



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

MARKET LIBERALIZATION – ELECTRICITY MARKET COMPETITION (WHOLESALE)

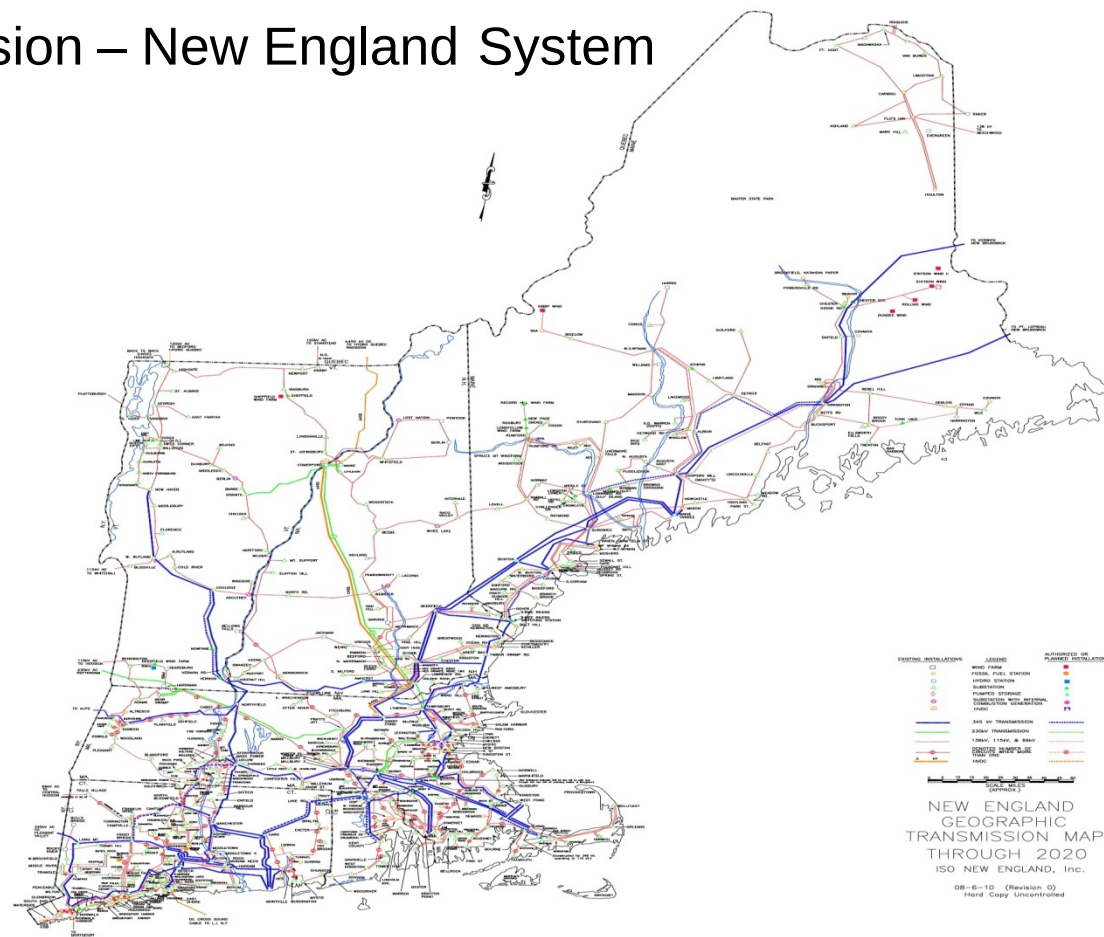
Chuck Cohen
Senior Staff Attorney

May 12, 2015

Maine's Two Electrical Systems

- There are two electrical systems in Maine
- One system serves Southern and Central Maine
 - Includes all of Central Maine Power Company's territory
 - Includes the Bangor Hydro Division of Emera Maine
- The other serves Northern and Eastern Maine:
 - Includes Maine Public Division of Emera Maine
 - Includes Eastern Maine Electric Cooperative

Transmission – New England System



New England's Electric Power Grid at a Glance

- 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



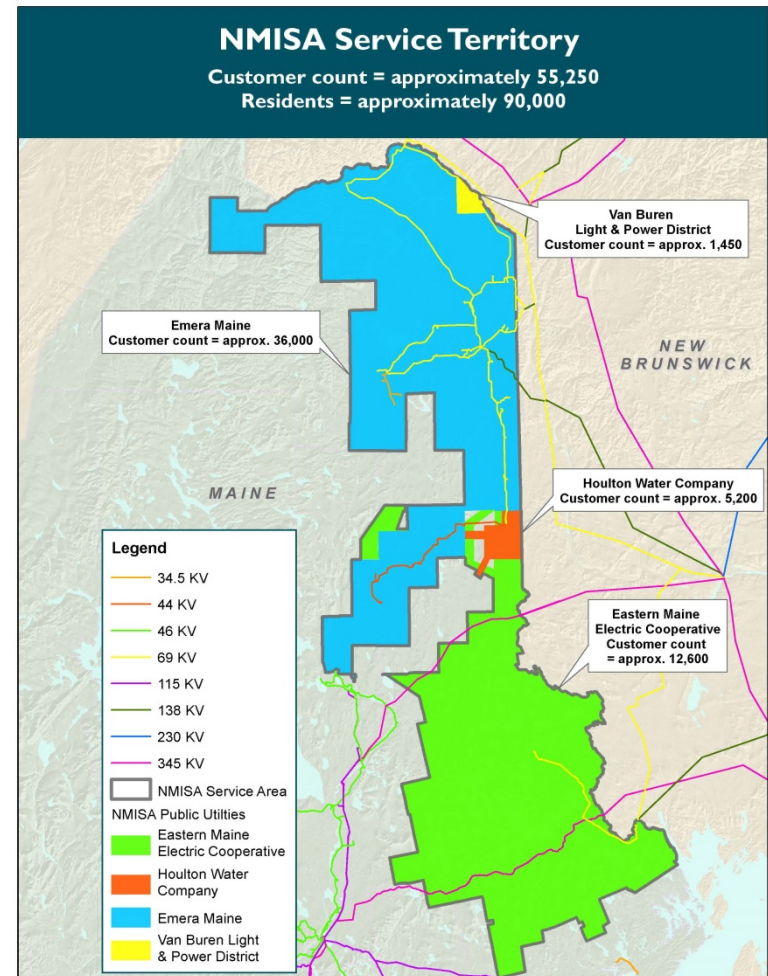
Northern Maine's Electric Power Grid at a Glance

Emera Maine – Maine Public District

- 392 miles of transmission facilities
- 3 interconnections with NB Power

Eastern Maine Electric Cooperative (EMEC)

- 39 miles of transmission facilities
- 1 interconnection with NB Power
- The two systems are not interconnected.



Overview of Northern Maine System

- Annual system peak load in range of 120-130 MW
- Winter peaking
- Interconnected to New Brunswick, Canada
- No direct connection to ISO New England system
- Most transmission lines 69kV
- Total transfer capability between NB Power and Emera Maine system is 112 MW for imports to Northern Maine and 83 MW for exports to New Brunswick



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Two Models Presented

- ISO New England (ISO-NE)
- Northern Maine Independent System Administrator (NMISA)



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

New England Independent System Operator (ISO-NE)

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

Power System Operations

- 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



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

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 Market

- Uniform Clearing Price Structure
- Day-Ahead Market
- Real-Time Market

Uniform Clearing Price (UCP)

- Each generator's bid reflects its own incremental operating costs
- Highest selected bid sets the UCP
- All generators receive the UCP
- Why does this make sense?
 - Economically efficient
 - Transparent
 - Does not encourage gaming



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Day-Ahead Energy Market

Features of the Day Ahead Auction

- Daily auction for electric power
- Determines wholesale electricity prices
- Regionally-based markets
- Buyers and Sellers are:
 - Large Energy Users
 - Distribution utilities
 - Retailers (serving homes and businesses)
 - Generators
 - Financial traders

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?



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Real-Time Energy Market

- Balances actual production and load during the operating day with quantities bid in the Day-Ahead market
- Market settlement system
 - Actual production and load are metered
 - Financial obligations determined by ISO-NE



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Energy Prices – Structure (Locational Marginal Prices)

- Prices vary by time
 - (hourly \$/MWh)
- Prices vary by location
- Prices vary by market (day-ahead vs. real-time)

Locational Marginal Prices (LMPs)

- LMPs are the sum of three components
 - Energy component
 - Same \$/MWh across region
 - Marginal Loss component
 - \$/MWh that varies by location
 - Congestion component
 - \$/MWh that varies by location



USAID
FROM THE AMERICAN PEOPLE



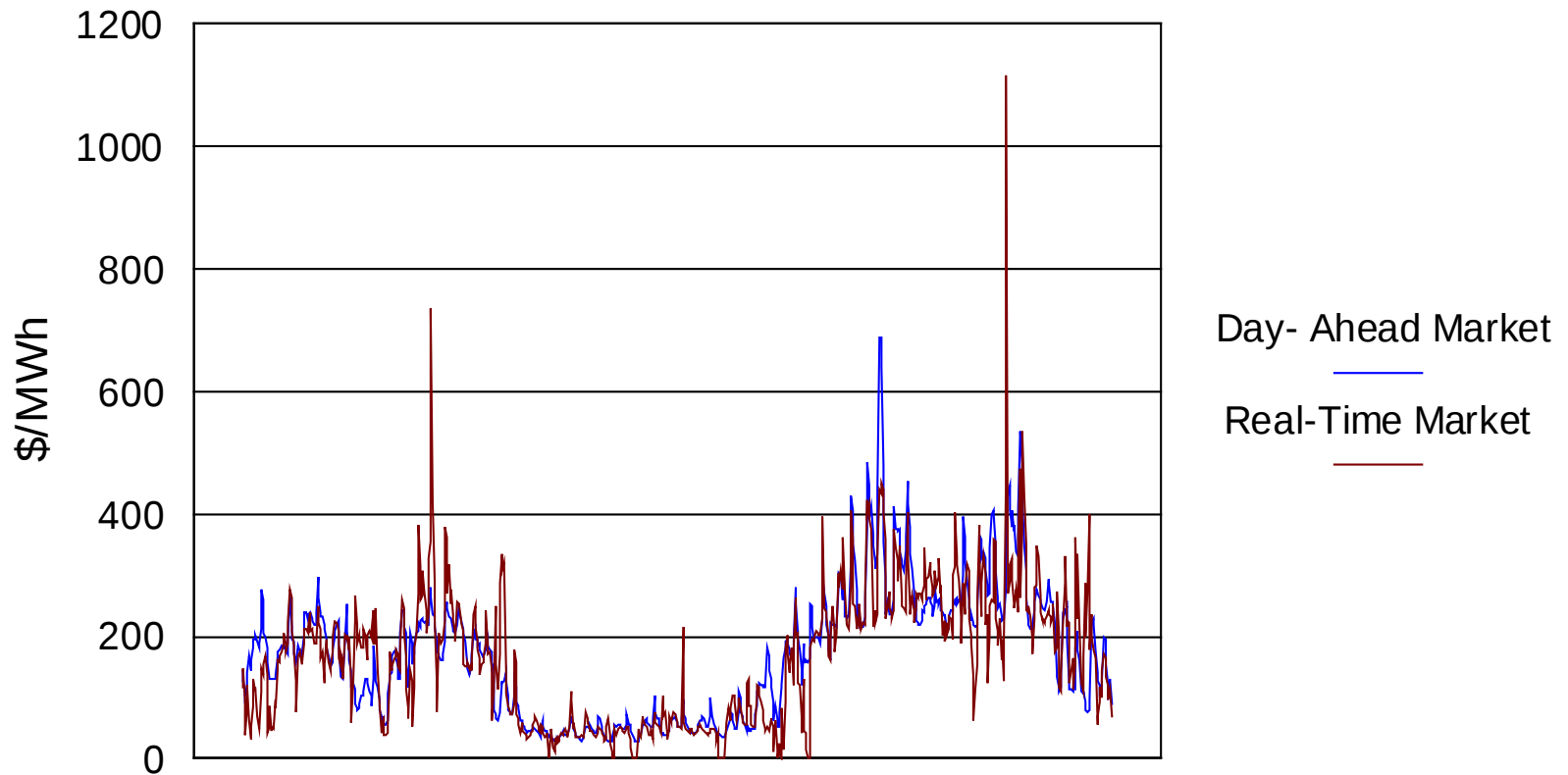
National
Association of
Regulatory
Utility
Commissioners

Energy Prices Day-Ahead vs. Real-Time

- 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





USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Forward Capacity Market (FCM)

Objectives of Forward Capacity Market

- Procure enough capacity to meet New England's forecasted demand approximately three years in advance
- Provide compensation for the fixed cost of existing generation
- Attract new resources through additional income stream
- Resources can include Demand Response

Features of Capacity Market

- Auction based system
- Auction establishes clearing price
- Accounts for locational capacity requirements
- ISO-NE contracts with generators
- Suppliers assessed charge based on customers' demand
- Penalties for non-performance during a shortage event



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

Operating Reserves Market

Operating Reserve

- Operating Reserve Capacity- Capacity over and above what is needed to provide energy to the market in order to ensure reliability
- Capacity is available for dispatch during system contingencies
- Reserve capacity requirement is based on largest foreseeable loss of supply

ISO-NE’s Open Access Transmission Tariffs (OATT)

- Under the ISO-NE System load is responsible for payment of transmission costs through the OATT
- Regional Network Service (RNS) rates cover the costs for the higher voltage Pool Transmission Facilities (PTF)
- Local Network Service (LNS) rates charged by local utility recover the costs of lower voltage facilities used to serve local load

Open Access Transmission Tariffs

- OATTs set the terms for access to and pricing for transmission service
- Intended to eliminate discrimination
- Required for all public utilities with jurisdictional transmission facilities
- FERC regulated
- Apply equally to transmission owner and third-party users

Open Access Same-Time Information System

- Internet-based, real-time information about transmission availability and prices
- Enables and facilitates market transactions
- Provides transparency



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

The Northern Maine Independent System Administrator (NMISA)

THE NORTHERN MAINE SYSTEM

- Northern Maine system is part of the Northern Maritime Control Area and the New Brunswick Power Transmission Operator is the Balancing Authority and Reliability Coordinator.
- In region generation limited:
 - 42 MW wind farm
 - 2 biomass facilities (one 36 MW and one 39 MW which had been deactivated)
 - 34.5 MW of hydro (physically located in Canada)
- Dependent on imports from Canada

NMISA Governance

- NMISA is governed by a seven member stakeholder board
- FERC Regulated
- NMISA files Tariffs and Market Rules with FERC

NMISA Roles and Responsibilities

- Interpret & enforce Market Rules & Operating Procedures
- Administer the reservation, scheduling & dispatch of the Northern Maine transmission system
- Administer the Market
- Conduct the Settlement & Billing

NMISA's Role in Long-Term Planning

- Each year NMISA issues a Seven –Year Outlook to access the long-term reliability.
- Supply adequacy is tested using a 20% planning reserve margin.
- NMISA is required assess whether investment in the transmission system is needed to maintain reliability in accordance with Reliability Standards, improve the performance of the Northern Maine Market, or reduce the cost of congestion constraints.

Long Term Planning (cont'd)

- NMISA looks to the market or to Transmission Owners
- NMISA actions to address issues are limited (entering into Reliability Must Run contracts with Generators)

NMISA Participants’ Roles and Responsibilities

- Provide information to the NMISA
- Comply with the Market Rules & Operating Plans
- Transmission Owners must file a FERC compliant OATT
- Suppliers submit Day-Ahead Balanced Schedule to the NMISA
- Generators schedule Operation and Maintenance Plans through the NMISA

Bilateral Energy Market

- The NMISA does not operate an exchange or bid based energy market in Northern Maine
- Energy is sold on a bilateral contract basis
- Supply must have a firm transmission path for imports

Operating Reserves

- NMISA's Operating Reserve requirement is its proportionate share of the Maritimes Area Operating Reserve requirement.
- The New Brunswick System Operator calculates the requirement for the region by maintaining adequate capacity to cover 100% of the single largest contingency plus 50% of the second largest contingency.
- Suppliers are responsible for paying for reserve requirements

Capacity Obligation

- NMISA establishes Capacity Obligation for Suppliers
- Northern Maine Capacity Obligation based on sum of projected peak load (18 month forecast) and Region's share of Reserve Requirement
- NMISA allocates to each Supplier each month a portion of the Region-Wide Capacity Obligation based upon Supplier's Share of the monthly peak load



USAID
FROM THE AMERICAN PEOPLE



National
Association of
Regulatory
Utility
Commissioners

ISO-NE v. NMISA

COMPARE AND CONTRAST

Comparing the Two Systems

- Geographic Area
 - Large (ISO)
 - Small (NMISA)
- Electric System
 - Large Bulk Power System (ISO)
 - Small System Tied to New Brunswick
- Market Characteristics
 - Large number of buyers and sellers (ISO)
 - Limited generation and suppliers (NMISA)

Comparing the Two Systems (cont'd)

- Energy Markets
 - Bid Based Auction System (ISO-NE)
 - Bilateral Contract System
- Capacity Markets
 - Auction System based on 3 year forward looking demand (ISO-NE)
 - No specific Capacity Market

Closing Thoughts

Note: Source material and graphics for several of these slides provided by ISO-NE.

Questions?