

# Quantifying the Air Quality Benefits of Energy Efficiency

## Energy Efficiency Renewable Energy Roadmap Pilot Project

Robert D. Bielawa, P.E.

New York State Department of Environmental Conservation

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# Topics

- Project Partners
- Project Goals
- Roadmap Pathways
- New York’s Roadmap Case Study
  - Combined Heat and Power
  - NY Sun Initiative
  - Build Smart NY Initiative
- Roadmap Issues
- Recommendations
- Related Efforts
- Helpful Resources



# Project Partners

- Maryland Department of Environment (MDE)
- Massachusetts Department of Environmental Protection (MassDEP)
- New York State Department of Environmental Conservation (NYSDEC)
- Northeast States for Coordinated Air Use Management (NESCAUM)
- Regulatory Assistance Project (RAP)
- EPA: OAP, OAQPS, Regions 1, 2, and 3

Funded by EPA/OAP and NESCAUM States



# Project Goals

- Help pave the way for integrating energy efficiency (EE) and renewable energy (RE) into air quality planning through real-world examples
- Road-test EPA's Roadmap for Incorporating EE/RE Policies and Programs into State and Tribal Implementation Plans
  - Inform future efforts to use the Roadmap
  - Identify issues and work with EPA to improve the Roadmap



# EPA's EE/RE Roadmap Pathways

- Baseline emissions projection pathway
- **Control strategy pathway**
- Weight-of-evidence (WOE) determination pathway
- Emerging/voluntary measures pathway

EPA's Roadmap and supporting documents:  
<http://epa.gov/airquality/eere/>



# New York's EE/RE Roadmap Case Study

- Combined Heat and Power (CHP) conversion project for Boiler MACT compliance
- NY- Sun Initiative ([ny-sun.ny.gov](http://ny-sun.ny.gov))
- Build Smart NY Initiative ([buildsmart.ny.gov](http://buildsmart.ny.gov))



# CHP

- **Who is Involved?**

- State of New York
- United States Department of Energy
- United States Environmental Protection Agency

- **Quick Facts:**

- The proposed Boiler MACT Rule significantly impacts oil, coal, biomass, and process gas boilers
- Facilities may consider converting existing units to natural gas, purchasing new units, or consider moving to natural gas fueled “Conventional CHP”



# CHP

- **Goals**

- provide a model for the country, where best practices and policies can be replicated to support increasing investment in CHP systems and industrial energy efficiency
- demonstrate how to include such EE/RE practices and policies in SIPs

- **Roadmap Status**

- 4 boilers that burn heavy oil with a total firing capacity of 370 million British thermal units per hour (MMBtu/hr) with a CHP potential of 37 MW
- Estimated 21 boiler MACT affected facilities (49 units) with a CHP potential of 566 MW





# NY Sun Initiative

- **Who is Involved?**

- New York State Energy Research and Development Authority
- Long Island Power Authority
- New York Power Authority

- **Quick Facts**

- Increases financial incentives for large, commercial-sized photovoltaic (PV) projects and expands incentive programs for small-to-medium residential and commercial systems;
- provides additional funding for its competitively bid solar program for larger-scale and aggregated systems that currently focuses on businesses, colleges and universities, and other large buildings located in New York City, Westchester County, and the lower Hudson Valley.



# NY Sun Initiative

- **Quick Facts**

- Initiates a balance-of-system (BOS) program, where NYSERDA and NYPA will work with private and public partners across New York State, to standardize and streamline procedures for permitting and interconnection, and development and training.

- **Goals:**

- attract significant private investment in solar photovoltaic systems,
- enable the sustainable development of a robust solar power industry in New York,
- improve the reliability of the electric grid,
- **reduce air pollution**

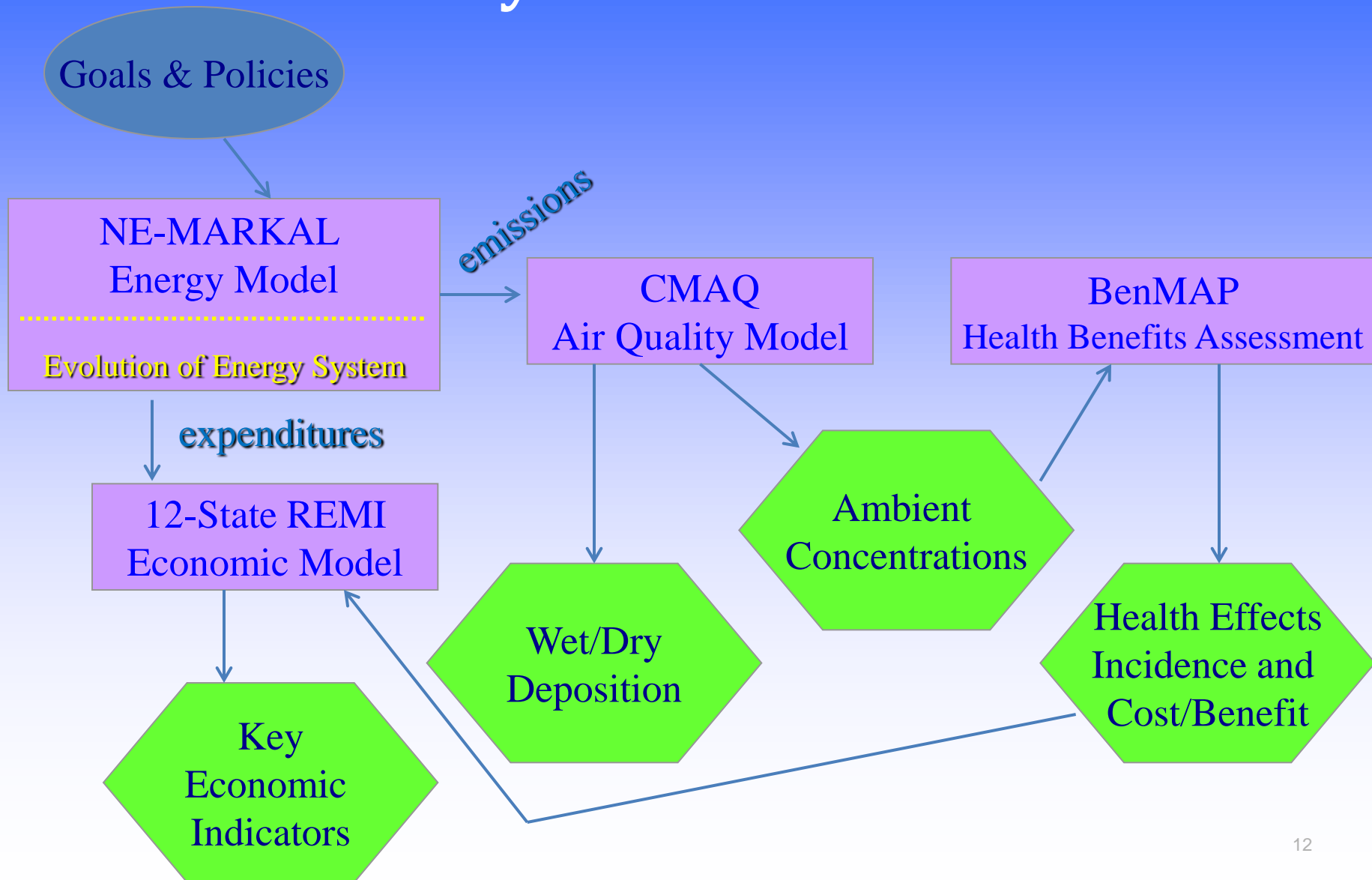


# NY Sun Initiative

- **Roadmap Status (Now and Next Steps)**
  - In process of quantifying emissions reductions
  - Results at this time are illustrative
  - Working with EPA
  - Internal discussion on how to use the results

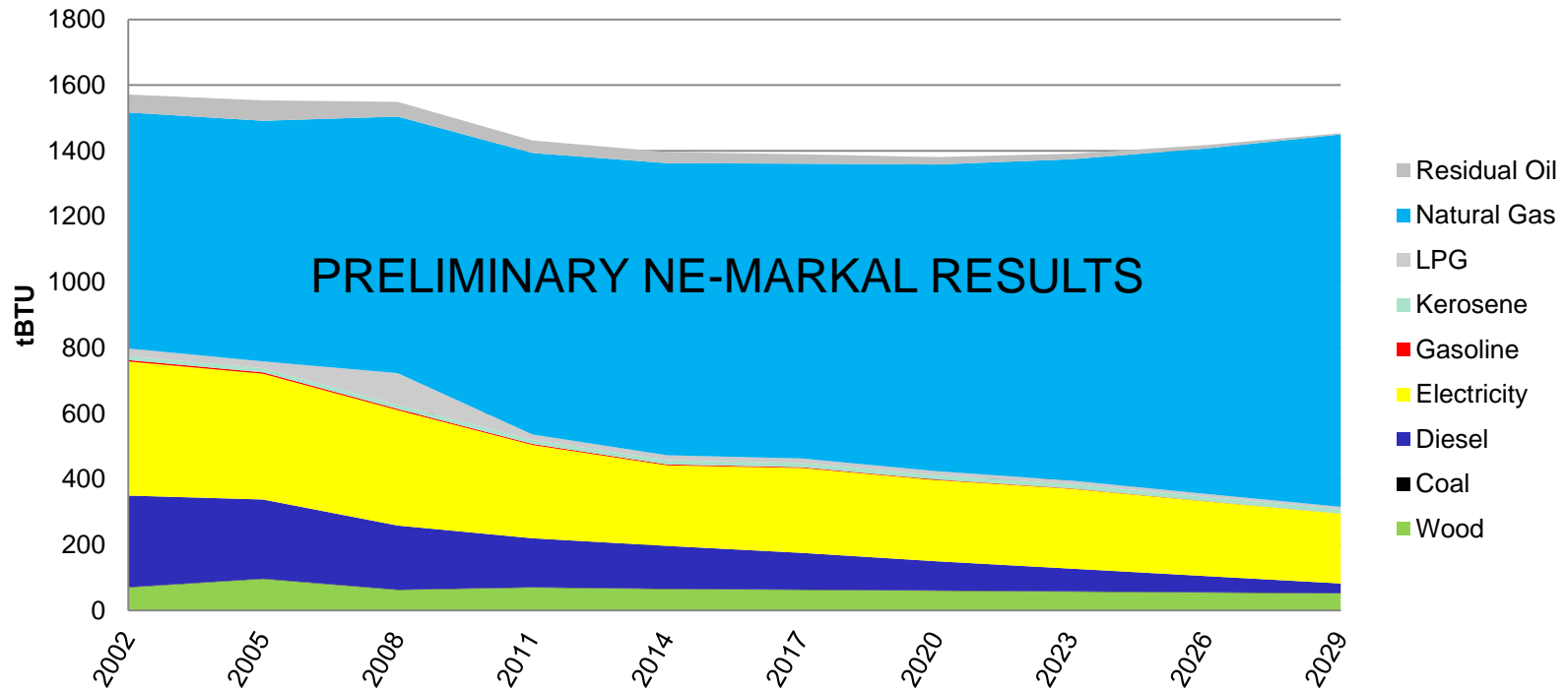


# NESCAUM's Multi-Pollutant Policy Analysis Framework



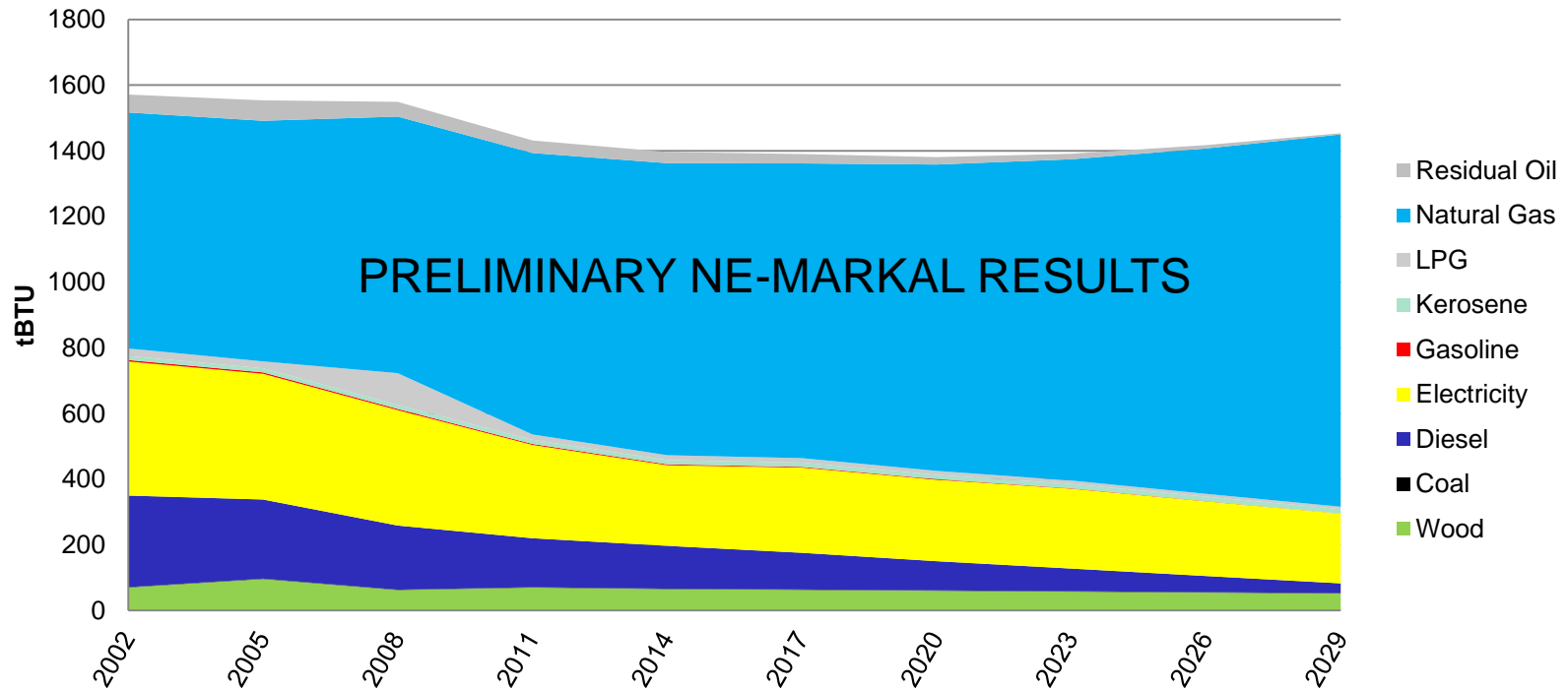
# NY Sun Initiative

## Buildings Sector Final Energy Consumption Reference Case



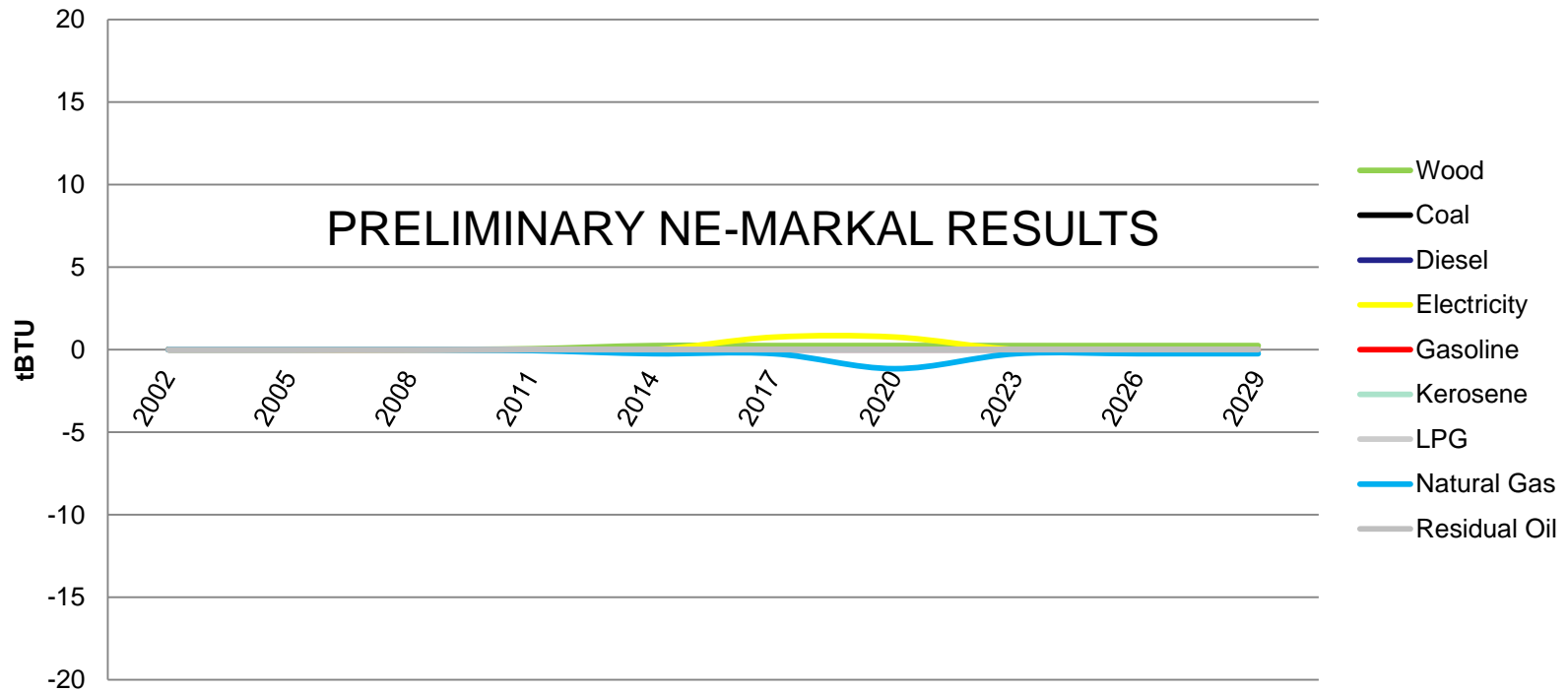
# NY Sun Initiative

## Buildings Sector Final Energy Consumption NY Sun Initiative



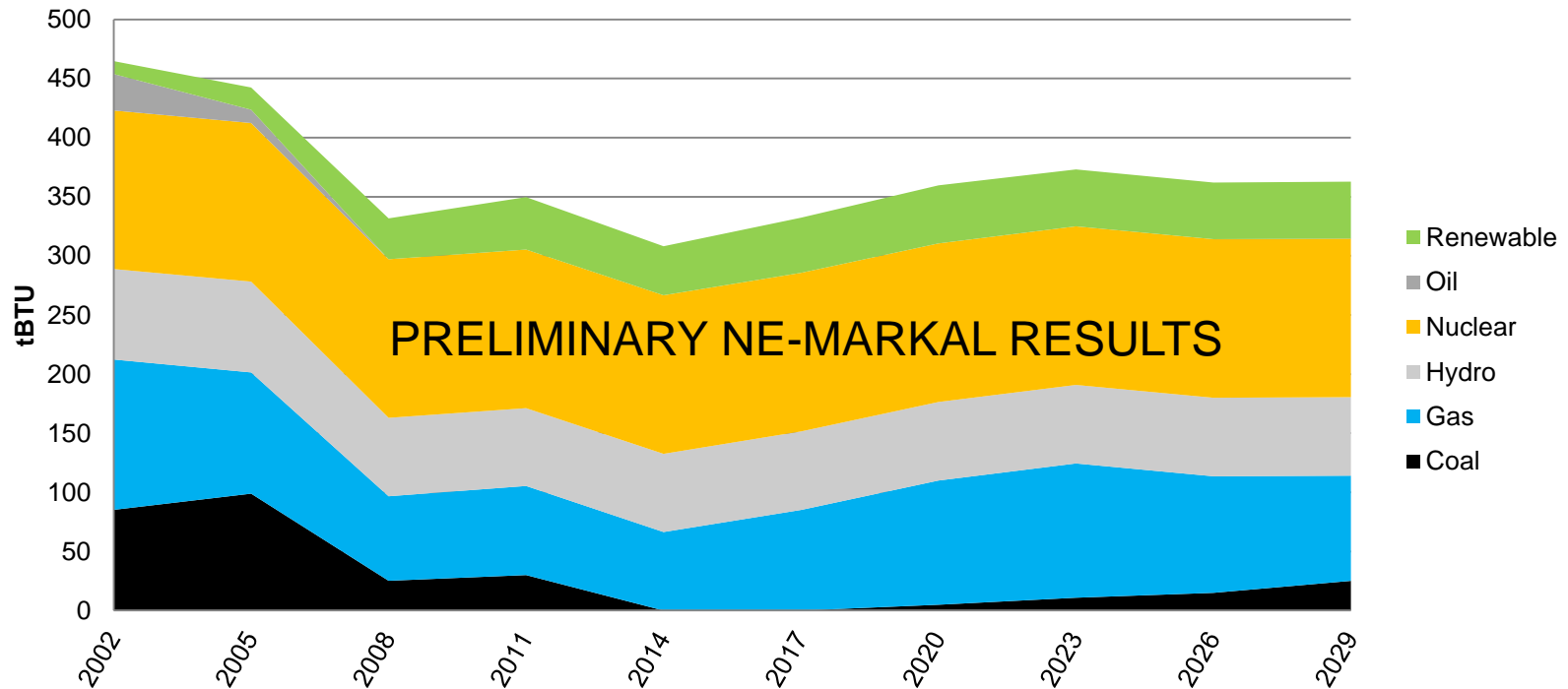
# NY Sun Initiative

## Buildings Sector Final Energy Consumption NY Sun Initiative Relative to Reference



# NY Sun Initiative

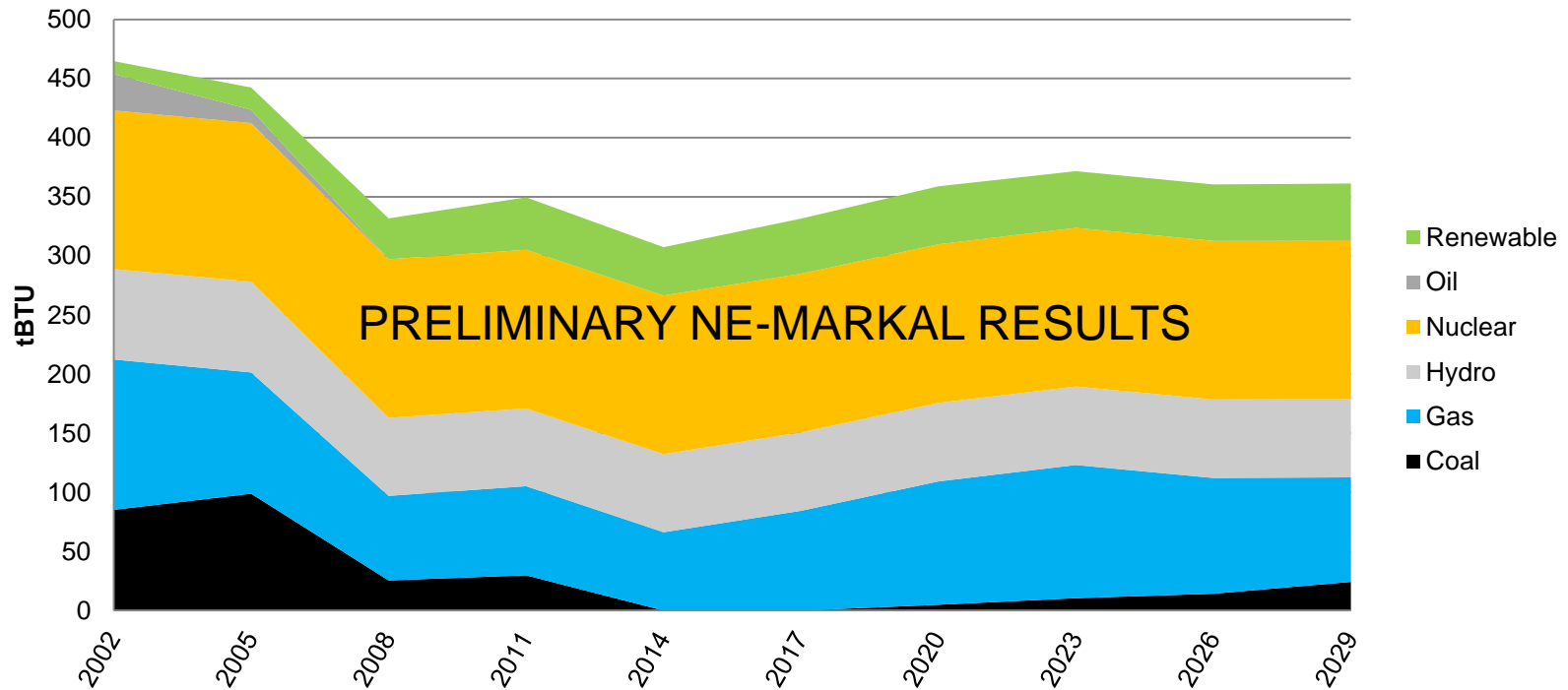
## Electricity Generation by Fuel Type Reference Case





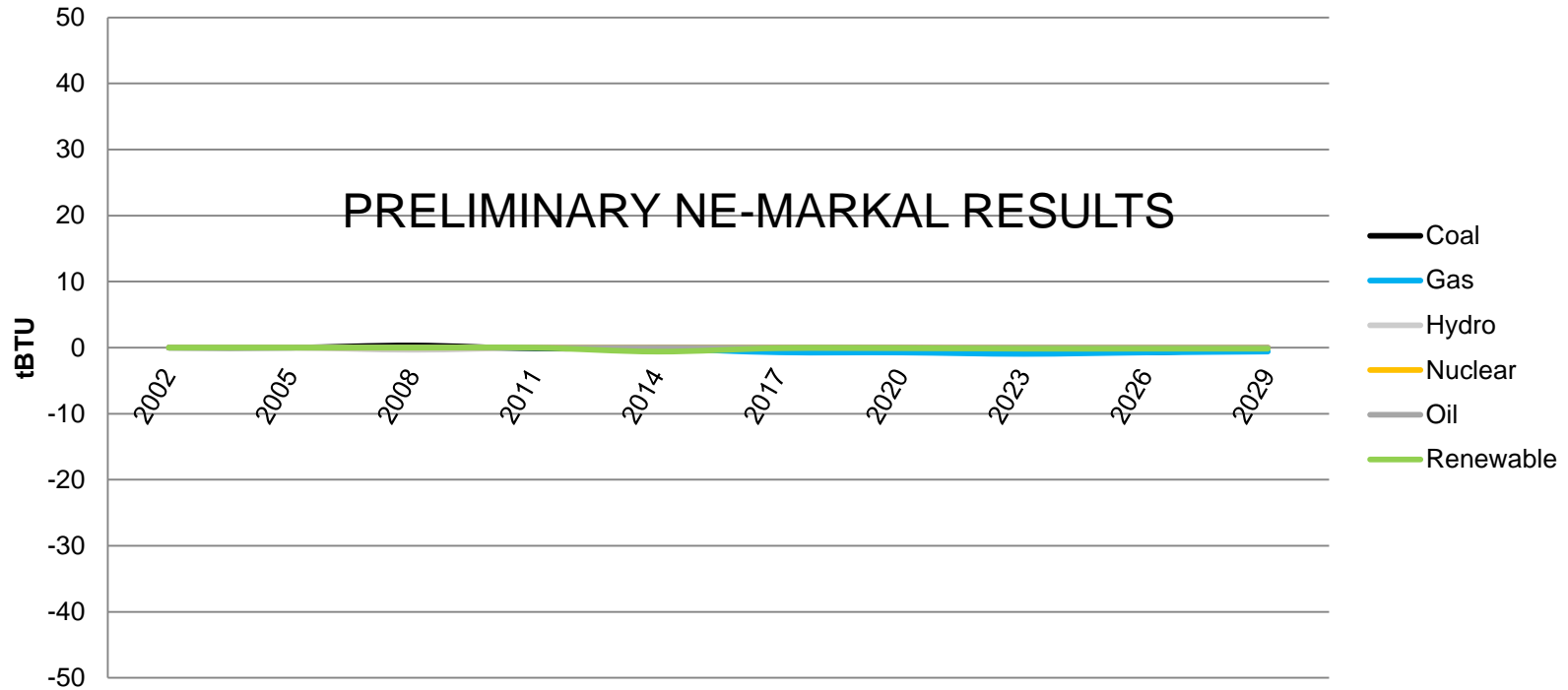
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## Electricity Generation by Fuel Type NY Sun Initiative



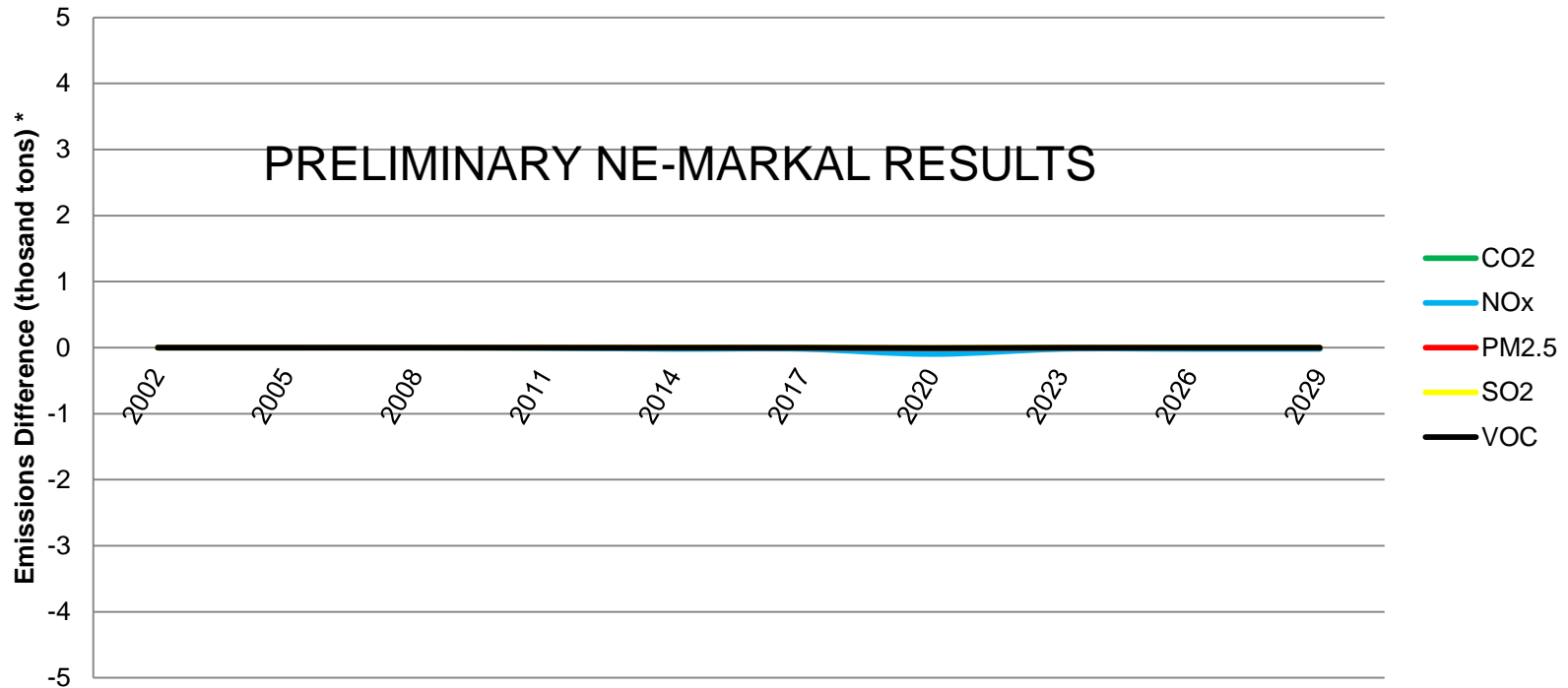
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## Electricity Generation by Fuel Type NY Sun Initiative Relative to Reference



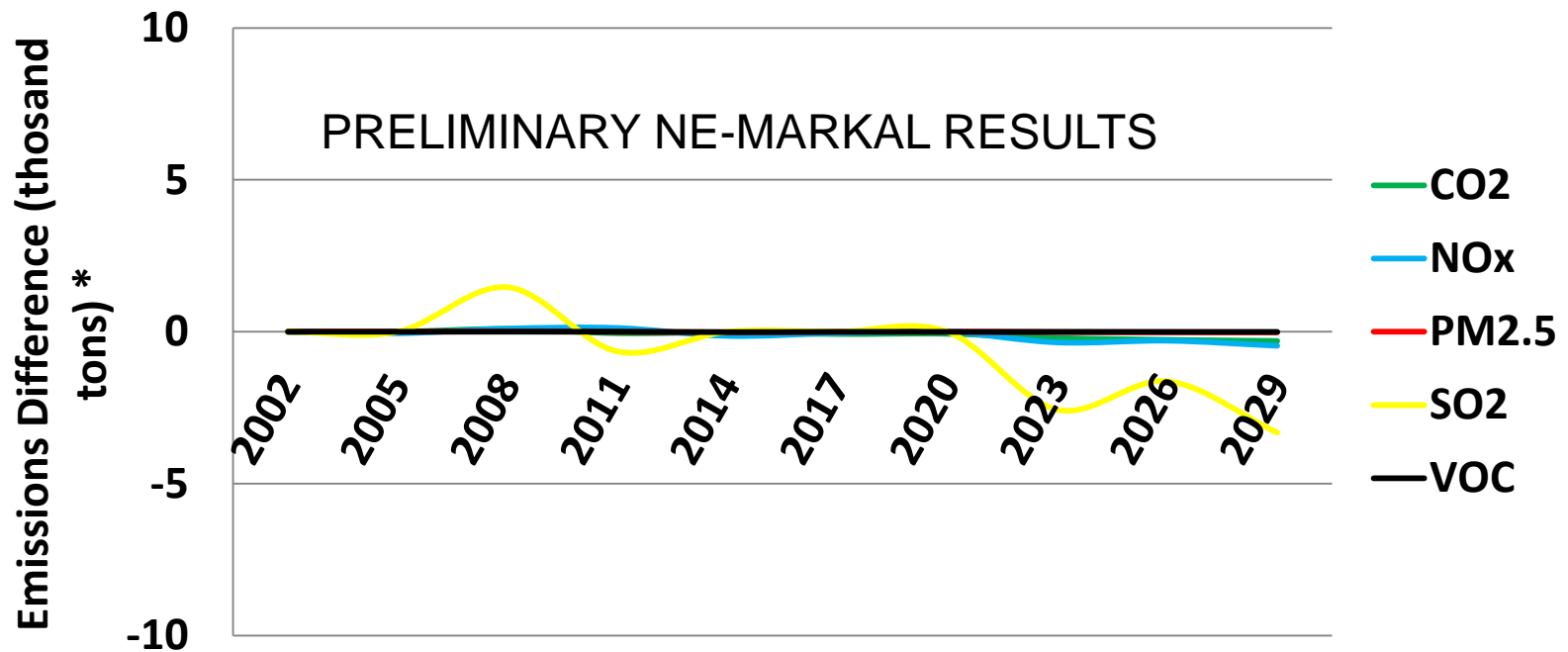
# NY Sun Initiative

## Difference Between Reference Case and NY Sun Initiative Emissions: Buildings Sector



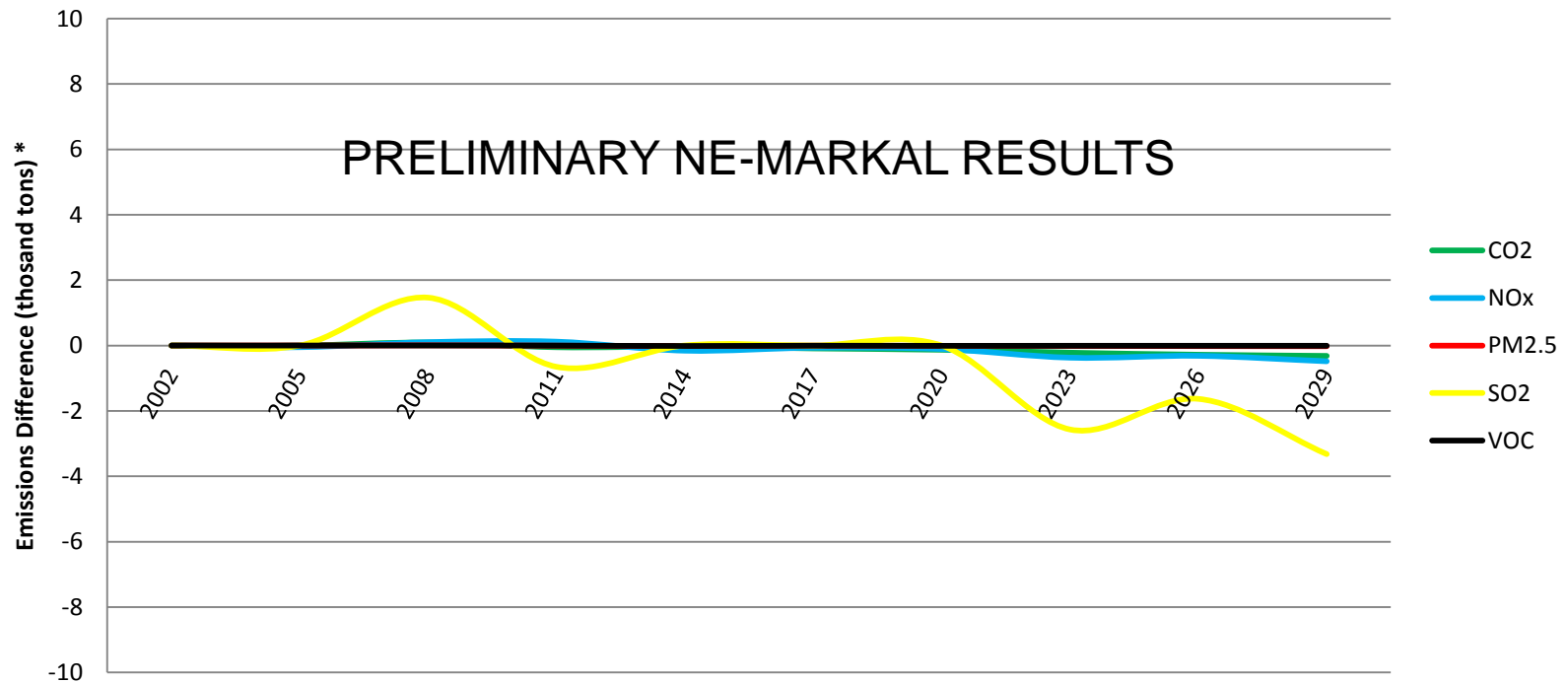
# NY Sun Initiative

## Difference Between Reference Case and NY Sun Initiative Emissions: Power Sector

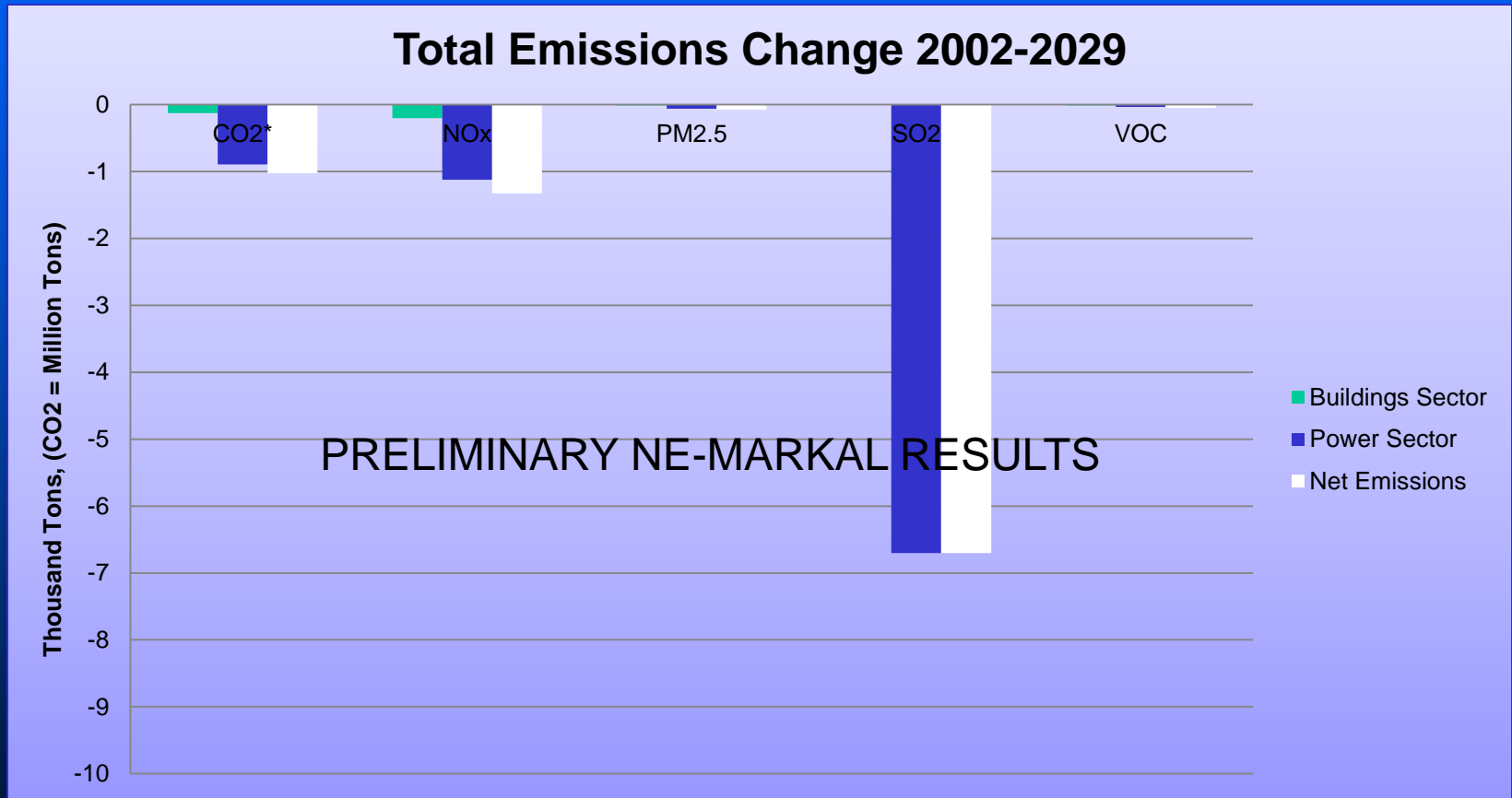


# NY Sun Initiative

Difference Between Reference Case and NY Sun Initiative  
Emissions: Net Emissions



# NY Sun Initiative



# Solar Study

- **ENVIRONMENTAL IMPACT** (through 2049) of 5,000 MW PV operating by 2025

(<http://www.nyseda.ny.gov/Publications/Program-Planning-Status-and-Evaluation-Reports/Solar-Study.aspx>)

- Fossil fuel consumption would be reduced by 1,100 trillion Btus (4%)
- Carbon dioxide (CO<sub>2</sub>) emissions would be reduced by 47 million tons (3%)
- Nitrogen oxides (NO<sub>x</sub>), which produces smog and acid rain, would be reduced by 33,000 tons (4%)
- Sulfur dioxide (SO<sub>2</sub>), which also produces smog and acid rain, would be reduced by 67,000 tons (10%)
- Mercury would be reduced by 120 pounds (3%)



# Build Smart NY Initiative

- **Who is Involved?**

- NYS Office of General Services (OGS)
- The New York Power Authority (NYPA)
- New York State Energy Research and Development Authority (NYSERDA)

- **Quick Facts**

- Buildings consume approximately 60% of the total energy used within New York State and emit approximately 50% of the greenhouse gases released in the State.
- State owned buildings consume approximately 3,000 GWh annually, which is approximately 5% of the energy consumed by all buildings throughout the state.
- New York State owns approximately 224 million square feet of real estate, which includes universities, prisons, mental health hospitals, office buildings, and facilities that house its trains, buses and equipment.
- Six state entities represent 92% of the State's energy bill – State University of New York, Department of Corrections and Correctional Services, the City University of New York, Office of General Services, Office of Mental Health and Metropolitan Transportation Authority.





# Build Smart NY Initiative

- **Goals**

- Reduce the state's average energy use intensity (EUI) by 20% within seven years
- Reduce greenhouse gas emissions
- Reduce annual state energy expenditures through energy efficiency
- Create good, in-state jobs
- Demonstrate the value proposition of energy efficiency
- Serve as a model for the public and private sectors

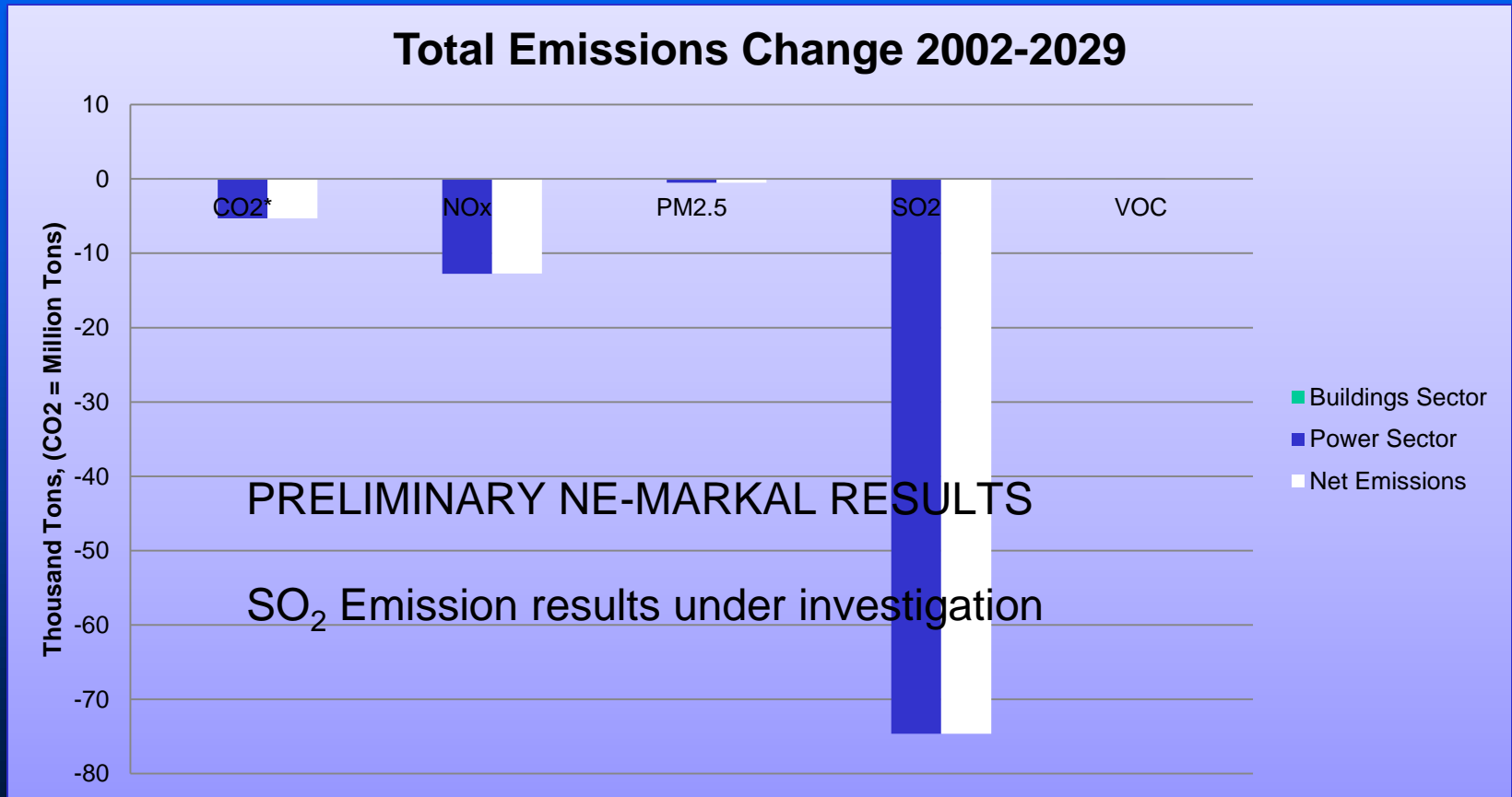


# Build Smart NY Initiative

- **EE/RE Roadmap Status**
  - In process of quantifying emissions reductions
  - Results at this time are illustrative
  - Working with EPA
  - Internal discussion on how to use the results



# Build Smart NY Initiative



# New York's Other Uses of NE-MARKAL Energy Model

- Applying the Multi-Pollutant Policy Analysis Framework to New York: An Integrated Approach to Future Air Quality Planning (May 2012)  
([http://www.nyserda.ny.gov/Publications/Research-and-Development-Technical-Reports/Environmental-Reports.aspx?sc\\_database=web](http://www.nyserda.ny.gov/Publications/Research-and-Development-Technical-Reports/Environmental-Reports.aspx?sc_database=web))
  - 10 GW of wind power by 2030
  - Renewable Portfolio Standard: 25% by 2013
  - 15% electricity demand reduction by 2015
  - 100% of appliances sold after 2020 meet the ENERGY STAR® standards for efficiency
  - 10% of residential and commercial hot water demand met through solar thermal technologies



# Roadmap Issues Identified To Date

- Location of emissions reductions
  - Determining where emissions *didn't* occur raises questions. What level of granularity/aggregation is generally appropriate?
- Acceptable use of energy models
  - How could analytical results be appropriately used in a SIP context? What is the process to evaluate?
- Acceptability of an “expanded” weight-of-evidence approach
  - Could a robust suite of analytical exercises allow for some level of SIP credit?
- Best use of new EPA tools
  - Are they appropriate for SIP-level use?
- Need for education on the appropriate scale of EE/RE and the benefits of a portfolio approach



# Case Studies Status

- New York is currently in the analysis phase
- Engaging with NYSDPS and NY ISO
- Engaging with EPA OAQPS, OAP, and Regional Offices on a regular basis
- EPA developing Q&A to help clarify potential issues
- Status report in early summer 2013



# Opportune Time to Consider EE-AQ Integration

- Good news:
  - Many related efforts underway, especially to quantify energy savings
  - EPA engaged and has some expertise
  - Energy offices and PUCs interested
  - Opportunity for you to have an impact on energy policy
- Challenges:
  - Uncharted territory
  - Requires time and up-front training
  - No formalized approach for assessing avoided emissions at the level we want for AQ planning purposes YET



# Recommendations for States Considering EE/RE Opportunities

- Engage with your energy office and public utility commission about existing and planned EE/RE programs. Gain an understanding of how these offices determine energy savings and their EMV practices
- Review your energy or emissions baselines to determine if EE/RE programs are included
- Try to account for emissions avoided or displaced by EE/RE programs – trickier – so start participating in forums that can help advance this.





# Related Efforts

- NEEP EM&V Forum: <http://neep.org/emv-forum>
- DOE Uniform Methods:  
[http://www1.eere.energy.gov/office\\_eere/de\\_ump.html](http://www1.eere.energy.gov/office_eere/de_ump.html)
- NACAA regulator dialogue
- NESCAUM ISO dialogue
- EPA EMV webinar series
- NASEO interested in Roadmap case studies to engage energy offices



# Some Helpful Resources

- NESCAUM/RAP Energy Training
  - Energy Efficiency Training: link to be updated
  - Engaging Your PUC: <http://www.raonline.org/event/webinar-engaging-with-your-public-utility>
  - Quantification: <http://www.raonline.org/event/measuring-the-air-quality-impacts-of-energy>
- American Council for an Energy Efficient Economy (ACEEE) data base of energy efficiency policies and programs by state: <http://aceee.org/sector/state-policy>
- Consortium for Energy Efficiency (CEE) program and resource lists: <http://www.cee1.org/content/cee-program-resources>
- Database of State Incentives for Renewables and Efficiency (DSIRE): <http://www.dsireusa.org/>



# More Helpful Resources

- EPA Energy Efficiency Overview  
<http://epa.gov/statelocalclimate/state/topics/energy-efficiency.html>
- US DOE Energy Efficiency Overview
- <http://energy.gov/science-innovation/energy-efficiency>
- For help connecting with your utility commission or energy office:
  - National Association of Regulatory Utility Commissioners:  
<http://www.naruc.org/>
  - National Association of State Energy Officials: <http://www.naseo.org/>



# Contact Information

Robert D. Bielawa, P.E.

NYSDEC

625 Broadway, 11<sup>th</sup> Floor

Albany, NY 12233-3251

p. 518-402-8396

f. 518-402-9035

e-mail: [rdbielaw@gw.dec.state.ny.us](mailto:rdbielaw@gw.dec.state.ny.us)

