

Effects of Energy Market Reform on GHG Emissions in the U.S.

Annex I Experts Group Meeting
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Overview

- Status of electricity restructuring in the U.S.
- Federal policy proposals
- Effects on electric sector GHG emissions
 - ◆ Effects of electricity restructuring generally
 - ◆ Effects of proposed environmental policies
- The importance of natural gas deregulation

Status of Electricity Restructuring

■ Wholesale Electricity Markets

- ◆ Regulated at the Federal level
- ◆ 1992: Legislation passed that mandated open access to the transmission system
- ◆ 1996: All utilities required to provide open access to their transmission facilities

■ Retail Electricity Markets

- ◆ Regulated at the State level
- ◆ Twenty-four states have passed restructuring legislation; most of these states are just beginning to implement retail choice
- ◆ Proposed Federal legislation would encourage retail competition through a flexible mandate for States

Federal Proposal: Comprehensive Electricity Competition Plan

- Proposed by the Administration to address several issues:
 - ◆ Revise Federal electricity laws
 - ◆ Facilitate competitive regional markets
 - ◆ Ensure continued reliability
 - ◆ Clarify State vs. Federal Authority
 - ◆ Preserve public benefits
- Flexible Mandate for Retail Competition by 2003
 - ◆ States would be required to implement retail competition by 2003, but could opt-out; States that have already passed restructuring legislation would be “grandfathered”
- Renewable Portfolio Standard: 7.5 percent of retail sales by 2010, subject to 1.5 cent per kilowatthour cost cap
- Public Benefits Fund (capped at \$3 billion)
- Incentives for CHP and DP

Greenhouse Gas Emissions

- Some restructuring forces tend to increase GHG emissions; others tend to reduce them
- Net effects of electricity restructuring depend critically on underlying fuel markets, existing capacity mix, nature of regulatory changes

Factors Affecting GHG Emissions

These factors will likely increase emissions:

- Demand response to price reductions
- Load shifting (mostly +, but some -)
- Early retirement of expensive nuclear generation
- Dispatch changes (initially +)

These factors will likely reduce emissions:

- Stronger incentive for heat rate improvements
- Reduction of fossil energy consumption in end-use sectors
- Increased marketing of “green power” and efficiency services
- Cost of capital (mostly -, but some +)

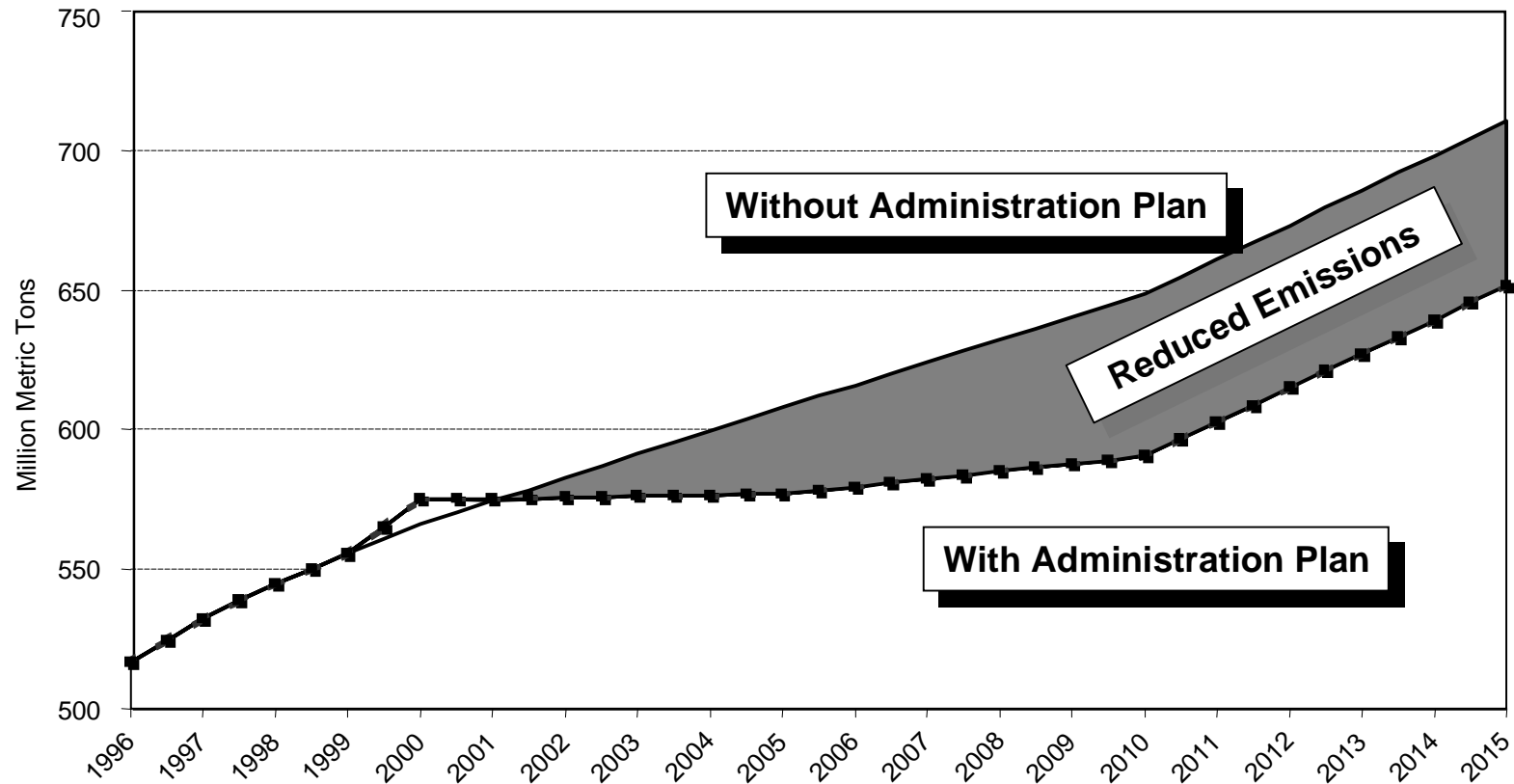
Policies Affecting GHG Emissions

- Renewable portfolio standard (RPS) & production tax incentives for renewables
- Public Benefits Fund (PBF)
- Incentives for combined heat & power (CHP)
- Remove regulatory barriers to CHP and distributed power (DP)

Emissions and Generation Mix Summary

- The Administration's plan reduces greenhouse gas emissions by 40 to 60 million metric tons of carbon equivalent annually by 2010 (6% to 10%).
- The Administration's plan significantly increases generation from renewable resources.
- Projected natural gas-fired capacity additions are marginally **lower**, but these additions continue to account for most new capacity.

Carbon Dioxide Emissions from Electricity Generation, 1996-2015

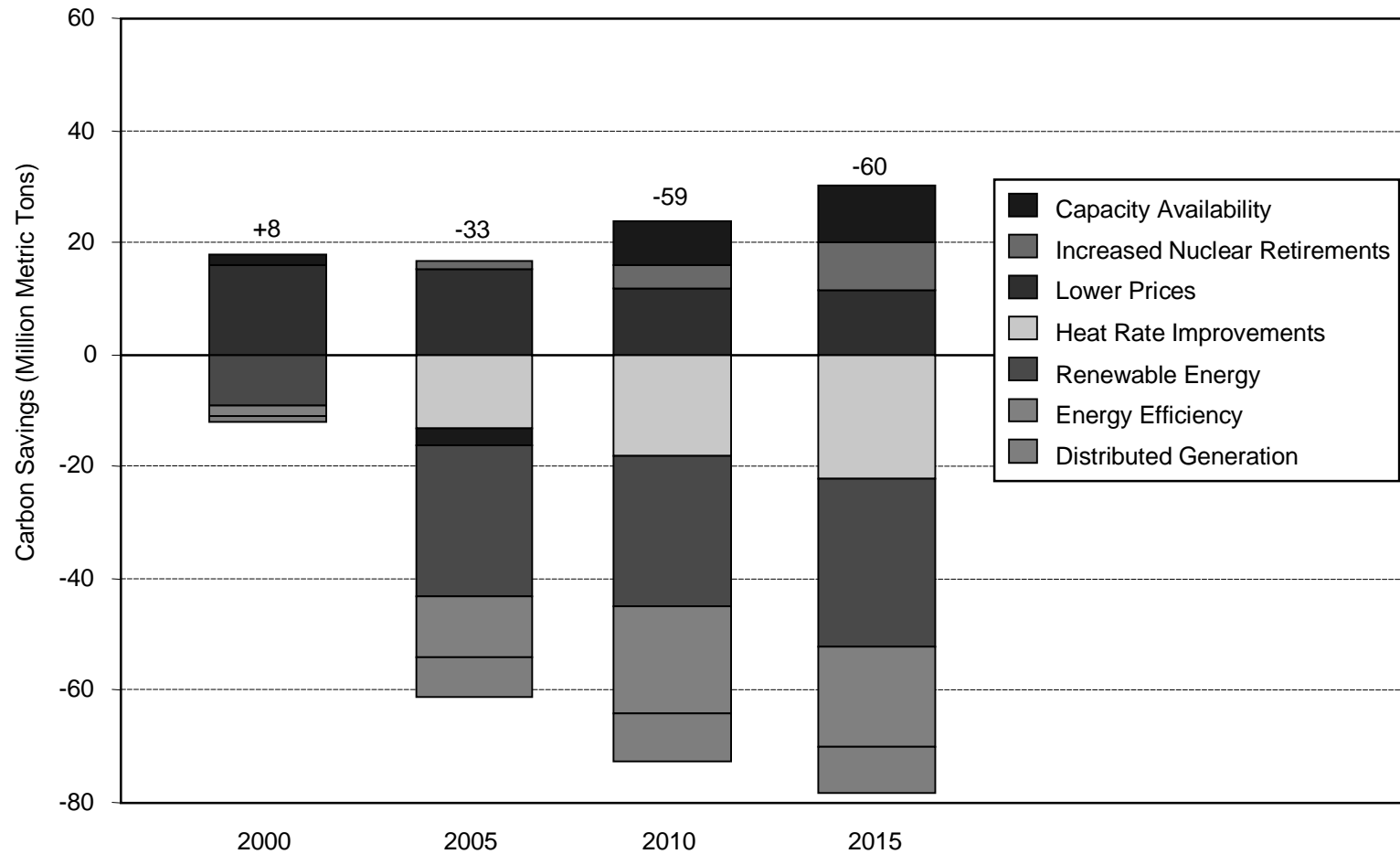


Note: Emissions from electricity generators are net of changes in emissions from other sectors, which result from increases in distributed generation or price responses.

Source: Policy Office, U.S. Department of Energy, POEMS model analysis (May 1999).

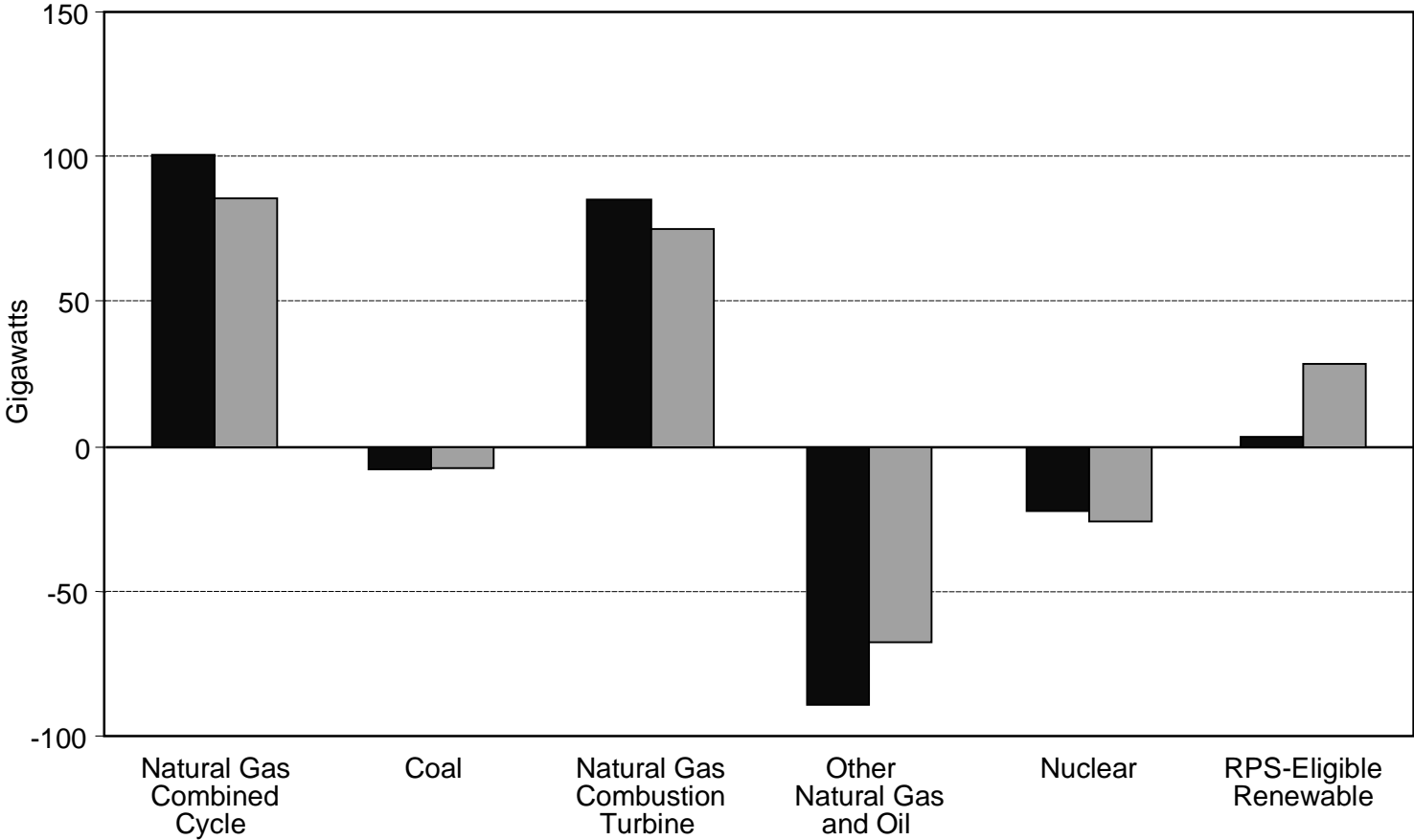
Elements Contributing to Carbon Dioxide Savings, 2000-2015

(Million Metric Tons Carbon Equivalent)



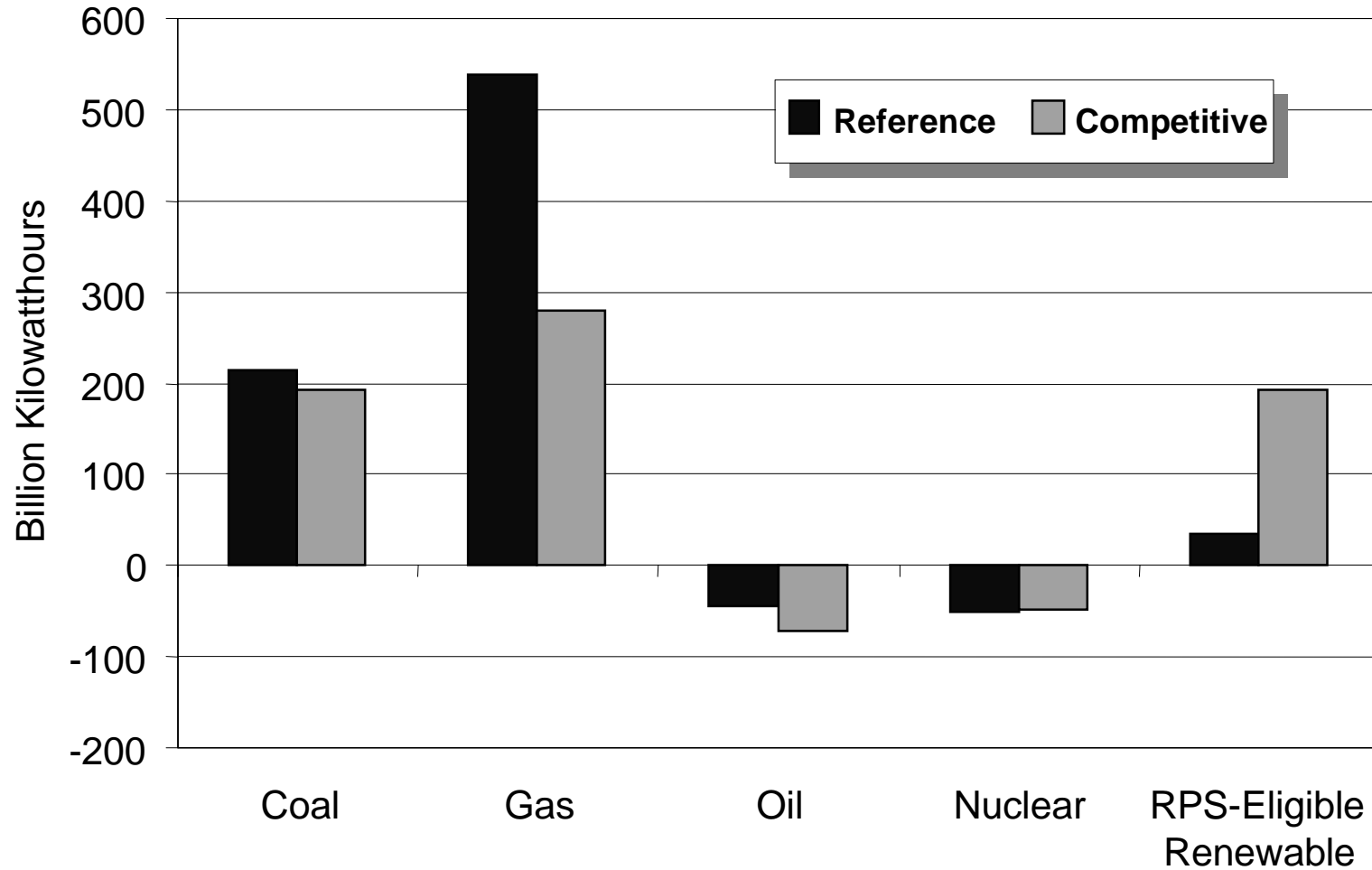
Source: Policy Office, U.S. Department of Energy, POEMS model analysis (May 1999).

Cumulative Change in Installed Capacity by Plant Type, 1997-2010



Note: Biomass co-firing capacity at coal plants is included in coal-fired capacity.
Source: Policy Office, U.S. Department of Energy, POEMS model analysis (May 1999).

Change in Generation by Fuel Type 1997-2010

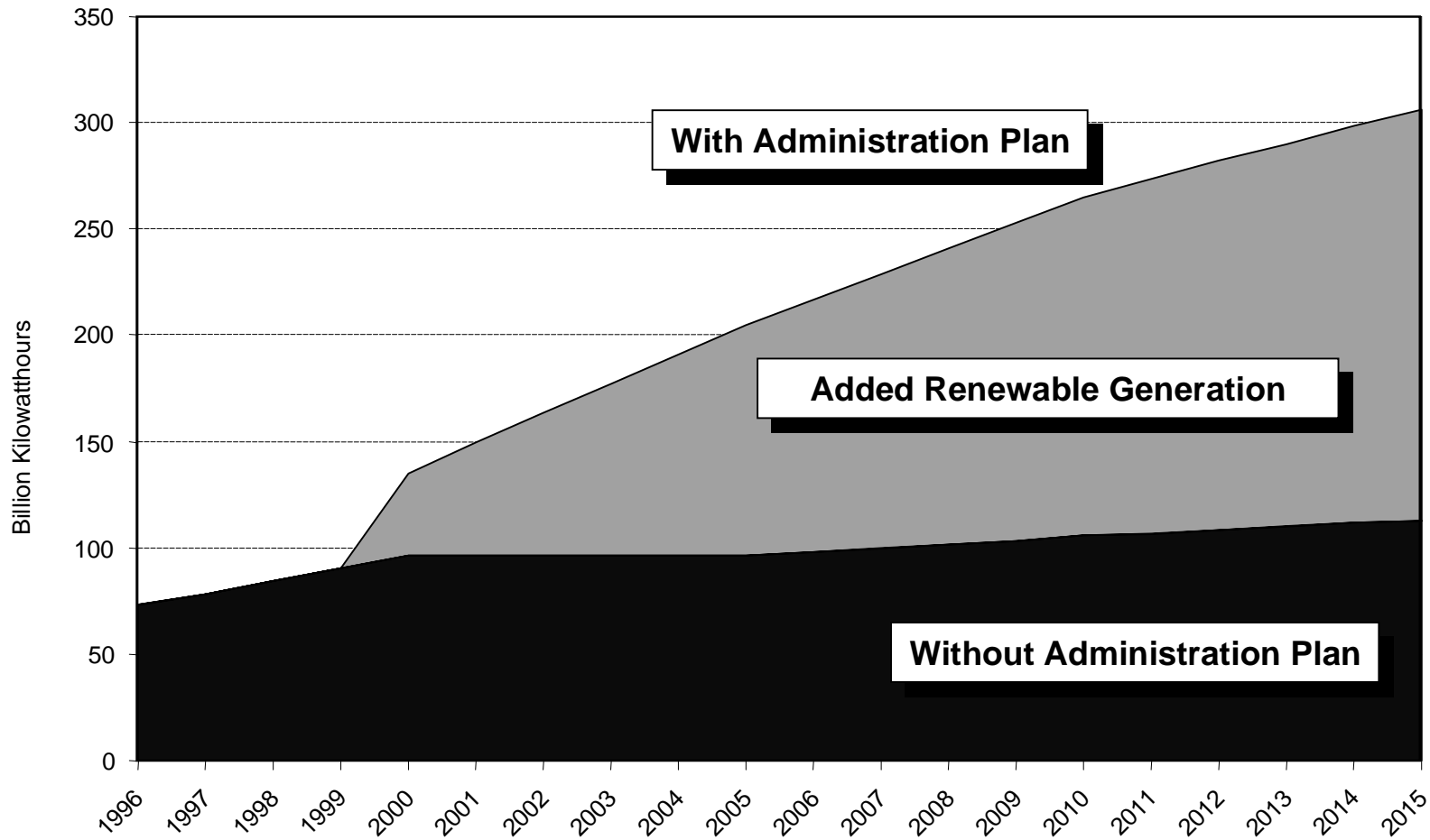


Note: Biomass co-fired generation at coal plants is included in renewable generation.
Source: Policy Office, U.S. Department of Energy, POEMS model analysis (May 1999).

Renewable Portfolio Standard

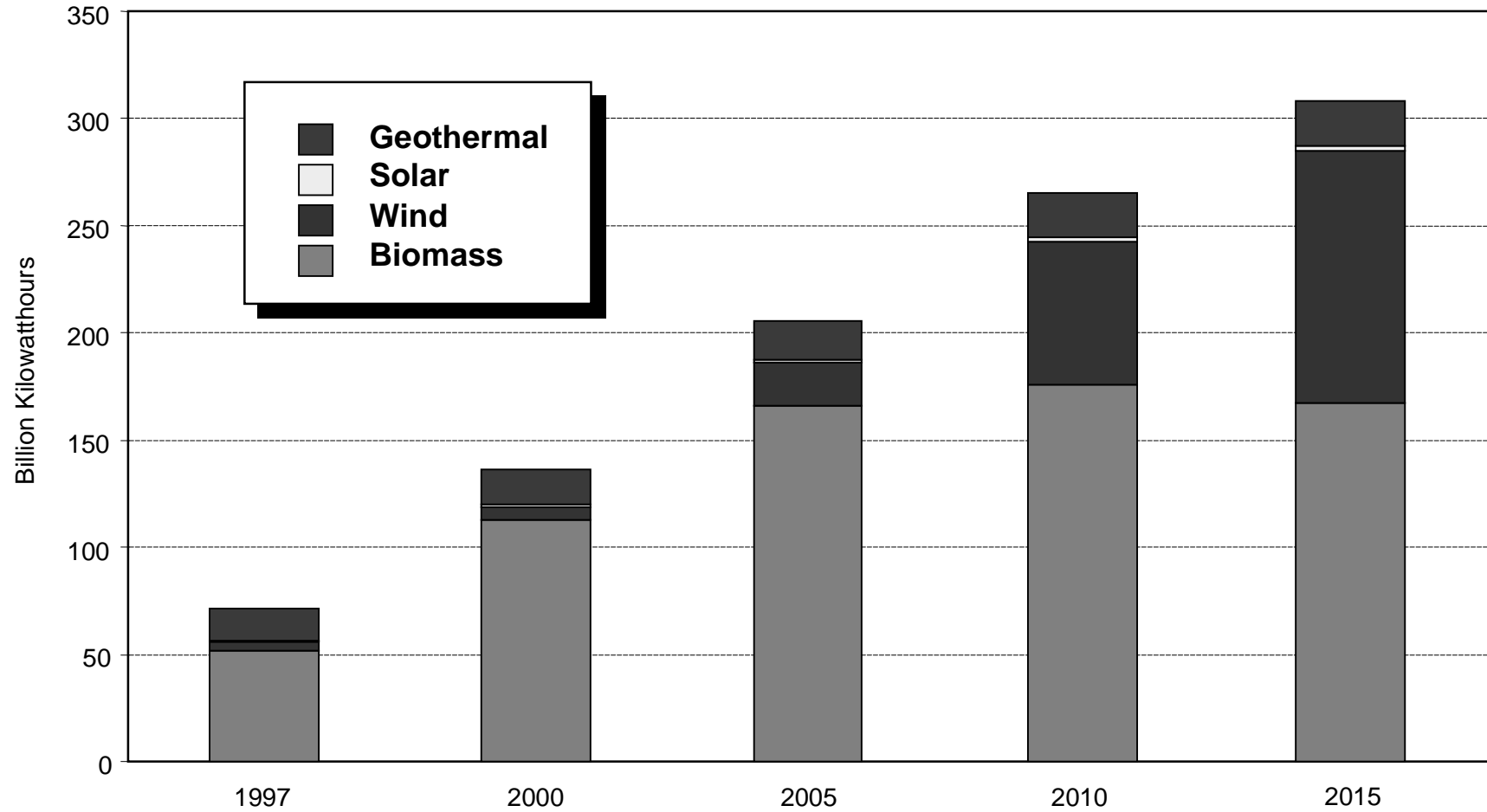
- Renewable portfolio standard requires all retail electric sellers to hold renewable energy credits equal to **7.5%** of their retail sales (1.5¢ per kWh cost cap)
- Credits would be tradable
 - ◆ Renewable electricity producers would generate credits; renewable energy producers and retail sellers would buy and sell credits
- Wind, biomass, geothermal, solar, and some MSW eligible
- Renewable generation currently **2.3%** of retail electric sales.
 - ◆ RPS would nearly triple renewable generation by 2010
- Wind and biomass co-firing at existing coal-fired power plants account for most additions of renewable generation

RPS-Eligible Generation in the Competitive Scenario, 1996-2015



Source: Policy Office, U.S. Department of Energy, POEMS model analysis (May 1999).

RPS-Eligible Generation by Type in the Competitive Scenario, 1996-2015



Source: Policy Office, U.S. Department of Energy, POEMS model analysis (May 1999).

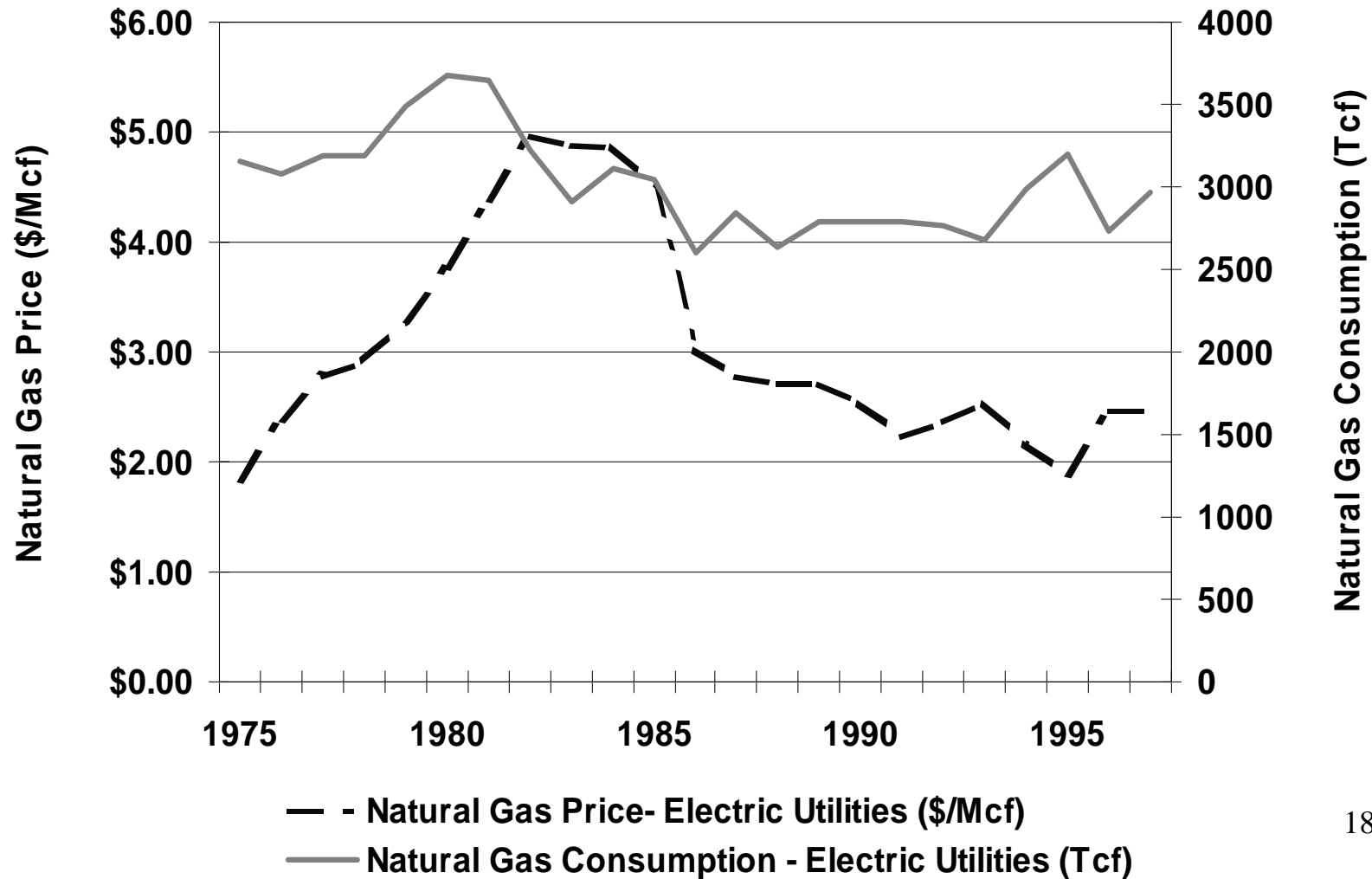
Natural Gas Deregulation

- Natural gas deregulation is an important underlying factor in electricity restructuring
- Low natural gas prices and improved gas-fired generation technologies have changed the economics of electricity generation

History of Natural Gas Regulation

- Wellhead price controls in the interstate natural gas market from 1954 to 1993
 - ◆ The U.S. began phasing out price controls in 1978
 - ◆ By the late 1980's most price controls had been lifted
- In 1978, U.S. imposed restrictions on natural gas use for electricity generation
 - ◆ Imbalances in the market due to price controls led to curtailments of gas supplies during the winter of 76-77
 - ◆ Restrictions on gas use repealed in 1987

Natural Gas Prices & Consumption by Electric Utilities, 1975-1998



Gas-fired Electricity Generation, 1975-2010

