

# Energy Efficiency and Climate Policy: Mining the First Fuel in the Race for Clean Energy

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# Overview

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- Why efficiency is the first fuel
- Documenting the benefits of efficiency investment for energy and climate policy
- Why conventional climate policy won't mine enough efficiency
- How to design climate policies that tap efficiency effectively



# Why Efficiency is the First Fuel: the McKinsey-Vattenfall Curve

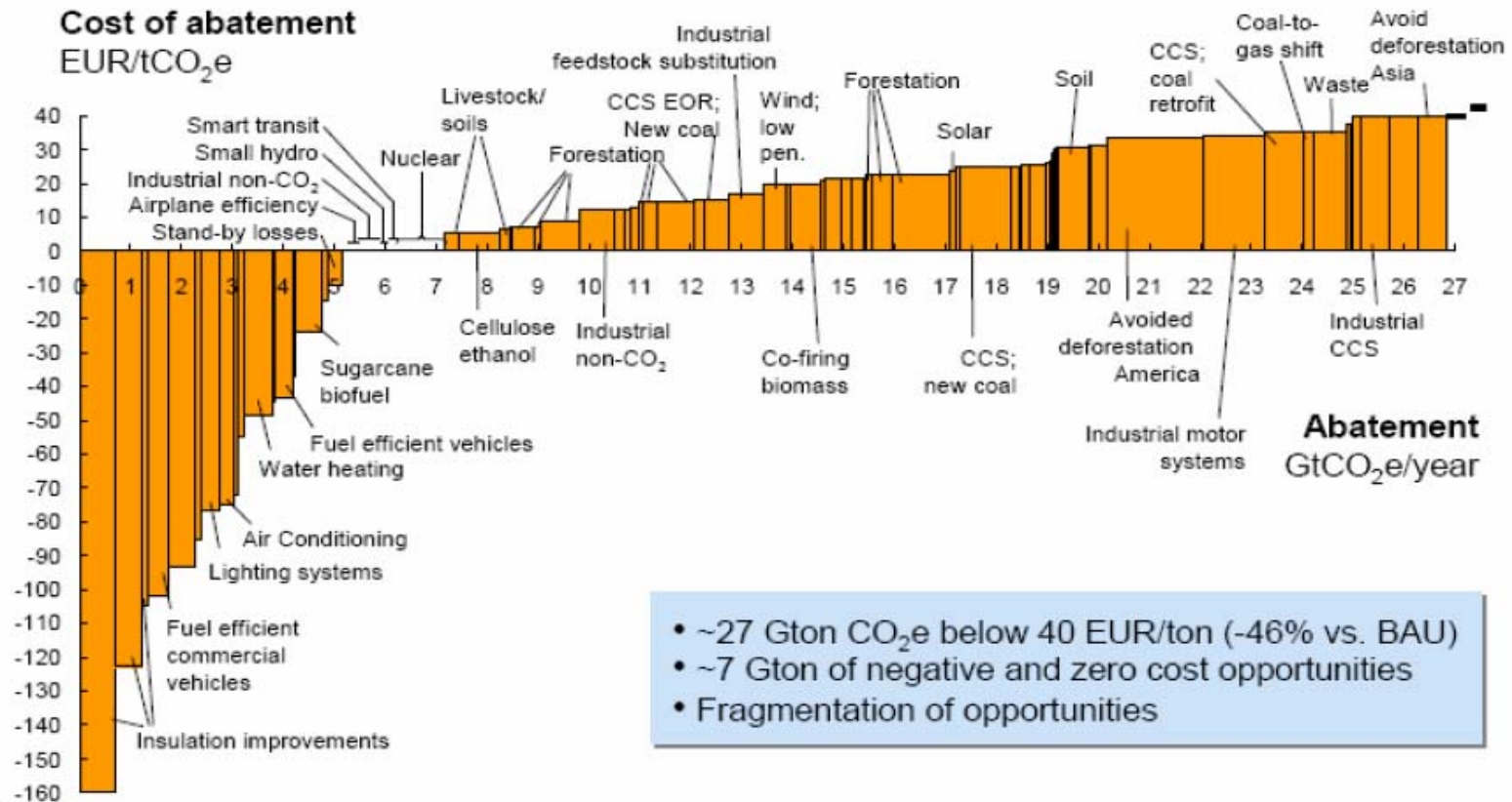


Figure 5. Financial cost-benefit analysis of CO<sub>2</sub> mitigation options prepared by Vattenfall, 2007.

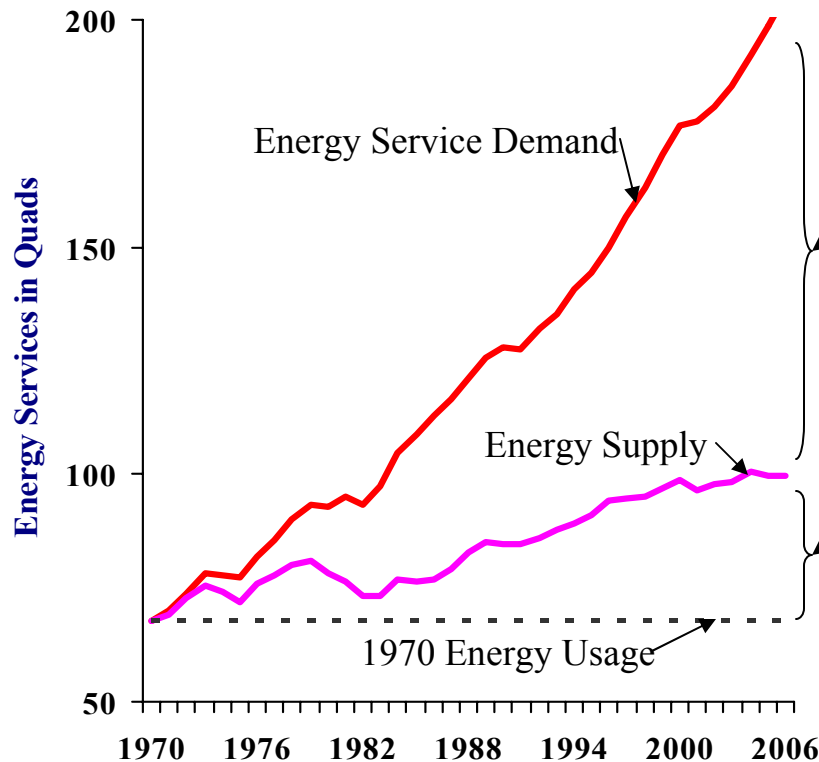
# Why Efficiency is the First Fuel

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- Clean supply is essential, but can't catch up with historical demand growth rates
- Delivering energy supply to the market is hard, and getting harder
- Unless we moderate demand growth, no clean energy supply strategy will be able to achieve deep carbon emissions reductions, or will make costs untenable
  - ...which is the same thing



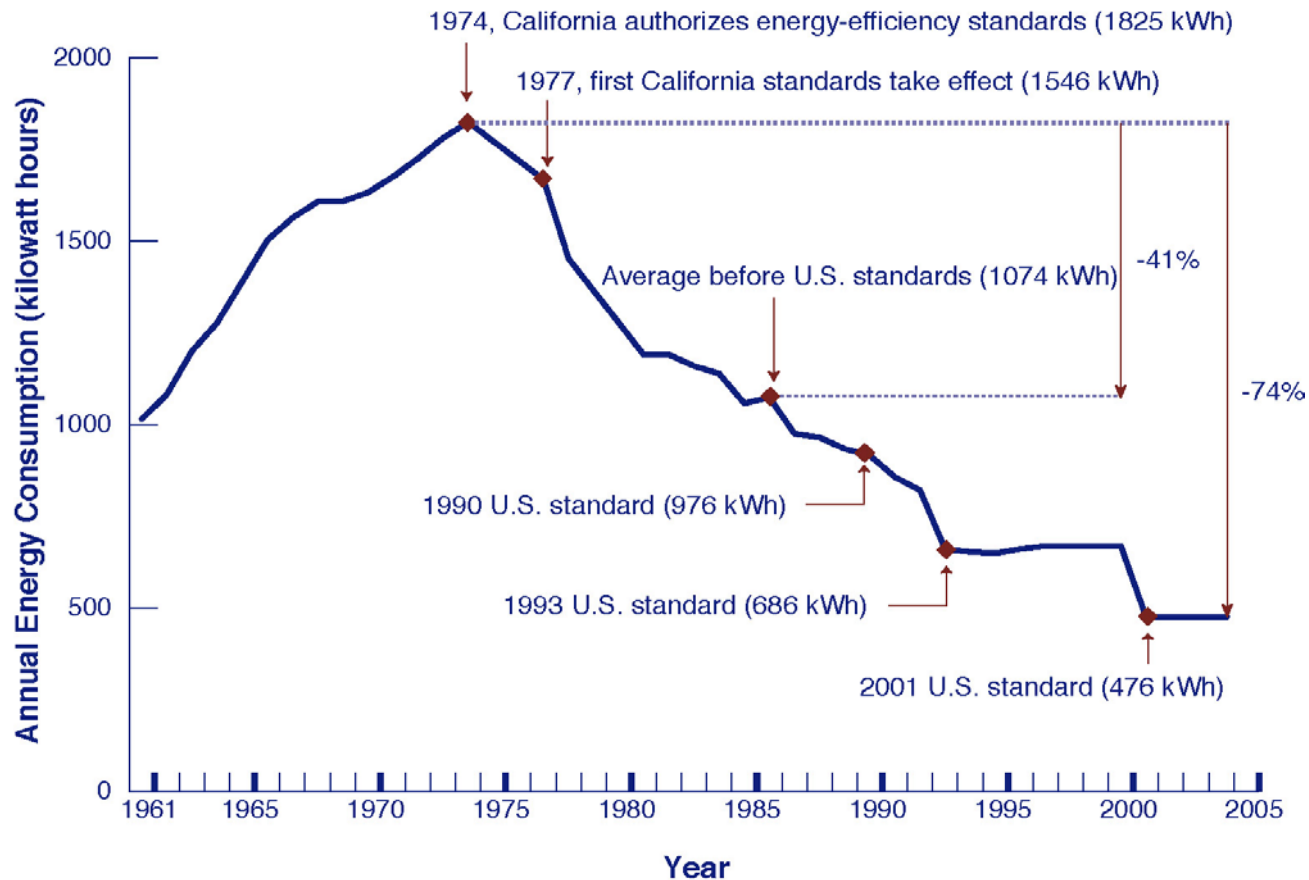
# Efficiency as a Driver of Economic Prosperity



- Since 1970, **energy efficiency** has met 77% of new energy service demands in the U.S, while **new energy supplies** have contributed only 23% of new energy service demands.

# How Efficiency Drives Prosperity

The humble refrigerator...



# Efficiency as infrastructure Investment

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- Total 2004 annual investment in energy-efficient technologies and services = \$300+ billion
  - Energy Star Product sales = \$88 billion
  - Efficiency value added is not 100% of all investments
- Total 2004 U.S. investment in *energy supply* infrastructure = \$100 billion
- **Inference:** U.S. energy services infrastructure investment exceeds energy supply infrastructure investment
- **Implication:** Investment opportunity is larger on the demand side than the supply side



# Examples of EE Investment

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- \$88 billion on Energy Star Products
- \$29 billion on Energy Star Homes
- \$12 billion on Energy Star windows
- \$5 billion on insulation
- \$32 billion on vehicles



# Efficiency Investment and Job Creation

- 2004 energy efficiency investment supports 1.6 million U.S. jobs
  - 230,000 directly attributable to efficiency value added
  - Distributed among manufacturing, services, construction
  - Jobs created in more labor-intensive sectors than those stimulated by energy supply investments
  - Direct jobs multiplier:
    - > 6 jobs per \$ million invested, vs.
    - ~ 2 jobs/\$ million for typical supply investments



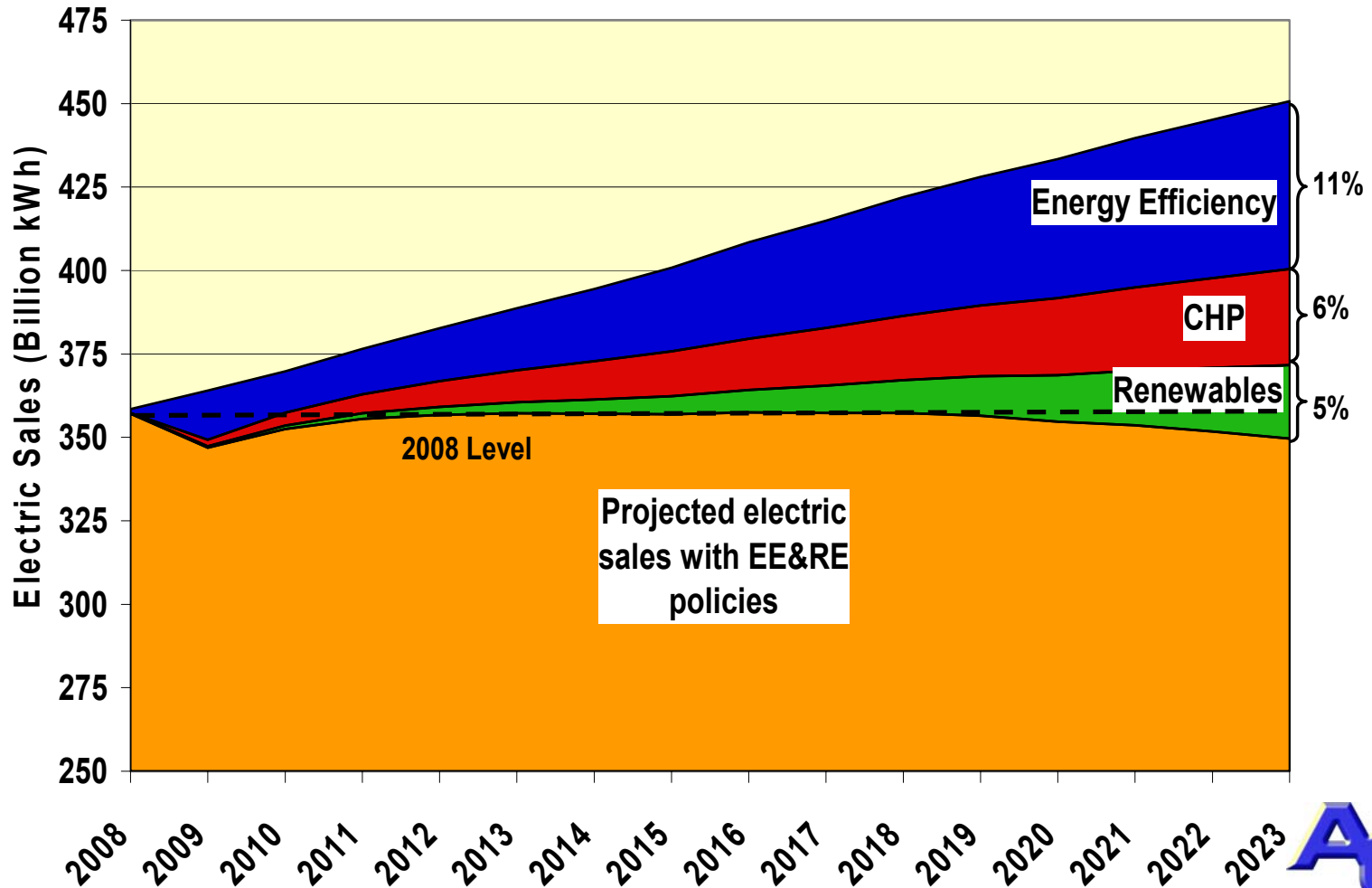
# Efficiency as a Large and Renewable Resource

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- In the beginning, there was...not much
- Today, we have efficient technologies in all end-use sectors
- Efficiency potential studies show we can cut demand growth by more than half
- Efficiency potentials stay high; new technologies and cost drops keep “refilling the well”



# Meeting Texas' Electricity Needs



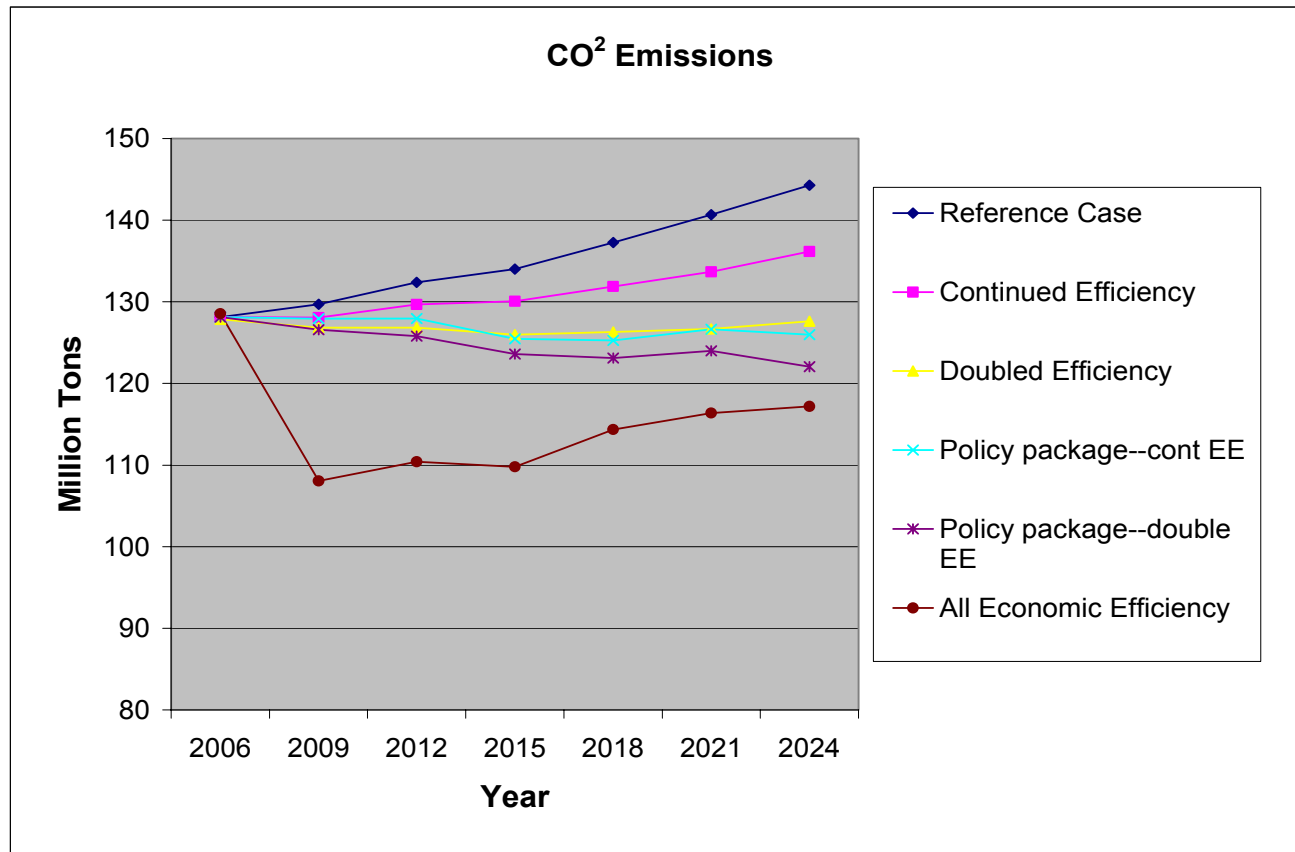
# Efficiency and Climate Policy

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- The Regional Greenhouse Gas Initiative (RGGI)
- ACEEE served as a stakeholder organization, and provided input to the modeling process
- RGGI staff used IPM and REMI models to assess policy impacts, including effects of increased efficiency investment

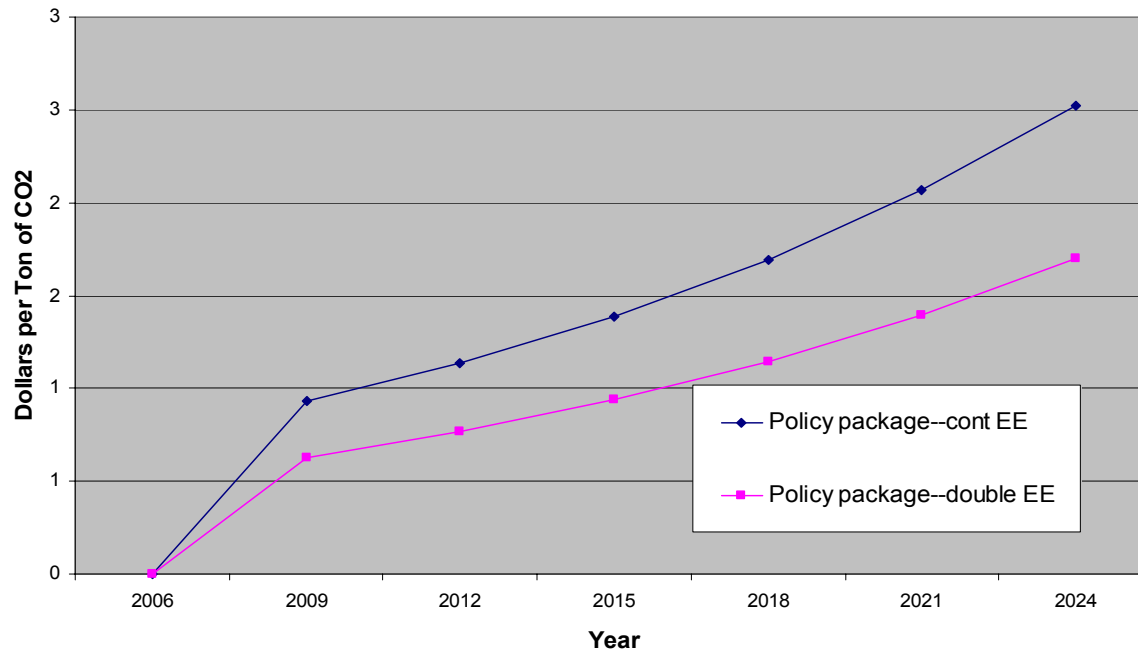


# RGGI Results: Carbon Emissions



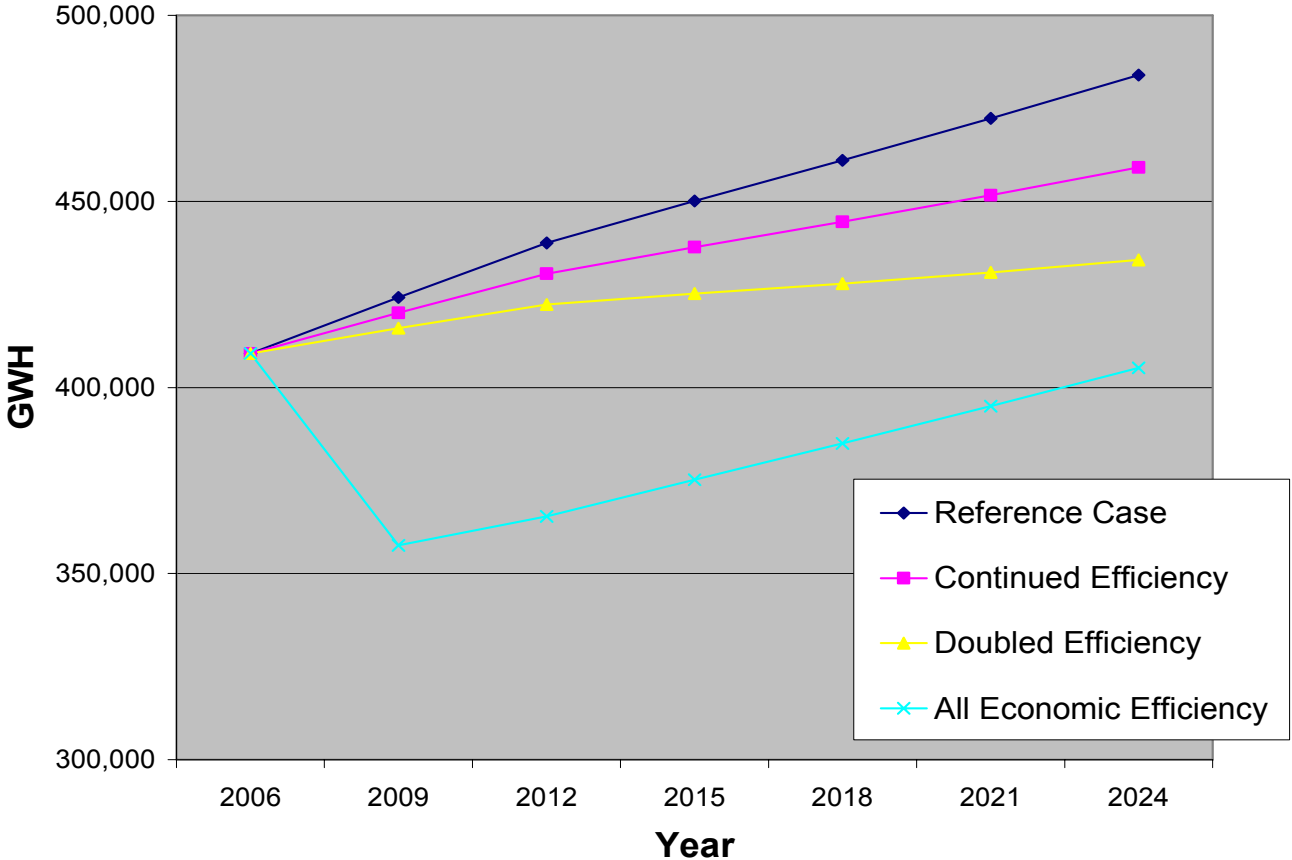
# RGGI Results: Carbon Prices

Carbon Allowance Prices



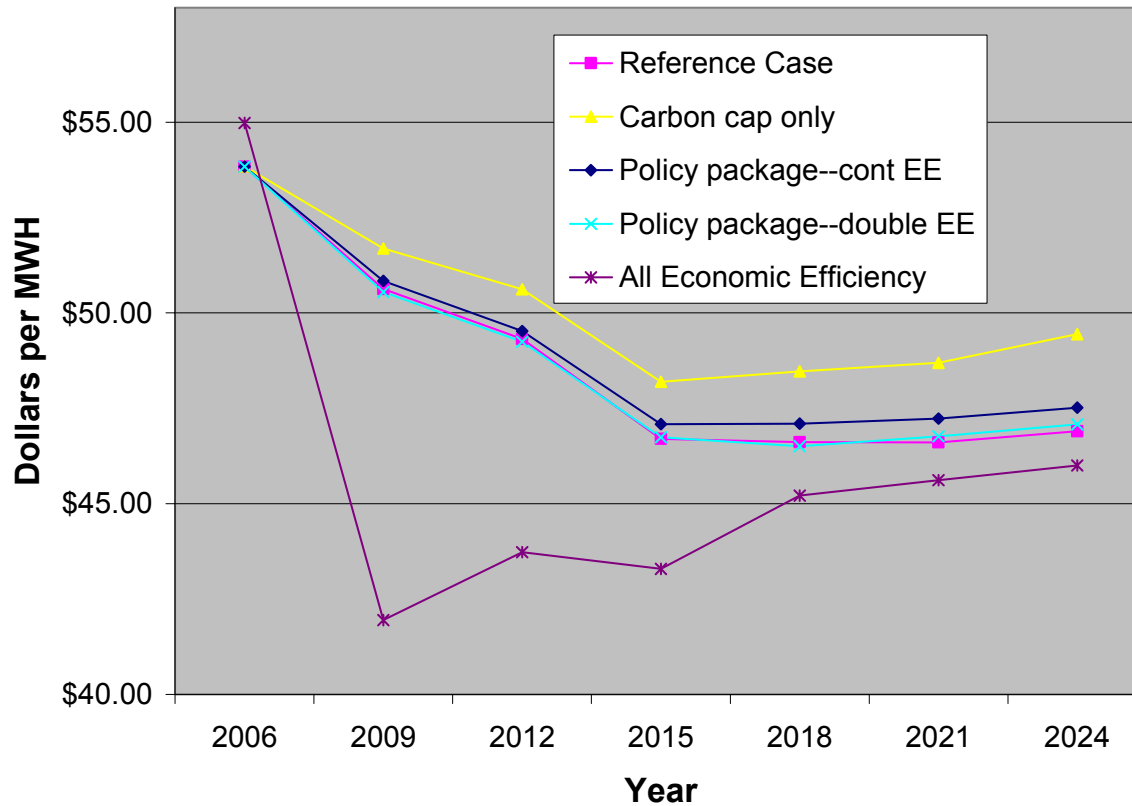
# RGGI Results: Power Sales

Electricity Generation



# RGGI Results: Electricity Prices

Electricity Prices (firm power)



# RGGI Results: Energy Bill Impacts

## Average Energy Bill Savings—RGGI Package with Doubled Efficiency

Residential		Commercial		Industrial	
2015	2021	2015	2021	2015	2021
\$71	\$118	\$390	\$650	\$2468	\$4092
7.5%	12.4%	4.8%	8.1%	2.8%	4.7%

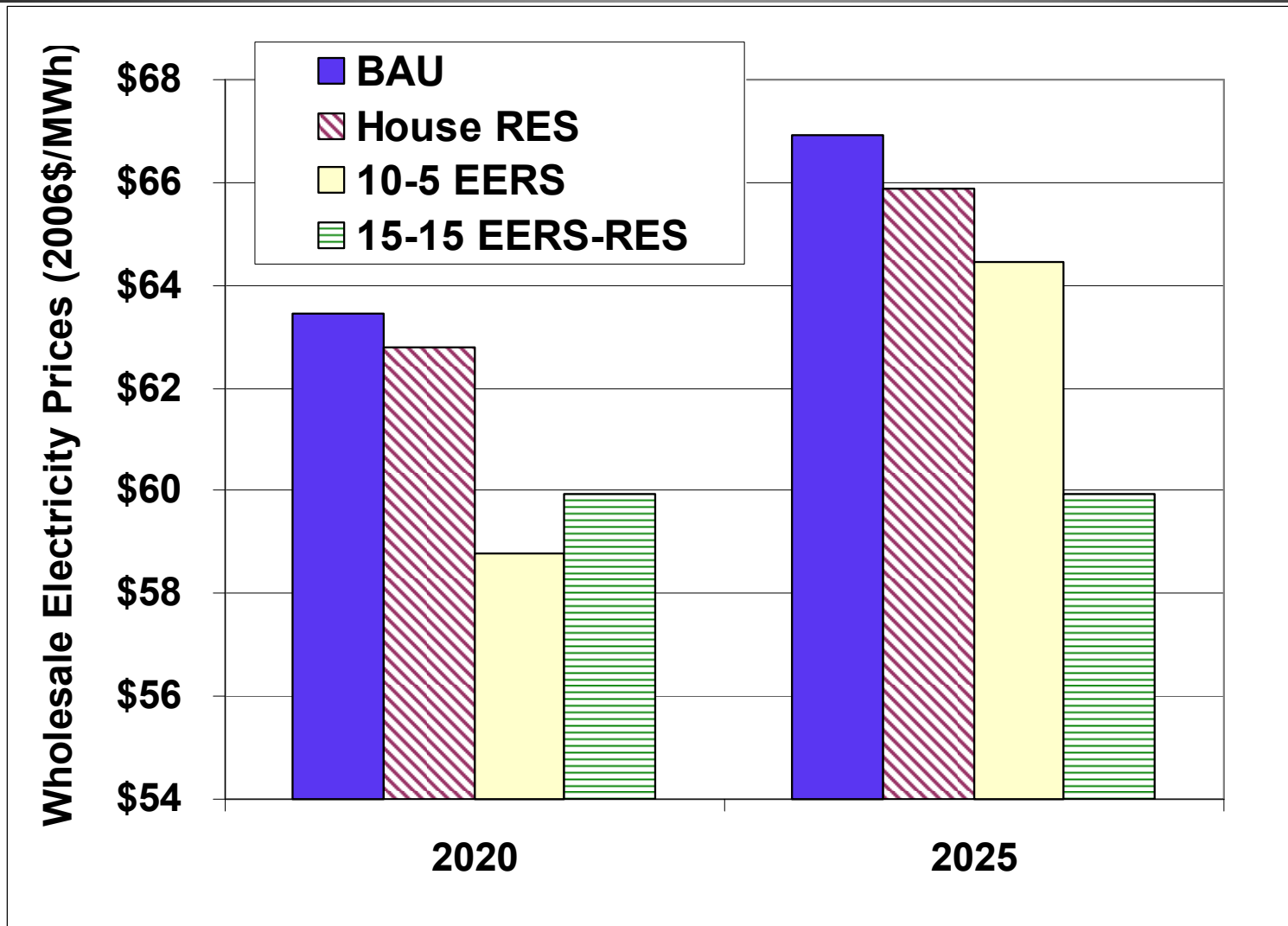


# Today's Energy Bill: RES and Energy Efficiency

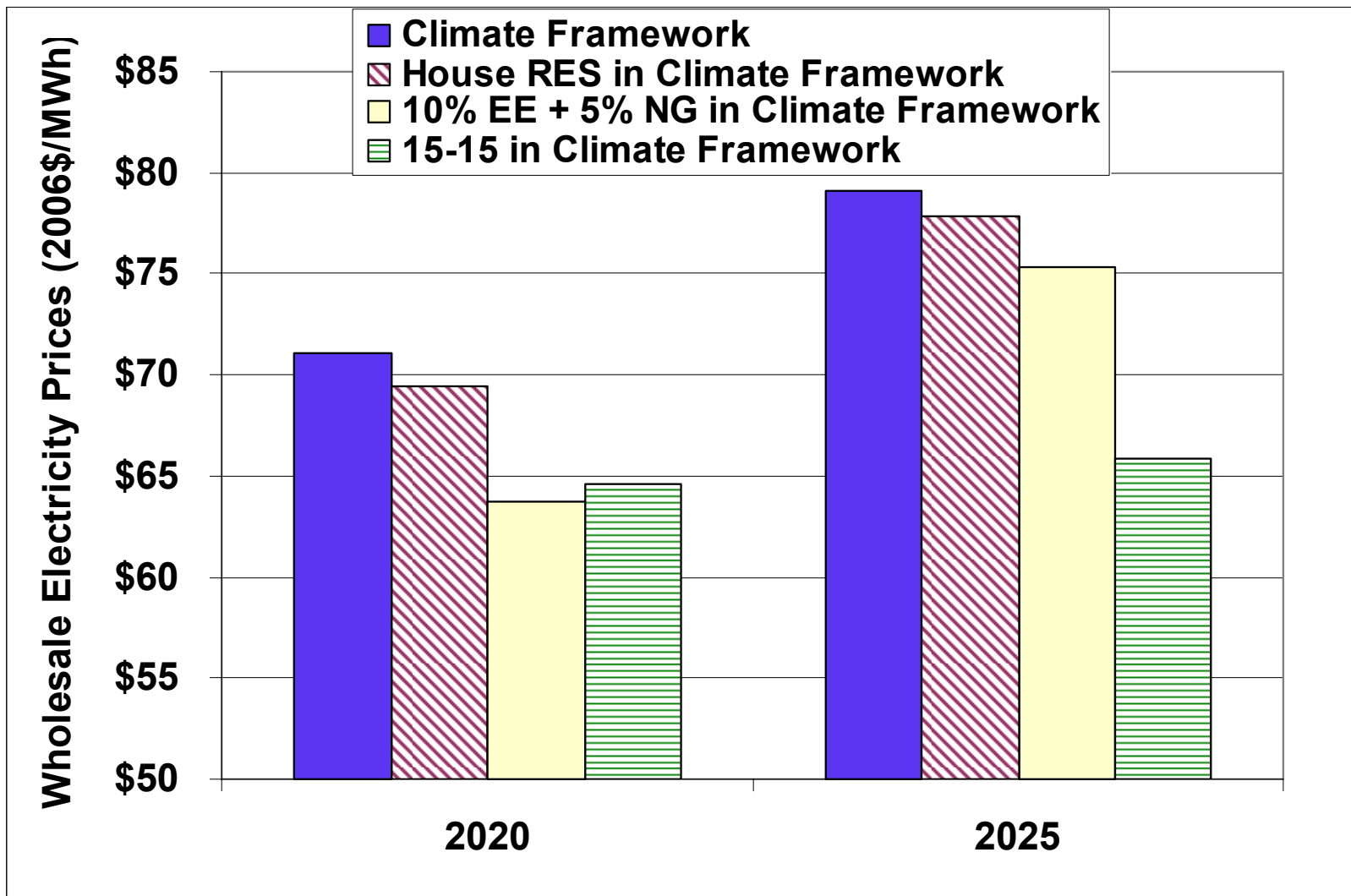
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- RES provision: 15% renewable electricity target by 2020 includes efficiency—can provide up to 27% of resource target
- ACEEE used IPM to model impacts of House RES, and more aggressive targets (15% RE, 15% EE)
- We also modeled RES in a climate policy framework, akin to Lieberman-Warner

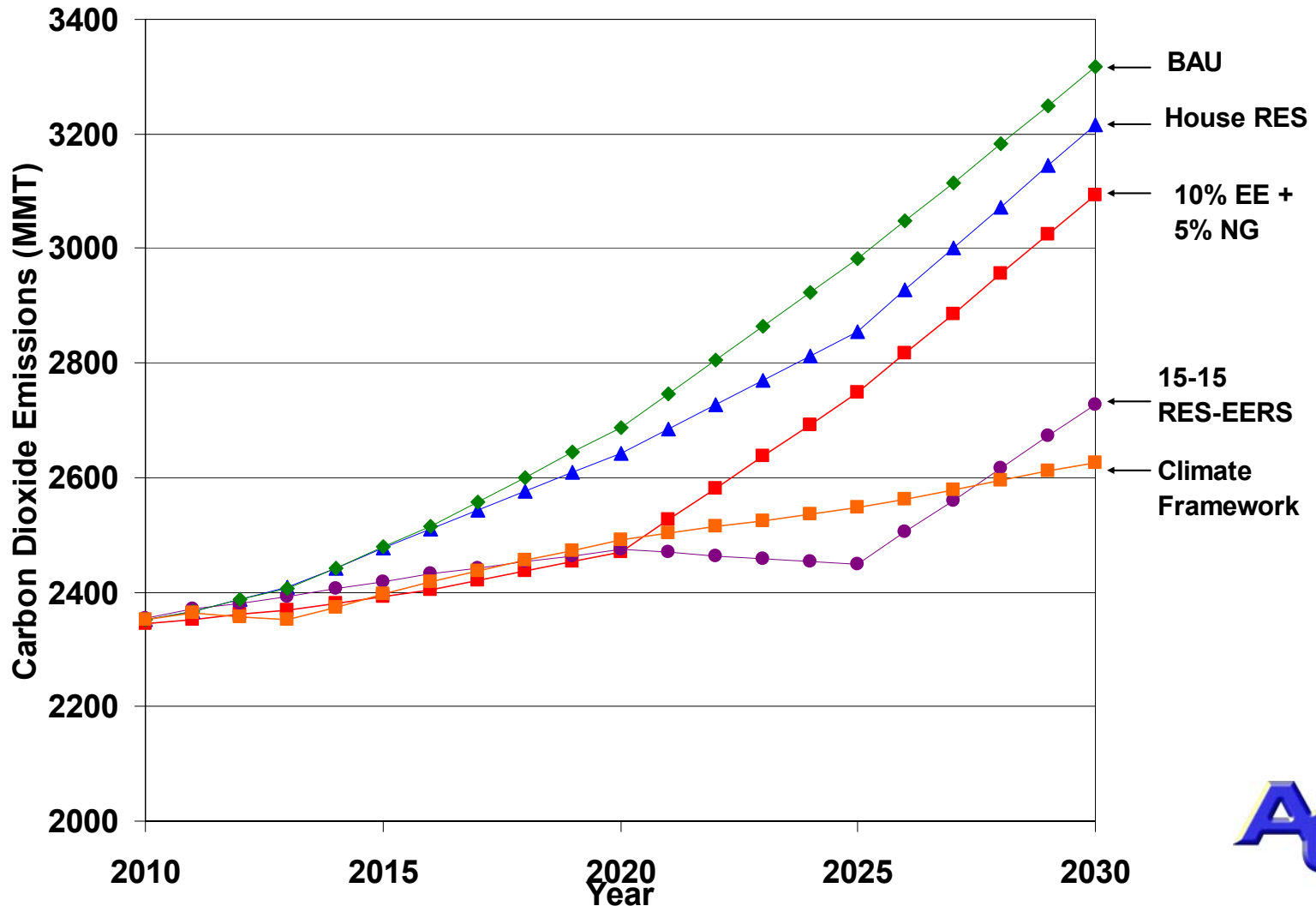
# National Wholesale Electricity Prices: BAU reference case



# National Wholesale Electricity Prices: Climate reference case



# CO2 Emissions in BAU and Clean Energy Scenarios



# Why Cap and Trade Alone Won't Mine Enough Efficiency

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- Caps placed upstream lock out downstream emission reductions from trading markets
  - The indirect-reduction/double-counting problem
- Price elasticity effects of carbon prices are blunted by income elasticity, cross elasticity, and market barriers
  - Principal-agent problem affects 50% of basic building energy use

# Hybrid Cap and Trade Policies Can Better Mine Efficiency

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- Allocation/auction policy
  - RGGI states auctioning 25%-100% of allowances, and using most proceeds for EE
  - Lieberman-Warner auctions 24%-73% of allowances, stipulating some EE uses
  - Lieberman-Warner makes direct allocations to
    - States, with EE stipulations
    - Distribution utilities (Load-serving entities), with EE stipulations



# Hybrid Cap and Trade Policies Can Better Mine Efficiency

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- Complementary policies
  - Energy Efficiency Resource Standards
    - RES analysis shows the benefits
  - Building codes
    - Lieberman-Warner includes House codes provision
  - Appliance standards
    - Lieberman-Warner includes House standards
  - Fuel economy standards



# Summary

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- Efficiency is the First Fuel in the race to contain global warming
  - If we don't drive down demand, we will not win
- Efficiency resources are abundant and affordable
- Efficiency takes policy action—markets alone won't invest enough
- Hybrid climate policy can mine EE to achieve deep emission reductions at modest costs



# Contact Information

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