

NE-MARKAL Analysis of the New England Governors Climate Action Plan

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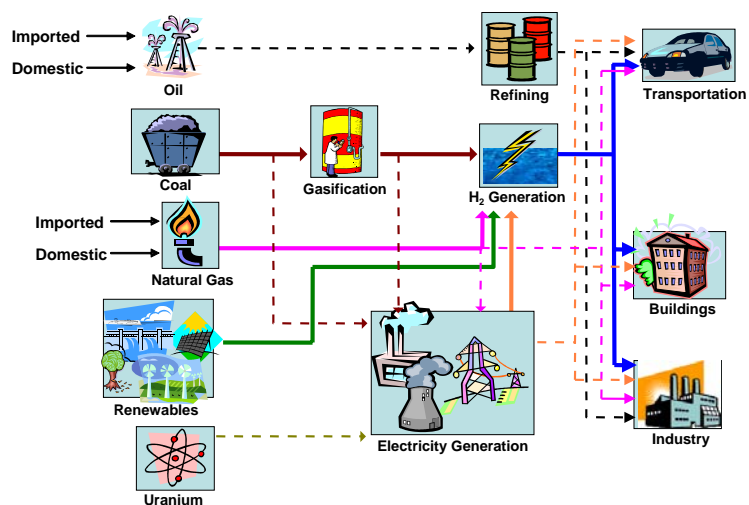
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The Clean Air Association of the Northeast States




MARKAL Modeling of Energy System Energy System Interactions



What are NE-MARKAL's Strengths?

- Big picture, multi-sector overview of regional programs (i.e. does not have the same sector specific level of detail like IPM or MOBILE)
 - Long term planning (i.e. not a dispatch model; may not identify optimal utilization of resources)
 - Flexible framework for quickly identifying sensitivities and alternatives (not necessarily telling you how to get there!)
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NE-MARKAL Primary Data Sources

- EIA
 - RECS, CBECS, MECS, SEDS, Form 767
 - SAGE Technology Repository
 - EPA
 - eGRID, ORD National MARKAL model
 - NREL
 - Renewable potential by category and location
 - DOE Office of Transportation Technology
 - Future LDV characterizations
 - Other
 - NEPOOL, State officials, FAA, NESCCAF technologies
 - RGGI Reference Case Assumptions
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Nature of the NEG analysis

- Establish a Reference scenario consistent with RGGI
- Impose NEG climate goals (economy-wide and sector specific targets)
- Identify greatest opportunity for least-cost carbon reductions, while satisfying RGGI, CA LEV, and RPS constraints
- Assumes regional cooperation (trading) within transmission constraints

NEG Climate Goals Representation

- Total economy-wide New England CO₂ – 1990 levels by 2010 and 10% reduction on said levels by 2020
- Power sector emission intensity - 20% reduction from 2002 (using 2005) levels as of 2025
- Demand sector reduction targets
 - ❑ Public buildings (assumed = 10% of commercial, no transportation) – 25% reduction from Reference case levels beginning in 2012
 - ❑ Rest of commercial – 25% reduction from Reference case levels beginning in 2025
 - ❑ Residential – 25% reduction from Reference case levels beginning in 2025
 - ❑ Industry and transport – voluntary actions in response to the 10% overall target

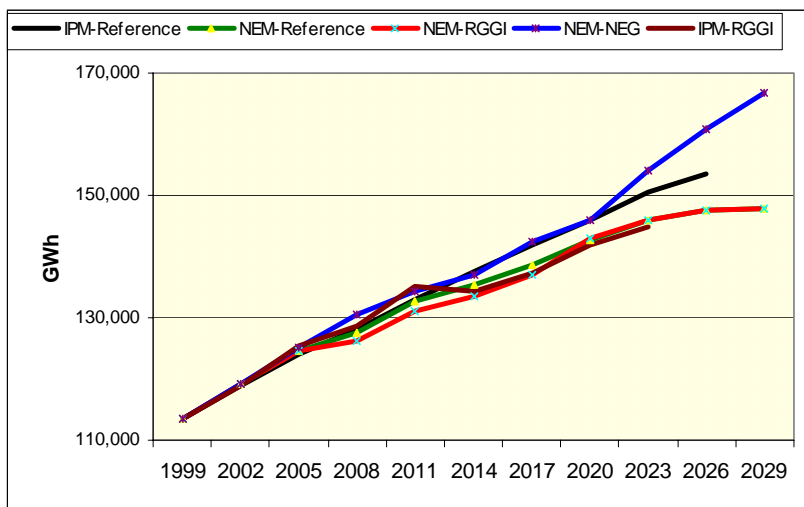
Scenarios

- ❑ Reference – NE Reference scenario
- ❑ RGGI package – NE cooperation with RGGI package cap in power sector
- ❑ NEG – NE cooperation with sector and 10% targets by 2020
- ❑ NEG+9 – NE cooperation with sector and 10% target by 2029

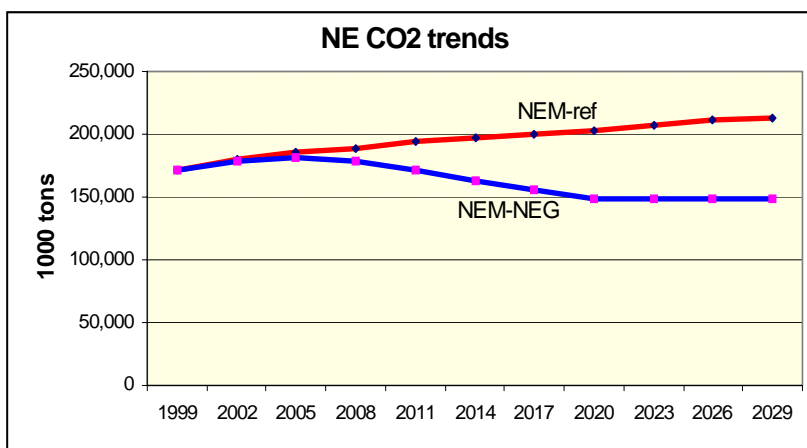
Limitations of the current analysis

- Current reference scenario is still very efficient relative to “likely” consumer behavior (i.e. RGGI and CA LEV are satisfied automatically based on least-cost considerations)
- Energy efficiency/conservation measures must be heavily constrained in reference scenario
- Aggregate “Other” categories in Commercial limit depiction of specific options

Consistent with RGGI

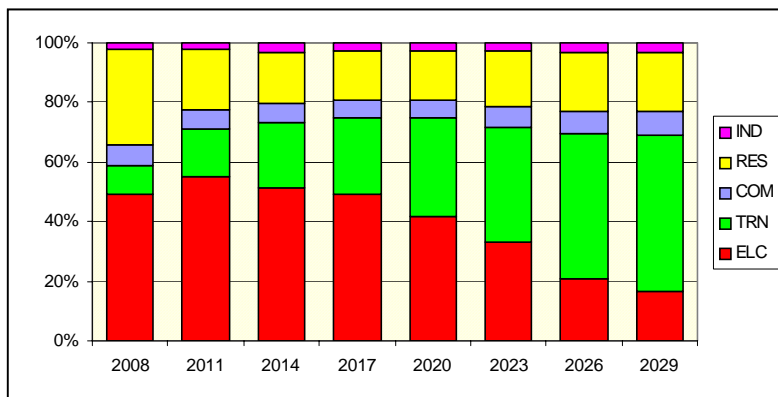


Preliminary Results – Overall CO₂ Trend

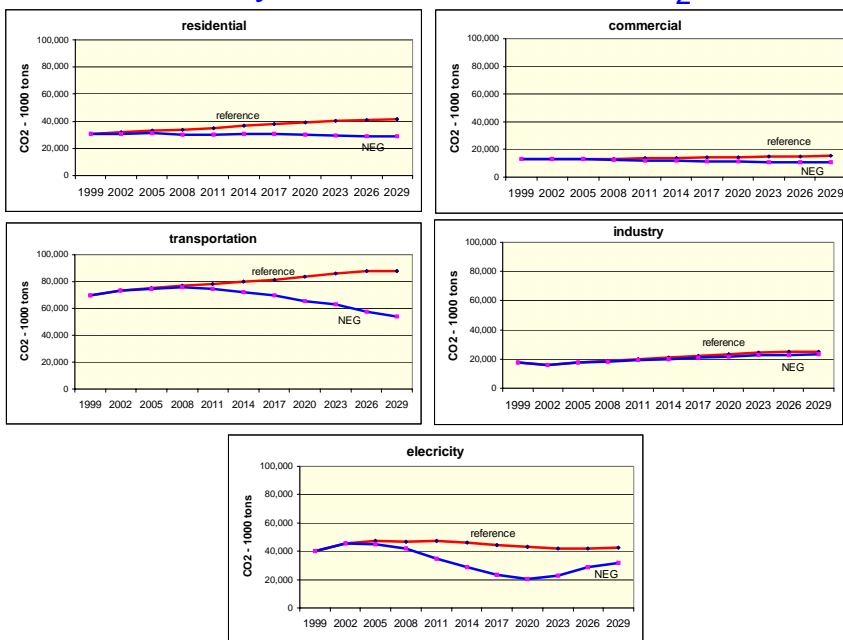


Preliminary Results – Achieving the NEG Climate Goals

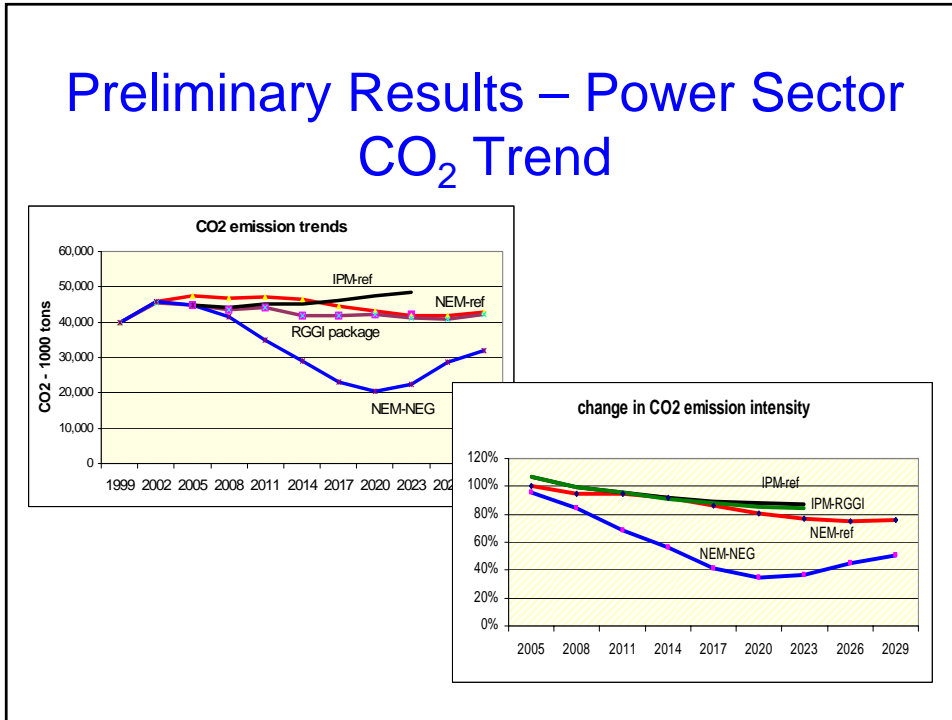
(Percent contribution of each sector to reductions)



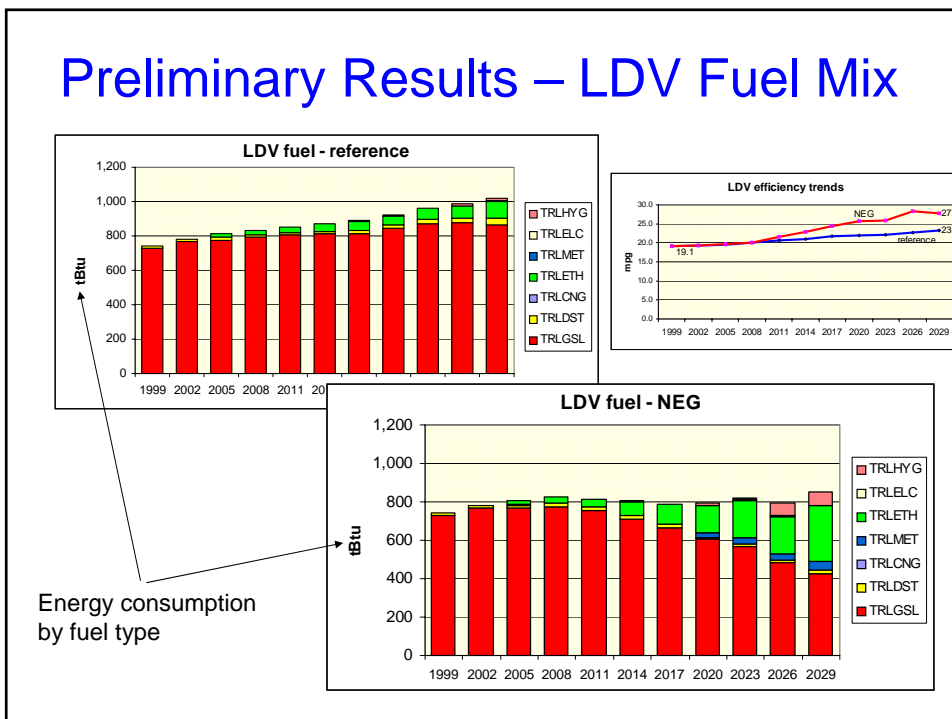
Preliminary Results – Sector CO₂ Trends



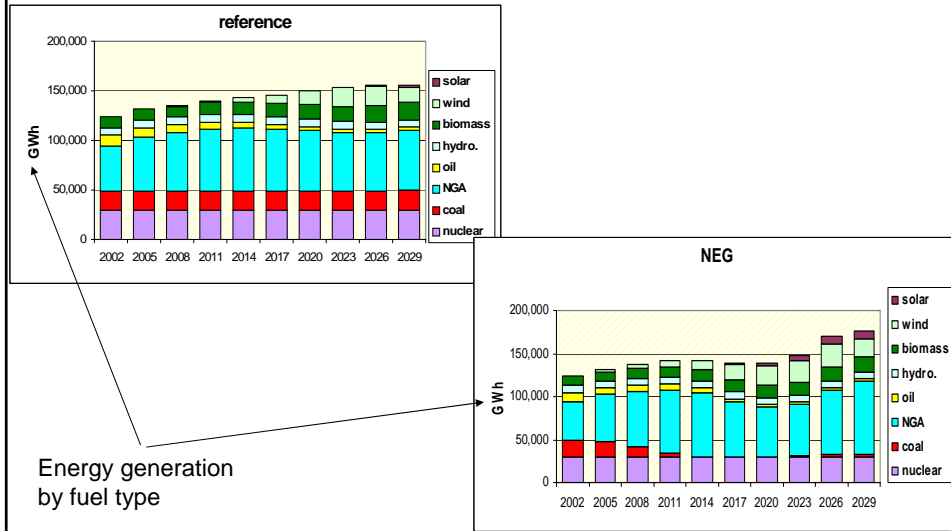
Preliminary Results – Power Sector CO₂ Trend



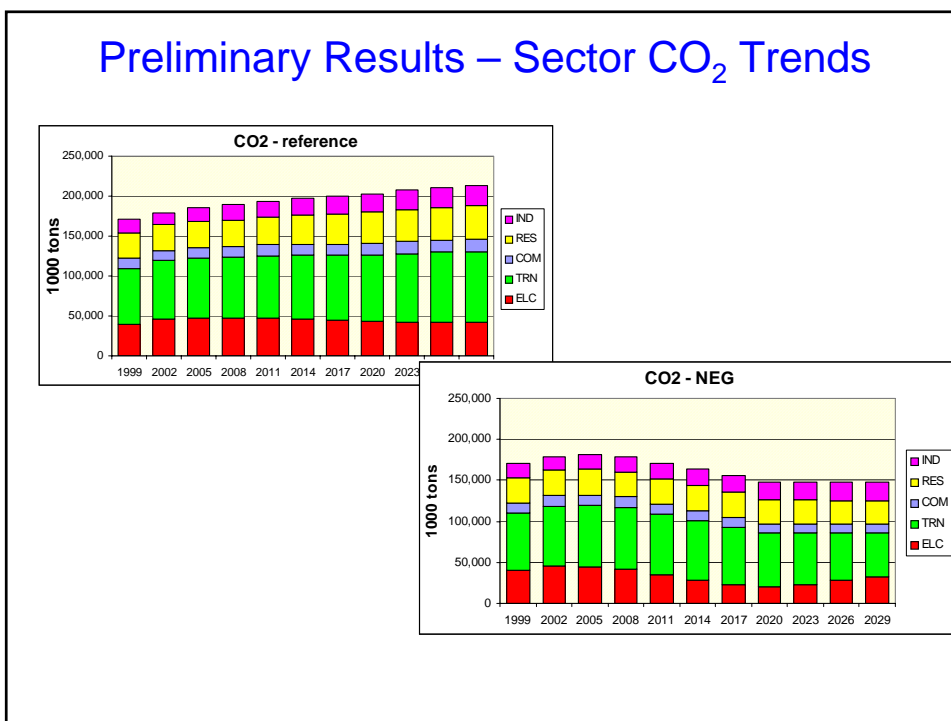
Preliminary Results – LDV Fuel Mix



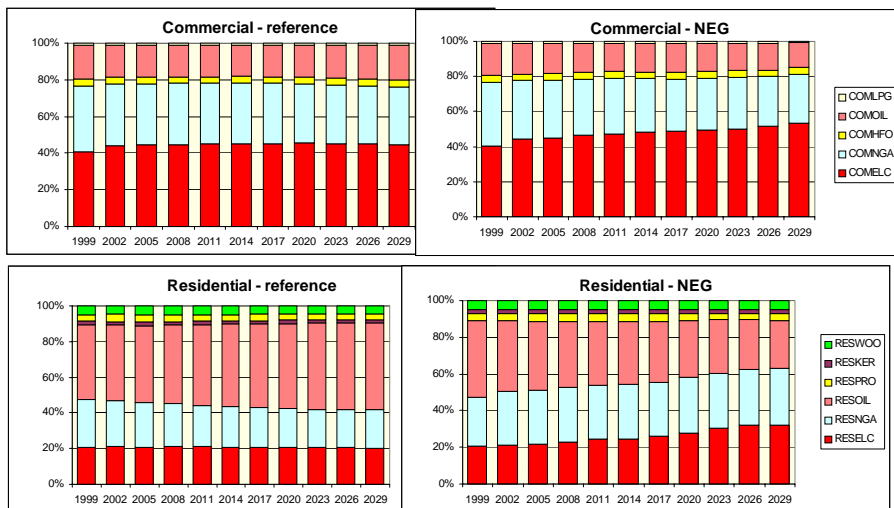
Preliminary Results – Power Sector Fuel Mix



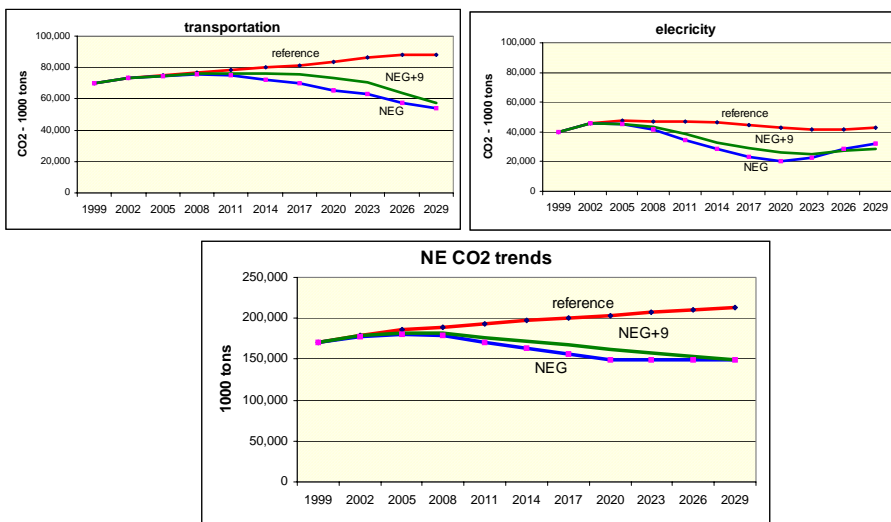
Preliminary Results – Sector CO₂ Trends



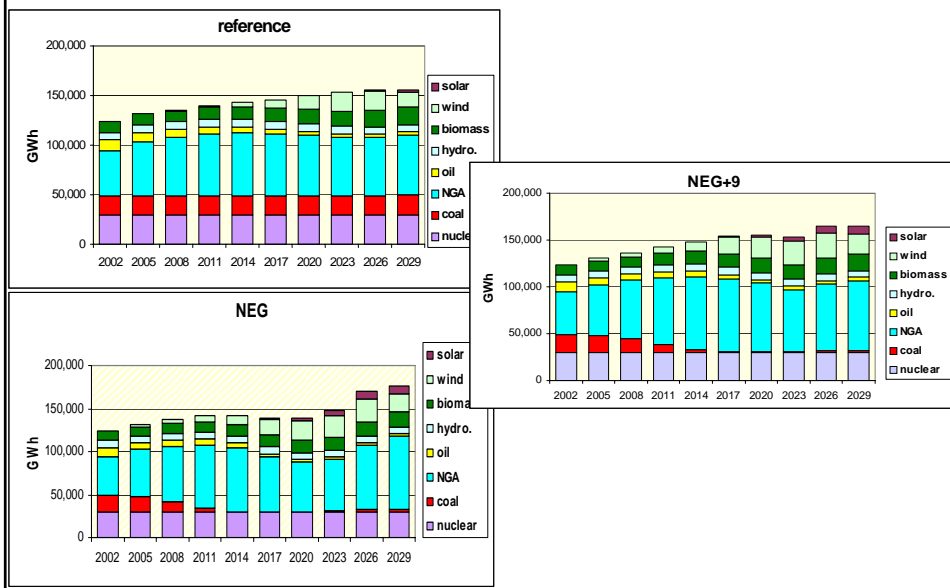
Preliminary Results – COM/RES Fuel Mix



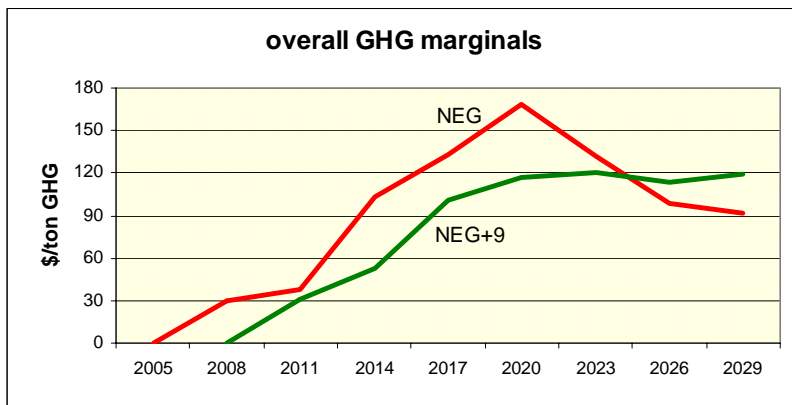
Preliminary Results – NEG+9 CO₂ Trends




Preliminary Results – Power Sector Fuel Mix



Preliminary Results – Reduction Costs



Conclusions

- NE-MARKAL suggests that from a cost-savings perspective, **residential heating** and **transportation** present the best near-term target for CO₂ emission reduction in the context of the RGGI program
 - Program options would include high efficiency furnace (or electric heat) upgrades as part of a low-sulfur heating oil program and ratcheting down on CA LEV post-2016
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