



**RGGI**

**Electricity Sector Modeling Results**

***Updated Reference, RGGI Package and Sensitivities***

**September 21, 2005**

**ICF Consulting**

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# Outline

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- RGGI Reference Case: New v. Old
  - Changes
  - Results
- RGGI Policy Scenarios
  - RGGI Package Scenario
  - Package Scenario with US/Canada Policies
- RGGI High Emissions Cases
  - RGGI High Emissions Package Scenario
- RGGI Low Emissions Cases
  - RGGI Low Emissions Package Scenario

**RGGI Reference Case**  
**New v. Old**

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# New v. Old Reference Case - Changes

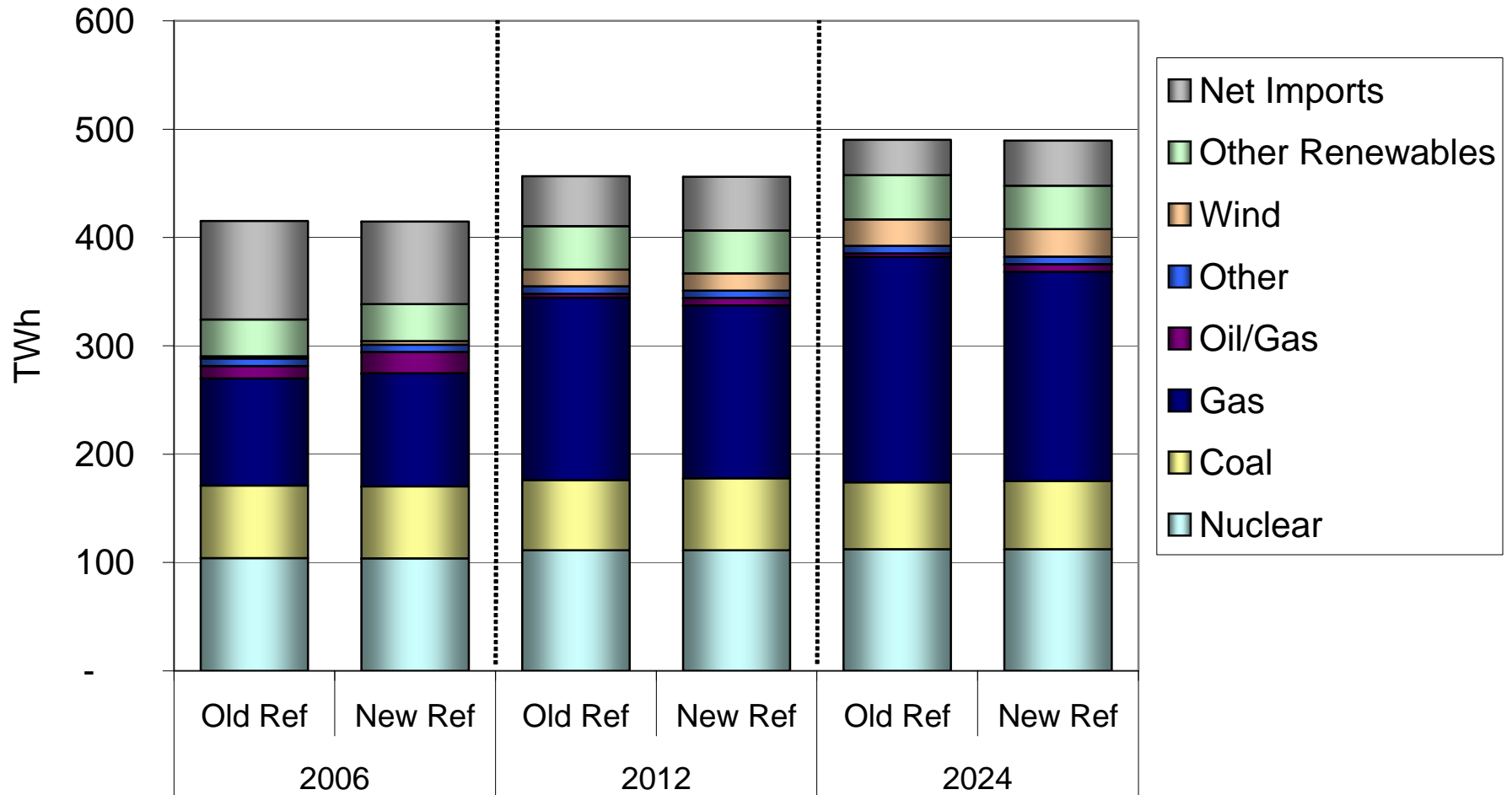
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- ▶ Three categories of changes were made to the original February RGGI Reference Case to arrive at the updated August Reference Case:
  - Assumptions updates to take advantage of more recent fuel market projections.
    - The change increased 2006 gas prices relative to the original Reference Case and resulted in mid- to long-term gas prices (2010-2024) averaging 7.5% higher (\$4.89/MMBtu v. \$4.55/MMBtu, in year 2003 dollars).
  - Near-term calibration measures to bring 2006 model projections more in-line with recent market experience
    - Near term oil/gas steam generation in New York and the RGGI region has been calibrated to approximate recent historical levels.
    - Transmission flows more closely represent 5-year average historical levels in the near-term.
  - Capacity market adjustments
    - More closely represent New York's upstate capacity market.



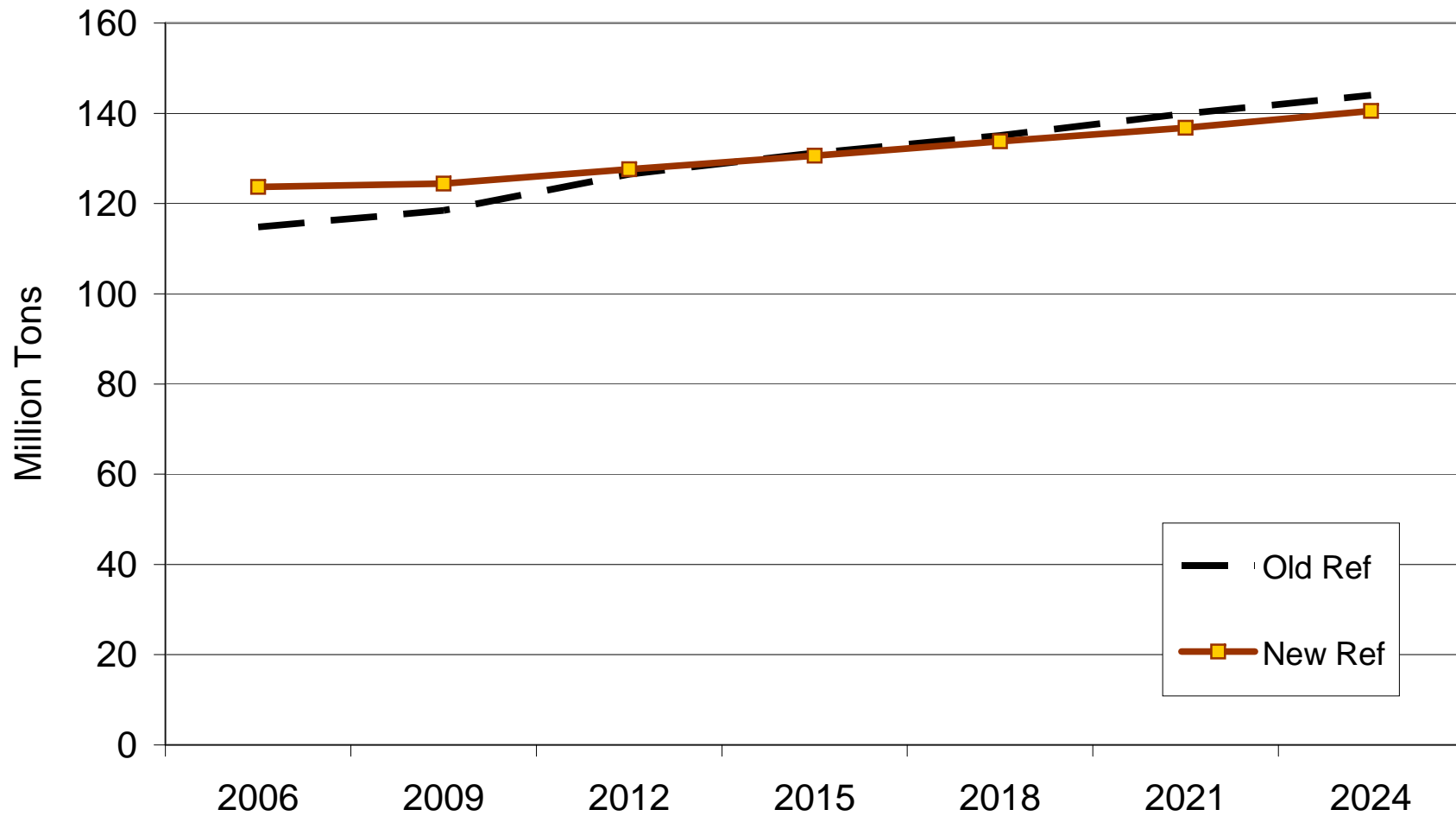
# RGGI Generation Mix

## New Reference v. Old Reference



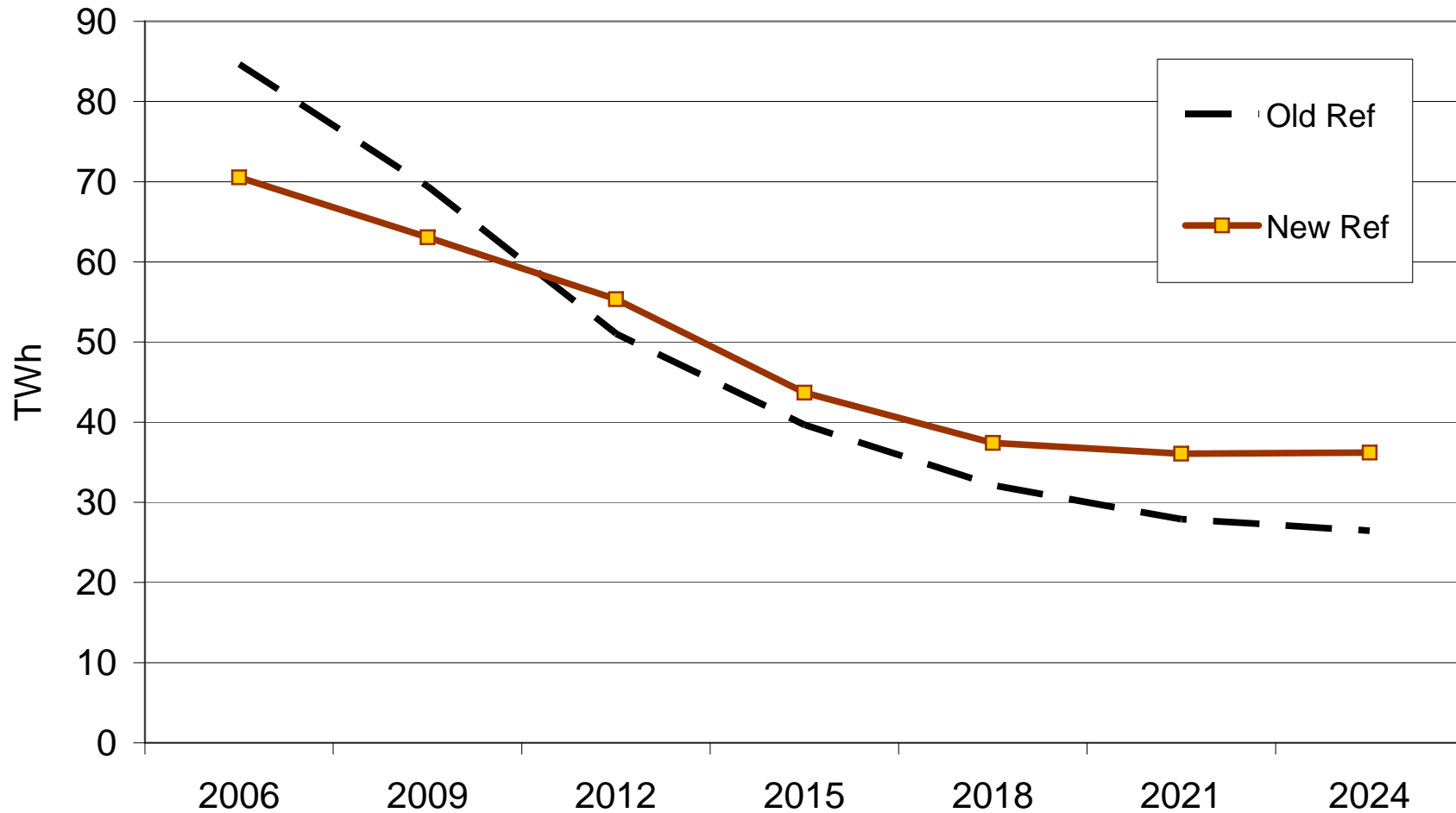
# CO<sub>2</sub> Emissions

## New Reference v. Old Reference



# RGGI Net Imports

## New Reference v. Old Reference



Note: Net imports have been adjusted to account for losses and now represent the actual energy served by imports.

**RGGI Package Scenario**  
compared to updated *Reference Case*



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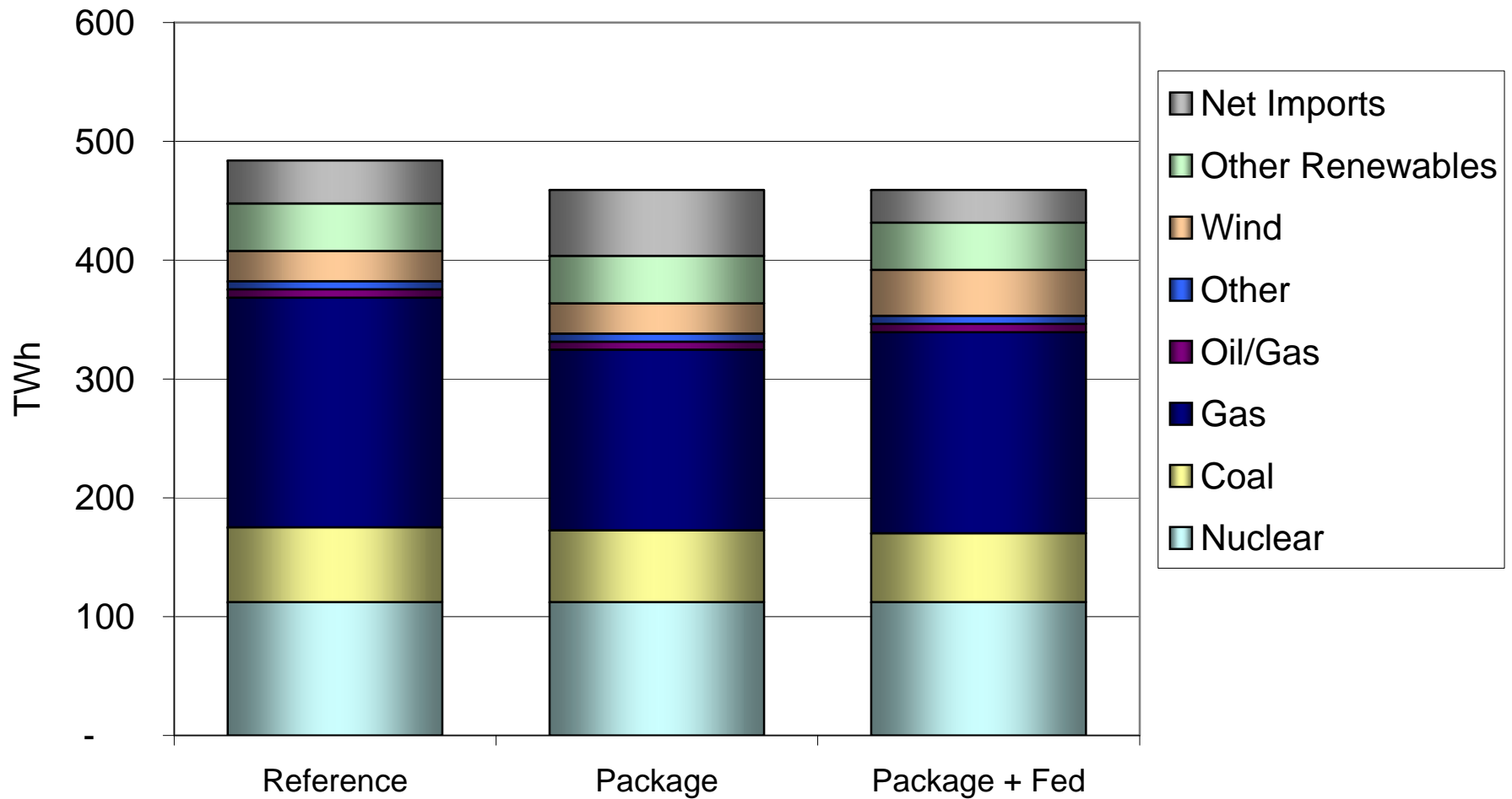
# Package Scenario

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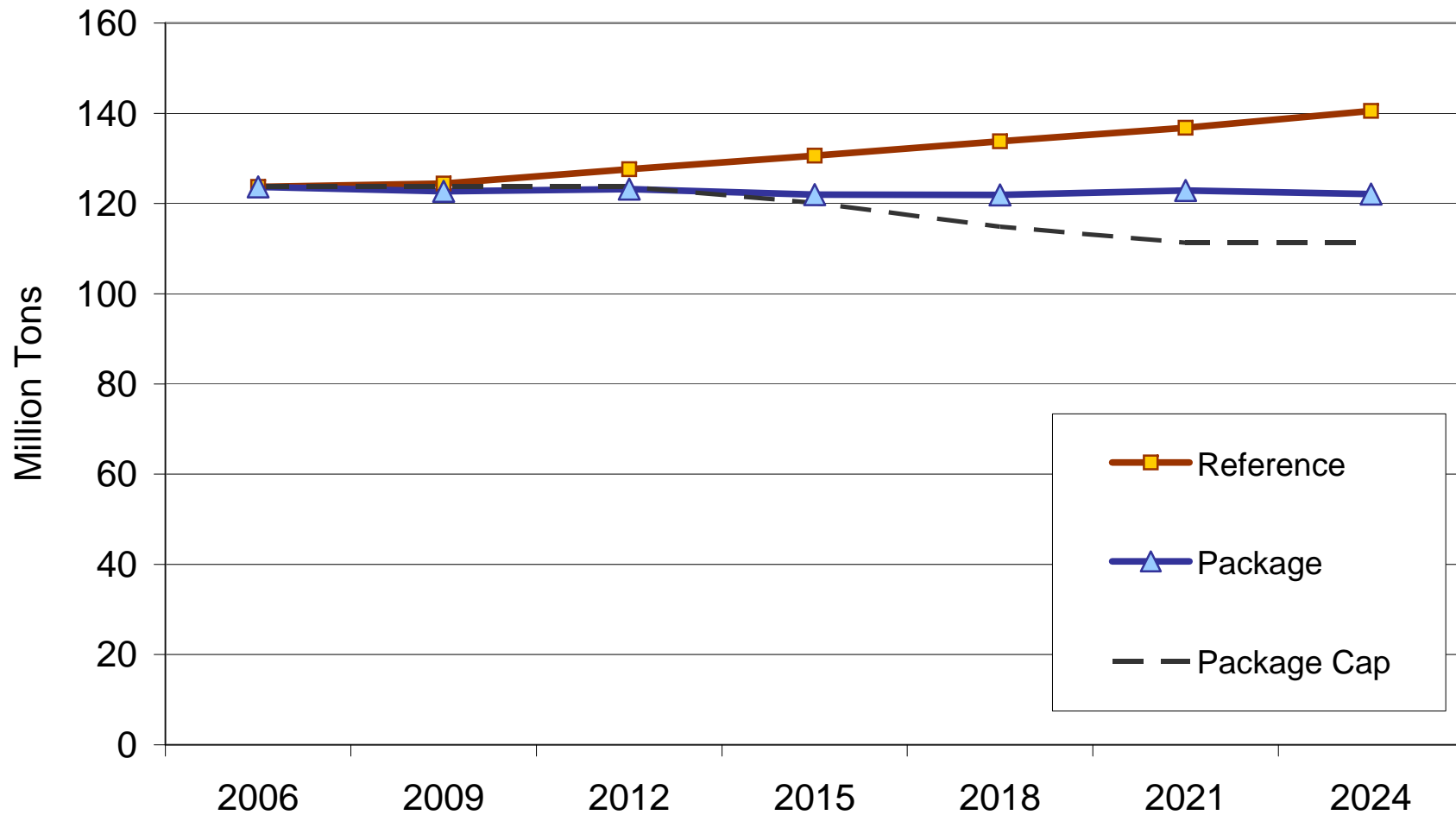
- The Package Scenario presented here is based on the new RGGI Reference Case and includes the following:
  - **CO<sub>2</sub> Policy** – Phased-in cap to 2020
  - **Offsets** – Combined RGGI and CDM Offset Curves, Limited to 50% of Required Reductions
  - **End Use Efficiency** – Technology costs, load shapes, load factors, and potential supply by sector are based on data provided by ACEEE. Program costs to implement measures are based on average of RGGI states' actual expenditures through 2004 to implement public benefit programs. The Package Scenario assumes that current levels of annual state expenditures for public benefit programs continue through 2025.
  
- The Package Scenario with US and Canada national carbon policies adds the following:
  - US policy assumes stabilization at projected 2015 levels starting in 2015
  - Canada policy assumes stabilization at projected 2008 levels starting in 2008



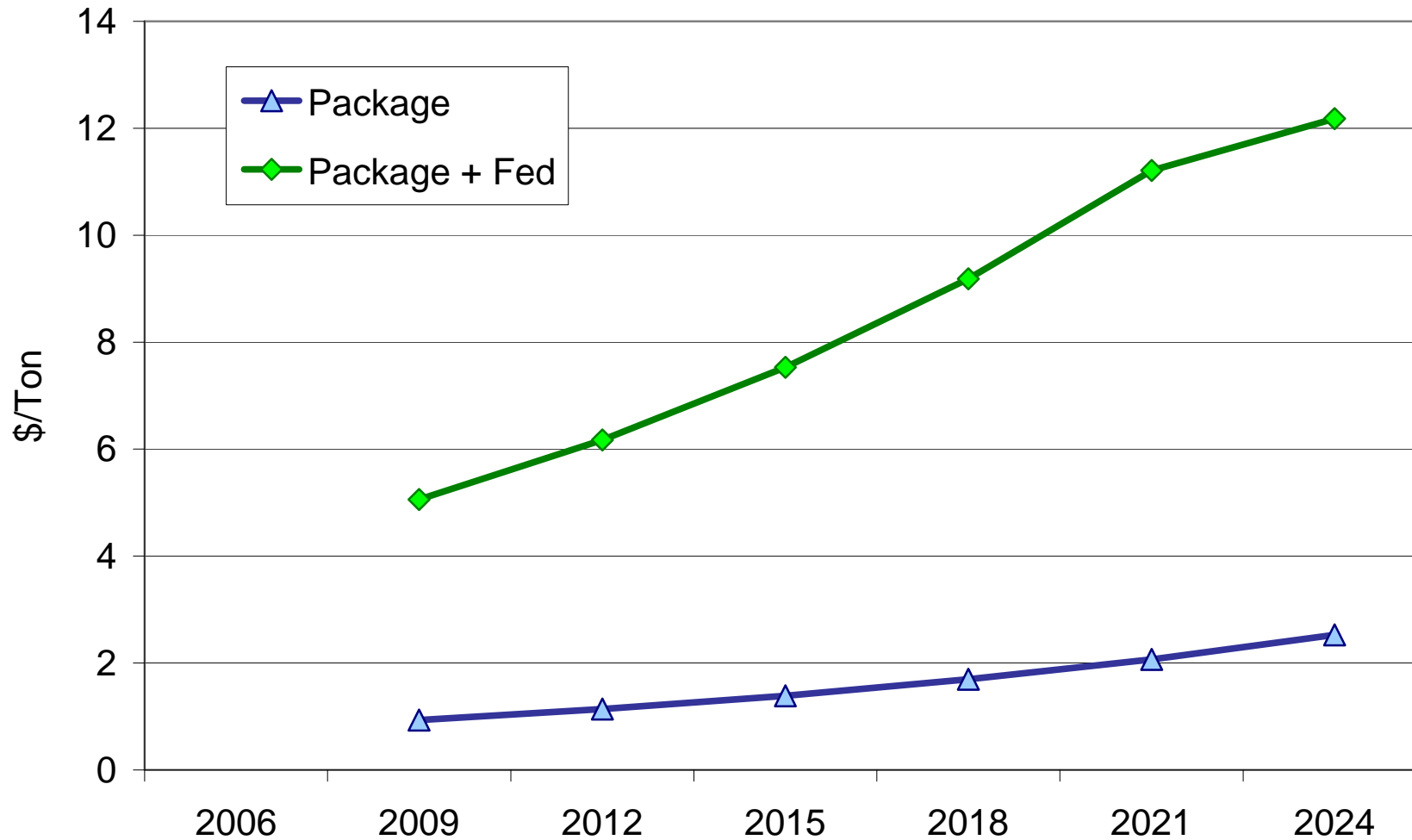
# RGGI Generation Mix in 2024



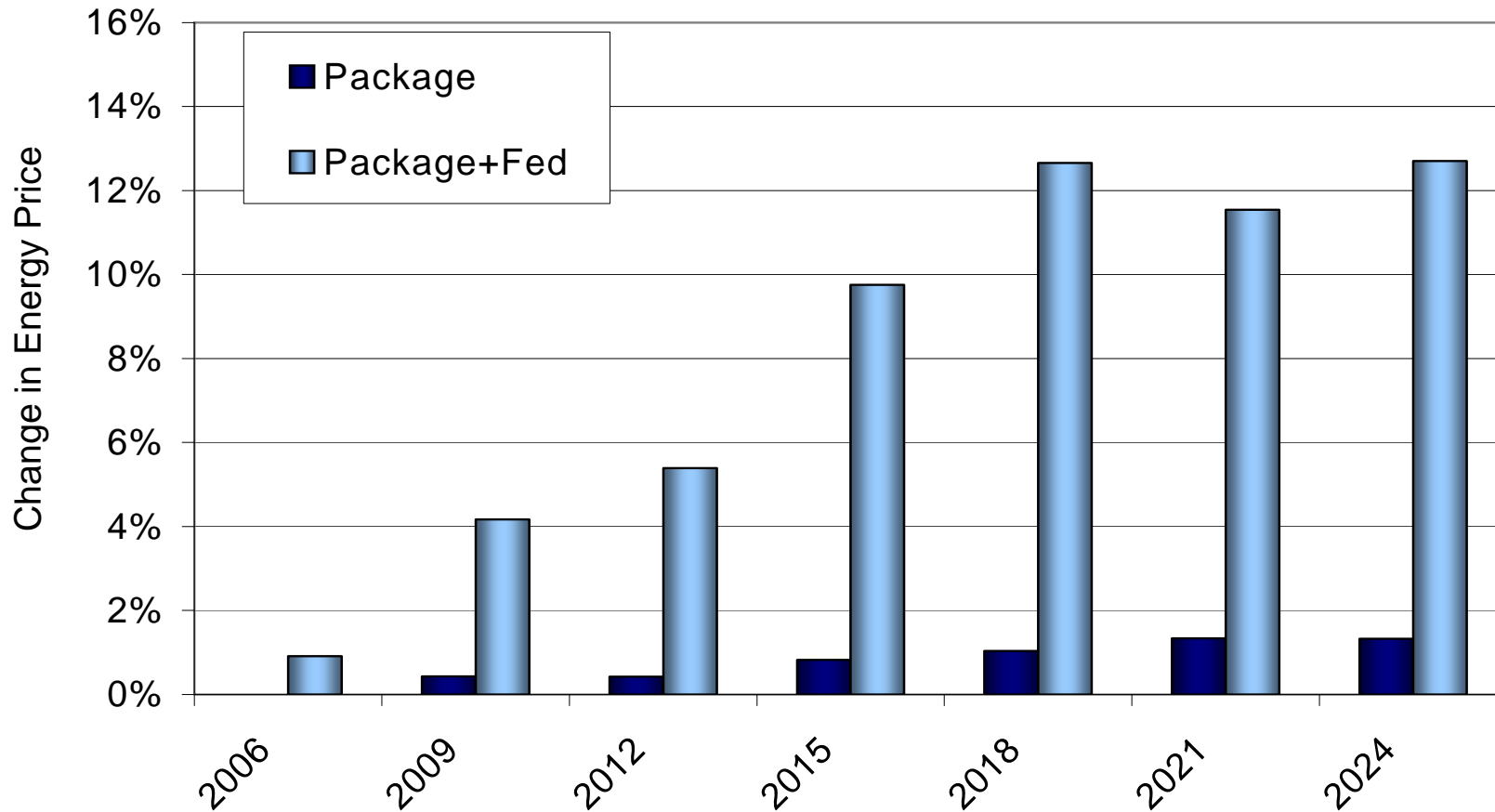
# CO<sub>2</sub> Emissions Trajectories



# CO<sub>2</sub> Allowance Prices



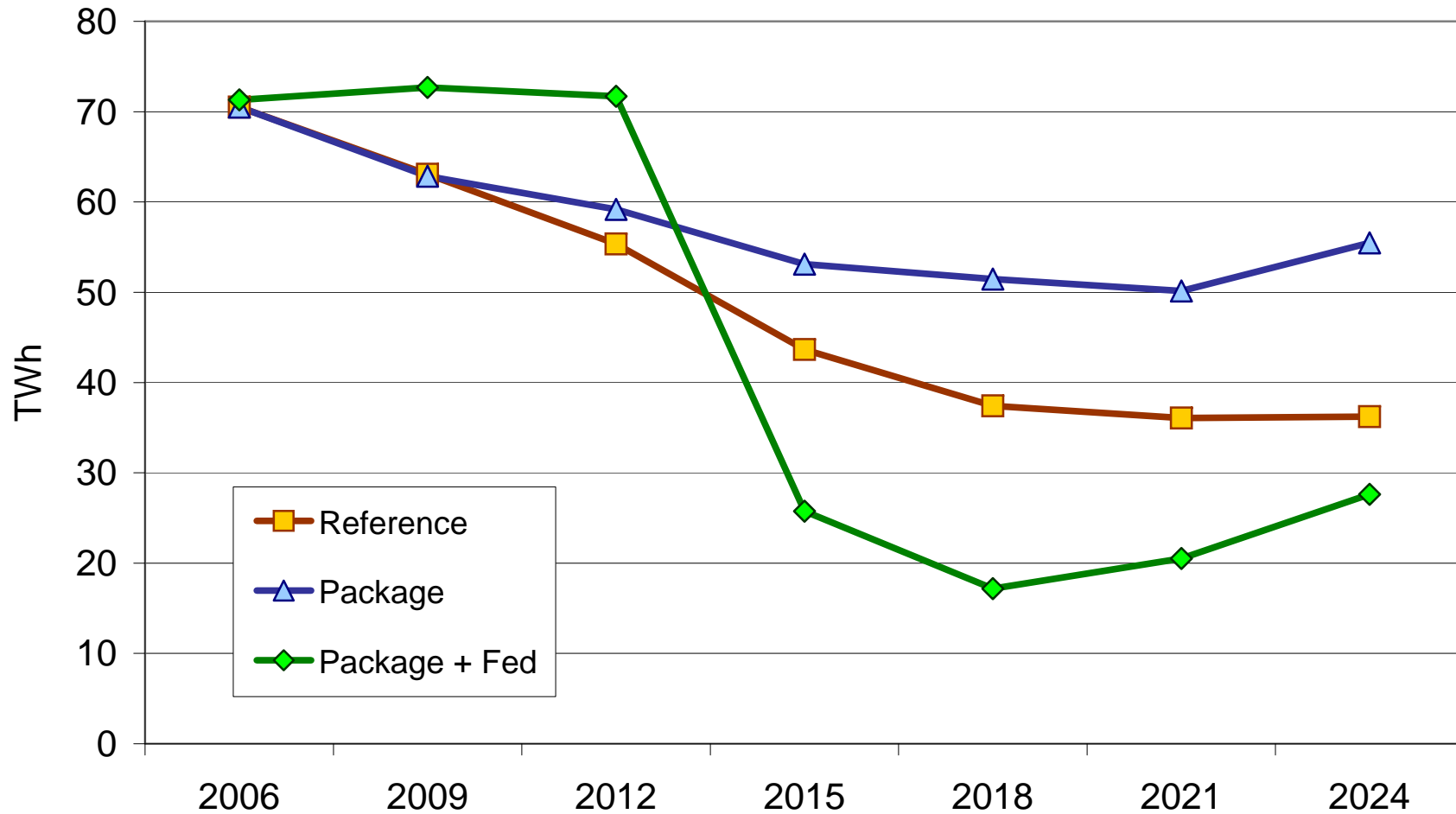
# Change in RGGI Average Annual Energy Prices



NOTE: Energy prices represent wholesale market prices and include annualized capacity prices. Note that the RGGI Package Scenario assumes that current levels of annual state expenditures for public benefit programs continue through 2025. While these types of programs cause lower wholesale prices by reducing electricity demand, they are paid for by consumers through a line item charge at the retail level, and are therefore not reflected in the wholesale price changes shown above. Current retail electricity prices already include the annual costs of these programs.

While the modeling assumes that end-use energy efficiency is implemented entirely by public benefit programs, it is recognized that energy efficiency could also be implemented by actions such as appliance standards and building codes that do not require state funding and could possibly be done at lower costs.

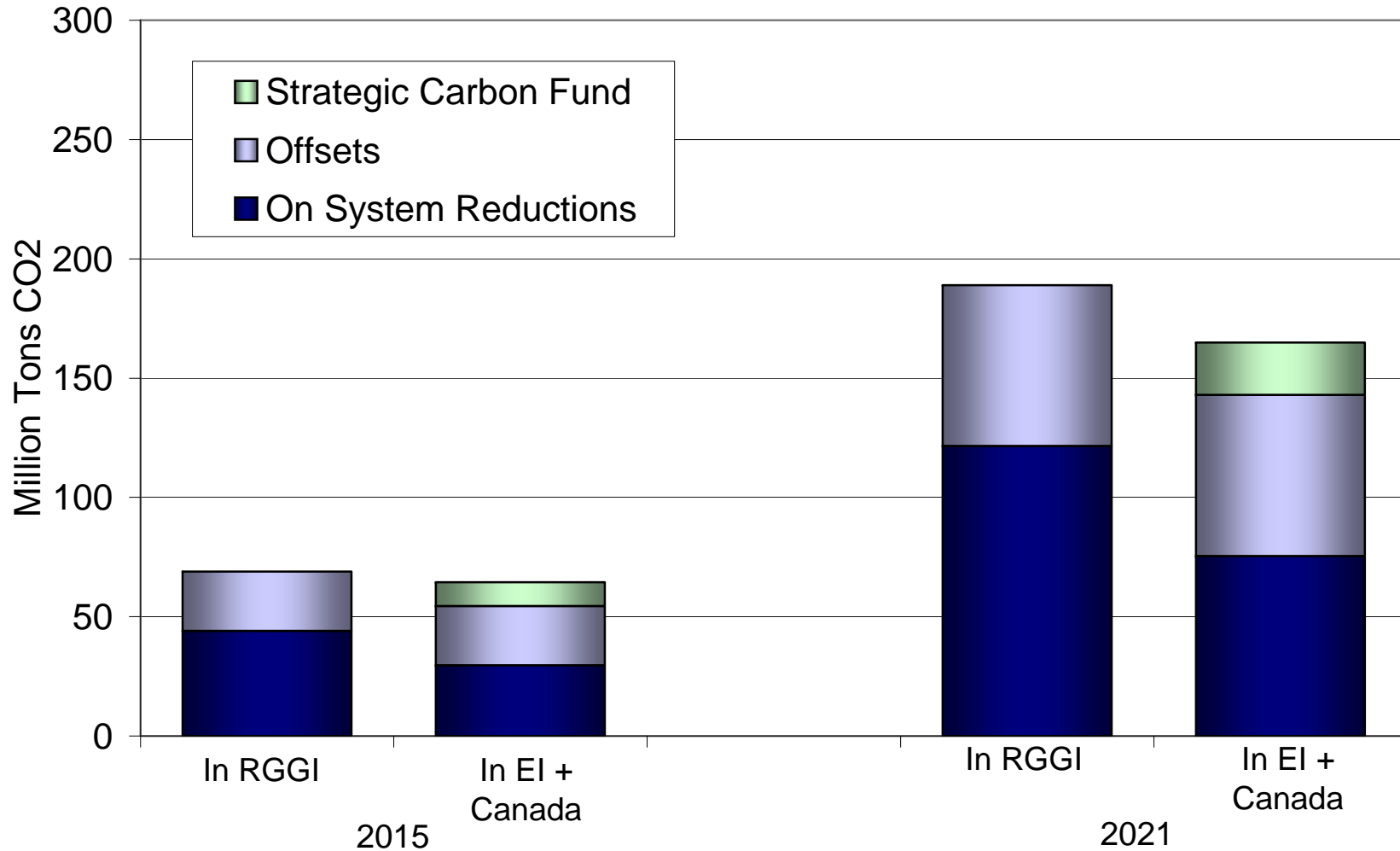
# RGGI Net Imports



Note: Net imports have been adjusted to account for losses and now represent the actual energy served by imports.



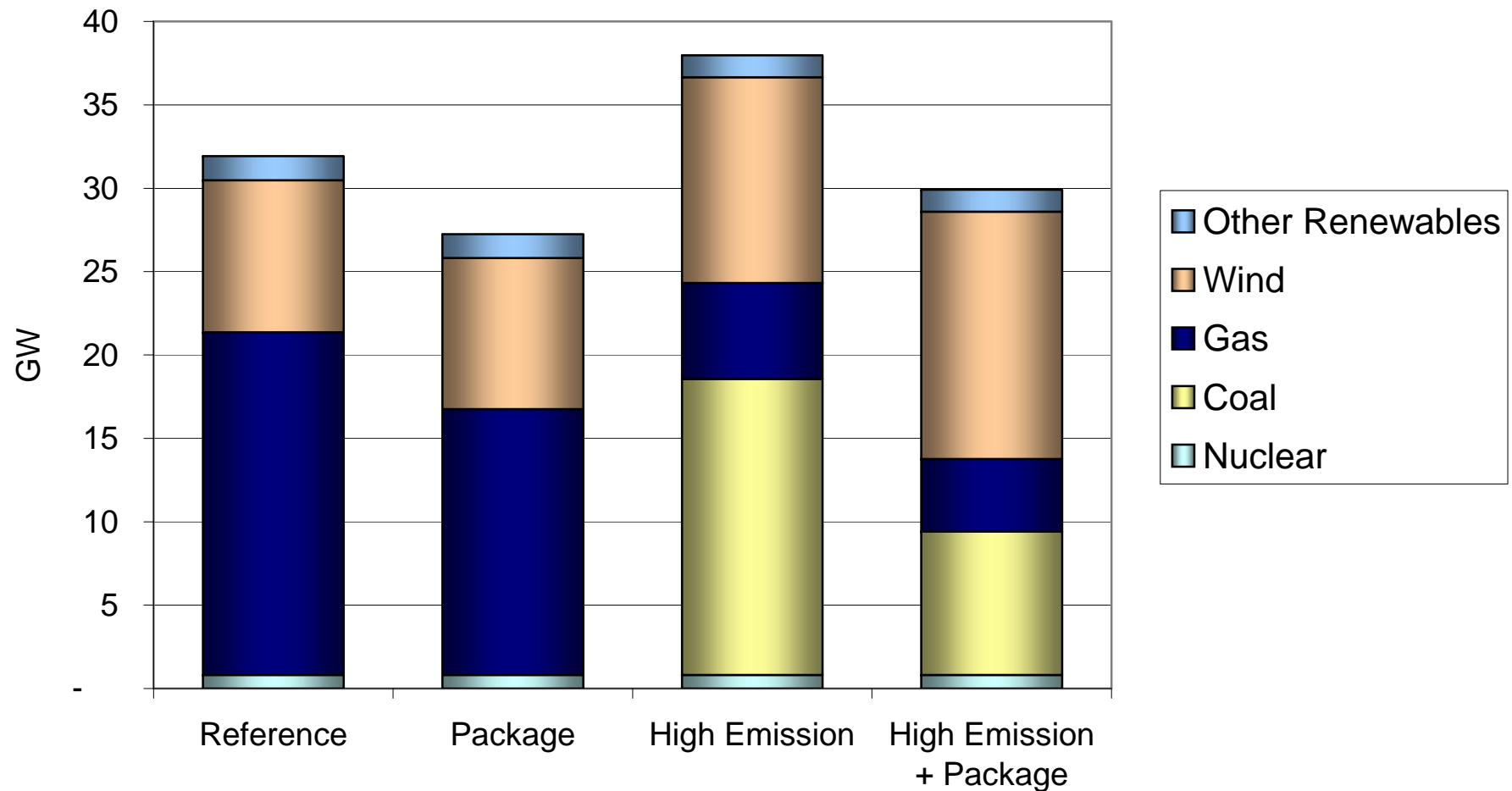
# Package Scenario Cumulative CO<sub>2</sub> Reductions RGGI and Eastern Interconnect/Canada



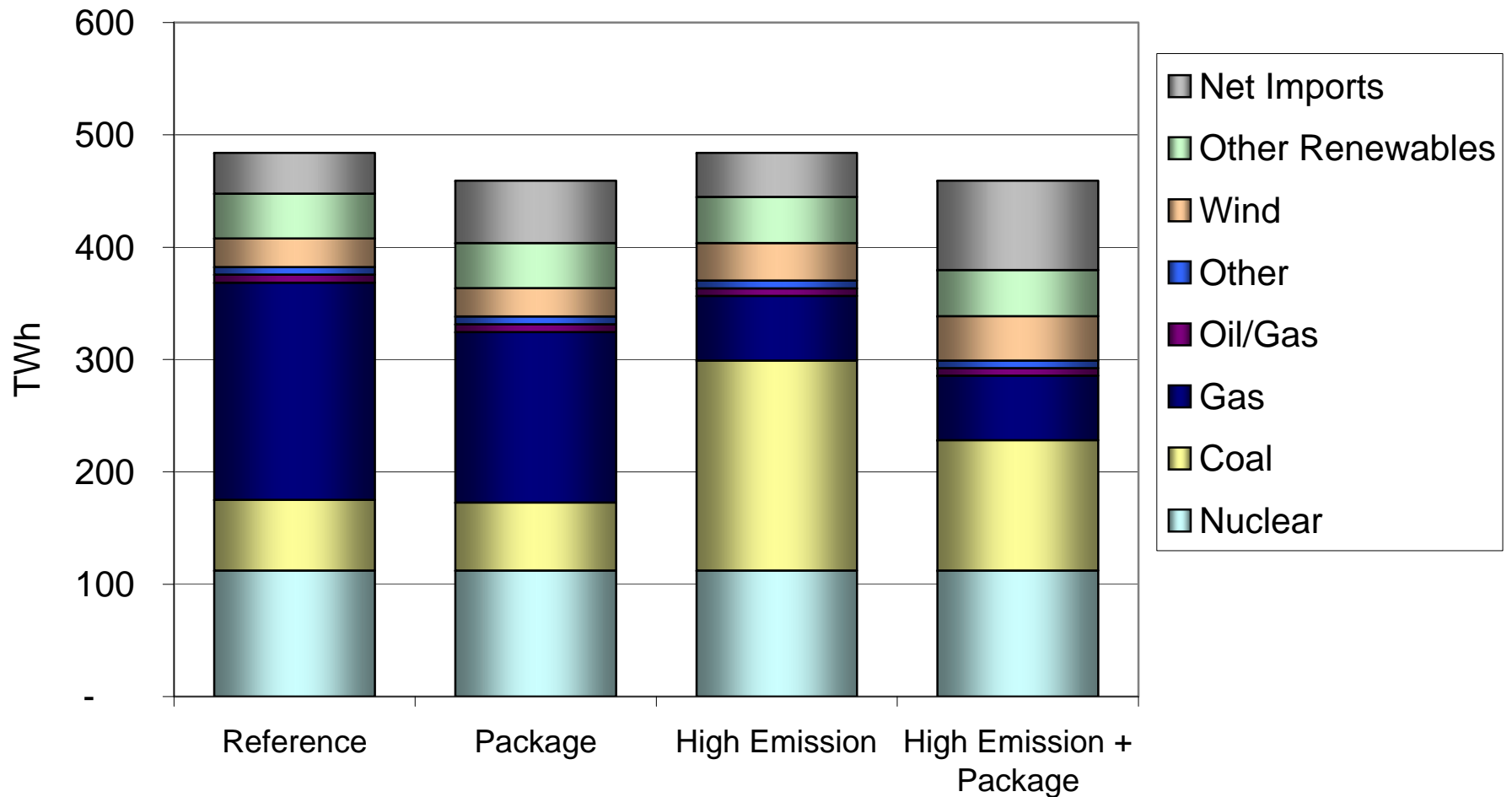
**RGGI Package Scenario**  
compared to  
*High Emissions Cases*



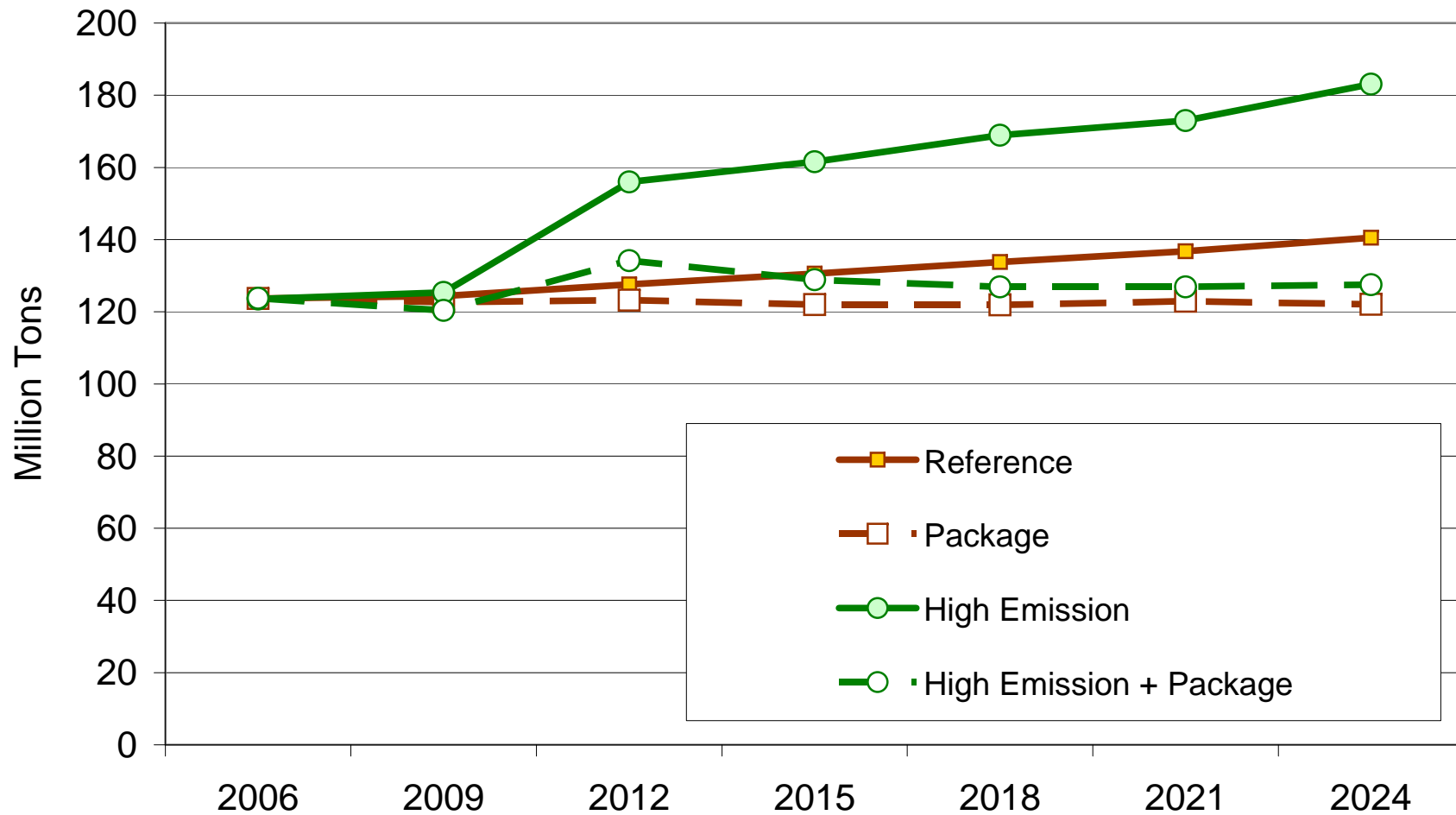
# RGGI Cumulative Capacity Additions by 2024



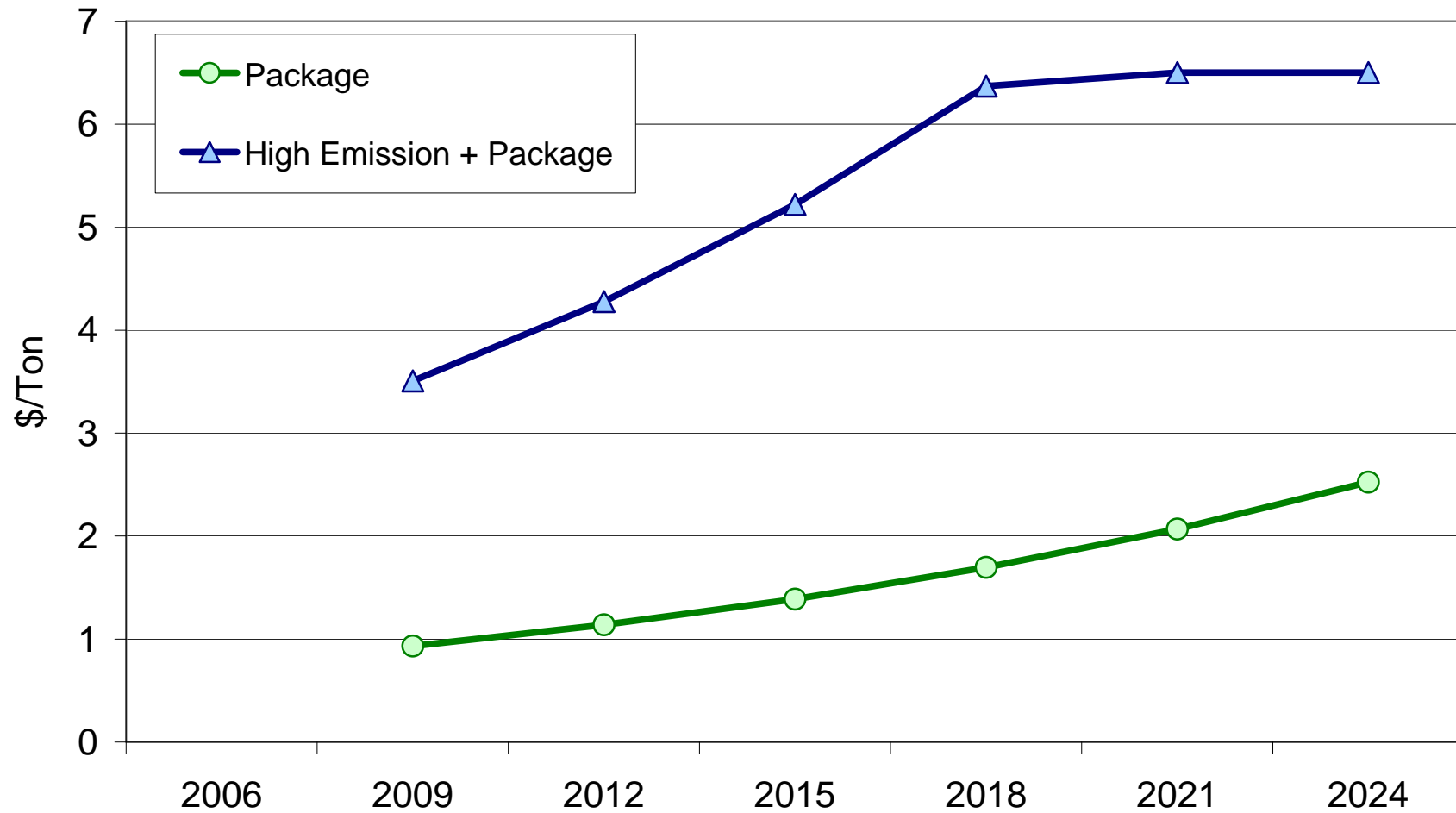
# RGGI Generation Mix in 2024



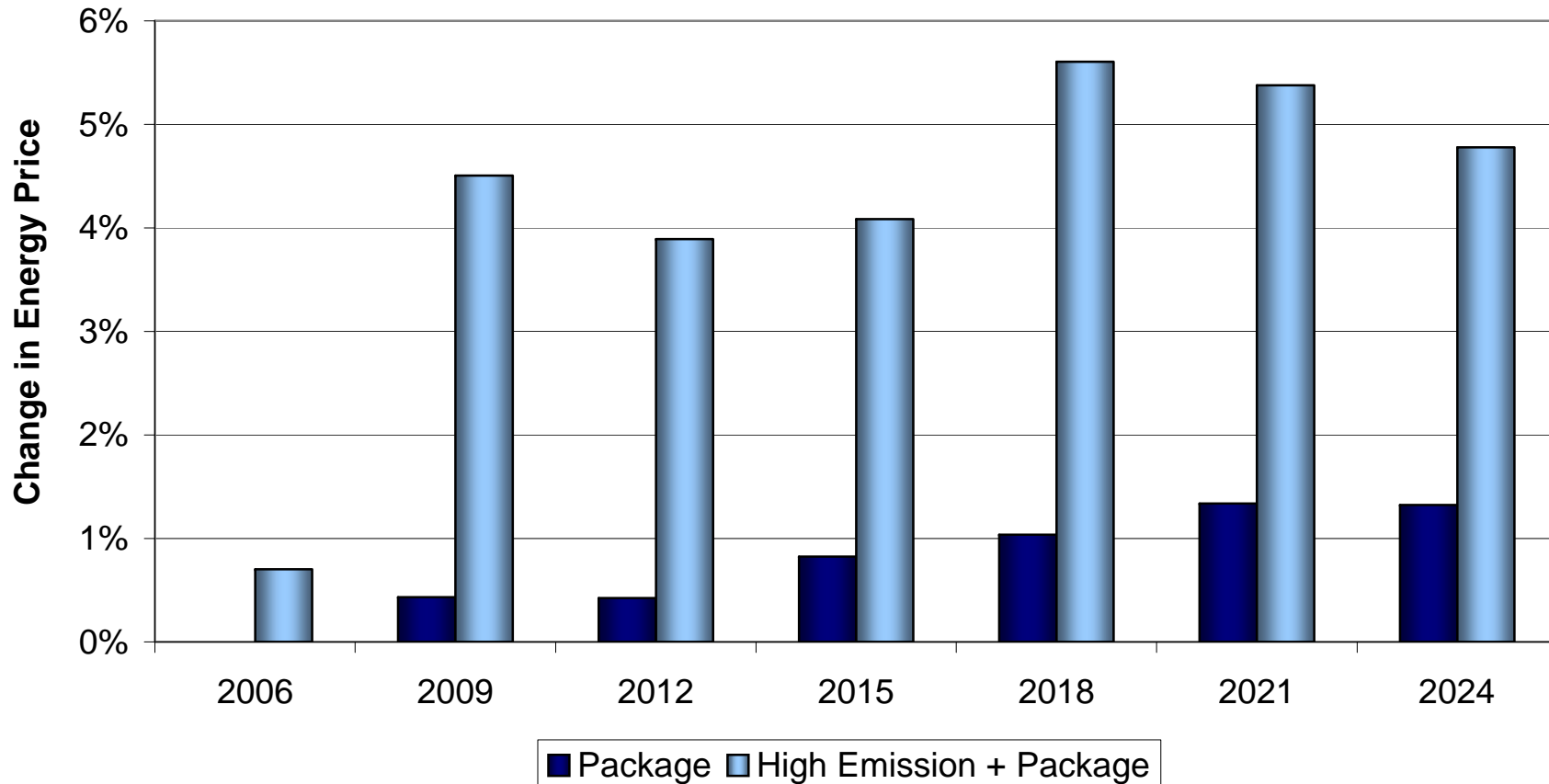
# CO<sub>2</sub> Emissions Trajectories



# CO<sub>2</sub> Allowance Prices



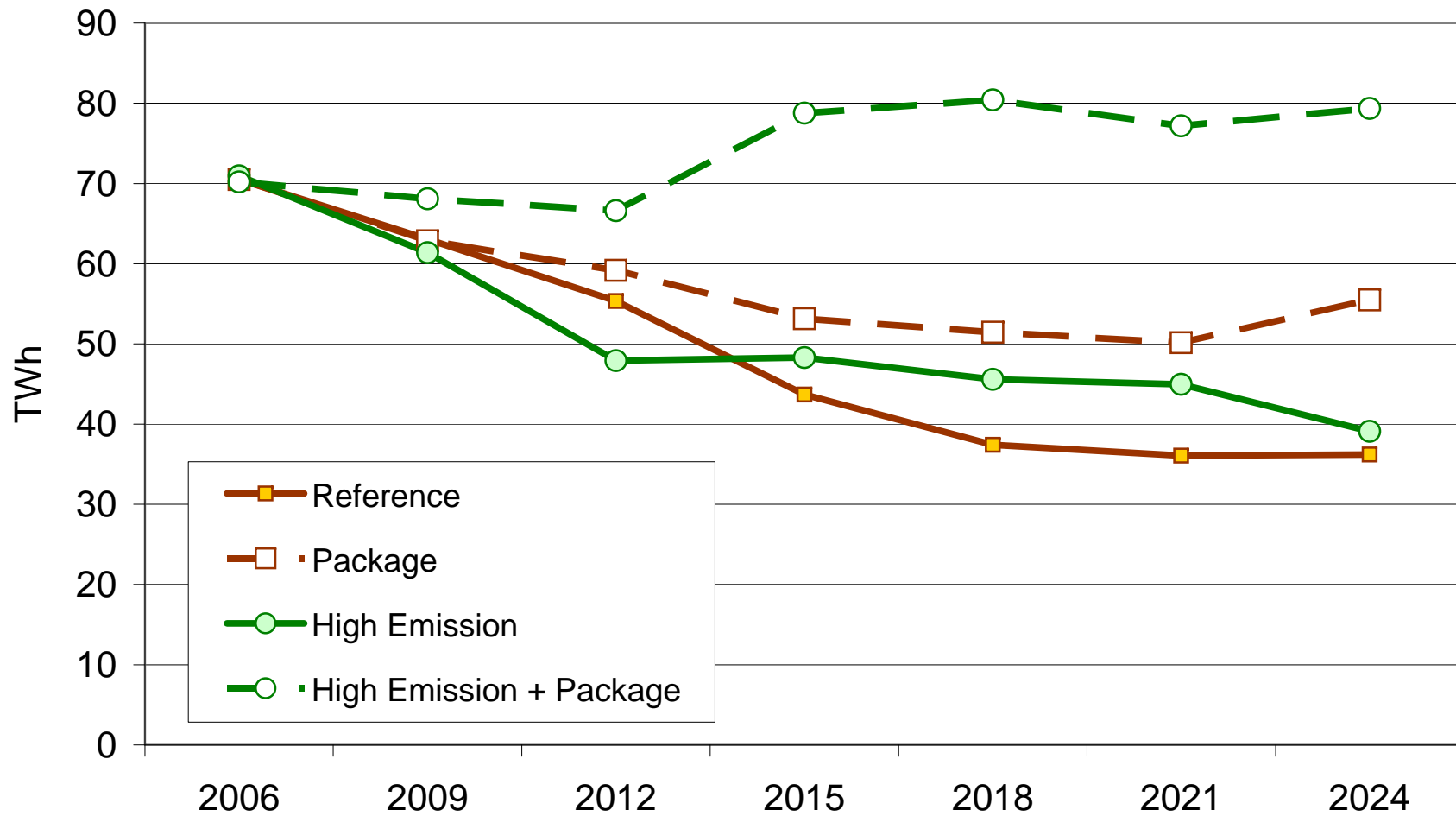
# Change in RGGI Average Annual Energy Prices



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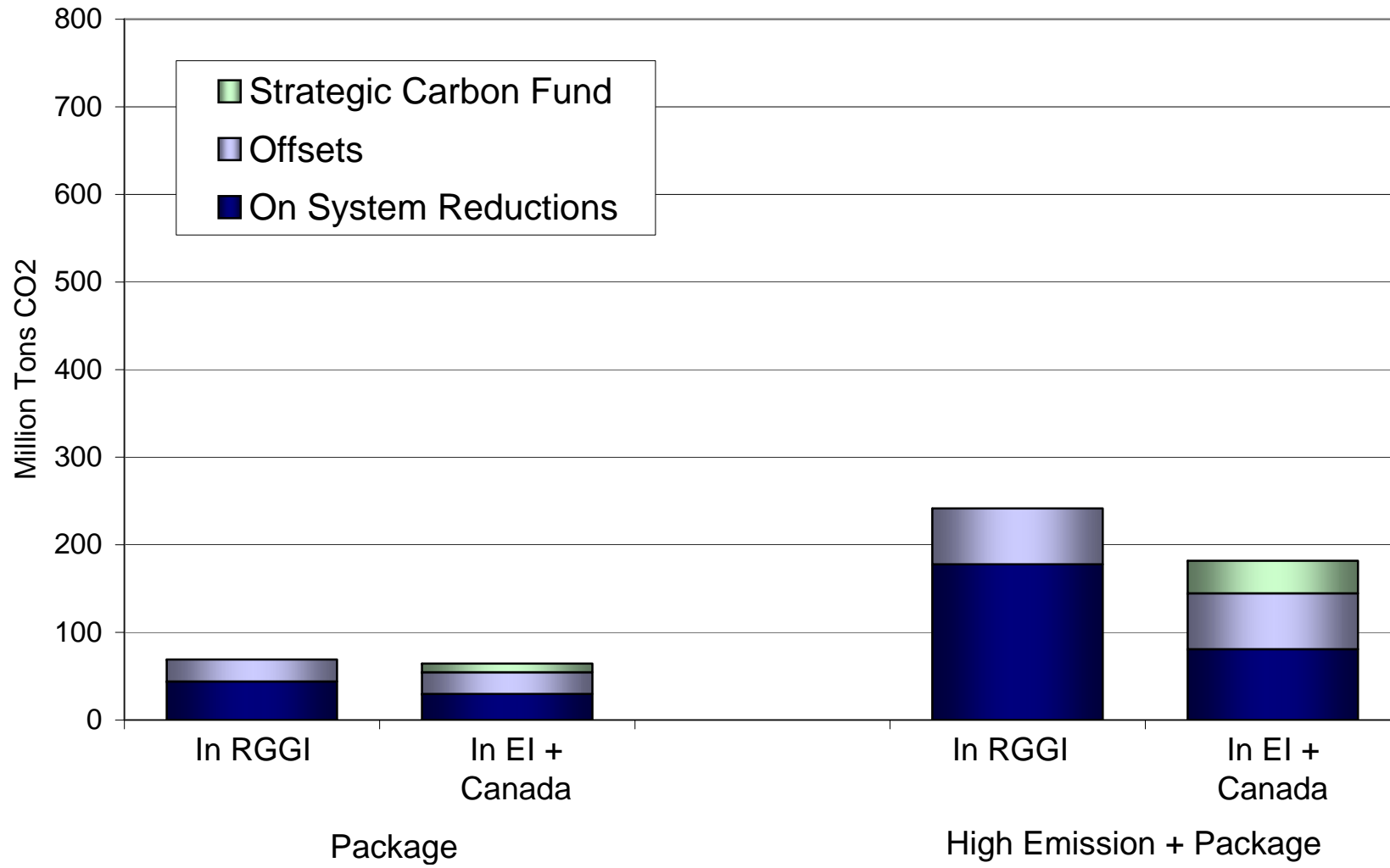
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# RGGI Net Imports



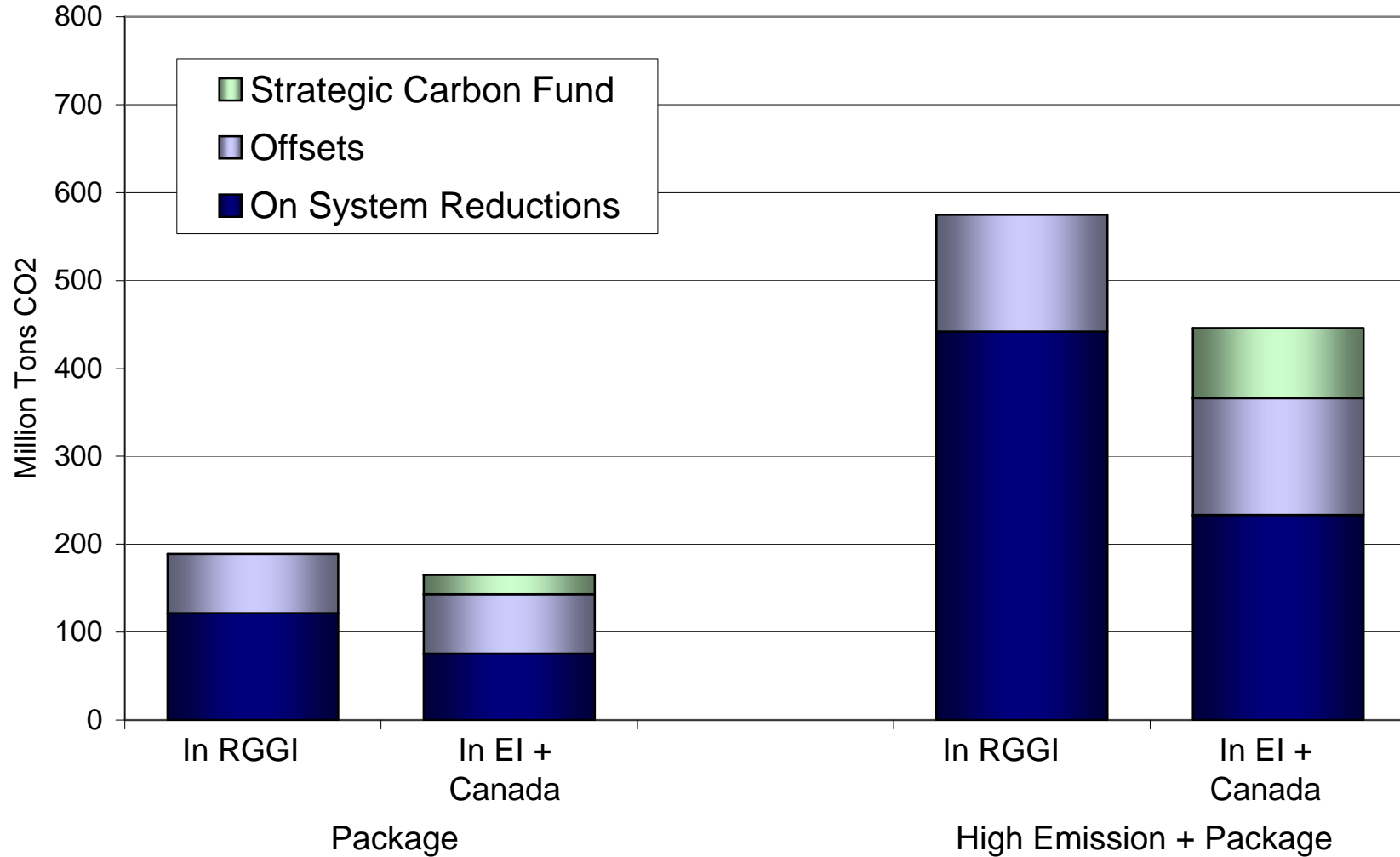
# Cumulative CO<sub>2</sub> Reductions by 2015

## RGGI and Eastern Interconnect/Canada



# Cumulative CO<sub>2</sub> Reductions by 2021

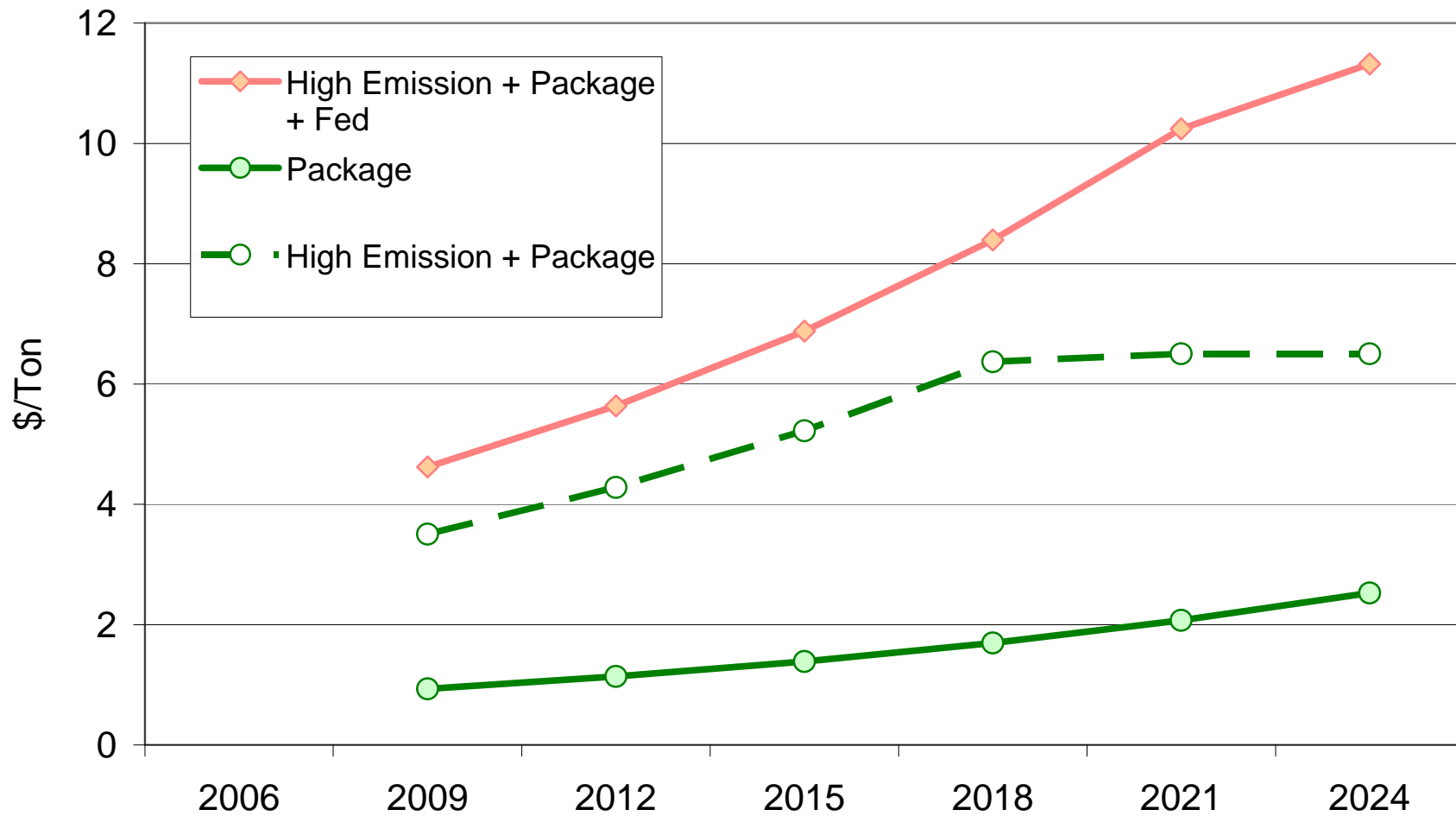
## RGGI and Eastern Interconnect/Canada



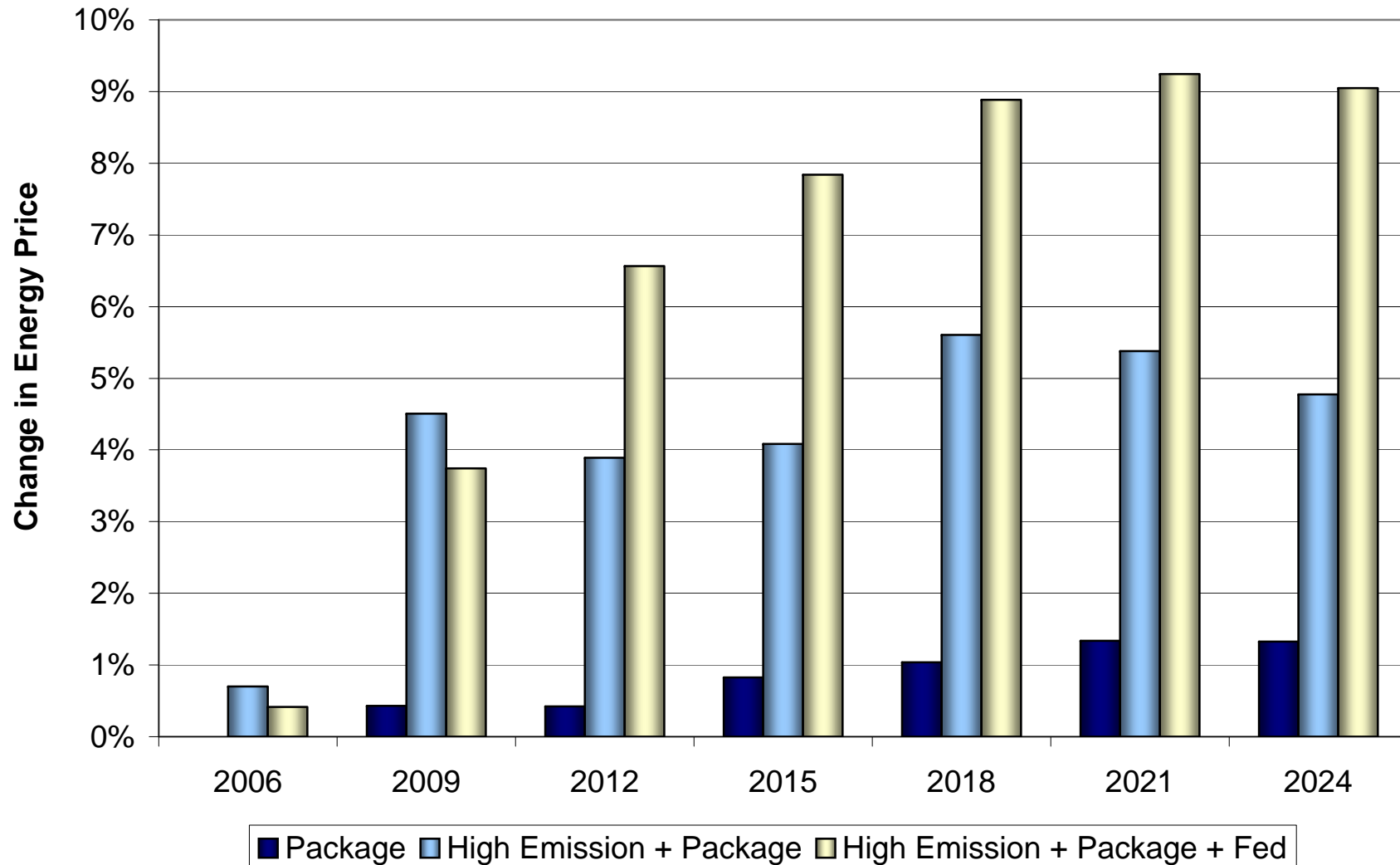


# **Package Scenario with US/Canada Policies**

# CO<sub>2</sub> Allowance Prices



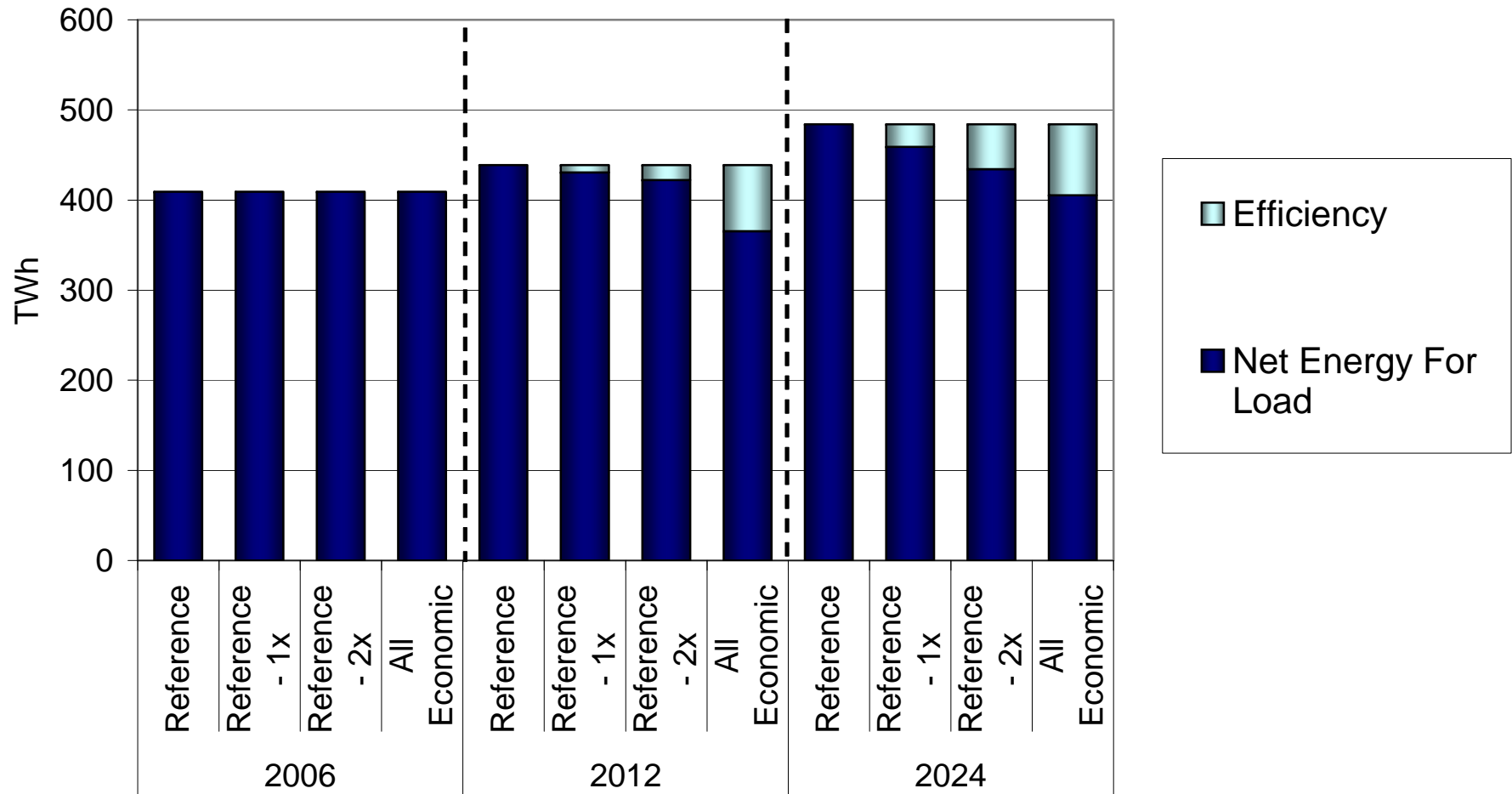
# Change in RGGI Average Annual Energy Prices



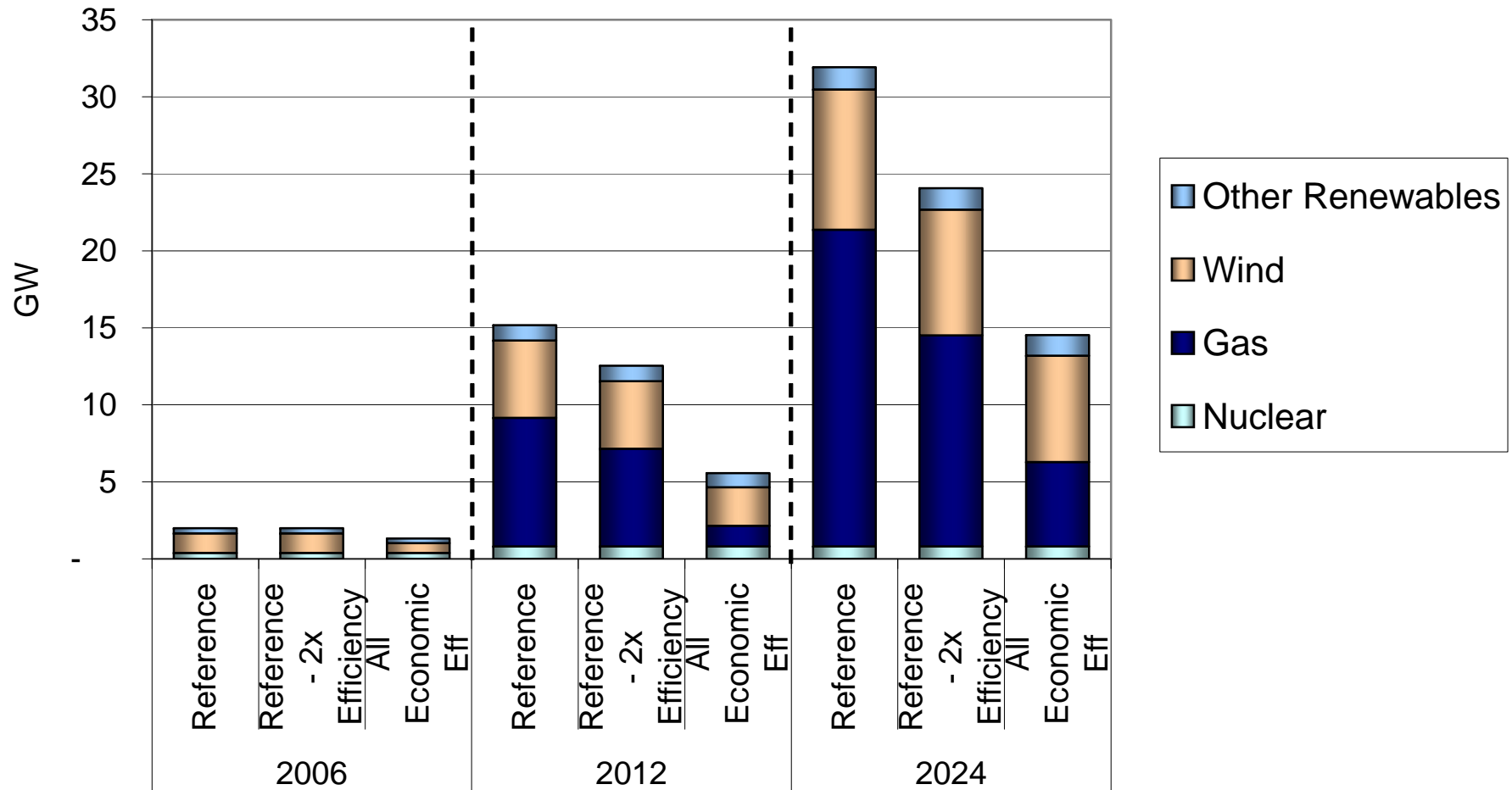
NOTE: Energy prices include annualized capacity prices.

# **RGGI Low Emissions Cases**

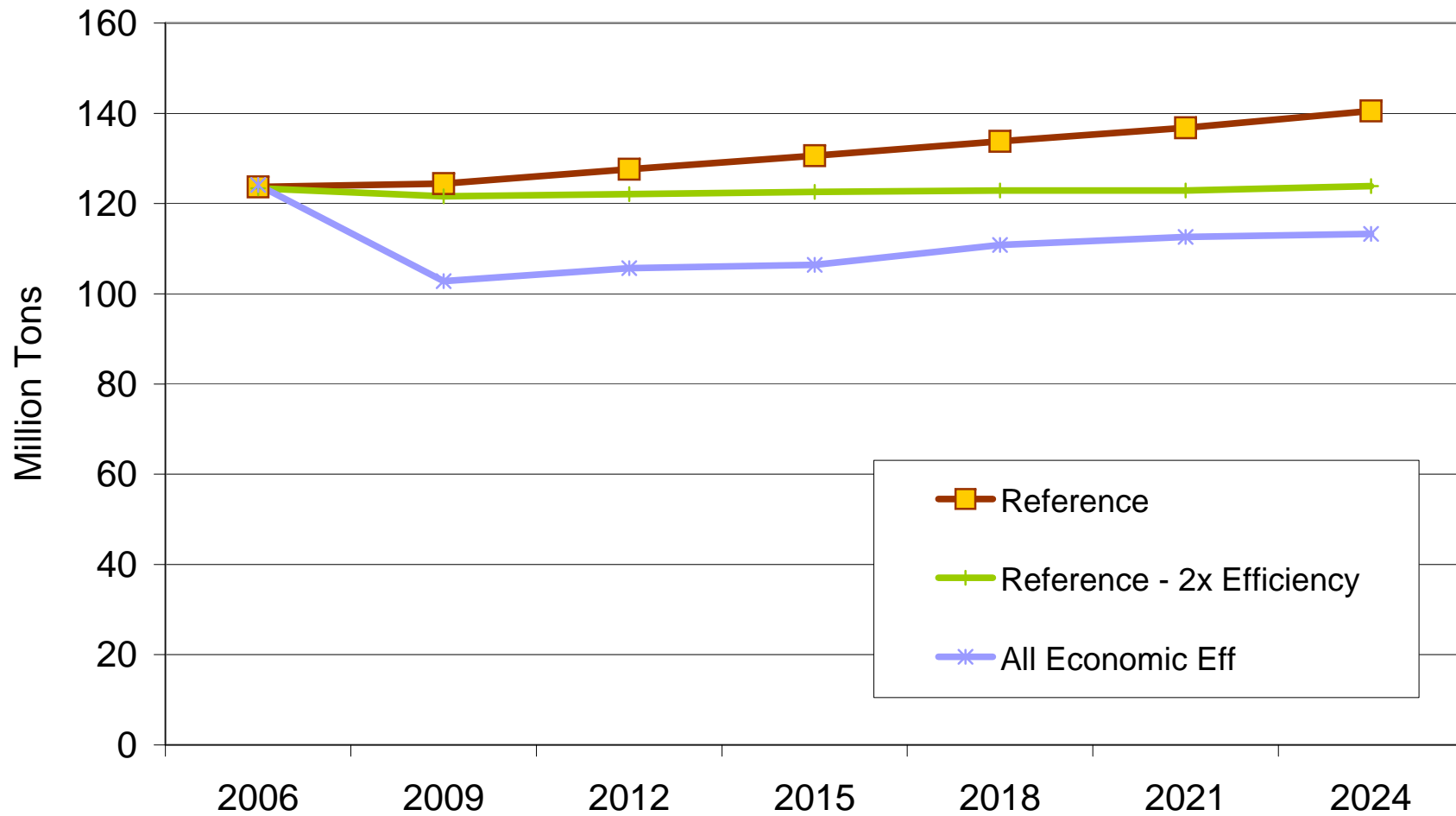
# RGGI Load Growth Comparison



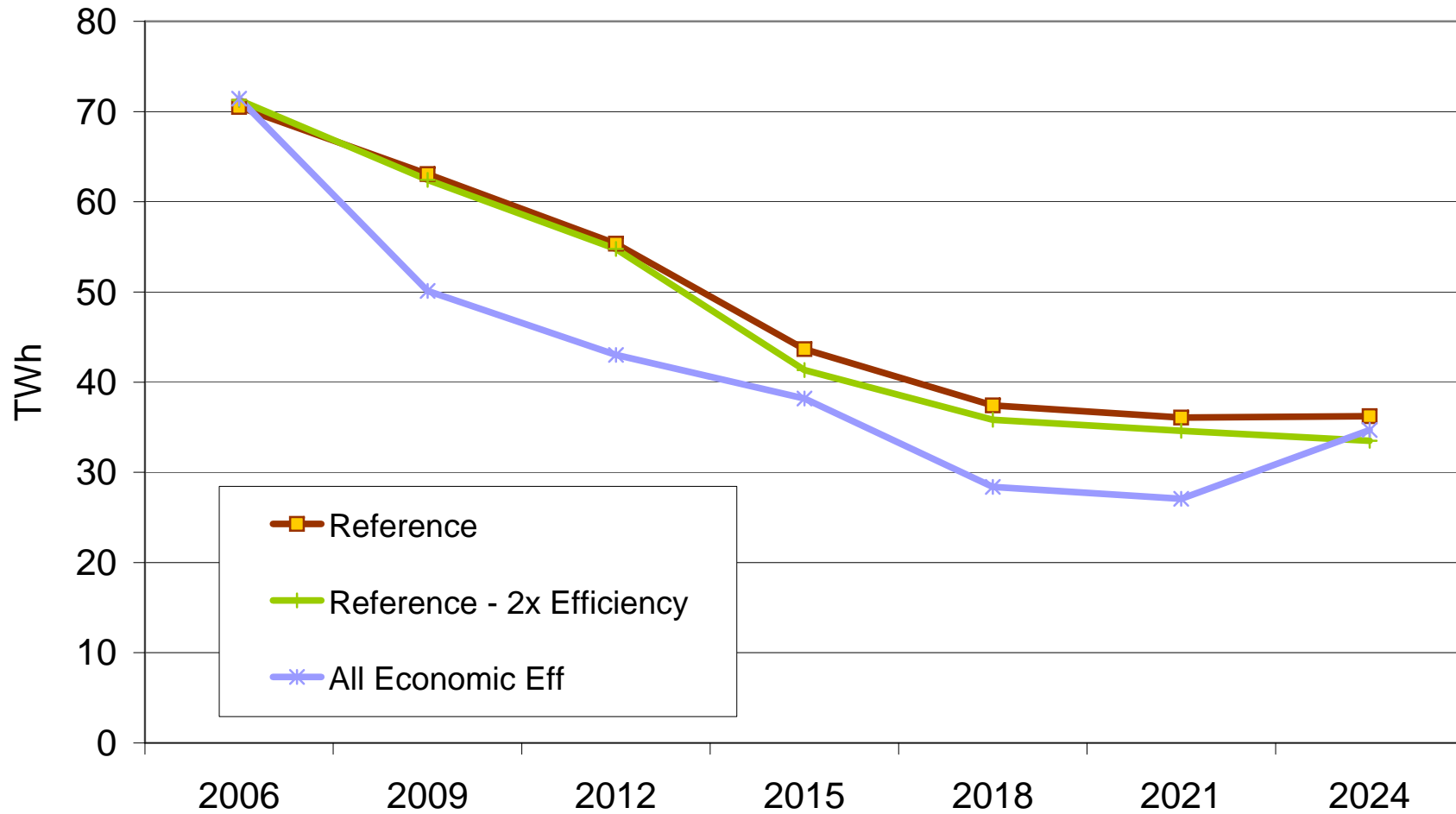
# RGGI Cumulative Capacity Additions



# CO<sub>2</sub> Emissions



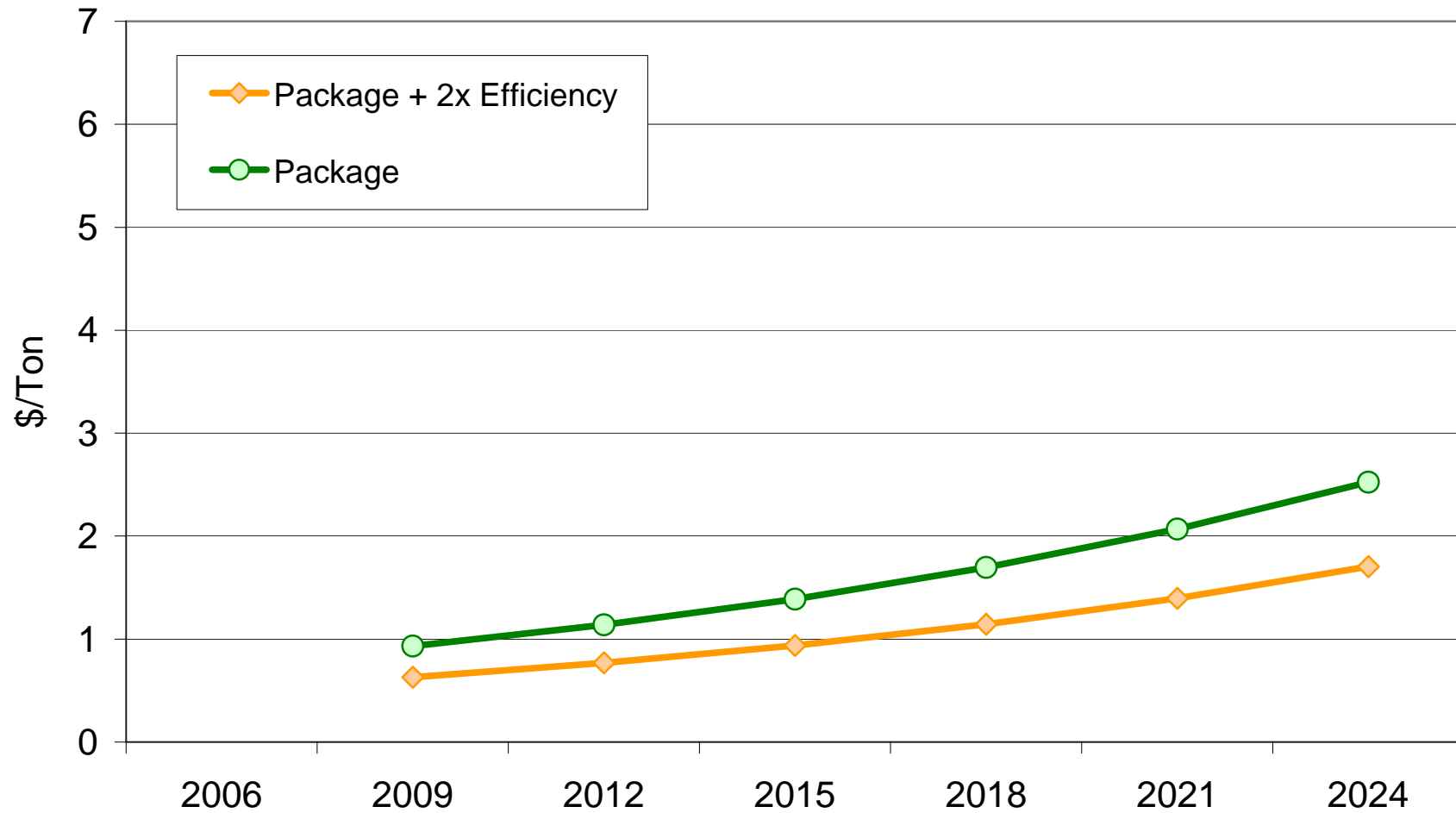
# RGGI Net Imports



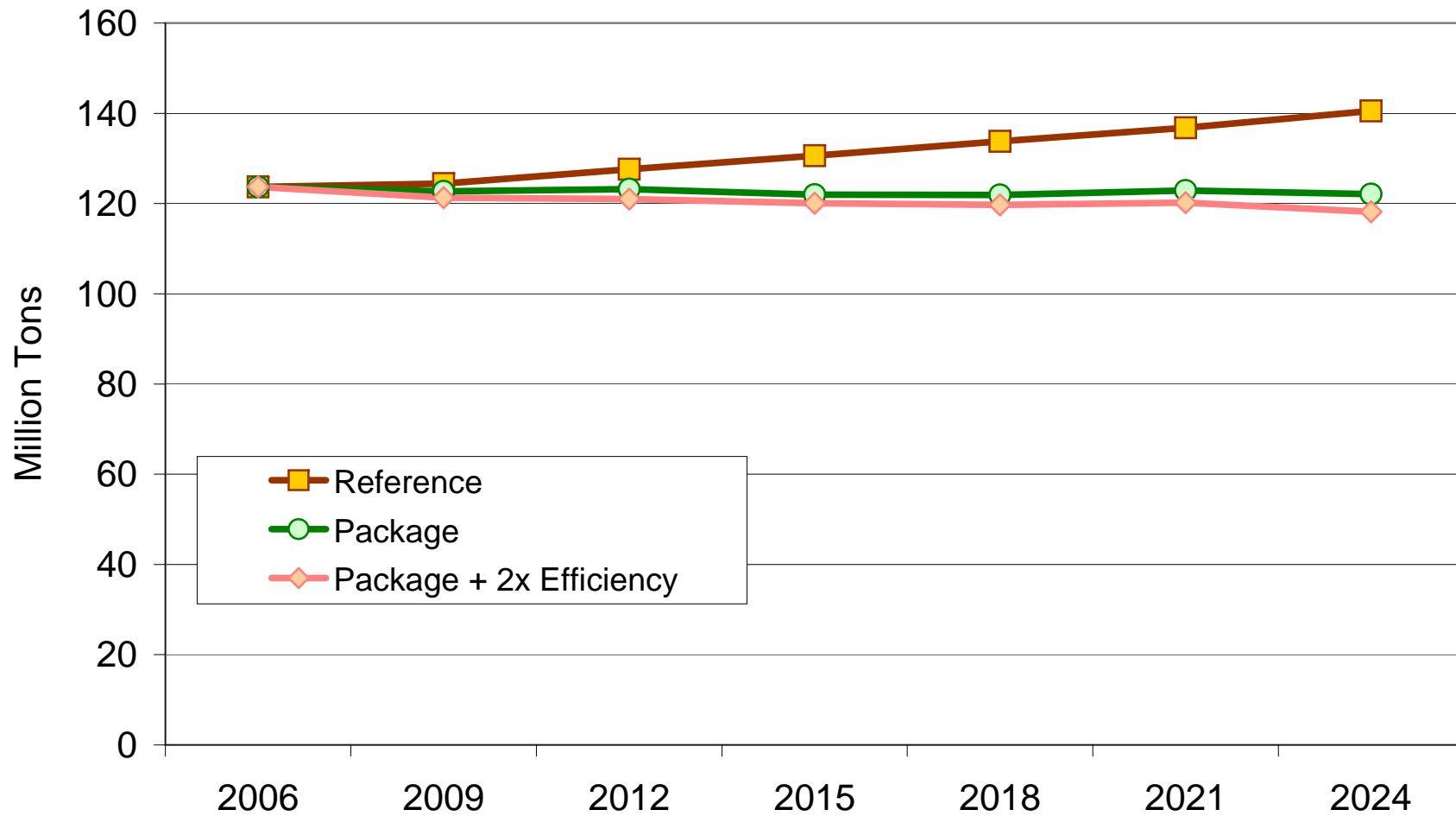


# **Package Scenario with 2x Efficiency Assumption**

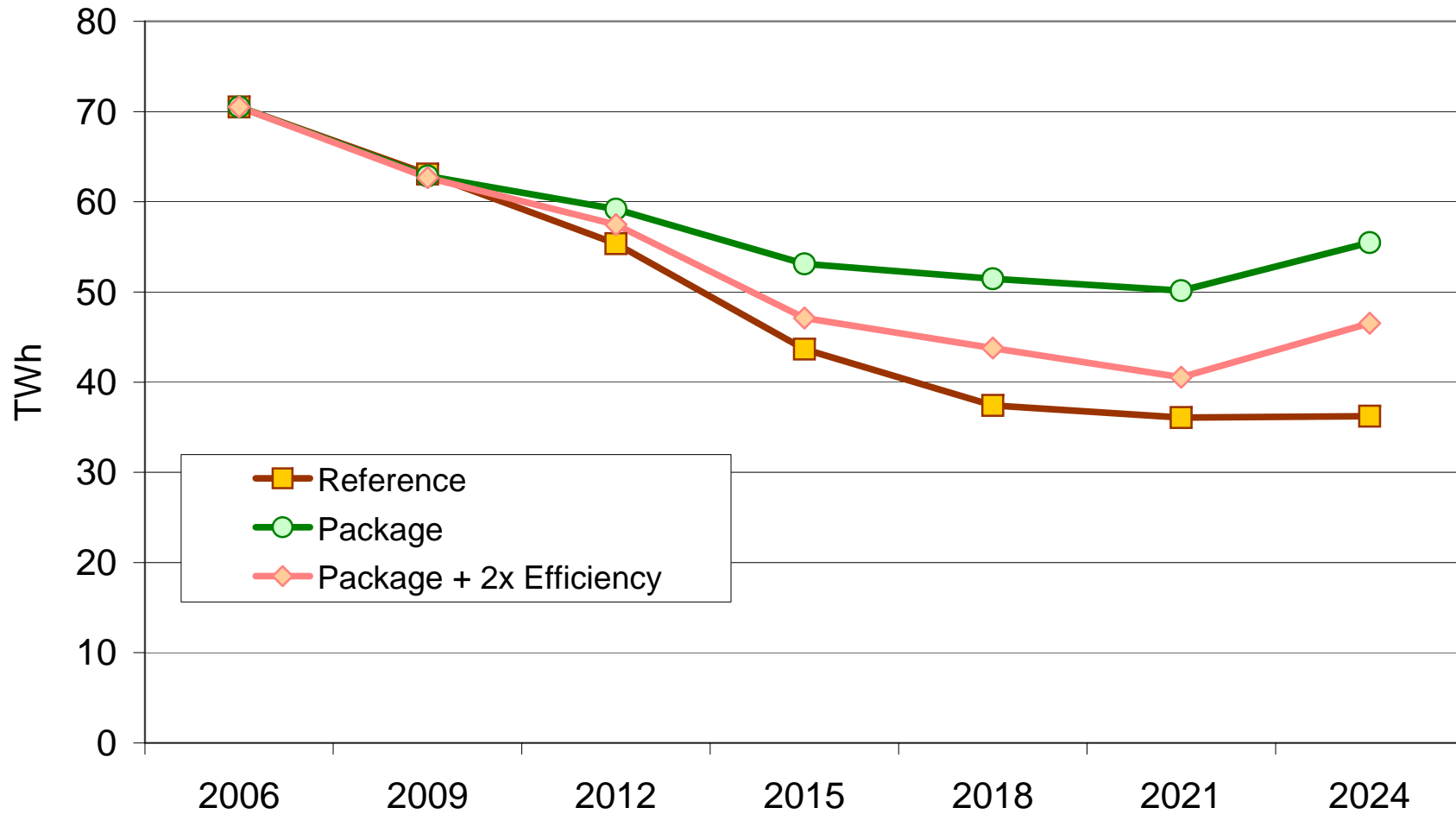
# CO<sub>2</sub> Allowance Prices



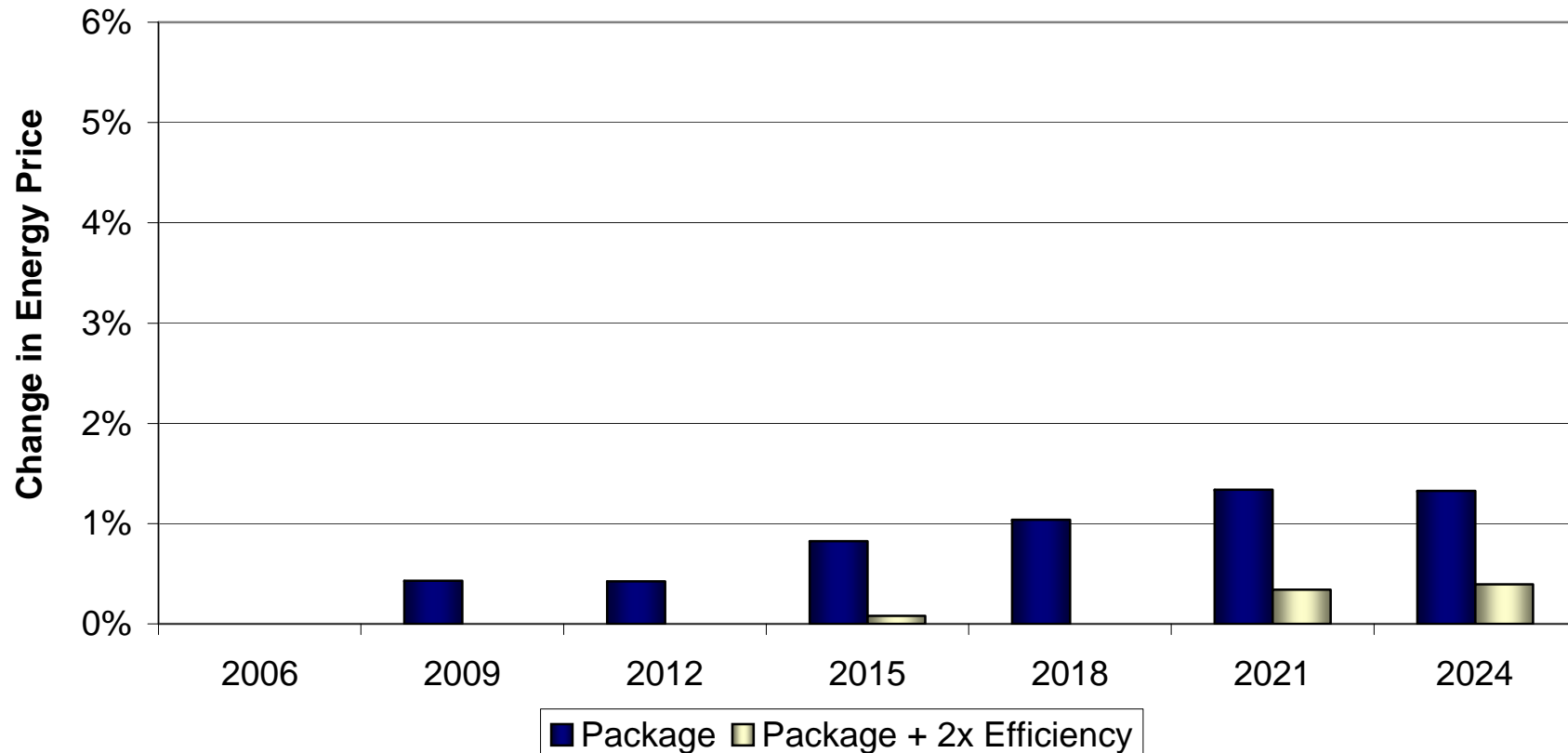
# CO<sub>2</sub> Emissions



# RGGI Net Imports



# Change in RGGI Average Annual Energy Prices

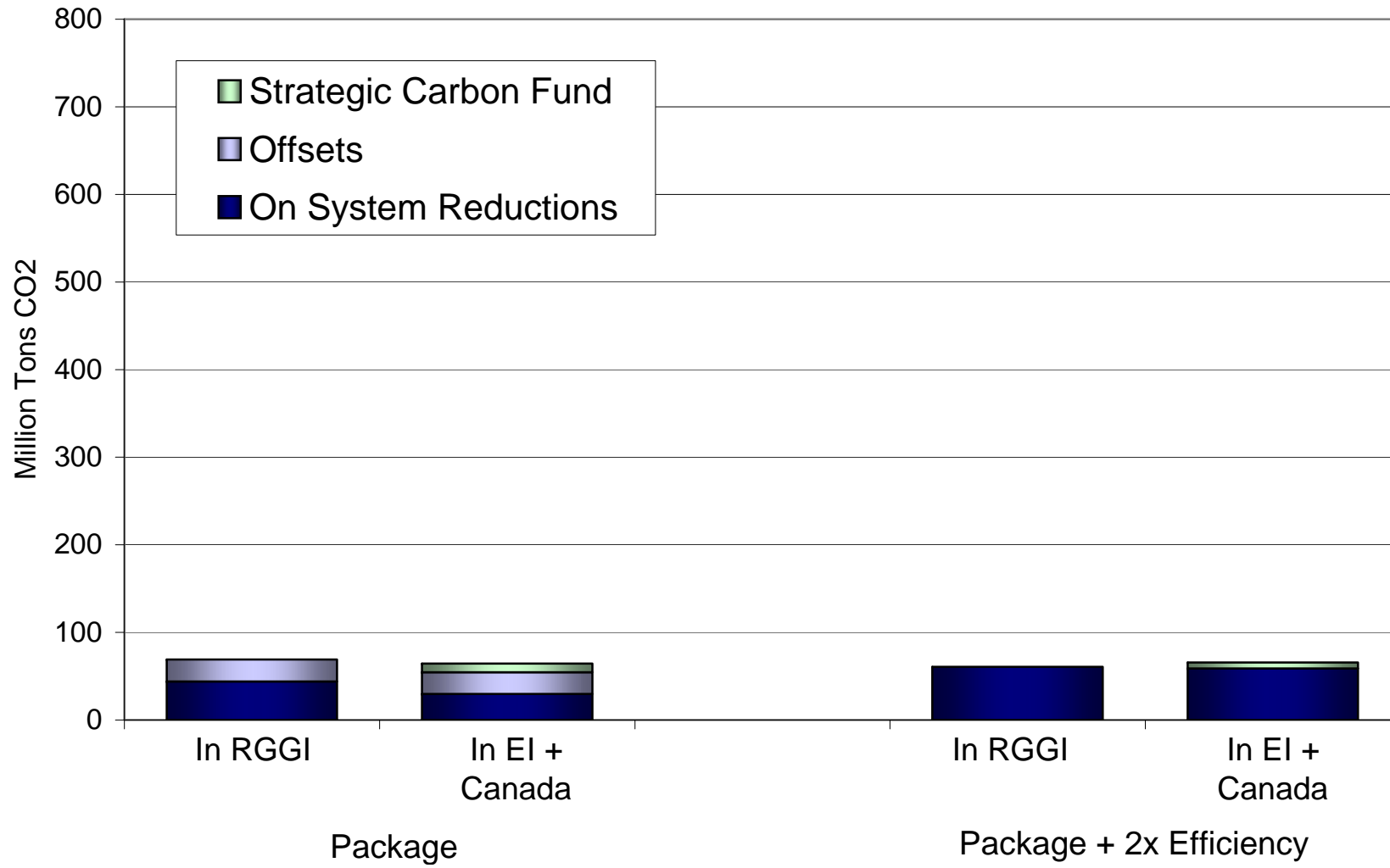


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# Cumulative CO<sub>2</sub> Reductions by 2015

## RGGI and Eastern Interconnect/Canada



# Cumulative CO<sub>2</sub> Reductions by 2021

## RGGI and Eastern Interconnect/Canada

