RGGI Workshop on Electricity Markets, Reliability and Planning

Topic Session 3: RGGI Design, Markets and Reliability – Issues Relating to System Operations

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Objective: Three Messages

1. **Reliability is paramount**

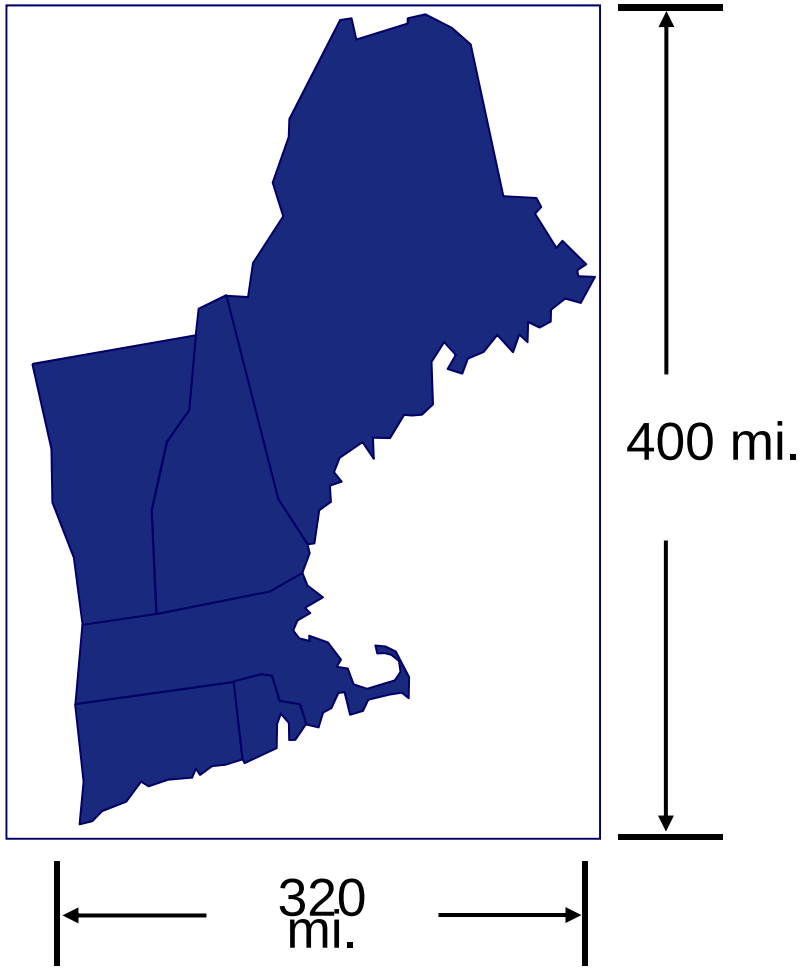
2. **Fuel diversity is important**

3. **Maintaining reliability requires certain uneconomic units to operate.**

Therefore… RGGI design needs to accommodate all three requirements.

Example: New England's Electric Power System

- **Serves 14 million people**
- **Peak demand: 25,348 MW on 8/14/02 (Lower Winter Peak)**
- **350+ generating units = 31,000 MW**
- **12 interconnections to neighboring systems provides summer import capability from New York (1,500 MW) and Canada (2,400 MW)**



ISO New England Inc.

- **Is Responsible for:**
  - Bulk power system reliability
  - Deregulated wholesale market administration
  - Regional transmission planning
- **Is in transition to becoming a Regional Transmission Organization (RTO)**
  - No change in market structure and operations
  - Provides greater authority plus states advisory role

Time Scales: Reliability vs. Cap Compliance

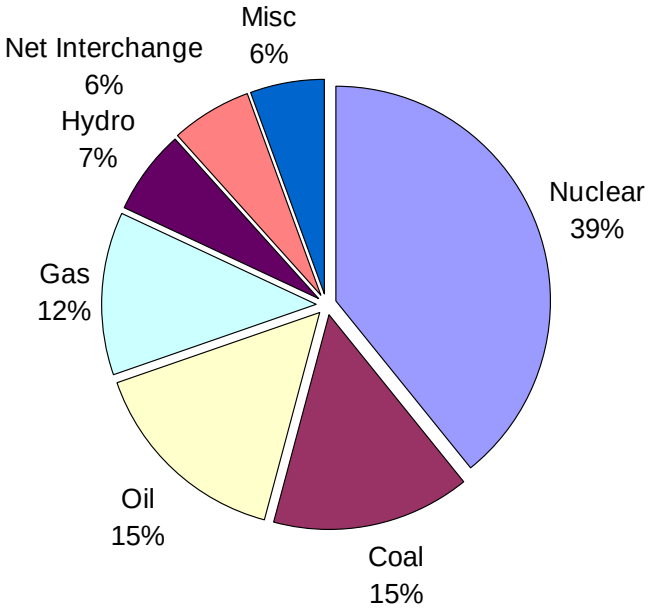
- **Reliability must be maintained at all times:**
  - **Second by second / minute by minute / hour by hour**
- **CO_2 Cap Compliance would have a longer time frame:**
  - **Monthly / Quarterly / Seasonal / Yearly**
- **RGGI Issue: Who is responsible for tracking, administering, and ensuring compliance with the periodic CO_2 Caps: the suppliers?..the ISO?..the States?..or some combination?**

Examples of Tools for Assuring Reliability:

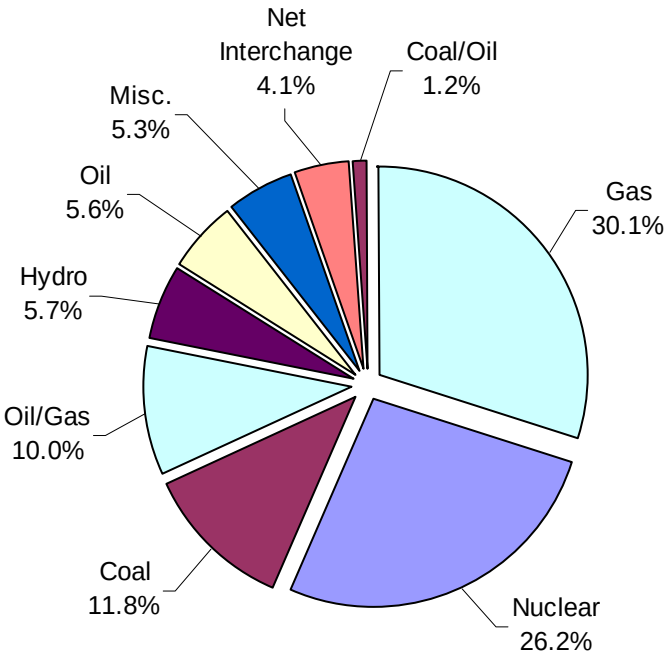
- **Real-time system security:**
  - **Out-of-merit dispatch order of generating units**
  - **Emergency Operating Procedures**
  - **Voltage reductions**
  - **Load curtailment**
- **Markets**
- **System Planning:**
  - **Resource adequacy**
  - **Transmission adequacy**
- **RGGI issues = Treatment of CO_2 emissions:**
  - **During operational emergencies and transmission planning**
  - **In state siting procedures for new infrastructure**
- **The RGGI Cap must be capable of being reflected through the Markets & Operations**

New England's Fuel Diversity: 1993 vs. 2003 Energy Mix

1993



2003



Sources: ISO NE 1993 Annual Report and

ISO NE Regional Transmission Expansion Plan 2004

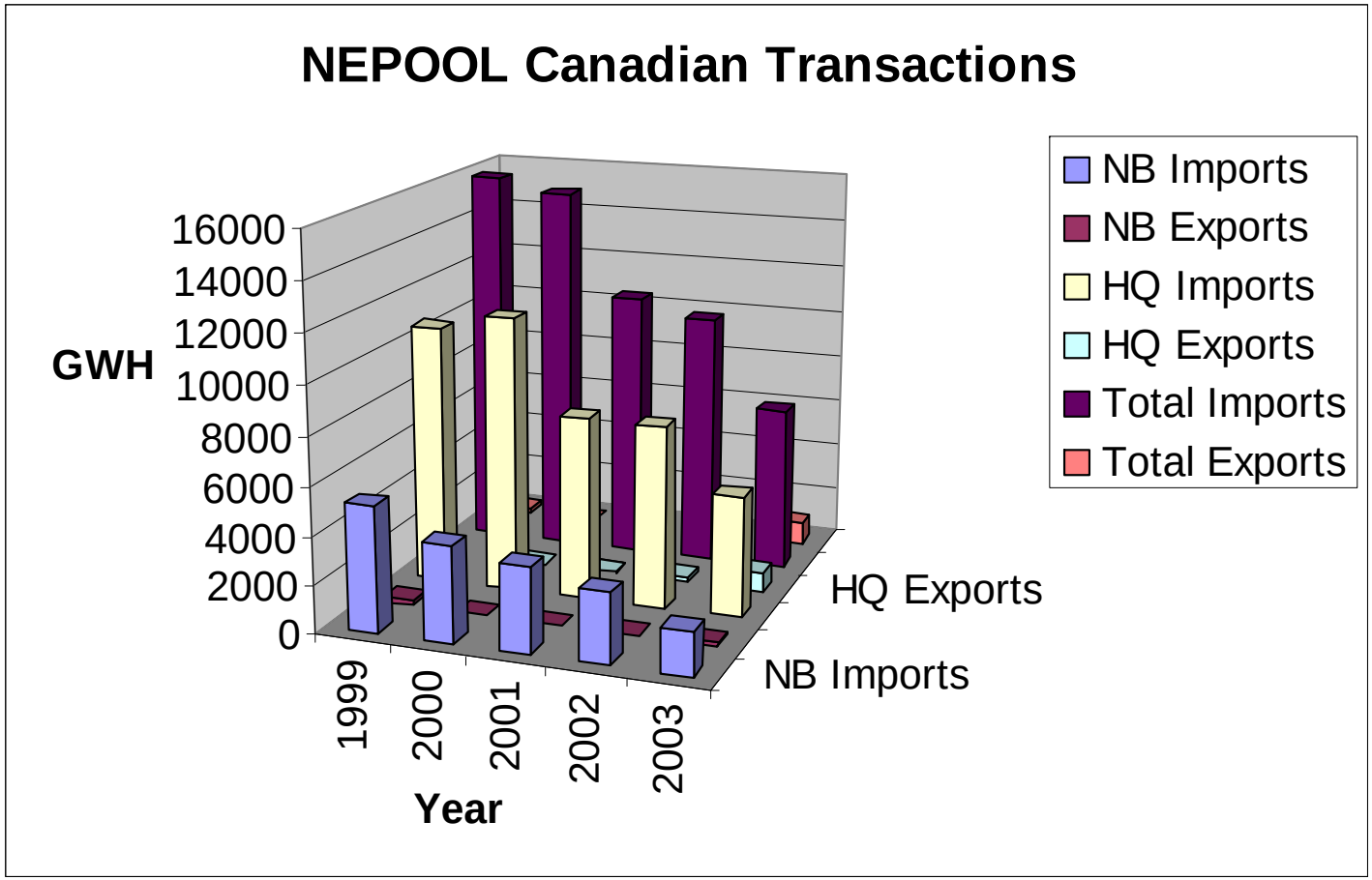
Fuel Diversity

- **RGGI Reference Case assumes:**
  - **New capacity is mostly gas-fired combined cycle technologies causing a projected CO_2 increase of ~20 million tons by 2020**
  - **Meets the states' RPS for renewables, projected improvements in efficiency use**
- **RGGI and energy facility siting issues: Only permit (or give advantage to) non-CO_2 emitting resources to satisfy load growth?**
  - **Efficiency and conservation**
  - **Wind, solar, & renewable biomass**
  - **Nuclear**
  - **Fossil fuels only if combined with 100% offsets**
  - **CO_2 issues in new fuel-delivery infrastructure (e.g., natural gas pipelines, LNG)**

Reliability and Out-of-Merit Unit Operation

- **Ensuring the reliability of transmission-constrained load pockets in New England may require out-of-merit units to operate in order to:**
  - **Cover generation and transmission outages (forced & scheduled)**
  - **Provide voltage and VAR support**
  - **Provide ancillary services (i.e. operating reserves: spin and non-spin)**
- **These are compensated through the market or by special contracts**

Canadian Interchange and Leakage



NY & Canadian Interchange and Leakage

- **Interchange is driven by energy economics**
- **Net interchanges have been ~ 4 – 6% of total energy (historically even more)**
- **RGGI Issues:**
  - **How to account for "Good" and "Bad" interchange from a CO_2 generation point of view?**
    - **Emissions of specific sources or**
    - **System average?**

CO_2 Cap Compliance and Reliability

- **From the viewpoint of system operations and reliability: Compliance flexibility is key for assuring reliability**
- **Implications for RGGI design – build in sufficient flexibility through:**
  - **Allocations**
  - **Treatment of trades**
  - **Creation of set-aside for "must-run" units operating for reliability**
  - **Siting low- or non-CO2 emitting resources to serve energy growth**
  - **Consider fuel diversity as essential feature of electric system planning**

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