CO_2 on the Ground in New England

Deregulation, Environmental Legislation, and Organized Markets – Oh My!

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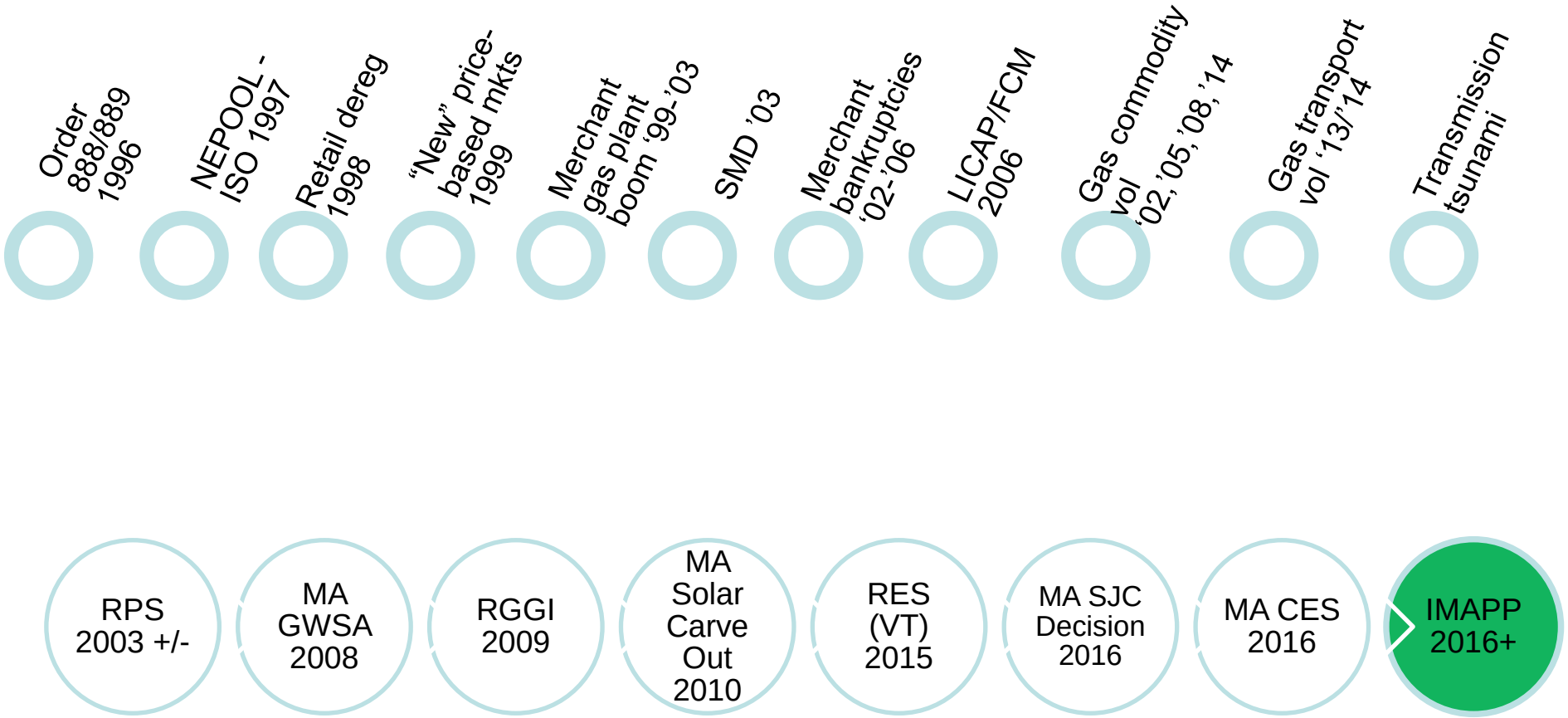
ENE Background

- Trusted advisor to Public Power, generation, cogen, & large retail ~ 1,100 MW
  - 21 municipal utilities in MA, CT, RI, VT
  - Gen management: 160 MW cogen, 77 MW wind, 19 MW hydro, 116 MW CT, 92 MW CCGT
  - Fuel & Renewable Credit management
  - Cost of Service & Rate Design, Resource Planning
  - Energy Efficiency – residential, C & I
  - Long Term PPAs
  - Distributed Generation
  - Energy Storage
  - Peak Load Management
  - Government Affairs – ENE Strategies

NE...A Tale of 2 Timelines



A Little Background on Falling CO_2 Levels

- Following deregulation, most new generation capacity has been gas-fired
- Combination of enviro pressures, relatively low gas prices, capacity vol has led to coal retirements
- Oil and coal generation greatly reduced
- Strong efficiency plans have blunted load growth
- Peak loads haven't recovered from great recession

Multi-prong State & Regional CO_2 Attack

- RGGI targets GHG
  - Significant amount of funds funnel back to energy efficiency and other initiatives
- RPS incent new, renewable/clean generation
  - One problem: 85% of load - NO LONG TERM MARKET!!
  - Well, except for solar carve out…
  - Public power last bastion long-term thinking, contracting
- State level energy procurements
  - MA Green RFP I & II
  - CT LREC/ZREC auctions
  - Tri-State (MA – CT – RI) RFP
  - 2016 MA Energy Legislation
    - Up to 1,200 MW transmission backed by CA hydro/wind
    - Up to 1,600 MW off-shore wind

IMAPP Process

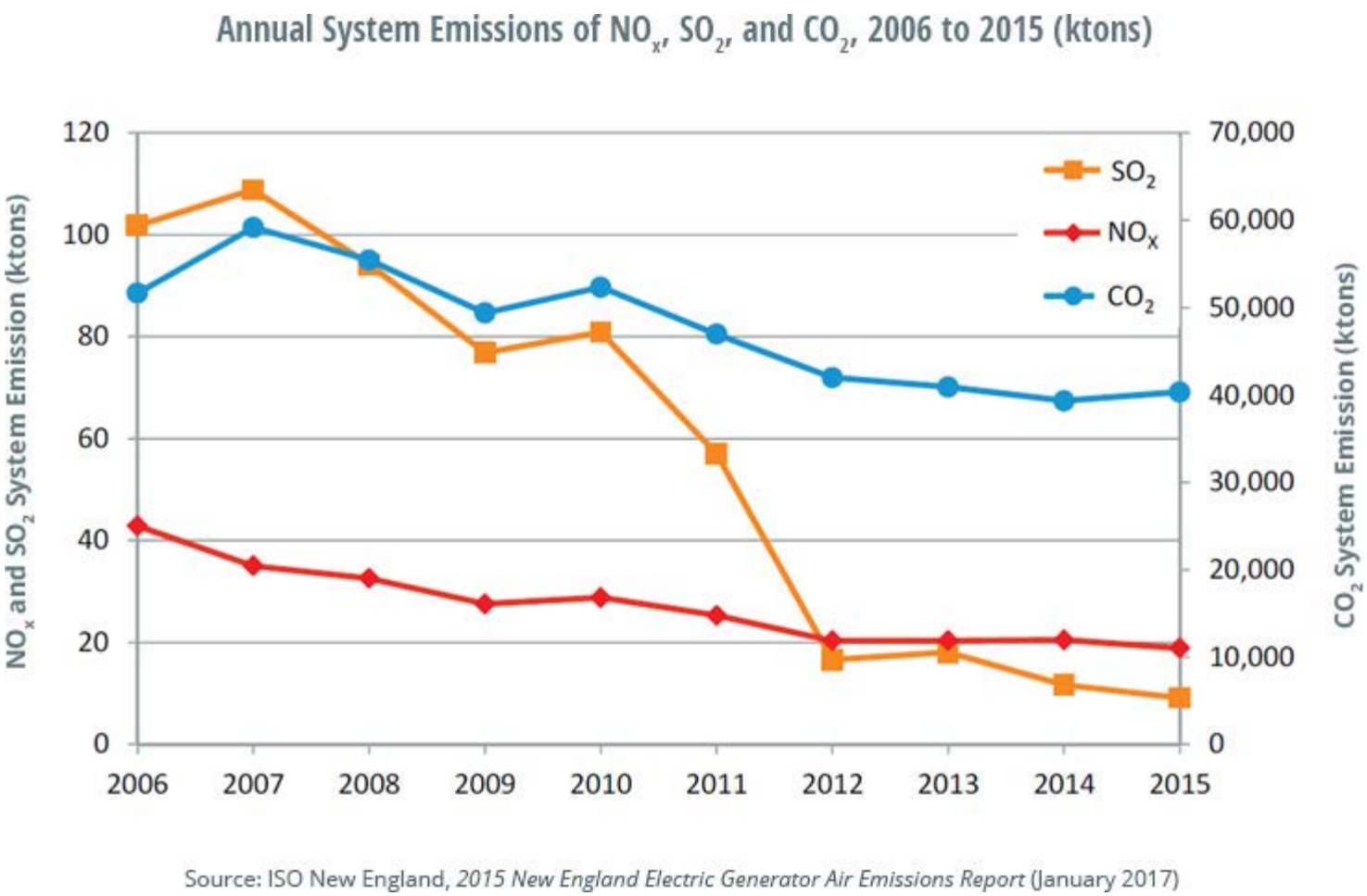
- Integrating Markets & Public Policy
- “Achieve” state goals overlayed on centrally dispatched, organized, deregulated wholesale markets
- Proposals have included hefty carbon pricing, 2 tier capacity auctions, fwd clean energy
- ISO proposal – 2 tier capacity market where new clean resources can ‘sub in’ for retirements

Wholesale Market Implications

- Big green buildout will depress energy prices
- Capacity market will be more volatile
- Transmission builds substantial
- Balancing act – will need more quick start to balance the intermittent green generation
- Storage will help shift PV, improve load factor

- Last but not least – WHO PAYS?

New England Emissions



Source: ISO New England, *2015 New England Electric Generator Air Emissions Report* (January 2017)

ENE Energy New England

Navigating the energy economy.™

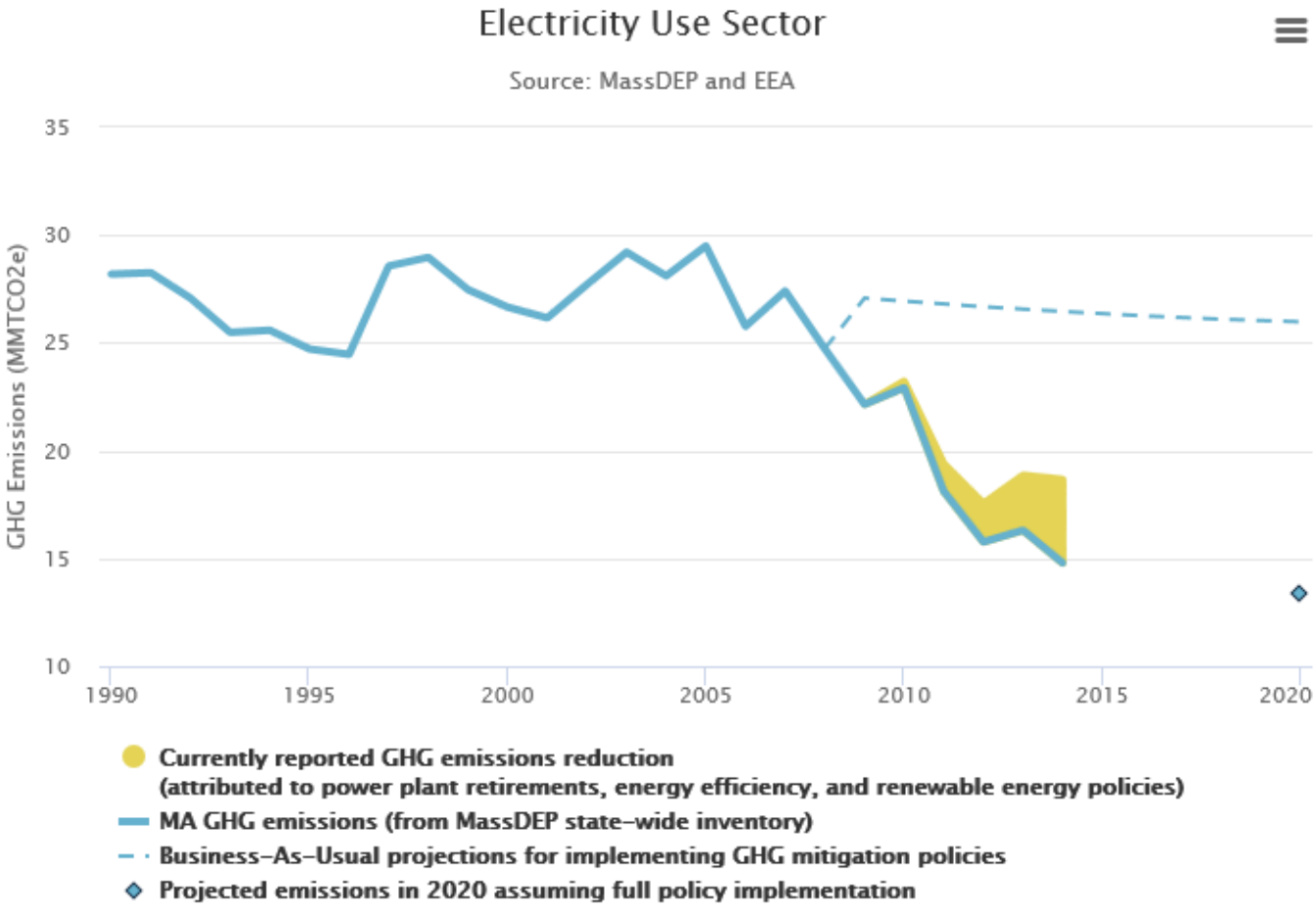
MA CES Example

- CES targets 80% clean generation by 2050
  - Public power exempt by statute to date
  - Draft CES regs includes munis
- Credit given for legacy carbon-free resources
  - Nuclear, hydro, pre-2014
- Creates Clean Energy Attributes
  - Wait, are those RECs?
  - ACP is ½ of RPS ACP (?)
- No sense of cost/benefit trade offs

NESCOE Analysis

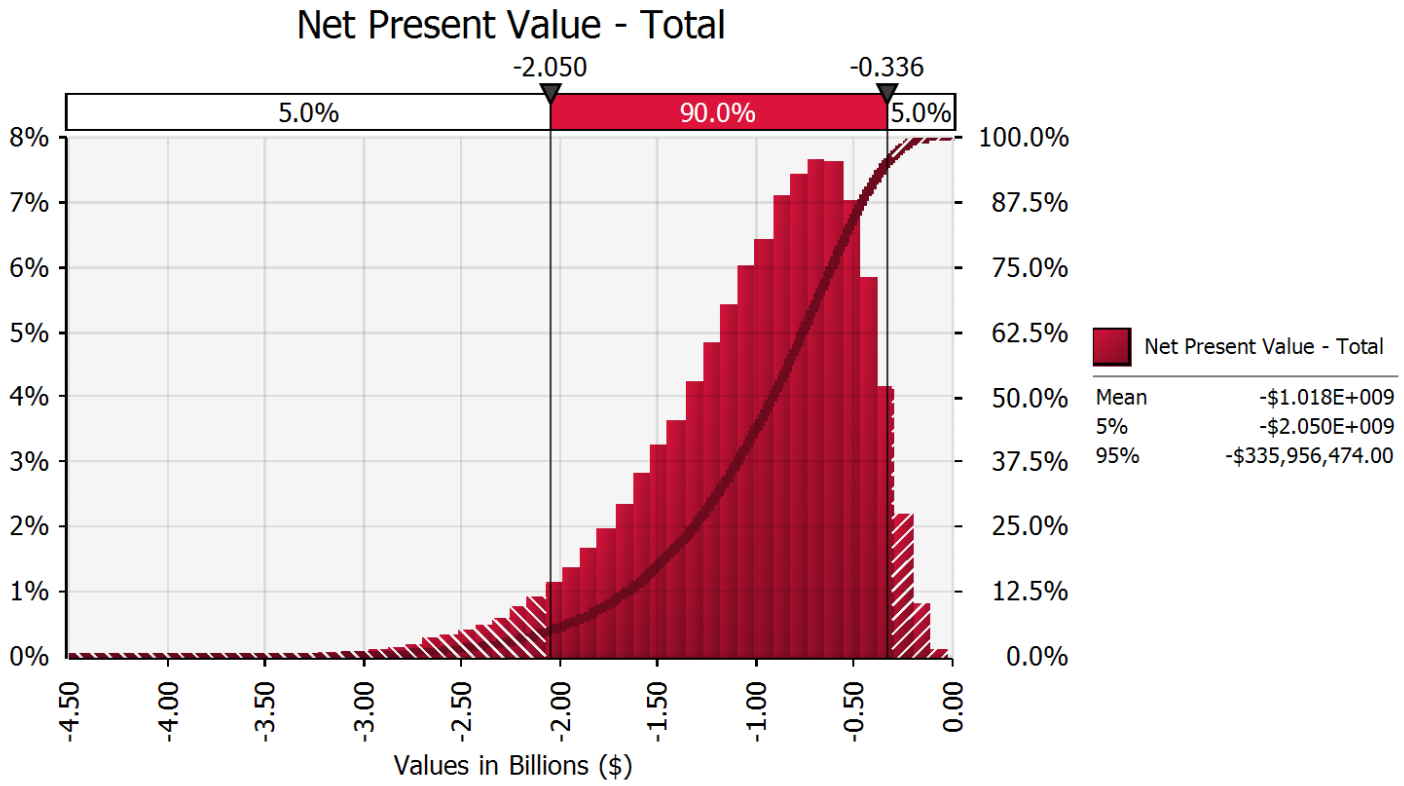
- Recent scenario analysis illustrates costs of building transmission to support clean resources
  - $42-54/MWH to bring in all that clean hydro & wind, and build out thousands of MW of on-shore wind, mostly in Maine
  - Regional transmission already costs $25/MWH!
- “Missing money” – technology revenue requirements not met by market
  - Ranges from $5-10/MWH to $50/MWH & up
- Without transmission, new wind will displace some existing wind & nuclear

MA Electricity Sector GHG



CES Cost Analysis 12 Systems

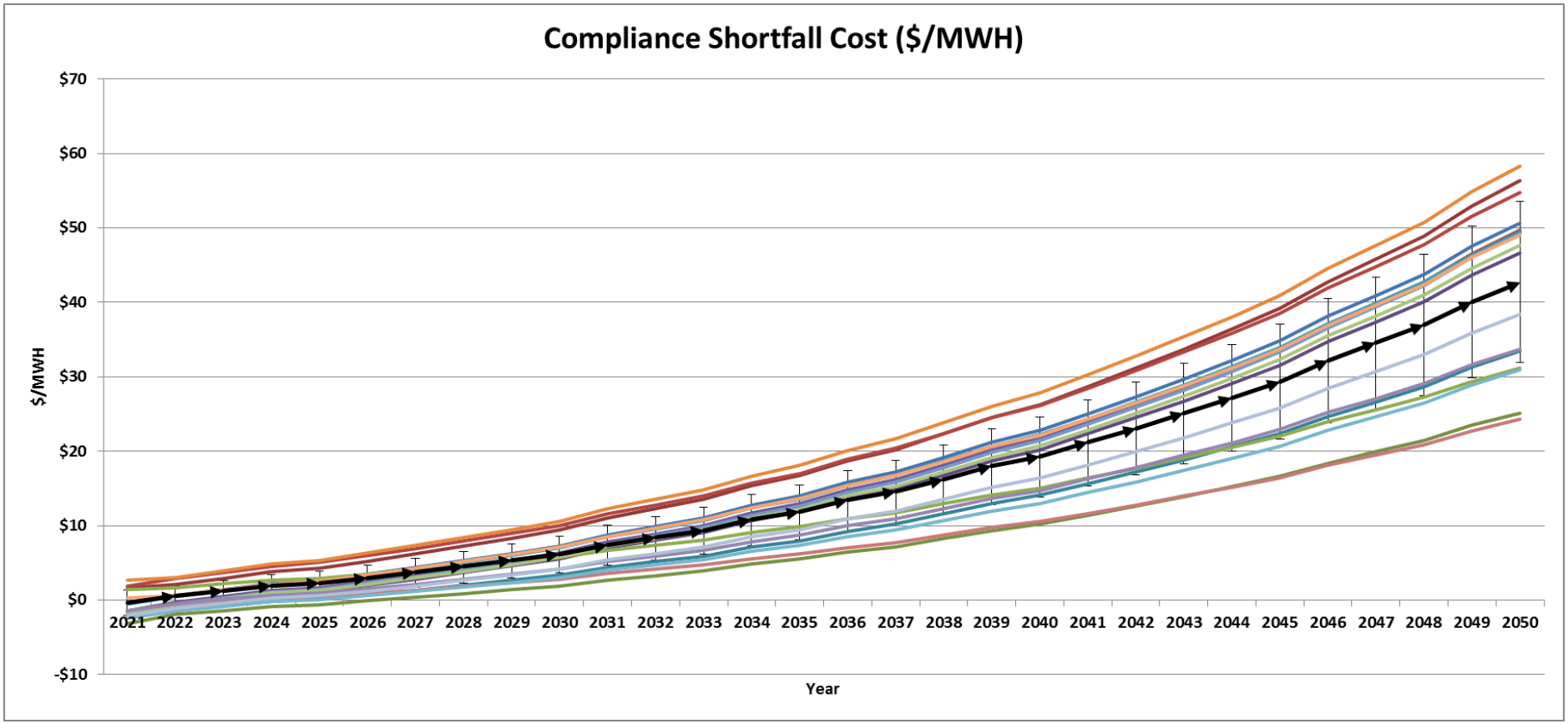
Totaled ENE Customer Results:



- Total Cost represents ~ between 3% to 19% of Current Total Electric Retail Sales Revenues
- Equates to $3 to $18 of Reduced Revenue/ MWH

CES Cost Analysis

Totaled ENE Customer Results:



Public Power Coping Strategies

- Government relations – raise awareness
  - PPAs, voluntary programs, demo projects
- Participate in leg & market rule development
- Lever vertical integration
  - Local resources help with cost avoidance
- Project participation alternatives
  - Get creative to reduce costs
  - Bring equity, lease to own, shared savings
- Mind resource flexibility

In Summary

- CO_2 reductions have been significant in New England since late 90's/dereg
  - Some legislated / regulated, some Darwinian
- No one owns long-term planning in a deregulated environment
- Ratcheting up clean energy goals can conflict with tenets of dereg & organized markets
- It all comes at a cost
- Do voters understand what the legislators are foisting upon them?

Thank You !

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