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# Renewable Portfolio Standards (RPS): What Are We Learning?

## Fuel Diversity A Cure for Natural Gas Pains ?

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**Energy Program Director**  
**Union of Concerned Scientists**

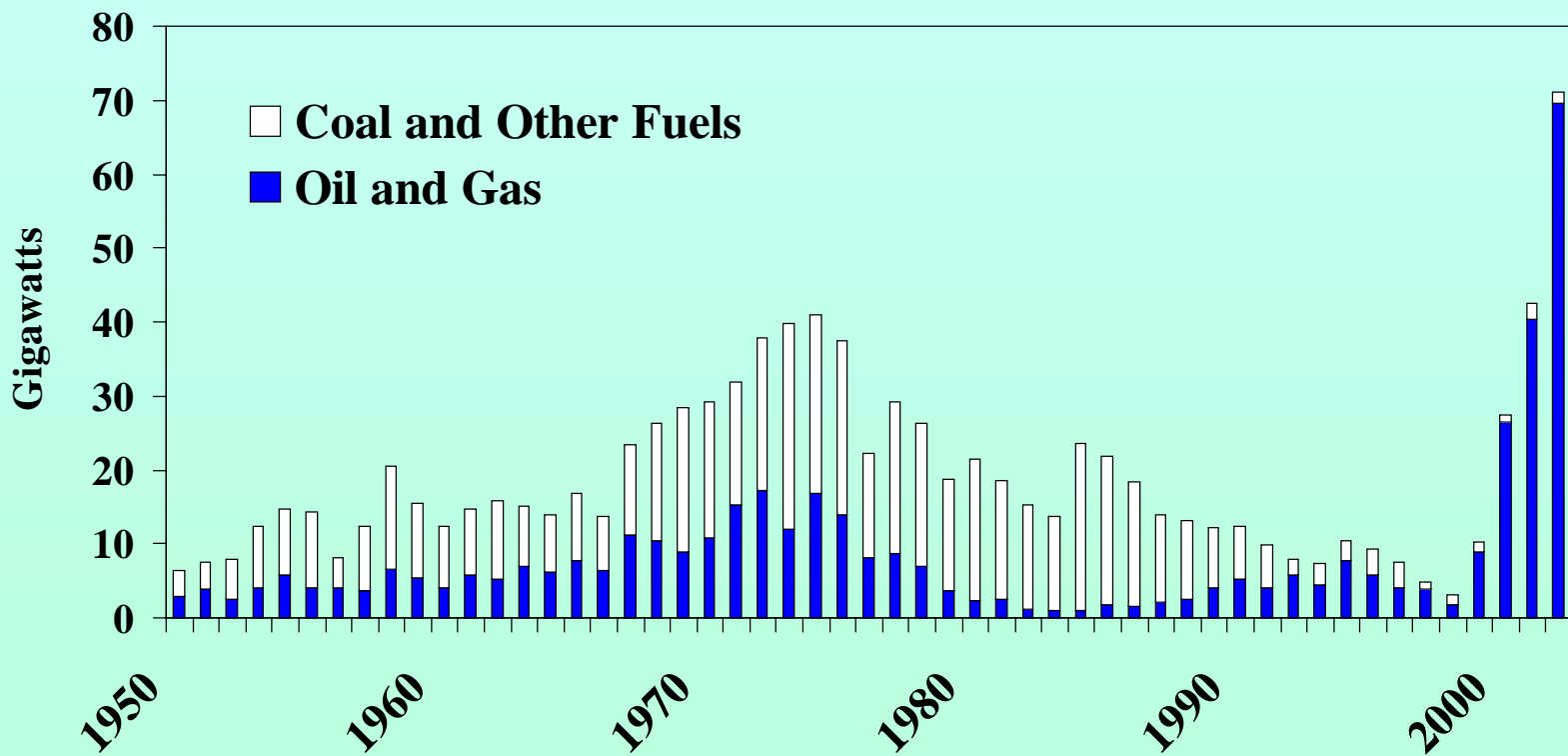
**ELCON 2005 Annual Meeting**  
**Las Vegas, NV**  
**February 2, 2005**



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# *The problem:* Surge of new natural gas plants...

Annual Additions to Electric Generation Capacity  
by Fuel, 1950-2002

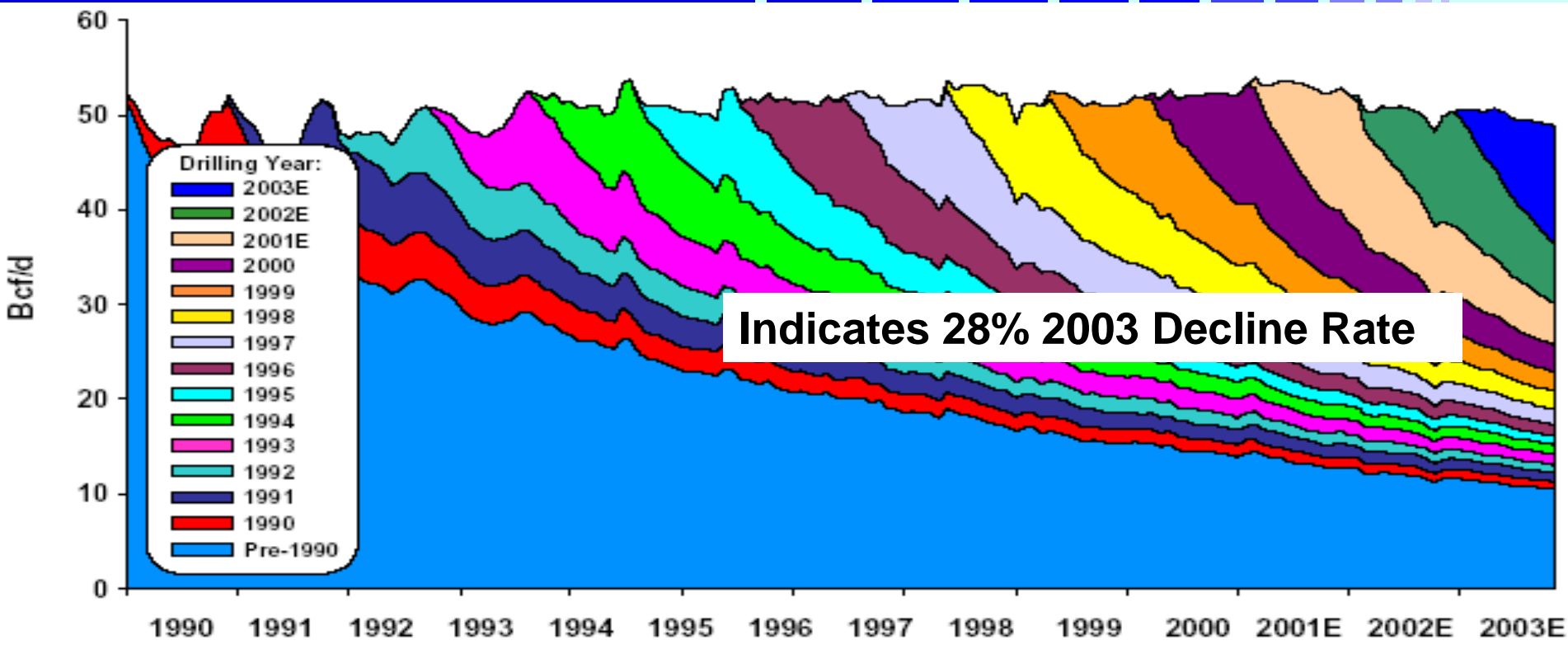


Source: EIA, *Annual Energy Outlook 2004*



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# While US gas productivity declines...



Indicates 28% 2003 Decline Rate

Production Decline Rate of Base:



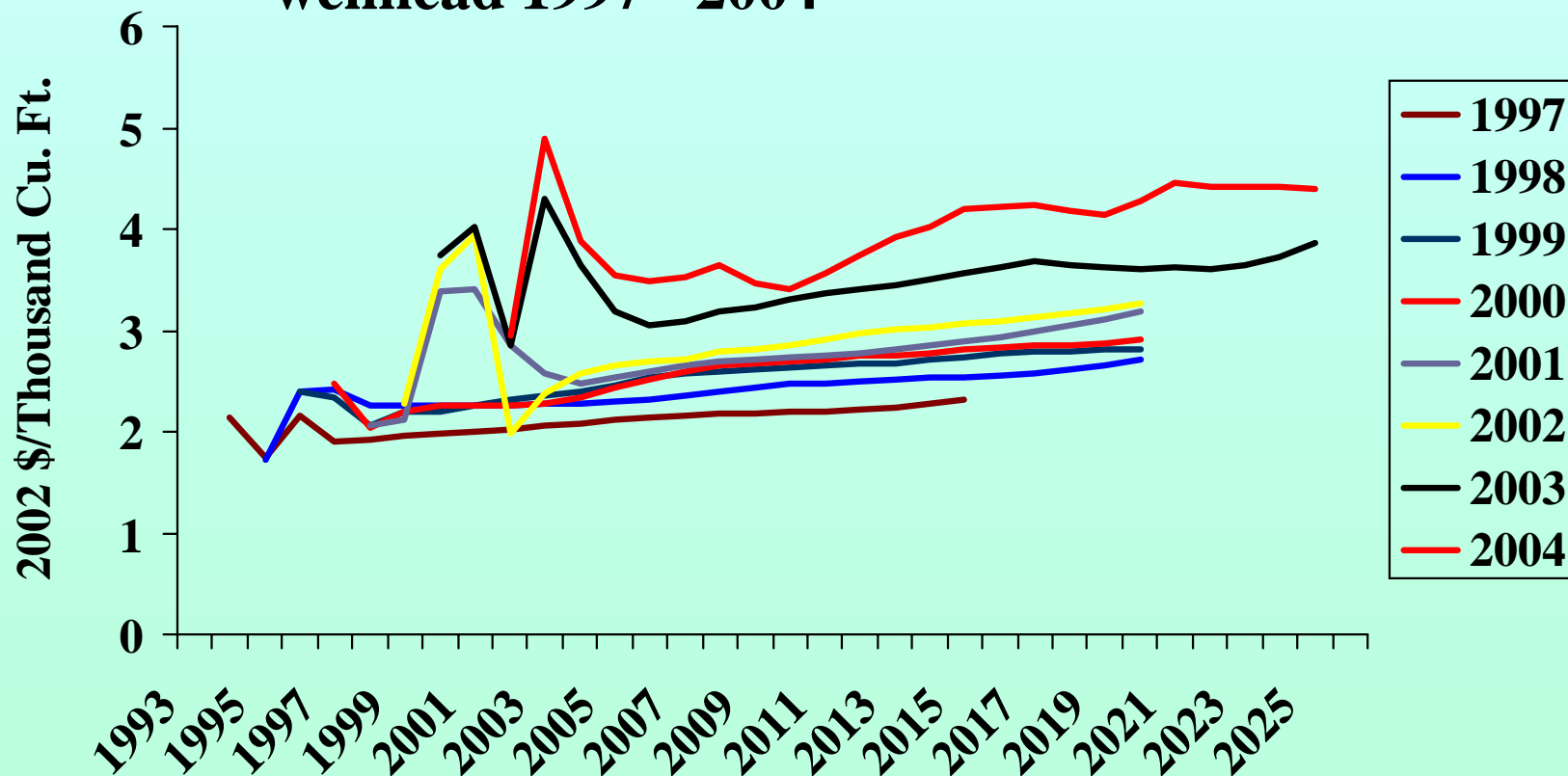
Source: Richard Levitan: IHS Energy, Petroleum Information Corp., EOG Resources



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# ...Helping to drive gas higher & higher

EIA annual gas price forecasts at  
wellhead 1997 - 2004



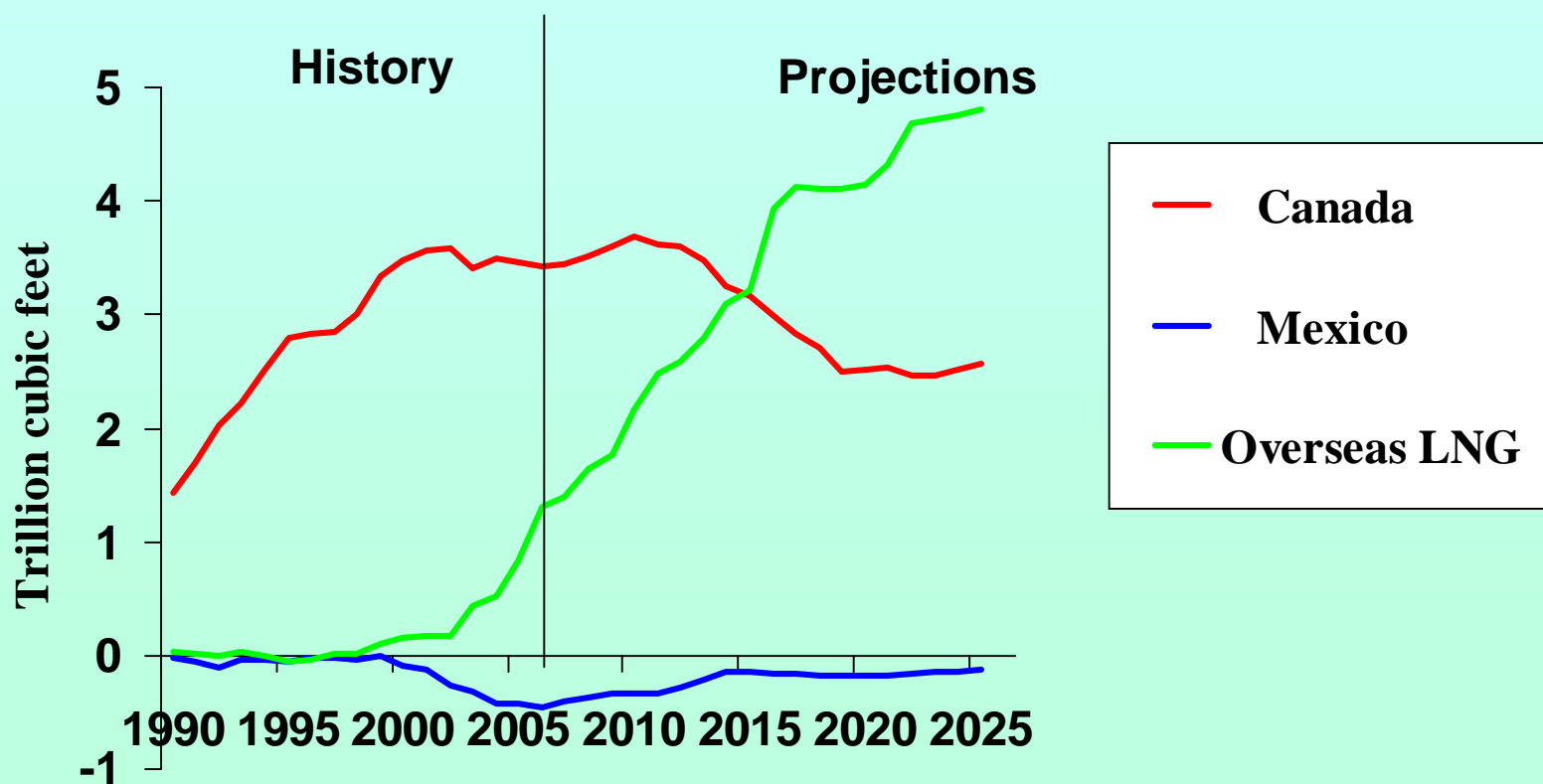
Source: EIA, *Annual Energy Outlook*



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# Increasing dependence on gas imports from overseas...

## U.S. Natural Gas Net Imports, 1990-2025



Source: EIA, Annual Energy Outlook, 2004



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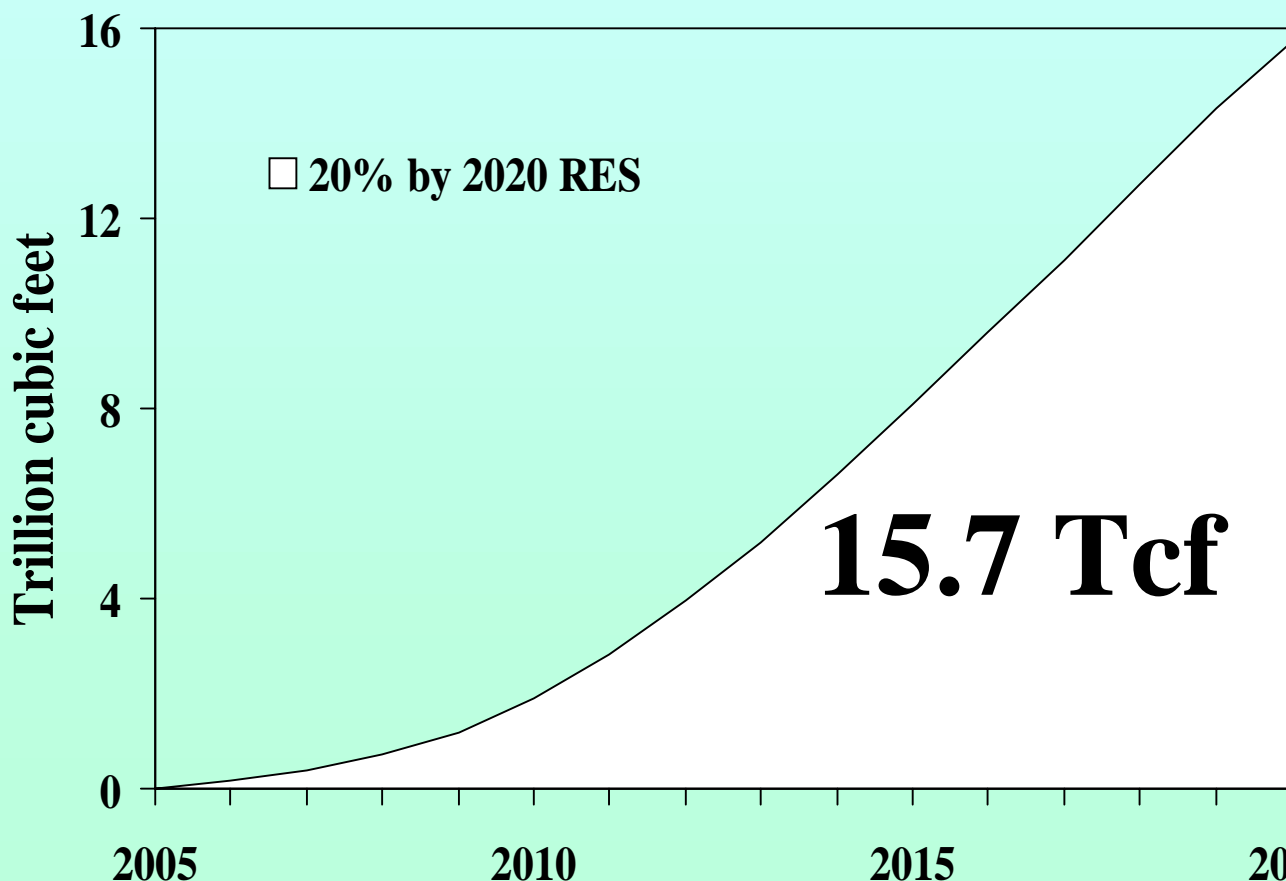
**What are we learning from  
modeling, across a range of  
models and assumptions?**



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# Renewable energy conserves natural gas supplies

## Cumulative Natural Gas Savings



**> 1/4 of  
residential  
gas use**

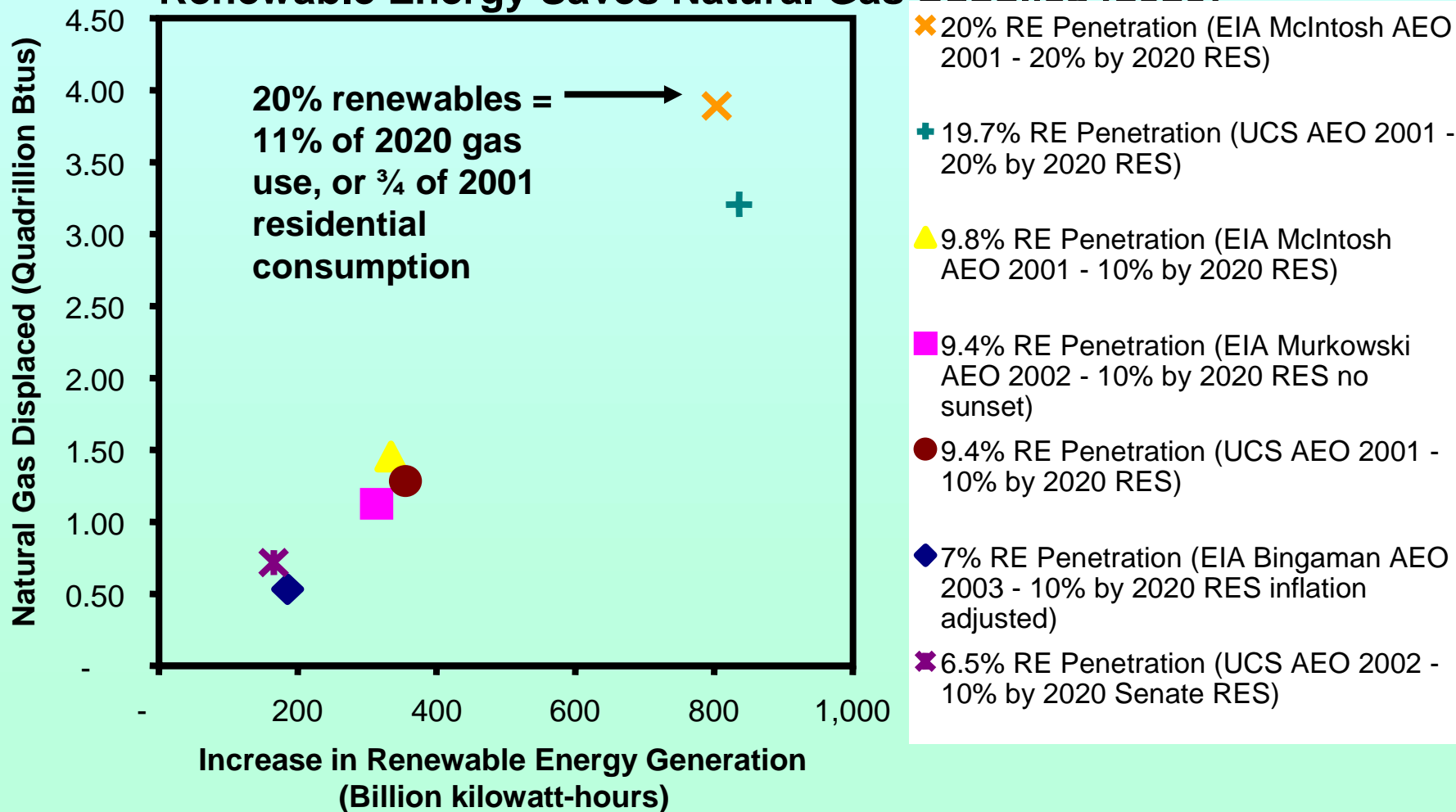
Source: UCS, Renewing Our Economy



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# EIA & UCS historical studies: More renewables = more gas savings

## Renewable Energy Saves Natural Gas Supplies (2020)

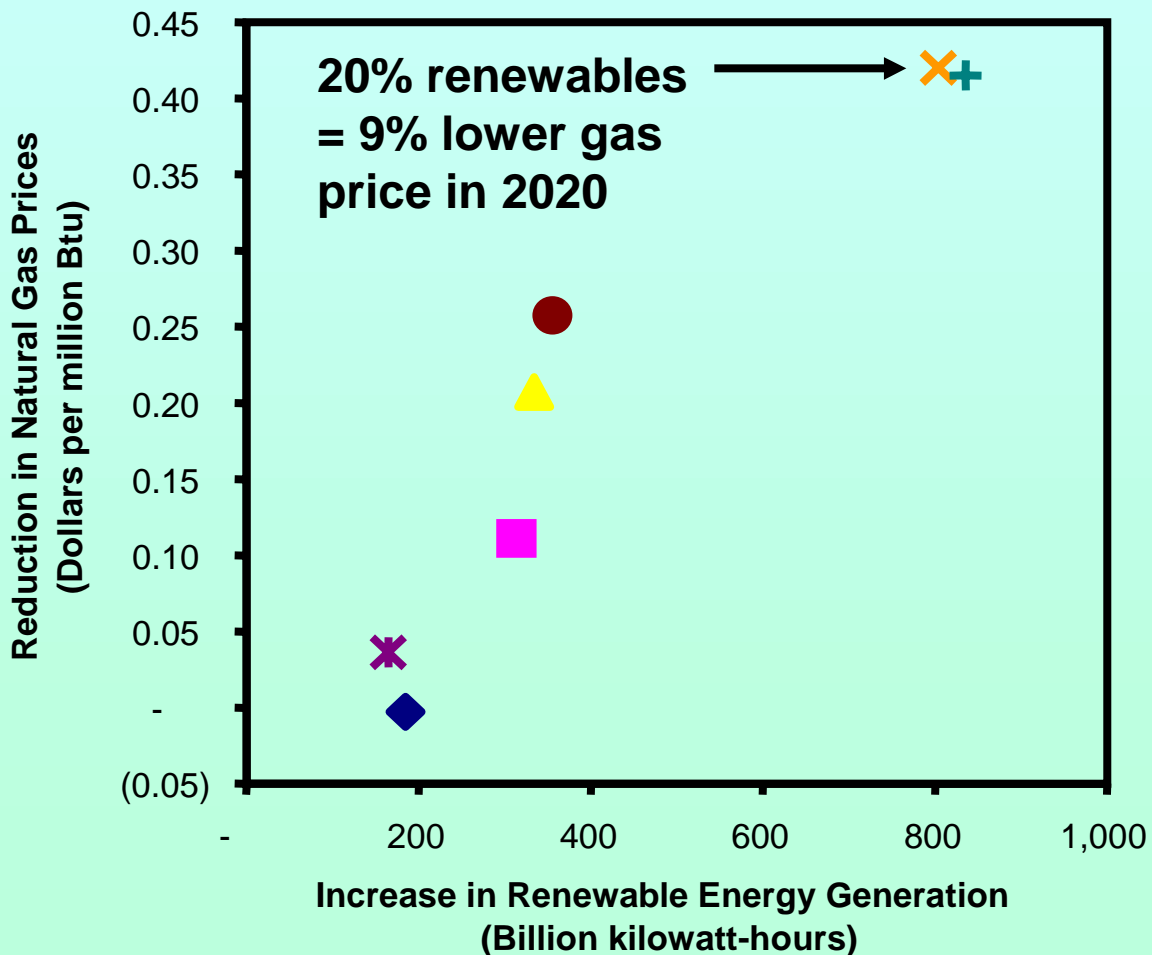




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# EIA & UCS studies: More gas savings = lower gas prices

(EEA model for National Petroleum Council → even bigger effect)



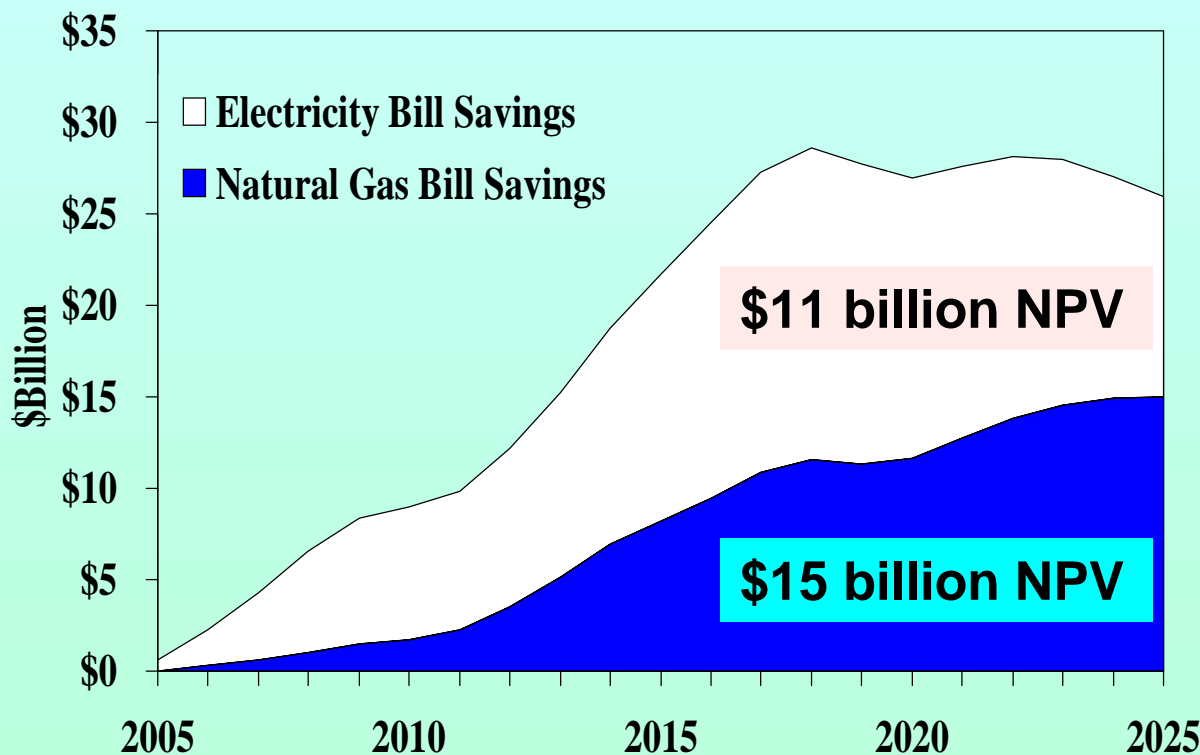
- ✕ 20% RE Penetration (EIA McIntosh AEO 2001 - 20% by 2020 RES)
- + 19.7% RE Penetration (UCS AEO 2001 - 20% by 2020 RES)
- ▲ 9.8% RE Penetration (EIA McIntosh AEO 2001 - 10% by 2020 RES)
- 9.4% RE Penetration (EIA Murkowski AEO 2002 - 10% by 2020 RES no sunset)
- 9.4% RE Penetration (UCS AEO 2001 - 10% by 2020 RES)
- ◆ 7% RE Penetration (EIA Bingaman AEO 2003 - 10% by 2020 RES inflation adjusted)
- ✖ 6.5% RE Penetration (UCS AEO 2002 - 10% by 2020 Senate RES)



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# EIA model and assumptions 2004: 20% renewables reduce *both* natural gas & electricity bills

Cumulative Natural Gas and Electricity Bill Savings\*  
(20% by 2020 RES)



EIA: 1% reduced demand for gas = 1% price reduction

Conservative:  
other studies have found 1% reduced demand for gas = 3% price reduction (EA/ACEEE)

\*Net present value using a 7% real discount rate.

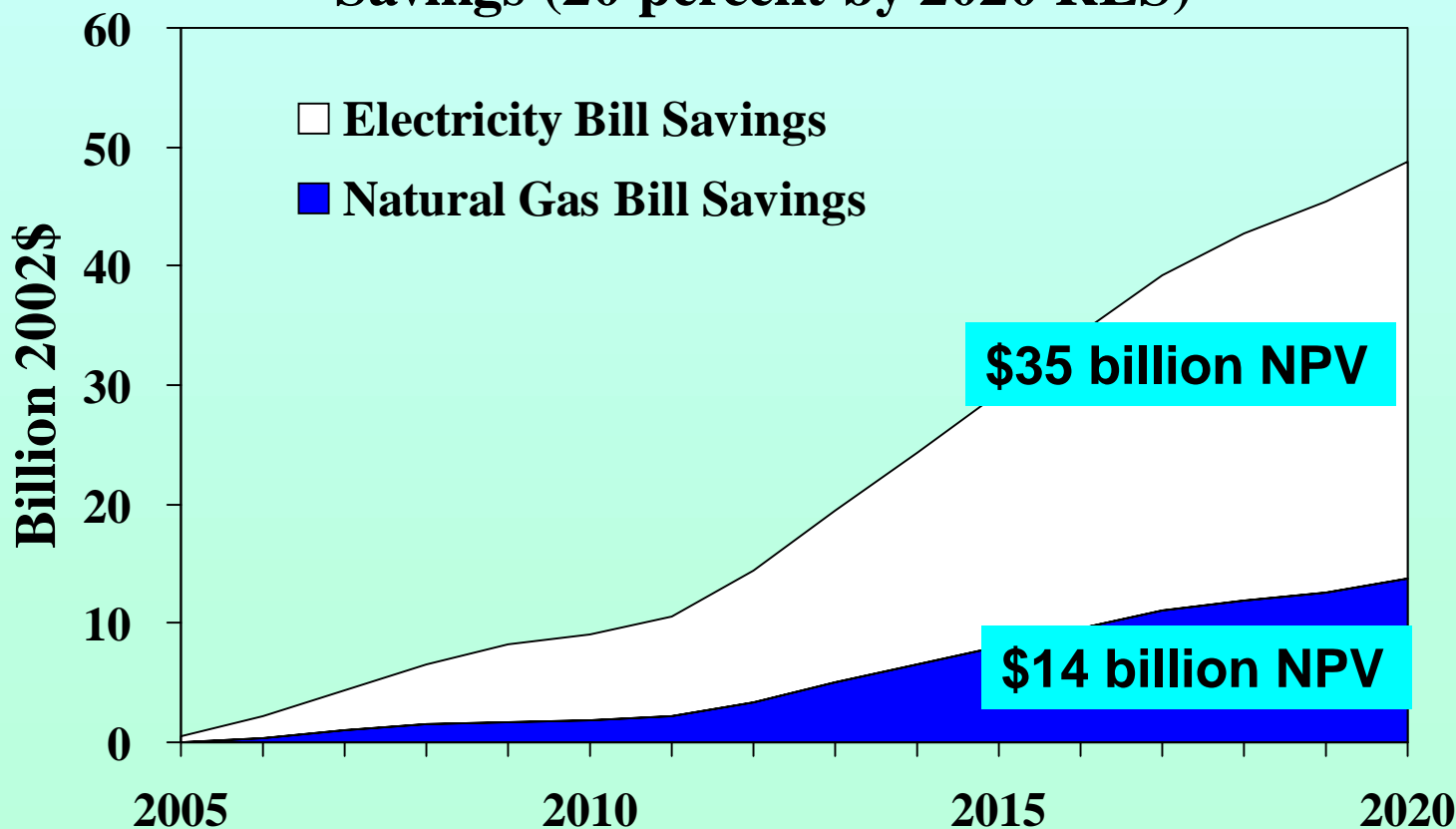
Source: UCS, using EIA NEMS model and assumptions



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# UCS: Renewable energy saves electric & gas consumers \$49b

## Cumulative Natural Gas and Electricity Bill Savings (20 percent by 2020 RES)\*



\*Excludes Transportation.

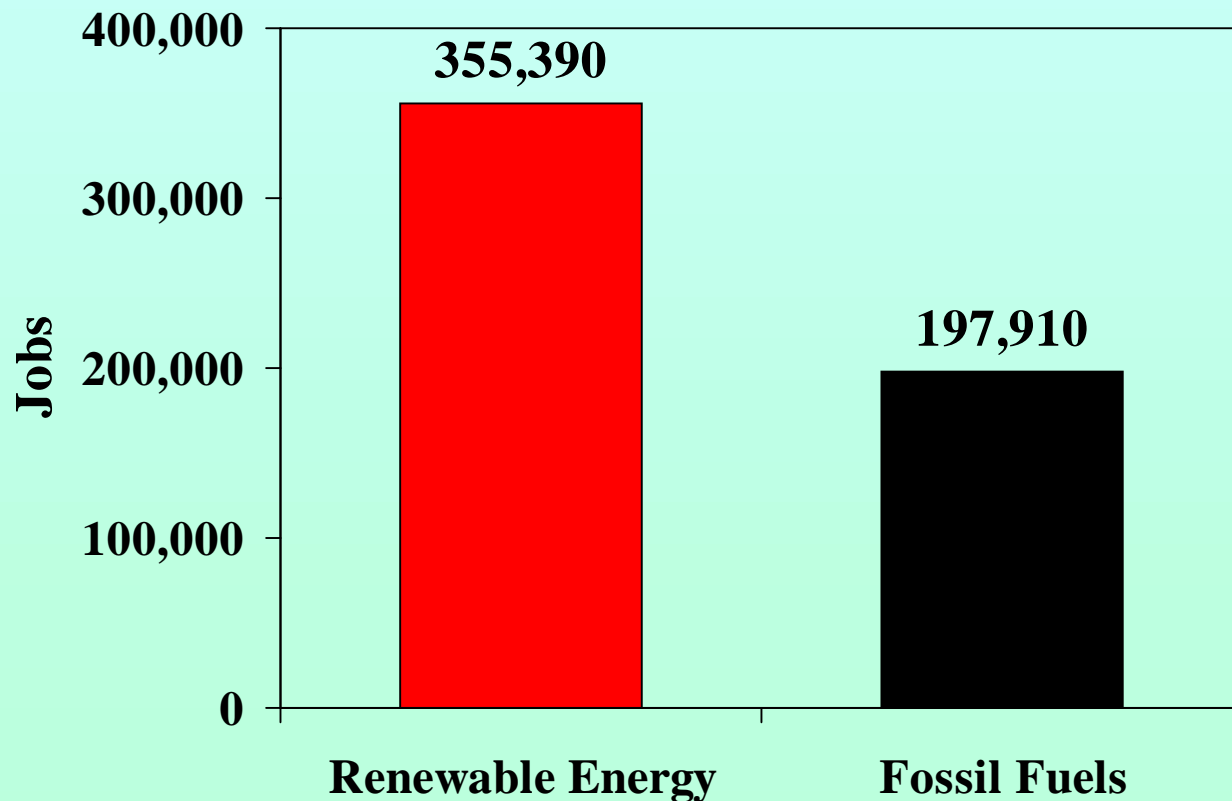
Source: UCS, Renewing Our Economy



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# Renewable Energy Creates Jobs

**Renewable Energy vs. Fossil Fuel Jobs, 2020**  
(20 percent by 2020 RES)



- **\$8.2 billion in income**
- **\$10.2 billion in GDP**
- **Nearly twice as many jobs as fossil fuels**

Source: UCS, *Renewing Our Economy*



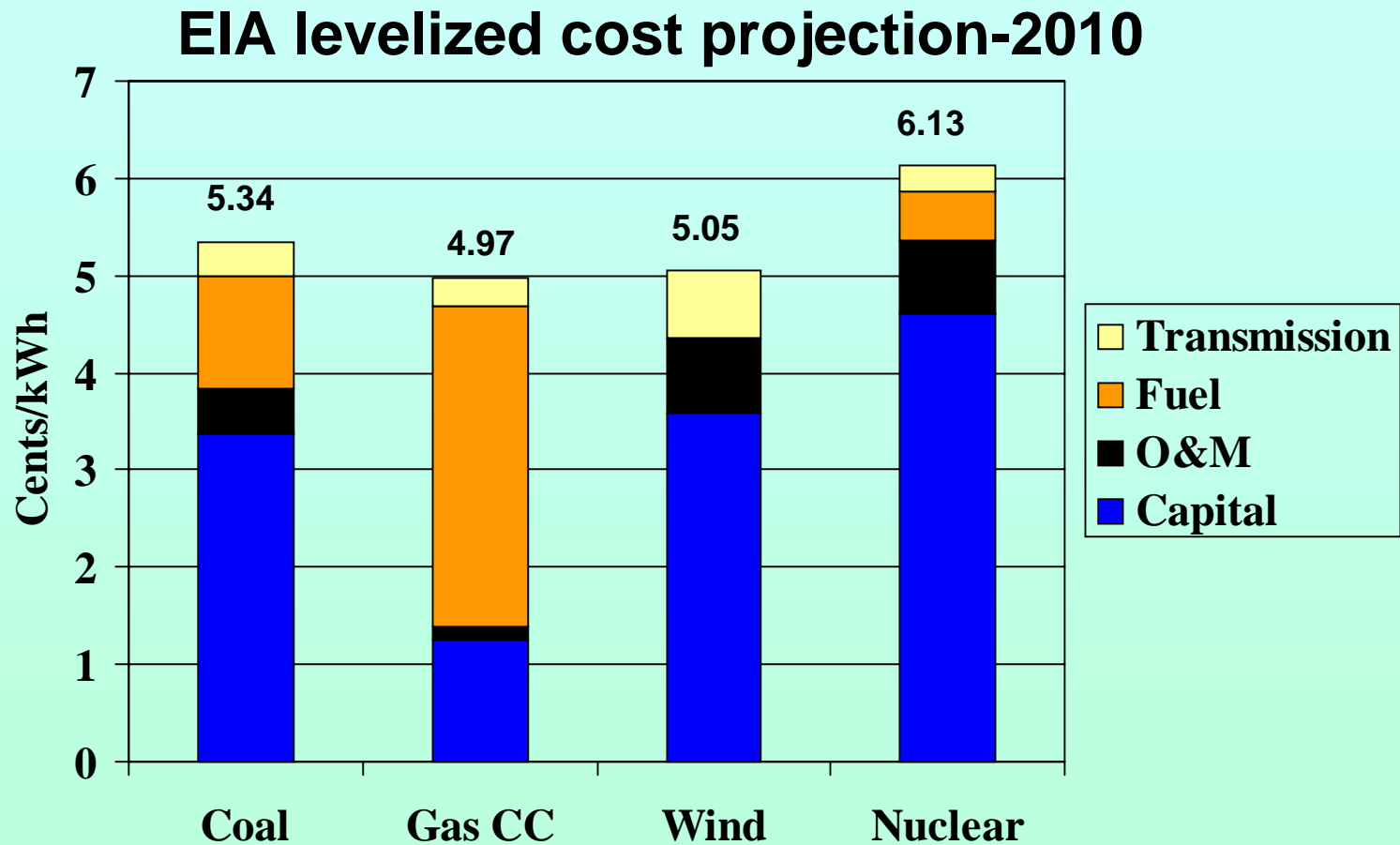
# Renewable energy & gas studies

- ★ **Series of scenarios examined by US Energy Information (EIA) and Union of Concerned Scientists**
- ★ **Renewable electricity (portfolio) standards—10% or 20% by 2020**
  - Different penetrations based on target level, exclusions (e.g., munis, coops, small utilities, baseline deductions (e.g., hydro, MSW)
- ★ **As important for what they say about the penetration of renewables as the policies to get there**
- ★ **Similarities**
  - National Energy Modeling System (NEMS)
  - Same demand forecasts, fossil technology costs, fuel price assumptions
  - Examine wind, geothermal, solar, biomass technologies
  - No ocean, incremental hydro
- ★ **Differences**
  - EIA: pessimistic renewable energy costs, performance
  - UCS: realistic renewable energy costs (similar to national energy labs Scenarios for a Clean Energy Future study (2000))
- ★ **Renewable electricity displaces ~50% gas, 50% coal – balance tilts more towards coal displacement as gas prices rise**



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# New class 6 wind tied with gas, cheaper than coal



Source: AEO 2004

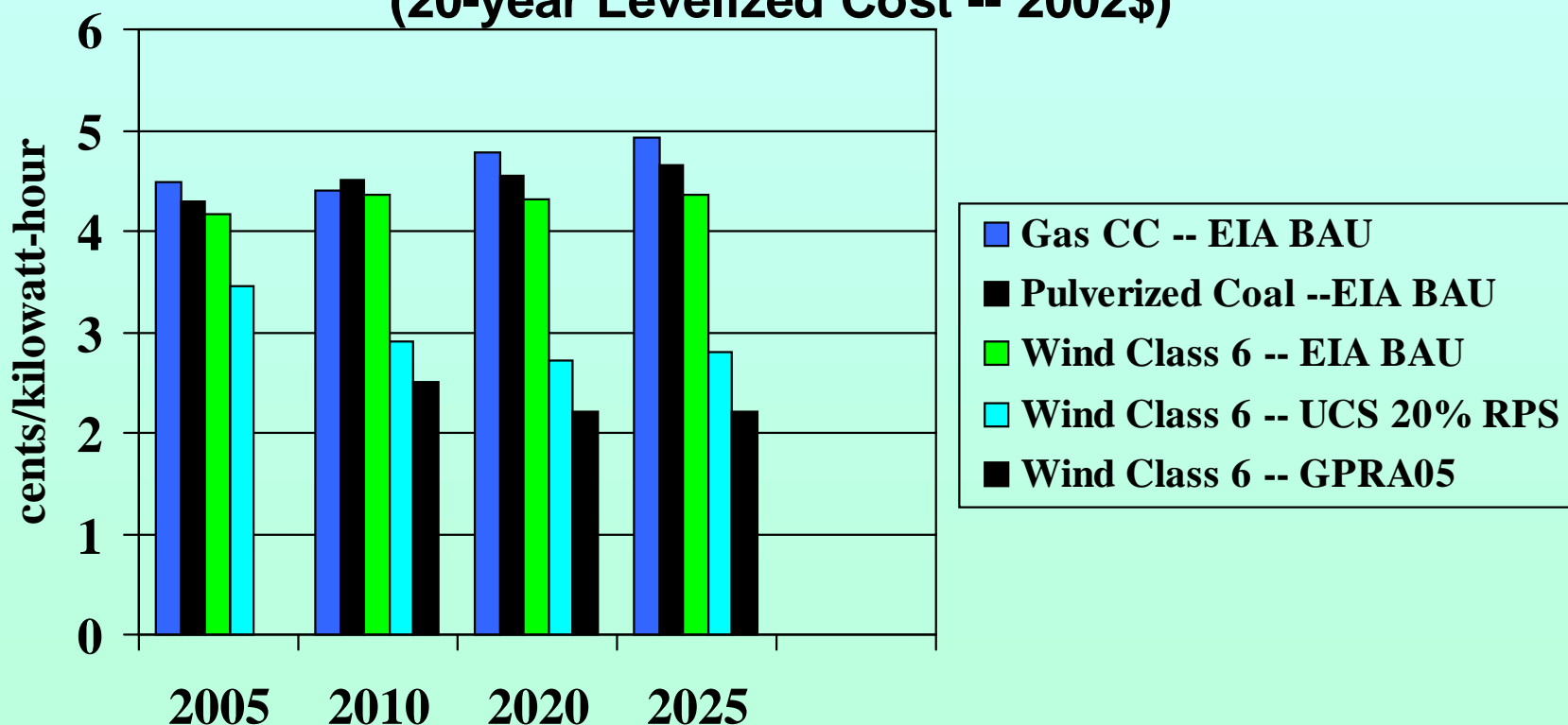


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# EIA wind projections extremely pessimistic

## Busbar Cost of Electricity from New Wind and Fossil Plants

(20-year Levelized Cost -- 2002\$)



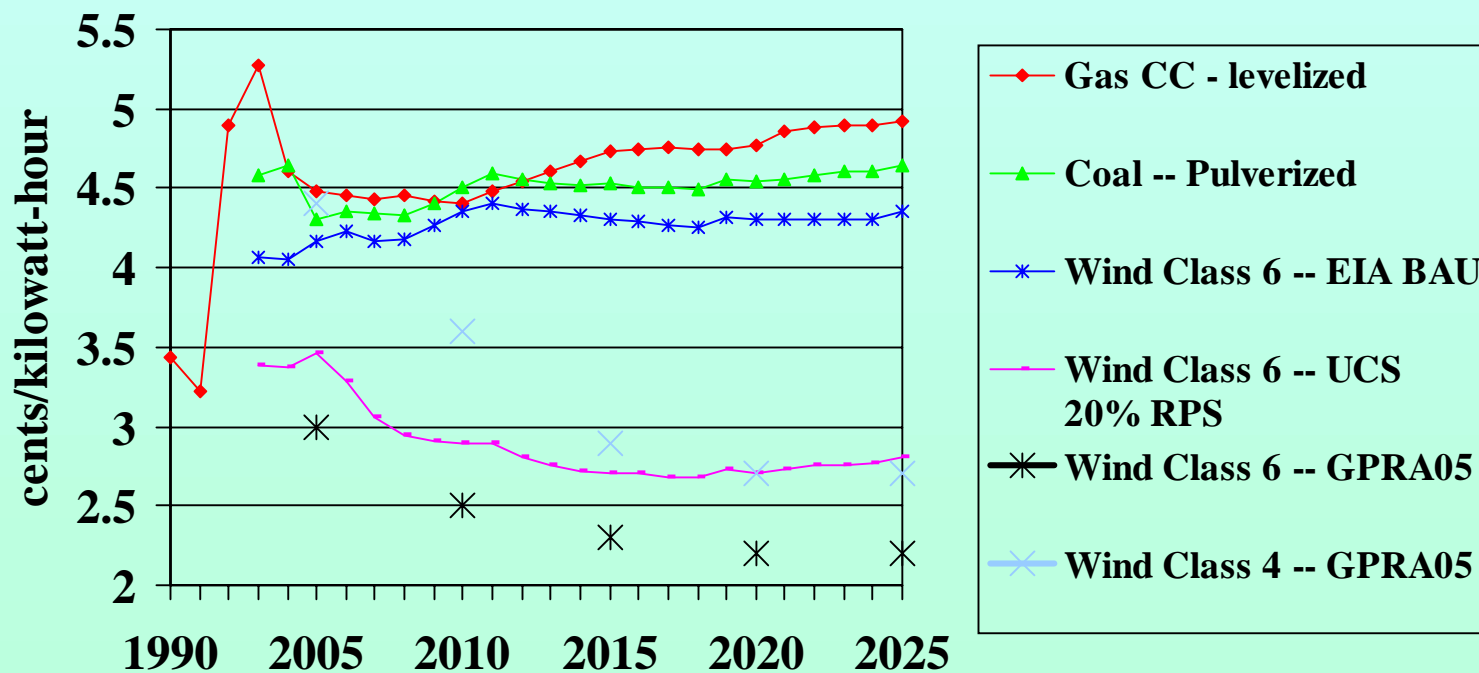
Sources: EIA-AEO 2004; UCS-Renewing Our Economy; GPRA05-DOE EERE



# Levelized Cost Data

(note more data is hidden)

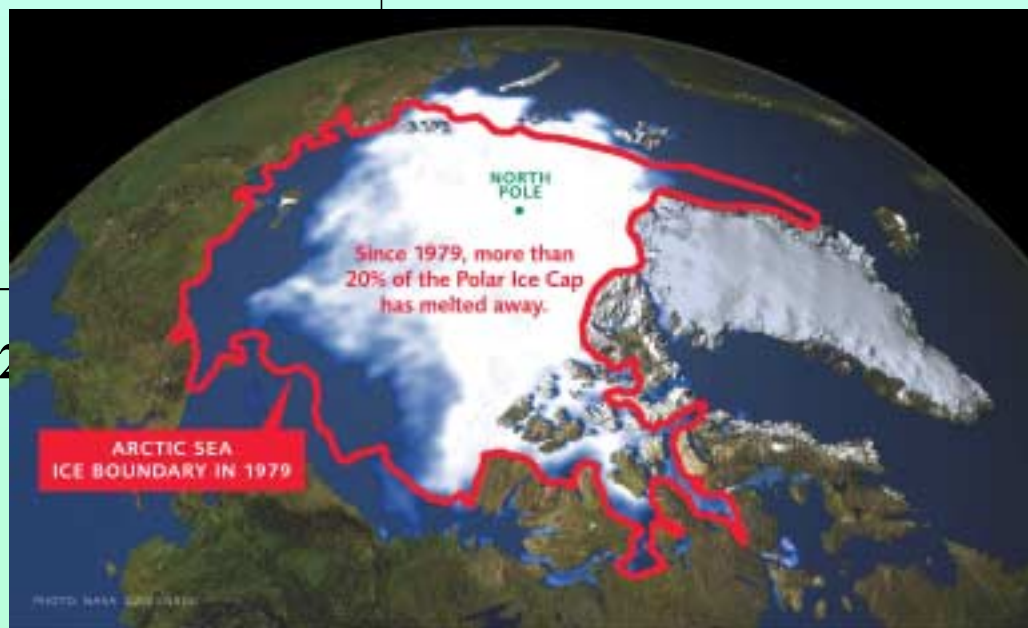
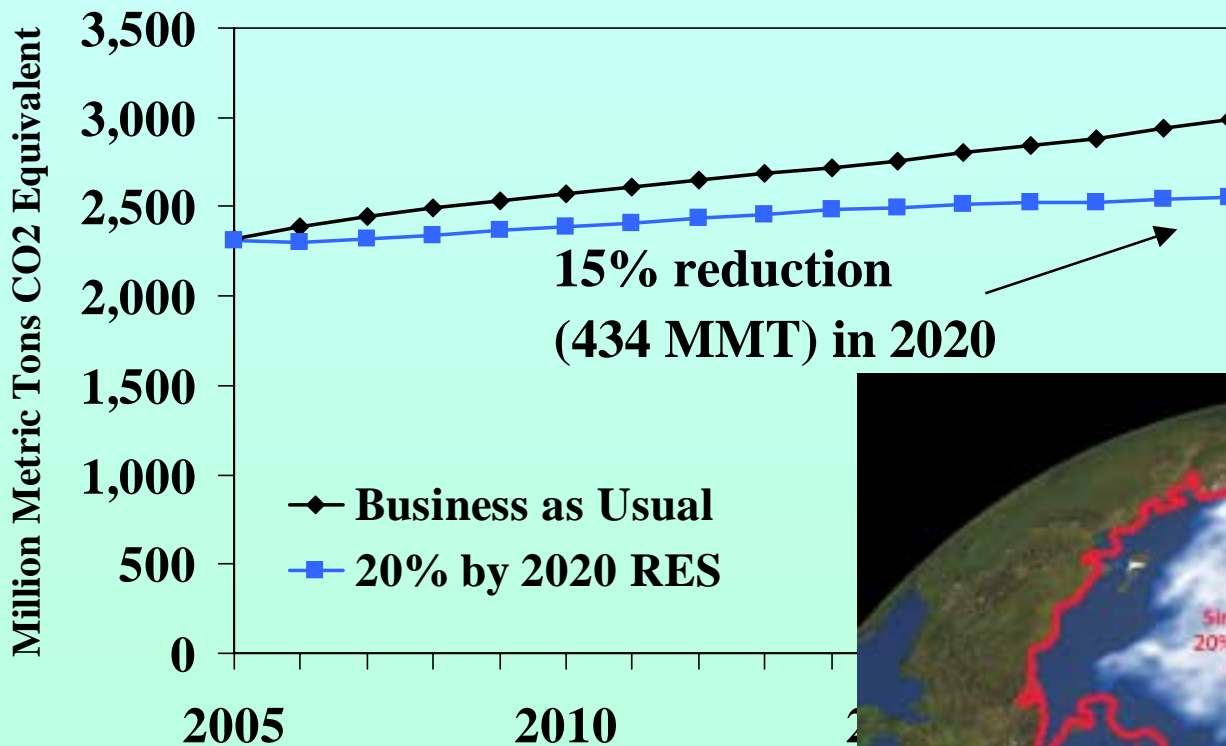
**Cost of Electricity from New Wind and Fossil Plants**  
(20-year Levelized Cost -- 2002\$)





# Renewable energy reduces emissions – hedges environmental compliance costs

## Power Plant Carbon Dioxide Emissions

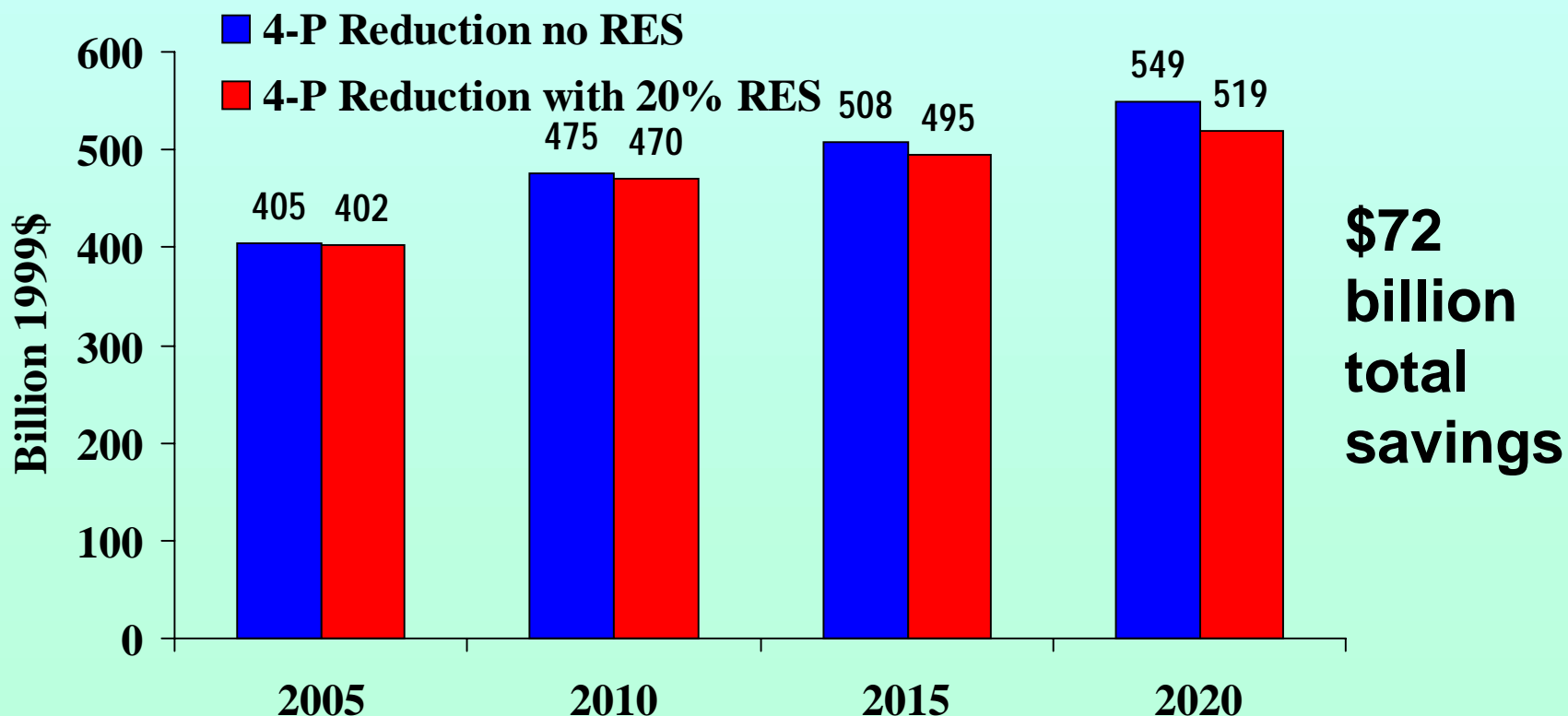




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# EIA (2001): Even bigger benefits from RPS under 4 pollutant caps

Total Consumer Energy Bills (not including transportation)



Source: EIA, *Strategies for Reducing Multiple Emissions from Electric Power Plants*, July 2001, Table H3.



# How quickly can renewables make a difference?

## ★ American Wind Energy Association

- 6,000 MW by end of 2005 = 0.5 Bcf/day = 15% of 3-4 Bcf/day shortage
- Transmission plans proposed for 30,000 MW by end of 2007 = ~3 Bcf/day
- 100,000 MW by 2013
- 600,000 MW competitive @\$4/mmBTU gas
- Needs
  - » Extend PTC for 5 years
  - » RPS
  - » Transmission tariff reform to increase capacity
  - » Tran-prairie and Inter-Mountain transmission “pipelines”

## ★ Solar Energy Industries Association

- Could alleviate 1/3 of gas shortage (i.e., 1-1.3 Bcf/day) by 2006
  - » Investment tax credit
  - » Production tax credit
  - » Rebate

## ★ Repeated short-term crises because ignore mid- and long-term

- RPS has been filed in Congress since 1997

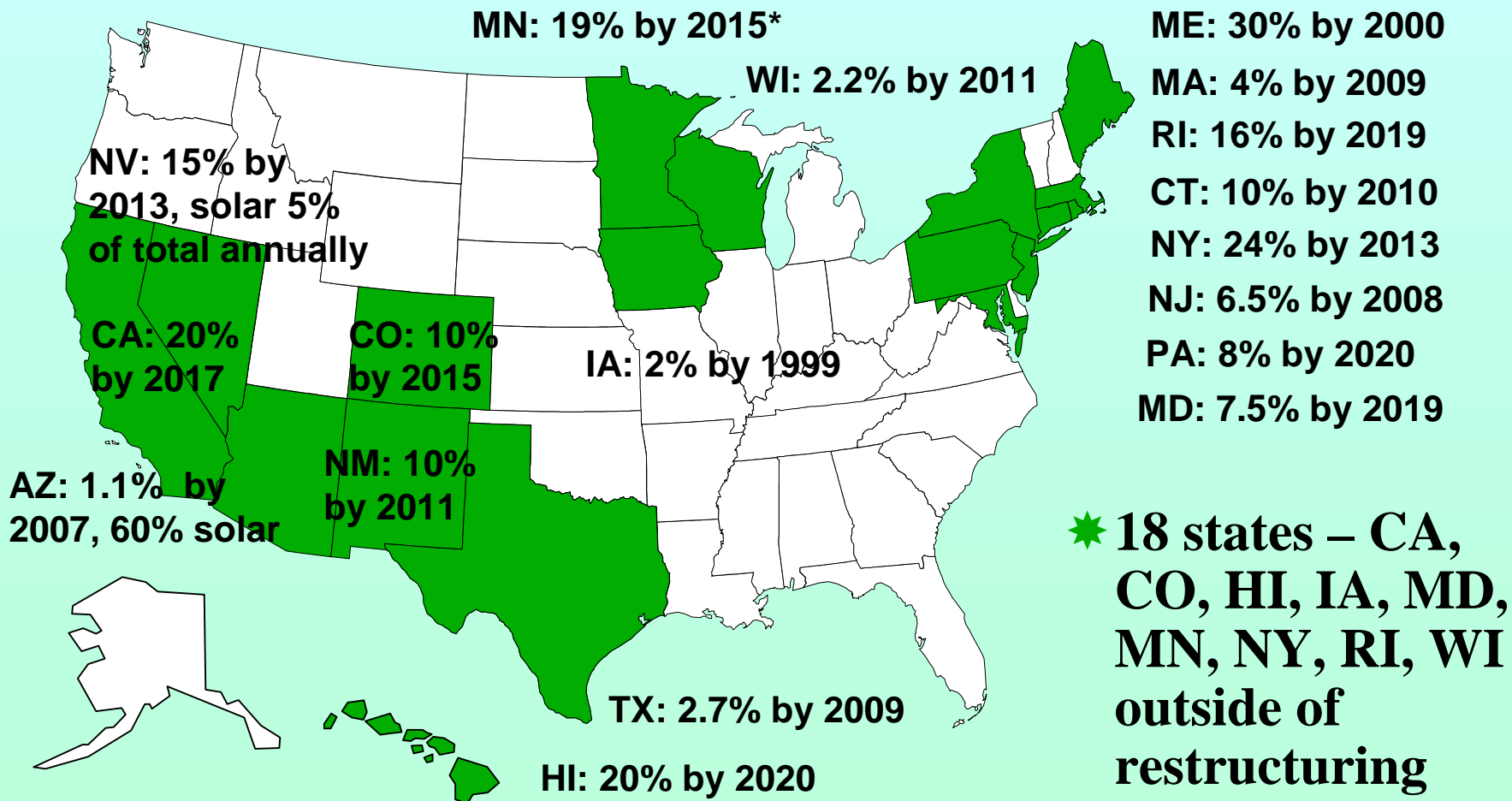


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**What are we learning in  
practice?**



# Renewable Electricity Standards



\* MN has a minimum requirement for one utility, Xcel.



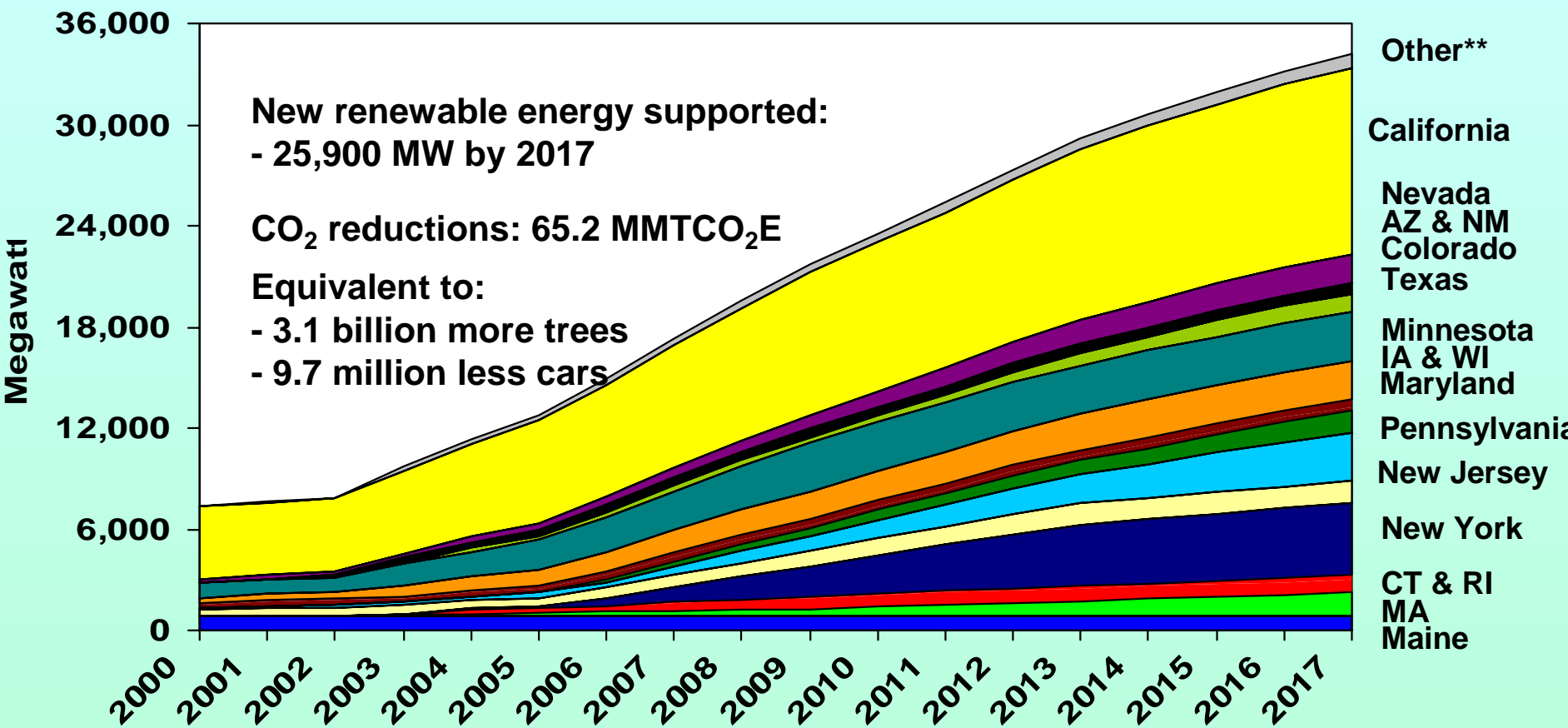
# Lessons from states

- ✓ **66-75% of new renewables in RPS states**
- ✓ **Regulated states working well**
- ✓ **Restructured states problematic, except TX**
  - ✓ EIA attributes to TX capacity-based standard (though regulators enforce based on RECs, generation)
  - ✓ We attribute to clear enforcement, long-term contract approval, deliberative polling, cooperative utilities
- ✓ **Need long-term contracts to finance facilities**
  - ✓ Cooperative utilities or utility requirements
  - ✓ Central procurement (NY)
  - ✓ Backup financial mechanism (MA,
- ✓ **Need public acceptance/siting**



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# Renewable Energy Expected From State Standards and Funds\*

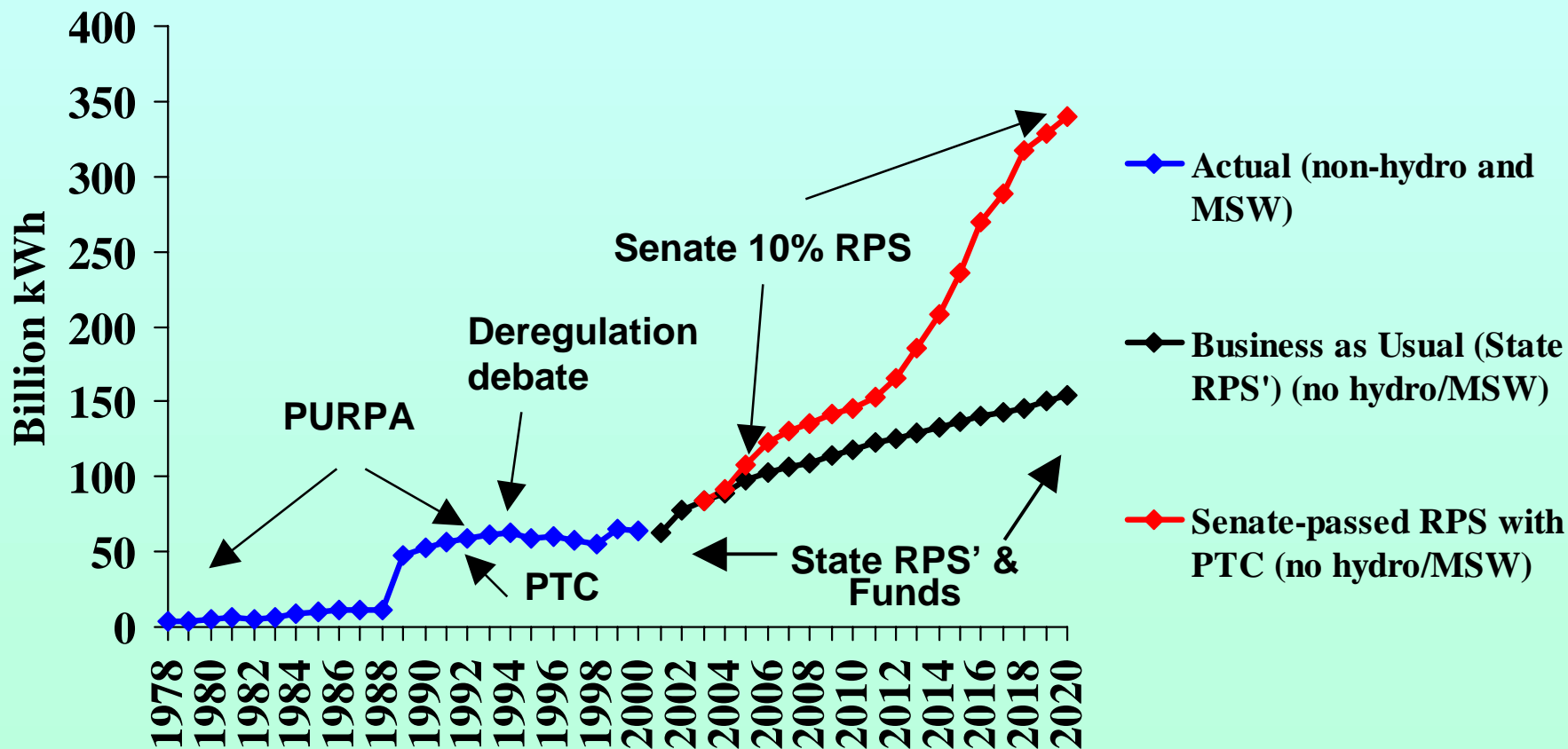


\*Projected development assuming states achieve annual RES targets.

\*\*Includes Delaware, Hawaii, Illinois, Montana, Ohio, Oregon, and Washington D.C.



# Renewable Energy Generation



Sources: EIA (actual, business as usual (includes state RPSs and funds)), UCS (Bingaman RPS).



# Why renewables/RPS for diversification?

- ✓ **Real diversification (not increasing the 2 resources that already comprise 70% of portfolio)**
- ✓ **Diversification with no/low fuel price exposure**
- ✓ **Hedge against carbon reduction costs**
- ✓ **Hedge against nuclear cost, safety, security, waste risks**
- ✓ **Technology is commercially available today**
- ✓ **You could own or contract for it yourself, or buy RECs**
- ✓ **Track record of price declines, hitting R&D benchmarks Price declines from manufacturing, installation and operating economies of scale as well as R&D**
- ✓ **Green markets, incentives, state actions not enough**
  - ✓ **Far from realizing full economic potential**
  - ✓ **Gas price benefits are partially external to utilities**
- ✓ **Bi-partisan support – 58 Senators, including 10 Rs**



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For more information...

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