



# **REMI Economic Impact Analysis Assumptions and Results**

## **91 Cap Bank Potential Scenario**

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NESCAUM



# REMI Model Overview

- The REMI (Regional Economic Models, Inc.) Policy Insight + Model:
  - NESCAUM's REMI model is a 12-state economic and demographic forecasting model
  - Uses a regional REMI Reference Case
- REMI output includes estimates of:
  - Changes in gross regional product (\$);
  - Changes in employment (job-years); and
  - Changes in real personal (disposable) income (\$).



# RGGI Program Review REMI Analysis

- These projections are draft and this analysis provides information for the overall program review process.
- Analysis projects potential macroeconomic impacts for the 9-state RGGI region due to potential changes in the RGGI program
- Analysis does not project macroeconomic benefits due to carbon emissions reductions (e.g., value of avoided GHG emissions)
- Analysis projects the macroeconomic impacts of the incremental changes between the current RGGI program (REMI Reference Case) and potential changes to the RGGI program (91 Cap Bank IPM Potential Scenario)



# RGGI Program Review REMI Analysis

- These benefits are in addition to the macroeconomic benefits due to the current RGGI program
- This analysis does not make any projections for RGGI allowance prices or RGGI proceeds after 2020
- This analysis does not analyze the impacts of investing RGGI proceeds generated after 2020



# **REMI Assumptions and Inputs**



# REMI Assumptions

- No changes are made to the REMI Reference Case inputs and assumptions.
- Inputs to REMI are developed using two sources of data which describe economic impacts resulting from potential changes to the RGGI program:
  - 1) States' Investments of RGGI Allowance Proceeds**
  - 2) IPM Output on Electricity Market Changes**



# REMI Assumptions

## States' Investments of RGGI Allowance Proceeds

- States' investments generate *incremental* changes in regional economic activity (e.g., spending, prices, labor availability)
- REMI model quantifies changes in the 91 Cap Bank Potential Scenario including the incremental investment of additional projected proceeds from 2012-2020
- Examples of proceed investments include: energy efficiency programs, GHG abatement projects, direct bill assistance



# REMI Assumptions

## States' Investments of RGGI Allowance Proceeds

- For this analysis, each state provided assumptions for how projected incremental proceeds from 2012-2020 could be invested.
- The following slides describe how proceeds were projected for the reference case and 91 Cap Bank Potential Scenario and how investments were modeled for this analysis.
- This analysis does not make any projections for RGGI allowance prices or RGGI proceeds after 2020.
- This analysis does not analyze the impacts of investing RGGI proceeds generated after 2020.



# REMI Assumptions

## States' Investments of RGGI Allowance Proceeds

- Annual proceeds were calculated by multiplying the estimated number of allowances projected to be purchased at auction by the projected CO<sub>2</sub> allowance price.
  - For the **IPM reference case**, calculation assumes that the market purchases enough allowances to meet demand based on emissions, minus the 47M banked allowances from first control period spread over the time horizon.
  - For the **91 Cap Bank Potential Scenario**, calculation assumes in 2012 that the market purchases CO<sub>2</sub> allowances to meet demand based on emissions. Assumes the market is made aware of new policies in 2013 and purchases all allowances of the surplus of allowances remaining after the market meets demand based on emissions. Post 2013, assumes the market purchases all CO<sub>2</sub> allowances offered.

# REMI Assumptions

## States' Investments of RGGI Allowance Proceeds

- Cumulative projected proceeds for the **IPM Reference case** are **\$1,549.97M (2010\$)**.
- Cumulative projected proceeds for the **91 Cap Bank Potential Scenario** are **\$3,783.49M (2010\$)**, representing an **additional \$2,233.51M (2010\$)** in proceeds compared to the Reference Case.

# REMI Assumptions

## States' Investments of RGGI Allowance Proceeds

- Regional Investment of Proceeds (\$M Cumulative 2012-2020) for 91 Cap Bank Potential Scenario

Scenario	Electric EE Investments	Fossil Fuel EE Investments	Total EE (Electric + Fuel EE)	Clean & Renewable Energy Investments	Direct Bill Assistance	GHG Abatement & Climate Change Abatement	Admin/ Other	Total
<b>Total % of RGGI Spend:</b>	44%	29%	74%	4%	10%	5%	7%	100%
<b>Total Cumulative Proceeds from 2012-2020 (2010\$M)</b>								
<b>Reference Case Proceeds</b>	\$689.55	\$454.25	\$1,143.80	\$60.03	\$152.13	\$78.51	\$115.50	\$1,549.97
<b>91 Cap Bank Proceeds</b>	\$1,683.19	\$1,108.83	\$2,792.02	\$146.54	\$371.34	\$191.65	\$281.94	\$3,783.49
<b>Difference in Cumulative Proceeds (Additional 2010\$M)</b>								
	\$993.64	\$654.58	\$1,648.22	\$86.51	\$219.21	\$113.14	\$166.44	\$2,233.51

# REMI Assumptions

## States' Investments of RGGI Allowance Proceeds

- State Proceed Investments:** The table below provides the breakdown of how each state assumed to invest the additional proceeds in the 91 Cap Bank Potential Scenario (through 2020) compared to the Reference Case

State	Electric EE Investments	Fossil Fuel EE Investments	Direct Bill Assistance	Clean & Renewable Energy Investments	GHG Abatement & Climate Change Programs	Admin/ Other	Total
Connecticut	50.0%*	19.5%*	0.0%*	23.0%*	7.5%*	0.0%	100%
Delaware	65.0%	10.0%	5.0%	0.0%	15.0%	5.0%	100%
Maine	68.0%*	13.0%	14.0%*	0.0%	0.0%	5.0%*	100%
Maryland	46.0%	0.0%	40.0%	10.5%	\$1M	3.5%	100%
Massachusetts	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	100%
New Hampshire	47.0%*	47.0%*	0.0%*	0.0%	0.0%	6.0%*	100%
New York	16.0%	59.0%	0.0%	0.0%	10.0%	15.0%	100%
Rhode Island	95.0%*	0.0%	0.0%	0.0%	0.0%	5.0%*	100%
Vermont	0.0%	98.0%	0.0%	0.0%	0.0%	2.0%	100%

\*Amounts may vary based on allowance prices.



# REMI Assumptions

## Timing and Duration of Investment of RGGI Proceeds

- REMI model analyzes the impacts of potential changes to RGGI program (including incremental additional proceed investments) made in 2013-2021.
- Assumes a 1-year lag time between receipt and investment of RGGI proceeds (e.g., 2014 proceeds are invested in 2015).
- REMI model includes assumptions on projected benefits of proceeds invested through 2040 to incorporate the lifetime impacts of these investments made in 2013-2021.

# REMI Assumptions

## Timing and Duration of Investment of RGGI Proceeds

- Energy savings benefits of states' investments in energy efficiency and similar programs are measured over their full lifetime.
- Lifetimes of benefits vary by type of program:
  - **Electric Energy Efficiency Measures:** Residential: 15 yrs; Commercial & Industrial: 15 yrs
  - **Fossil Fuel Energy Efficiency Measures:** 15 yrs
  - **Clean & Renewable Energy Measures:** 20 yrs
  - **GHG Abatement & Climate Change Programs:** 20 yrs

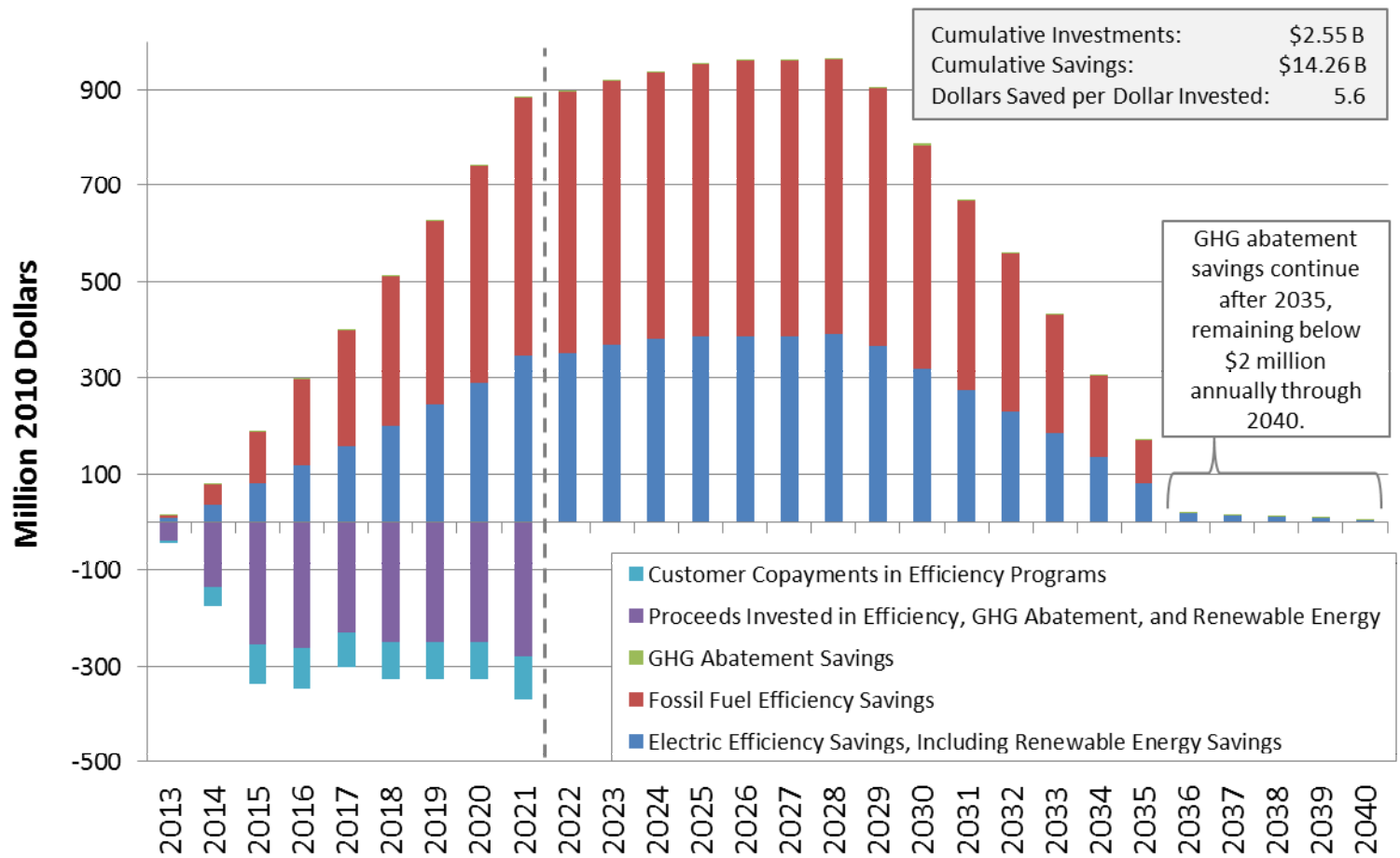


# REMI Assumptions

## Timing and Duration of Investment of RGGI Proceeds

- Projected fossil fuel prices post-2020 were made using the AEO 2012 high oil price cases data
- Projected electricity prices post-2020 were extrapolated from IPM by using the AEO 2012 electricity price growth rate

# 91 Case REMI Inputs: Investments in Efficiency and Bill Savings







# REMI Assumptions

## IPM Output on Electricity Market Changes

- IPM outputs reflect incremental changes in the electricity market's response to RGGI, which in turn influence regional economic activity
- IPM 91 Cap Bank Potential Scenario models the RGGI program from 2012 to 2020

# REMI Assumptions

## IPM Output on Electricity Market Changes

- REMI analysis uses data from the IPM model outputs (2012-2020), including incremental changes from the reference case to potential cap scenarios in:
  - Projected energy prices
  - Projected CO<sub>2</sub> allowance prices
  - Generation
  - Load
  - Fuel mix
  - Imports
  - Energy Costs: Overnight capital, retrofit, new build, fixed and variable O&M, fuel

# REMI Assumptions

## IPM Output on Electricity Market Changes

- **Regional changes in electricity market outcomes**
  - **Impacts to Generators—net impacts equal sum of following components:**
    - Allowance purchases by generators with CO<sub>2</sub> emissions (-)
    - Impact of allowance price on generator revenues (+/-)
    - Impact on load due to investments in EE (-)
    - Change in generation (imports, effect of EE) (-)
  - **Impacts to Ratepayers—net impacts equal sum of following components:**
    - Influence of allowance purchases (-)
    - Impact on load due to investments in EE (+)
    - Avoided Energy and Capacity Costs from EE (+)
    - Avoided Distribution Costs from EE (+)

# REMI Assumptions

## IPM Output on Electricity Market Changes

- **Regional changes in electricity market outcomes (*continued*)**
  - **Impacts to Shareholders of Generation Companies:**
    - Change in marginal generator income x 14% (population of 9 RGGI states as % of US total) (-)
  - **Other Economic Impacts:**
    - Changes in new capacity builds (-)
    - Changes in retrofits to existing capacity (-)



# REMI Results



# Summary of Regional Economic Impacts

- **Results for the 91 Cap Bank Potential Scenario are presented as both:**
  - **Value change** (in 2010\$ or job-years) between the policy scenario and business-as-usual regional economy (REMI Reference Case)
  - **Percentage change** from the policy scenario from the business-as-usual regional economy (REMI Reference Case)

# Summary of Regional Economic Impacts (3% Discount Rate)

## Summary of Regional Economic Impacts, 2012-2040

Scenario	91 Cap Bank
<b>Cumulative Change in Gross State Product (\$2010)</b>	\$8.2 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional GSP:	\$48,000 Billion
<b>Cumulative Change in Employment (Job-Years)</b>	124,800
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Employment:	941,000,000
<b>Cumulative Change in Real Personal Income (\$2010)</b>	\$6.8 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Real Personal Income:	\$43,000 Billion



# **Additional REMI Results**



# Summary of Regional Economic Impacts (0% Discount Rate)

## Summary of Regional Economic Impacts, 2012-2040

Scenario	91 Cap Bank
<b>Cumulative Change in Gross State Product (\$2010)</b>	\$14.5 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional GSP:	\$74,000 Billion
<b>Cumulative Change in Employment (Job-Years)</b>	124,800
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Employment:	941,000,000
<b>Cumulative Change in Real Personal Income (\$2010)</b>	\$12.4 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Real Personal Income:	\$66,000 Billion

# Summary of Regional Economic Impacts (7% Discount Rate)

## Summary of Regional Economic Impacts, 2012-2040

Scenario	91 Cap Bank
<b>Cumulative Change in Gross State Product (\$2010)</b>	\$3.9 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional GSP:	\$31,000 Billion
<b>Cumulative Change in Employment (Job-Years)</b>	124,800
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Employment:	941,000,000
<b>Cumulative Change in Real Personal Income (\$2010)</b>	\$3.1 Billion
Percent Change from Business-As-Usual	0.0%
Business-As-Usual Regional Real Personal Income:	\$28,000 Billion