

Electric System Considerations

OTC Meeting

Washington, D.C.

July 28, 2006

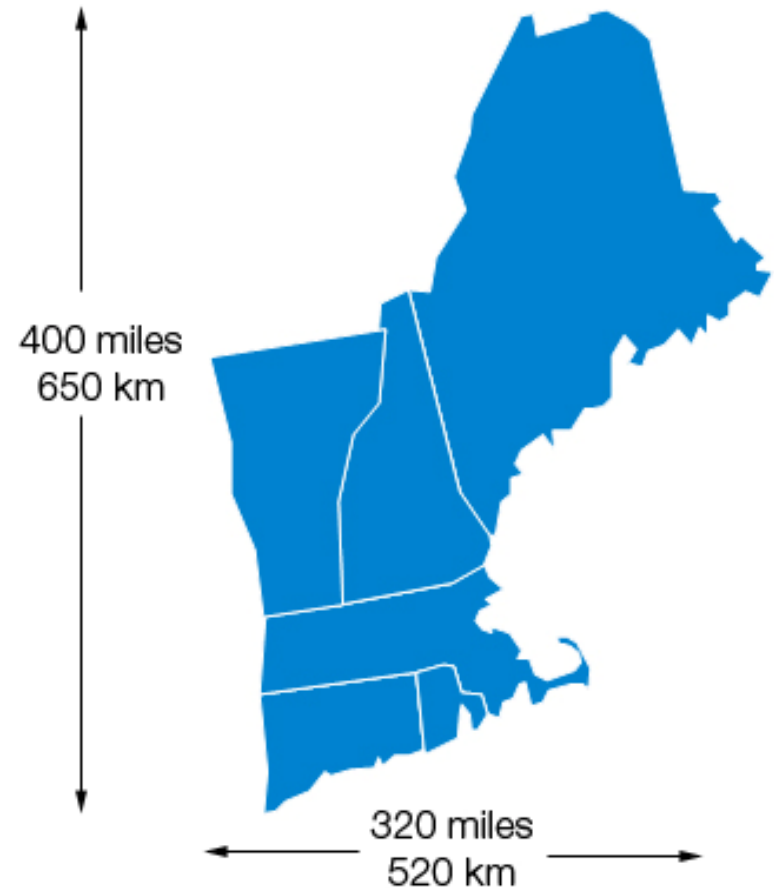
Michael I. Henderson
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Presentation Objectives

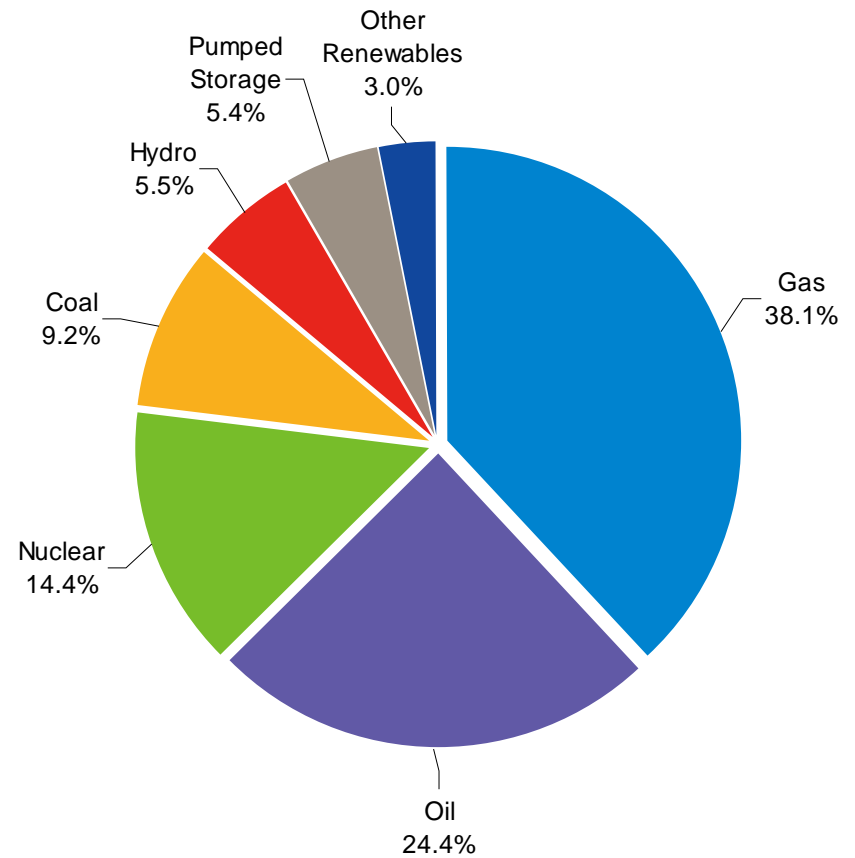
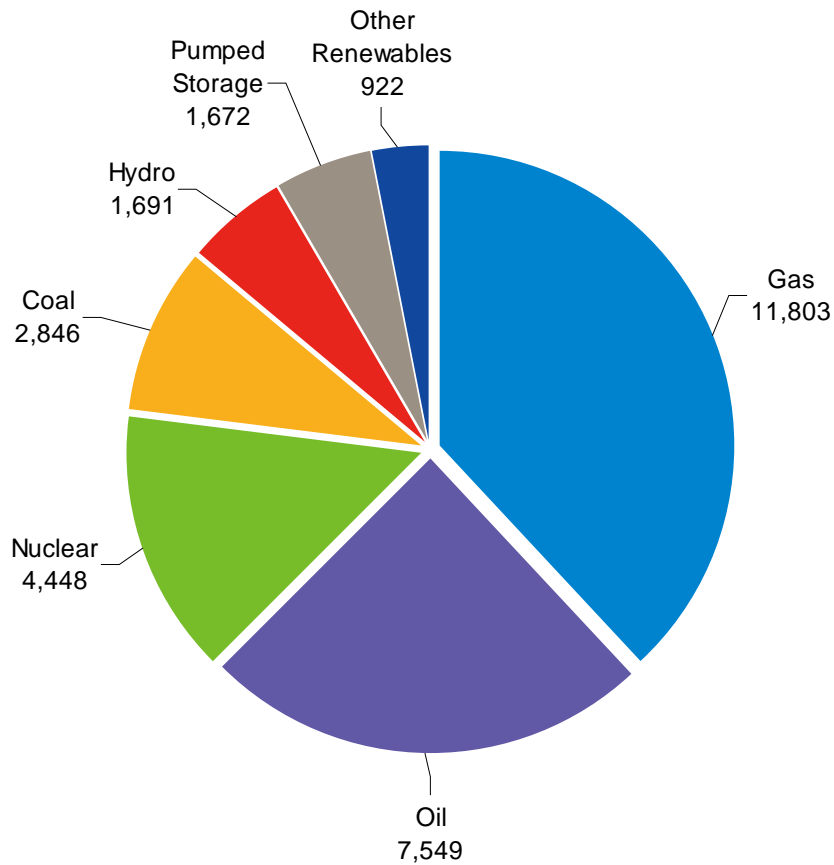
- Who is ISO New England
- System needs
- Some emissions data
- Electric system requirements
- Observations

New England's Electric Power System

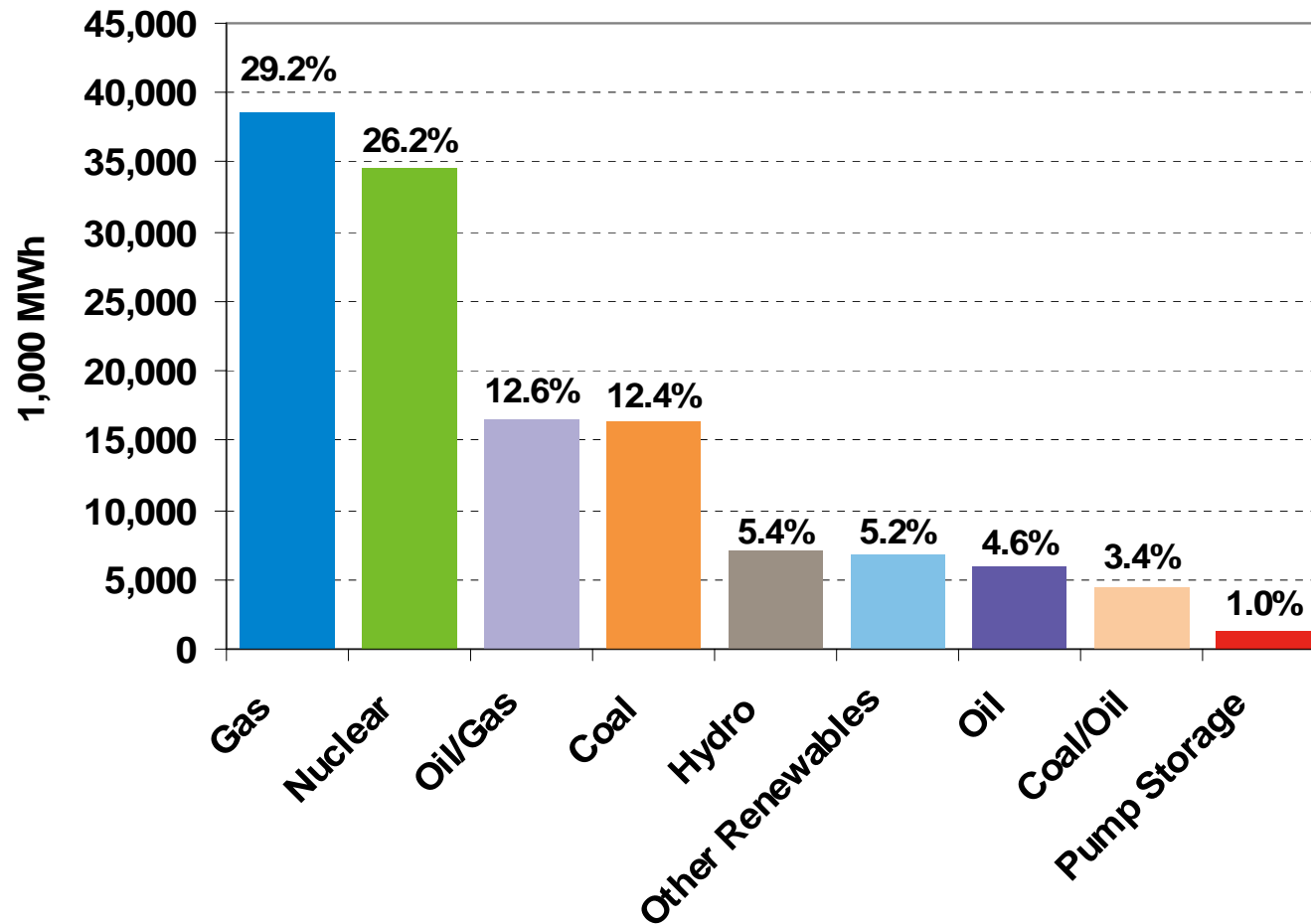
- 14 million people; 6.5 million households and businesses
- 350+ generators
- Total supply = 32,000 MW
- 8,000+ miles of transmission lines
- 12 interconnections to neighboring systems
- All-time peak demand: ~27,400 MW on 7/18/06
- \$11 billion energy market
- Eight (8) Pricing Zones



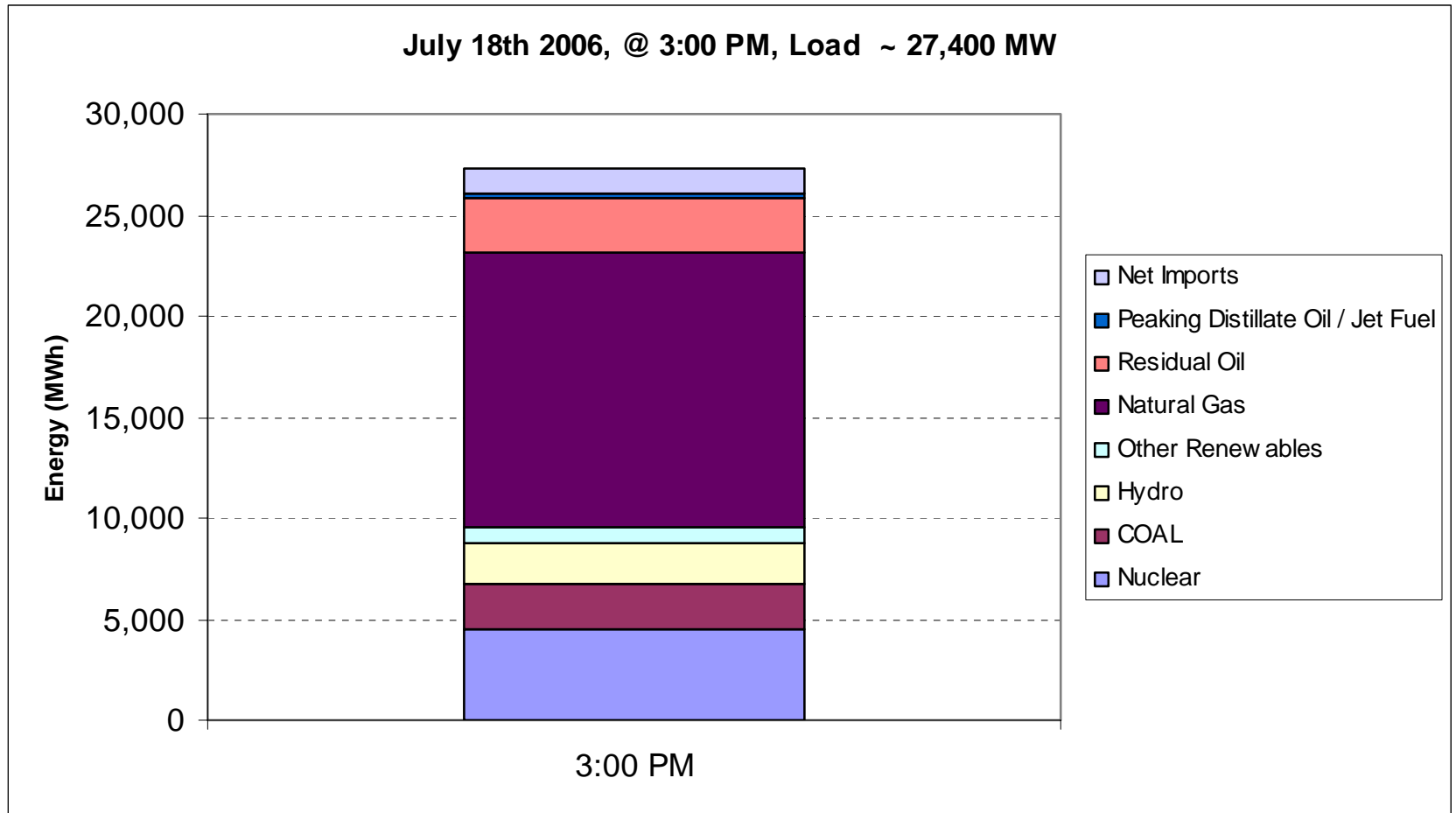
2006 New England Generation Capacity Mix



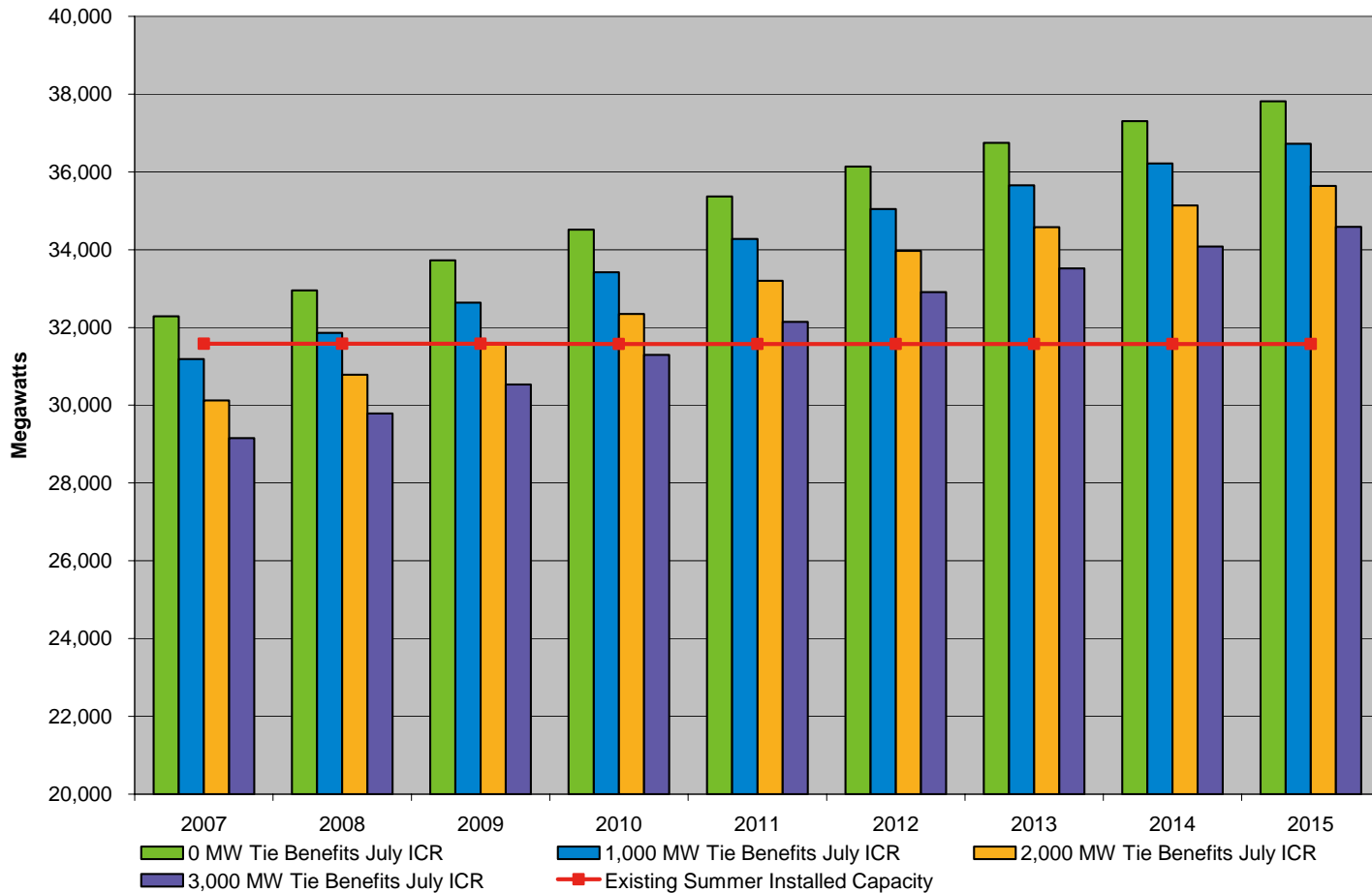
New England Electric Production in 2005



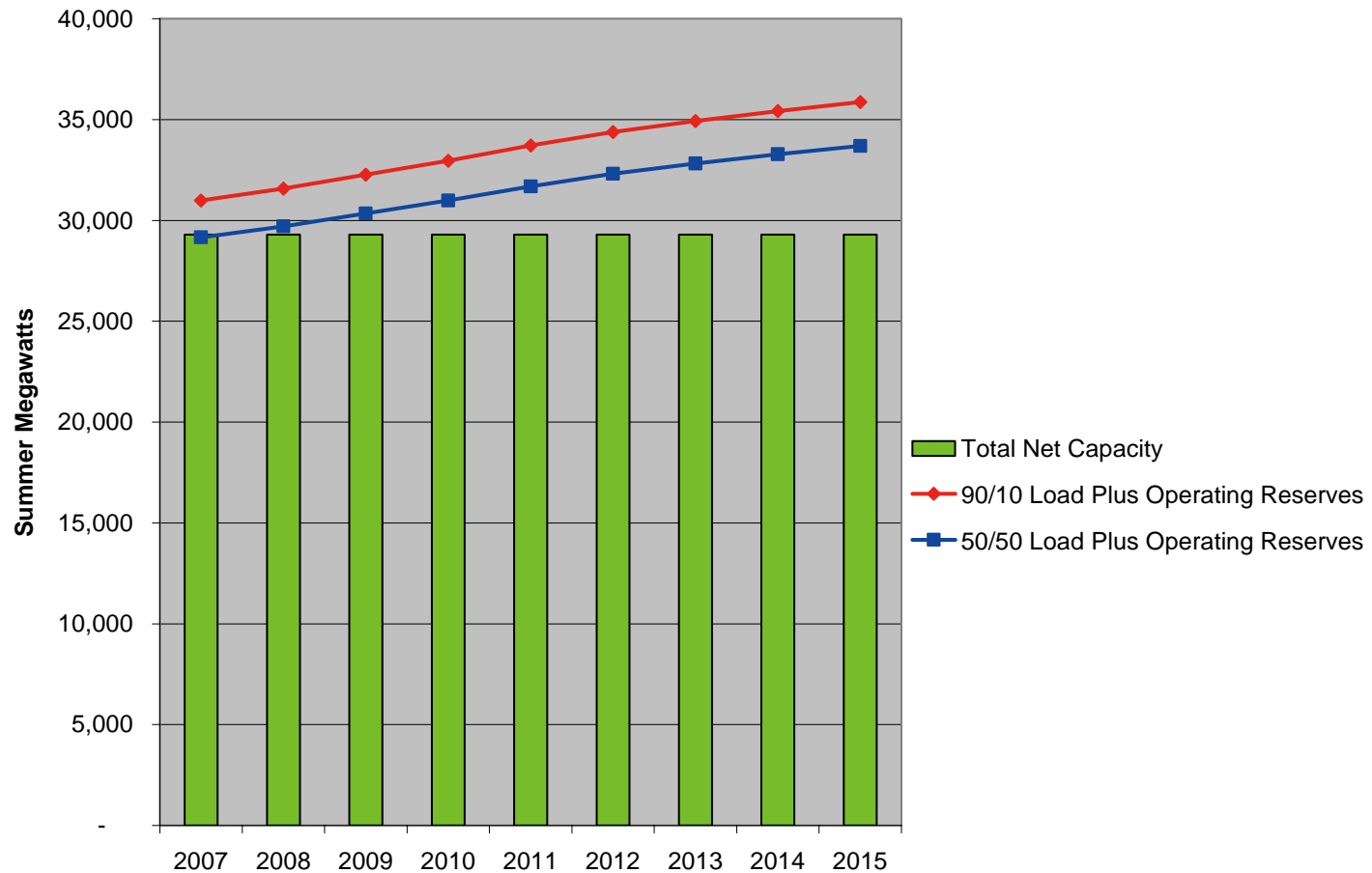
New England Generation Online During Peak Hour



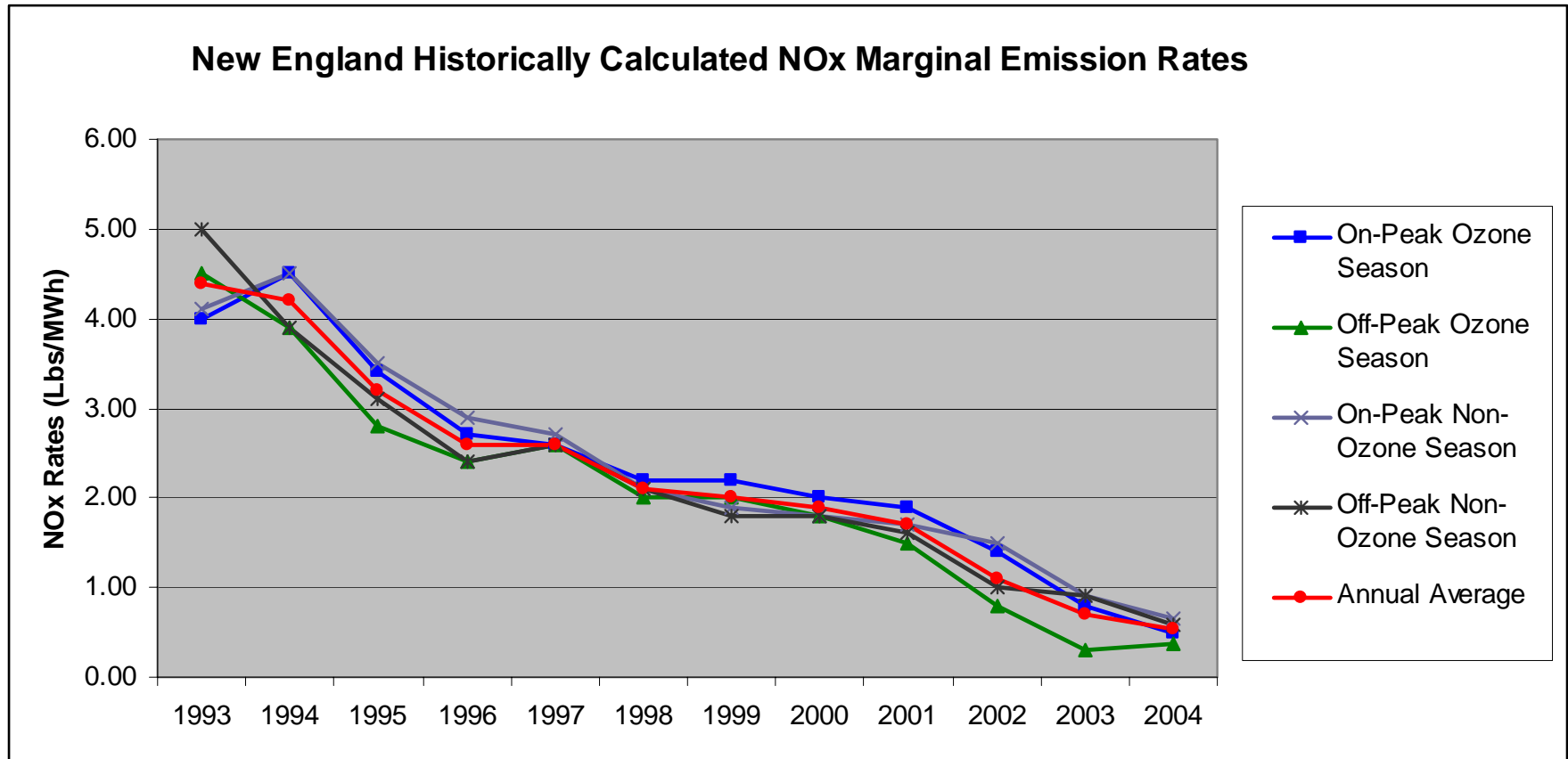
New England's Growing Need for Resources



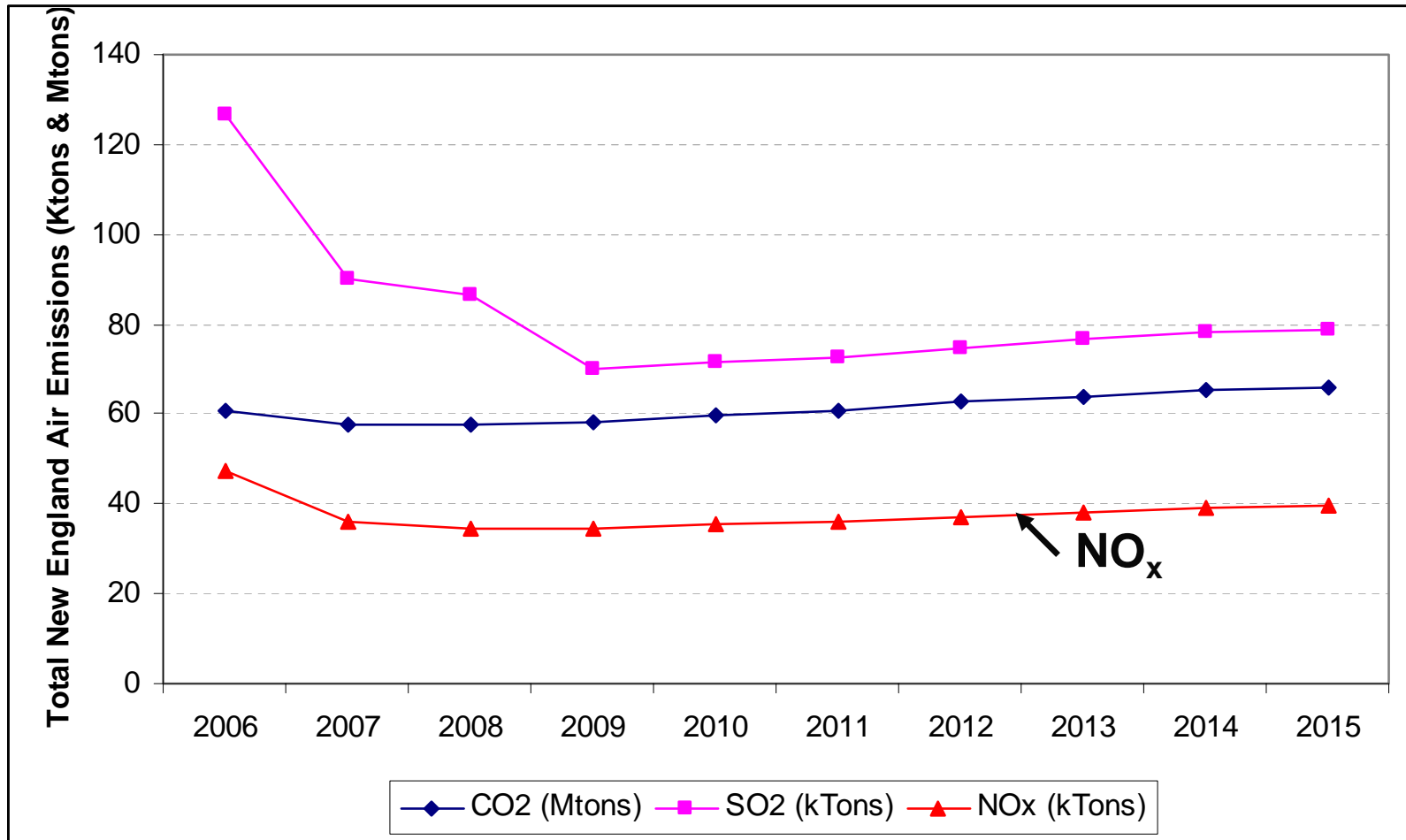
Projected New England Capacity Situation



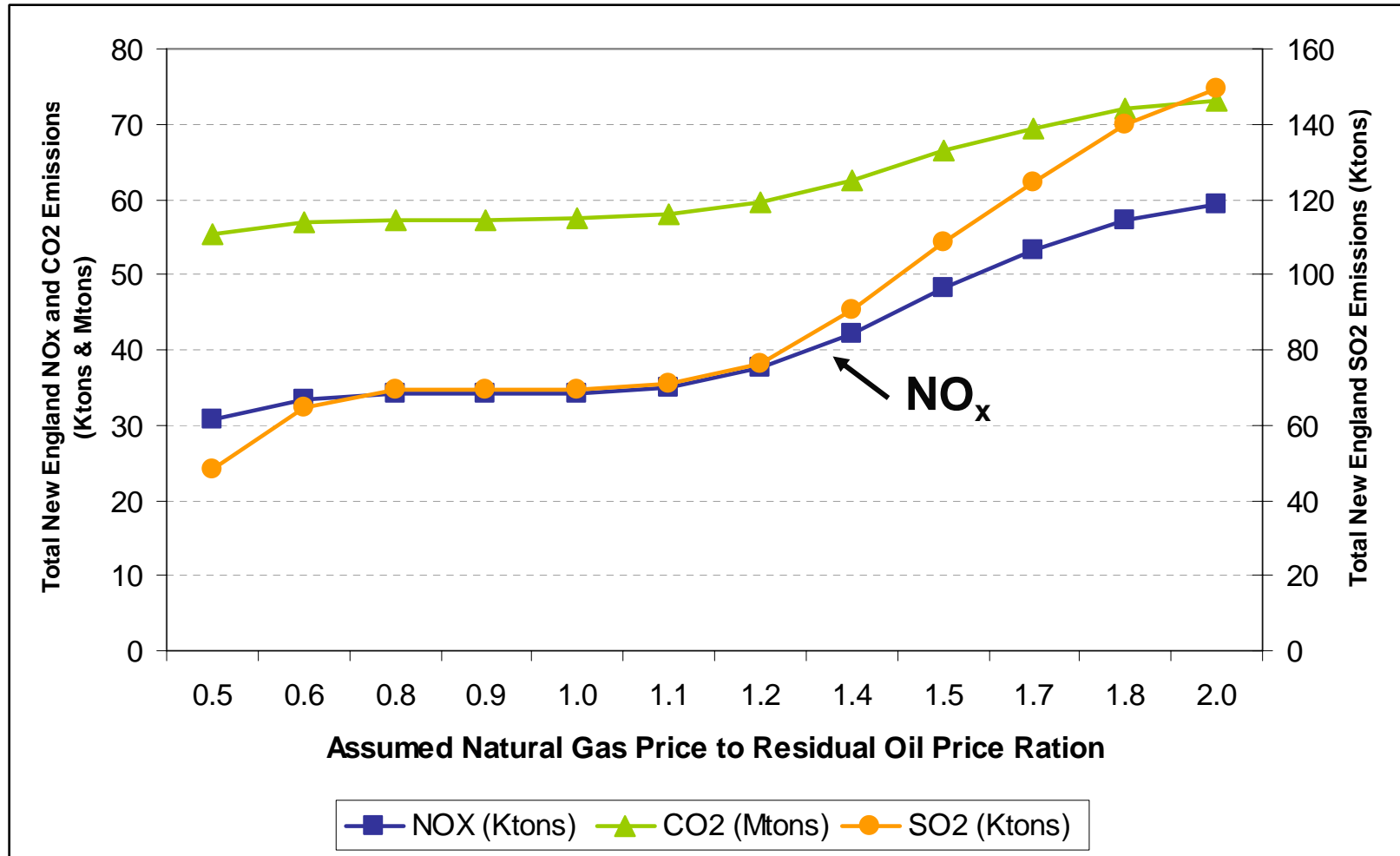
Average NO_x Emission Rates for Marginal Generation in New England



New England Annual Emissions Projections without CAIR, CAMR or RGGI



Sensitivity of New England NO_x Emissions to Gas/Oil Prices



Many Variables Can Affect NO_x Emissions During the Peak Demand (HEDD)

- Generation outages
 - A large nuclear plant outage (1200 MW) would result in replacement generation most likely NO_x emitting
- Weather uncertainty
 - Hotter and longer than predicted e.g. California heat wave
- Fuel prices
 - Relative price of natural gas
- Imports
 - Can be highly variable due to resource availability and price

New Capacity in the Pipeline

ISO Project Queue (6/4/06)

- Nuclear Upgrades 321 MW
- Wind 924 MW
- Biomass 141 MW
- Hydro and Land Fill Gas 15 MW
- Gas/Oil 2,507 MW
- The renewable projects currently in the Queue leave a significant shortfall in meeting the 2015 Renewable Portfolio Standards for New England

New England Electric System Requirements

- Maintain reliability of the electric system under all load conditions
- To maintain reliability system-wide ISO's Regional System Plan shows a need for new capacity
 - By 2009 need 170 MW and best location is Connecticut
 - By 2015 need 4,300 MW
- Until new capacity is added there will be greater use of operating procedures (OP-4 Actions)
- Need hourly operating reserve system-wide and locally for area contingencies
- Greater fuel diversity
 - 40% dependency on natural gas is a concern
 - Reliability
 - Price
 - Winter is critical, but summer is also problematic
- Low or zero emission resources are needed to meet environmental requirements
 - Also provide needed system capacity and diversity of fuel supply

Observations

- Need for capacity means
 - Avoid retirements
 - Need operating flexibility, especially during resource shortages
 - Add resources
- Recent natural gas combined cycle additions have reduced the region's NO_x emissions by displacing higher emitting resources
 - High NO_x emitting units tend to be generally higher cost i.e. oil-fired and dispatched less frequently
 - But high dependence on natural gas has created reliability and price concerns
- Increasing demand response, energy efficiency and conservation are possible strategies to reduce peak demand and emissions
- Low or zero emission characteristics are beneficial