Function	Reliability	Economy
Operations (short-run)	(1) Inadequate contingency reserves resulting in load shedding	(2) Extreme price volatility with suppliers exercising market power
Planning (long-run)	(3) Inadequate investment to meet peak load plus reserve margin	(4) Region's asset portfolio results in high/unstable costs or insecure supply

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Operations – Reliability

1	2
3	4

- In the short-run, reliable system operations require contingency reserves (i.e., ancillary services)
  - Regulation, 10-minute, 30-minute
- New England ancillary service markets (ASM) are a work in progress
  - Implementation currently planned in two phases (Fall 2005 and Summer 2006)
  - ASM are complex markets
  - In the meantime, ISO New England relies upon Reliability Must Run (RMR) generators to provide reserves

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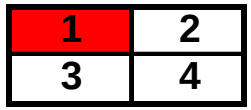
Operations – Reliability  (cont.)

- Typical demand resources cannot provide reserves today, and may find it difficult to participate in ASM in the future
  - Definitions, communication, telemetry, and system infrastructure issues
- ISO New England implements a Real-Time Demand Response Program to address times of capacity deficiencies
  - However, capacity deficiency situations are rare (hopefully)
  - It is likely that demand response is an under-utilized reserve resource
- ***Issue: Enabling demand to fully participate in ASM is a major challenge, but is also very promising***

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Operations – Economy

1	2
3	4

- Economic efficiency requires some price responsive demand. Demand response addresses concerns for:
  - Price volatility
  - Market clearing price levels and risk premiums
  - Market power
- Most electricity customers are not price responsive
- Retail rates and wholesale prices are *disconnected* in real-time
  - Few customers are motivated to reduce load when wholesale prices are high because they are not are exposed to such prices
- Few customers have the technology to automatically respond to price

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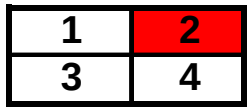
Operations – Economy  (cont.)

- ISO New England implements programs to encourage demand to respond to wholesale prices
  - Real-Time Price Response Program
  - Day-Ahead Load Response Program
- However, dynamic *retail* pricing (e.g., Real Time Pricing, Critical Peak Pricing, etc.) would likely be more effective
  - Customer education and infrastructure development is also needed
- ***Issue: States need to implement such a policy***
  - ***ISO administers wholesale markets only***
  - ***States have jurisdiction over retail markets***

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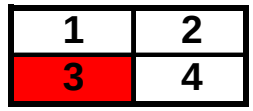
Planning – Reliability



- New England as a region has sufficient capacity at the present time
- Maintaining long term resource adequacy is a growing concern
  - High load growth in Southwest Connecticut, Northeastern Massachusetts, and Northwest Vermont
  - Significant number of generators face extreme financial difficulty
  - Generator retirements are anticipated
- Market design enhancements to improve price signals for long-term investment have encountered substantial opposition creating uncertainty
- Transmission investment has not kept pace with growth
  - $2 – 4 billion of transmission investment is needed over the next 10 years
  - Inadequate transmission has resulted in local reliability problems being experienced today – i.e., Southwest Connecticut (SWCT)

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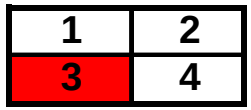
Planning – Reliability  (cont.)

- ISO-NE issued an RFP in December 2003 for up to **300 MW** of new emergency resources in SWCT
- SWCT RFP Results:
  - Eligible resources included Quick Start Generation, Demand Response, and On-Peak Conservation (C&LM)
  - 34 Proposals Received, 8 Suppliers Selected
    - Selection criteria: cost, viability, reliability benefit
  - All selected resources were either **C&LM** or **Demand Response**
  - Contracts Executed in April 2004
  - 4-Year Term with 5th Year Option
  - Total cost about $128 Million over 4 years
- ***Issue: Who should take long positions in the market?***

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Planning – Economy

1	2
3	4

- A competitive wholesale electricity market has been in place in New England since 1997
  - 8,000 MW of gas-fired capacity added since 1999
- About 10,332 MW of New England's capacity uses natural gas only
  - **41%** of electricity production in New England burns natural gas
  - By 2010 that number is expected to grow to **49%**
- After Texas, New England is the most dependent region on natural gas in North America
  - **Natural gas fired power plants typically set wholesale electricity prices**

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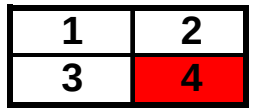
Planning – Economy  (cont.)

- January 14–16, 2004: coldest weather in 20 years (–9°F)
  - Highest recorded winter peak demand of 22,817 MW
  - Large amounts of gas-fired capacity unavailable = 6,061 MW
    - Fuel related = 2,964 MW; Equipment or weather related = 3,097 MW
  - Lowest operable capacity margin = -110 MW (OP4)
  - Natural gas is used as a space heating fuel in the region
  - Load shedding was avoided
- However, the Cold Snap resulted in changes to System Operations, market timelines and flexibility, market monitoring and analysis, and dual-fuel capability
- ***Issue: Will markets provide sufficient resource diversity? Do we need a long-term regional planning process?***

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Allow Demand Response (DR) to Address Risks

Objective / Function	Reliability	Economy
Operations (short-run)	*•DR can provide contingency reserve services* *•Implement ASM and enable DR to participate*	*•DR allows demand to respond to price* *•Retail markets should develop dynamic retail pricing products*
Planning (long-run)	*•DR can be rapidly implemented to provide capacity* *•Implement capacity markets, enable DR to participate, and encourage long positions*	*•DR is a diverse resource that can enhance the region's portfolio* *•Enable DR to participate in all markets; include DR in long-term planning*

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