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# Wholesale Electricity Market Balancing Operational Models and Issues

Mark Vannoy, Chairman  
Maine Public Utilities Commission

May 14, 2015



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# Two Models Presented

1. Two-settlement system
2. Bilateral contract-based system



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# Two-Settlement System

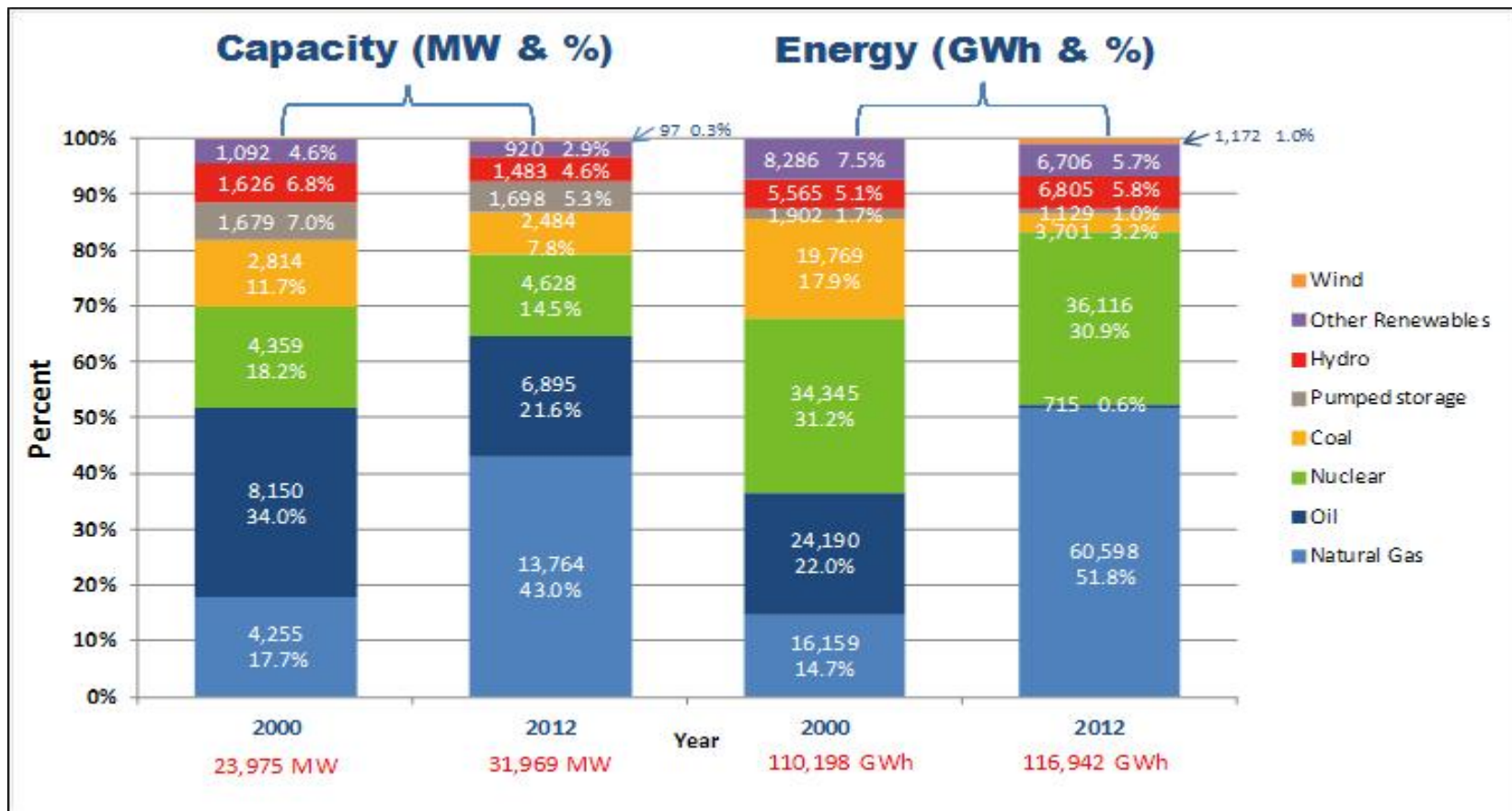
## New England Independent System Operator (ISO-NE)

## Large and Tightly Integrated System

- 6.5 million households and businesses; population 14 million
- 350+ generators
- 8,000+ miles of high-voltage transmission lines (115 kV and above)
- 13 interconnections to electricity systems in New York and Canada
- 31,750+ megawatts (MW) of generating capacity and approximately 1,850 MW of demand resources
- 28,130 MW all-time peak demand, set on August 2, 2006
- 500+ buyers and sellers in the region's wholesale electricity markets
- \$5 billion in transmission investment since 2002; approximately \$6 billion planned over next 5 years
- \$5 billion total energy market value in 2012

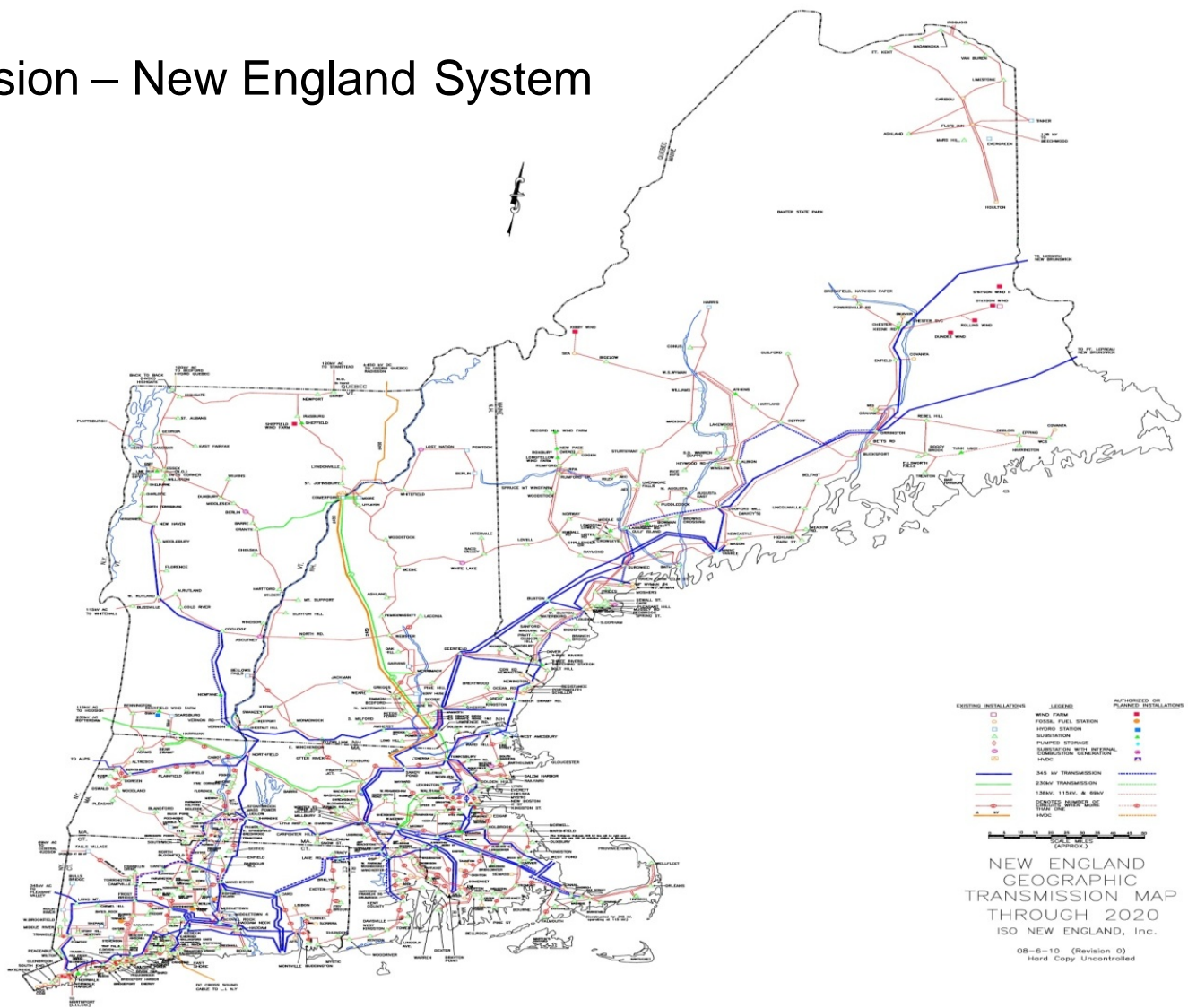


# Generation - New England System





# Transmission – New England System



# About ISO-NE

- Regional Transmission Organization (RTO) for New England
- Created in 1997
- Private, not-for-profit corporation
- Regulated by FERC
- Independent of market participants

# ISO-NE Oversight and Governance

- FERC regulated market rules and tariffs
- States
- New England States Committee on Electricity (NESCOE)
- Market participants
- New England Power Pool (NEPOOL)
- Board of Directors



# ISO-NE Roles and Responsibilities

- Real time operation of the power system
- Administration of wholesale markets and tariffs
- System planning

# ISO-NE System Operations Roles

- Plan and coordinate generator and transmission outages
- Forecast system load
- Dispatch generation
- Coordinate external transactions
- Operate grid in real time
- Invoke operating procedures to address emergency/pre-emergency conditions/events

# Generator Dispatch

- ISO-NE dispatches resources in the region as one system
- Security-constrained, economic dispatch
- Key Objectives:
  - Maintain reliability throughout the region
  - Minimize the cost of power supply



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# ISO-NE Wholesale Electricity Markets

- Energy
  - Daily market for purchase and sale of electric energy
- Capacity
  - Three-year forward market that commits capacity to meet resource adequacy needs
- Ancillary Services
  - Reserves and regulation for system operations

# ISO-NE Energy Markets

- Two-settlement system
  - Day-Ahead Market
  - Real-Time Market

# Day-Ahead Market

- Buyers and sellers bid in quantities and prices on a day-ahead basis
- ISO-NE clears the market based on these day-ahead bids



# Ensuring Supply & Demand Balance on the Operating Day

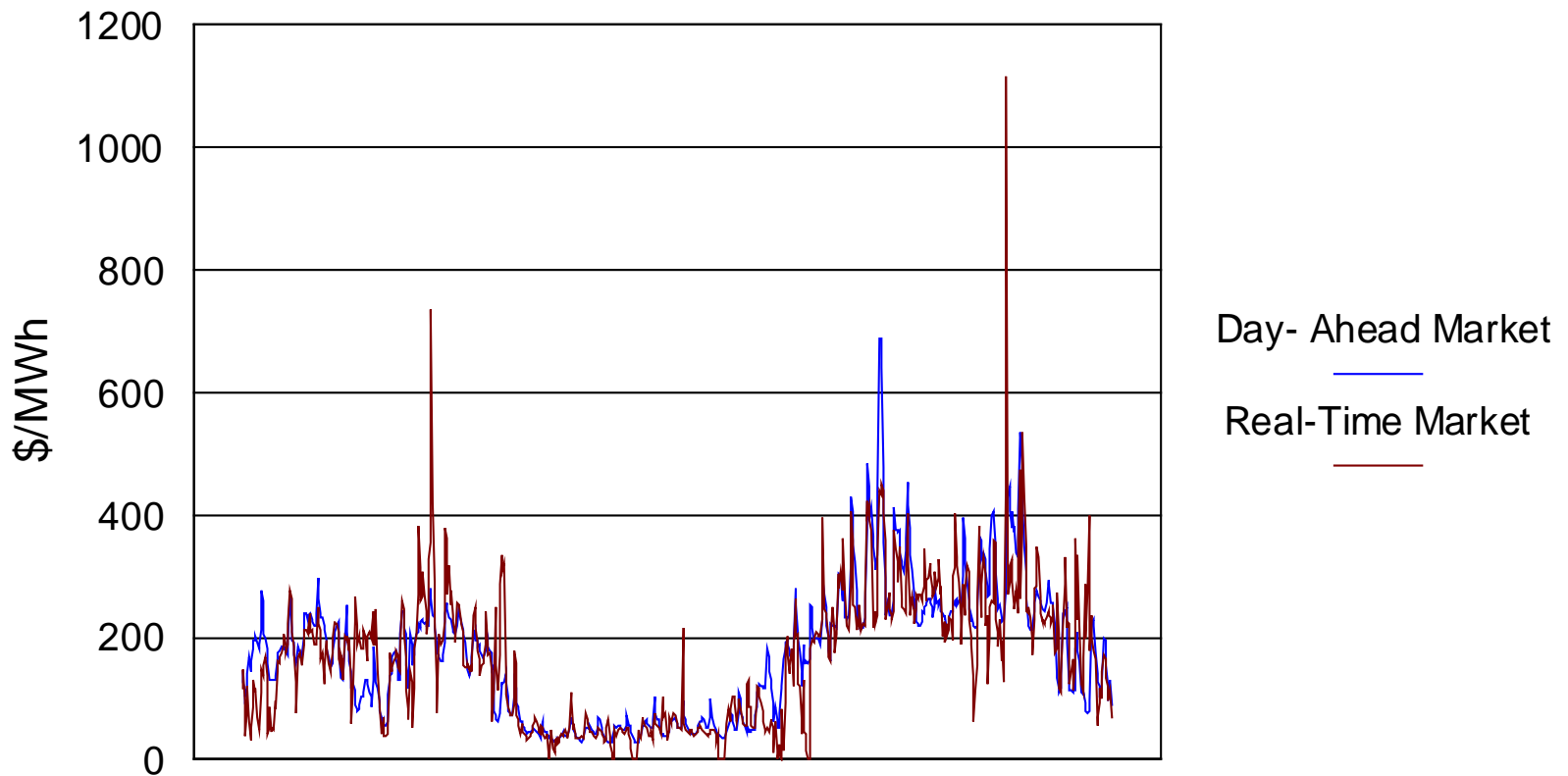
- ISO-NE operates to system to ensure balance in real time
- ISO-NE establishes the financial obligations of market participants based on actual performance
- How?

# Real-Time Energy Market

- ISO-NE balances actual energy production and load during the operating day against quantities in the Day-Ahead market
  - Day-Ahead and Real-Time market prices tend to be approximately equivalent on average, over time
  - Real-Time market can be more volatile

## ISO-NE LMPs

January 2014





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# **Bi-lateral Contract System**

## **Northern Maine Independent System Administrator (NMISA)**

## About NMISA

- Independent System Administrator for Northern Maine System
- Private, not-for-profit corporation
- Regulated by FERC
- Independent of market participants
- Actual system operation is handled by the Northern Maine Area Operator (NMAO), which includes the in-region transmission utilities acting pursuant to NMISA direction

## About NMISA (cont.)

- Northern Maine system is relatively small and isolated from markets
- Interconnected with New Brunswick, Canada (NB) system
- NB System Operator is NPCC Balancing Authority
- Northern Maine is reliant on imports
- NMISA was created to allow for competition; however, competition has not been robust



# NMISA Roles and Responsibilities

- Develop and implements tariffs and rules for wholesale market
- Oversees certain aspects of reliability
- Develops Operating Plan
- Administers “balanced schedule” processes

# NMISA Balanced Schedule – Supplier Obligations

- Each retail supplier must have sufficient resources to supply its expected load at all times (hourly basis)
- Obligation is met primarily through bi-lateral contracts for supply between the retail suppliers and generators, including for imports

# NMISA Balanced Schedule – NMISA Obligations

- NMISA develops and implements an Operating Plan to ensure supply-demand balance
- Operating Plan
  - Specifies the scheduled dispatch level of each in-region generator
  - Confirms sources and amounts of Balancing Energy Requirement (BER), which are the differences between supplier load estimates and NMISA forecast
  - Provides any other relevant information CEPs

# Operating Plan

- Day-ahead scheduling process establishes the Operating Plan for the next Trading Day
- Retail suppliers and generators are required to submit hourly day-ahead schedules
- NMISA
  - Validates and confirms all schedules
  - Confirms sources of BER and operating reserves for each hour
  - Submits to NB a schedule of imports and exports on each interface

## Operating Plan (cont.)

- Non-confidential elements of the Operating Plan are posted on the NMISA web
- Hour-ahead Scheduling Process allows for the Operating Plan to be updated during the Trading Day
- Hour-ahead Schedules must be submitted 30 minutes before the hour

# NMISA Balanced Schedule – Utility Obligations

- As the Northern Maine Area Operator (NMAO), the two in-region transmission utilities implement the Operating Plan in real time



# NMISA Operating Plan

- Specifies scheduled uses of
  - Transmission and generation resources
  - Interchanges with NB
  - Source and amount of ancillary services
- NMAO can deviate from the Operating Plan in response to operating conditions that
  - Pose a threat to reliability or
  - Render the economics of the Operating Plan unreasonable

# Closing Thoughts

- Given the relatively small size and number of market participants, the NMISA bi-lateral system appears to work and is less costly to administer than ISO-NE two-settlement system
- Reasons that competition is weak in NMISA are the region's size and isolation from a larger market

*Note: Source material and graphics for several of these slides obtained from ISO-NE and NMISA.*

Thank you. We would be happy to answer any additional questions you may have.

**Questions?**