

# Climate Change Legislation, Utility Costs and Regulatory Strategies

## ELCON Members Only Spring Workshop

Presentation of  
Ron Binz, Chairman  
Colorado Public Utilities Commission

June 3, 2008

## Outline of this presentation

- Introduction to the Colorado PUC
- The challenge we face with climate change
- Implications of proposed federal GHG policies
- One State's strategies
- What ELCON members can do
- Questions and Answers

## Caveat

- I am one of three equal commissioners
- My positions are my own
- I am confused by many things and have not made up my mind on much at all
- I don't even agree with some of the things I say
- Good advice: *don't believe everything you think*

# The Colorado PUC

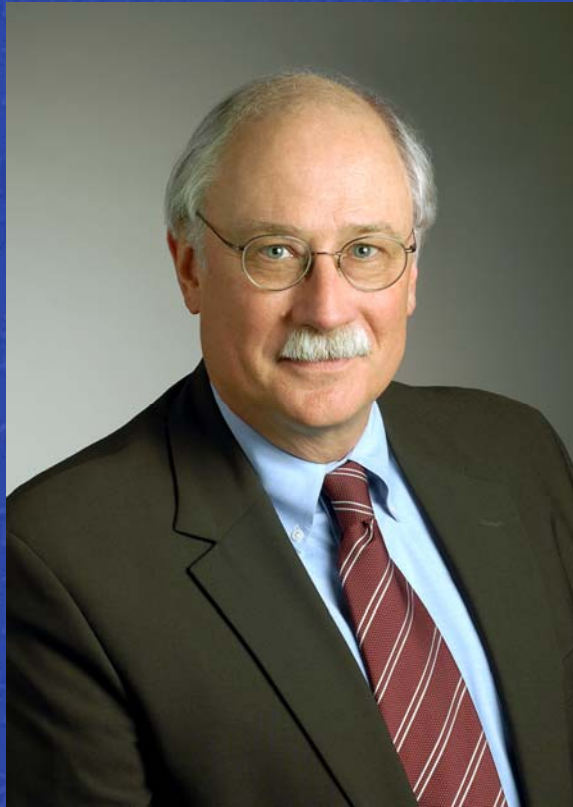
*The Public Utilities Commission's mission is to achieve a flexible regulatory environment that provides safe, reliable and quality services to utility customers on just and reasonable terms, while managing the transition to effective competition where appropriate.*

- Independent agency, created in the constitution
- Three Commissioners, appointed by the Governor
- Four year terms
- Partly judicial, partly legislative
- Ninety-member staff is an agency within the Department of Regulatory Agencies

# Colorado Commissioners



Matt Baker



Ron Binz



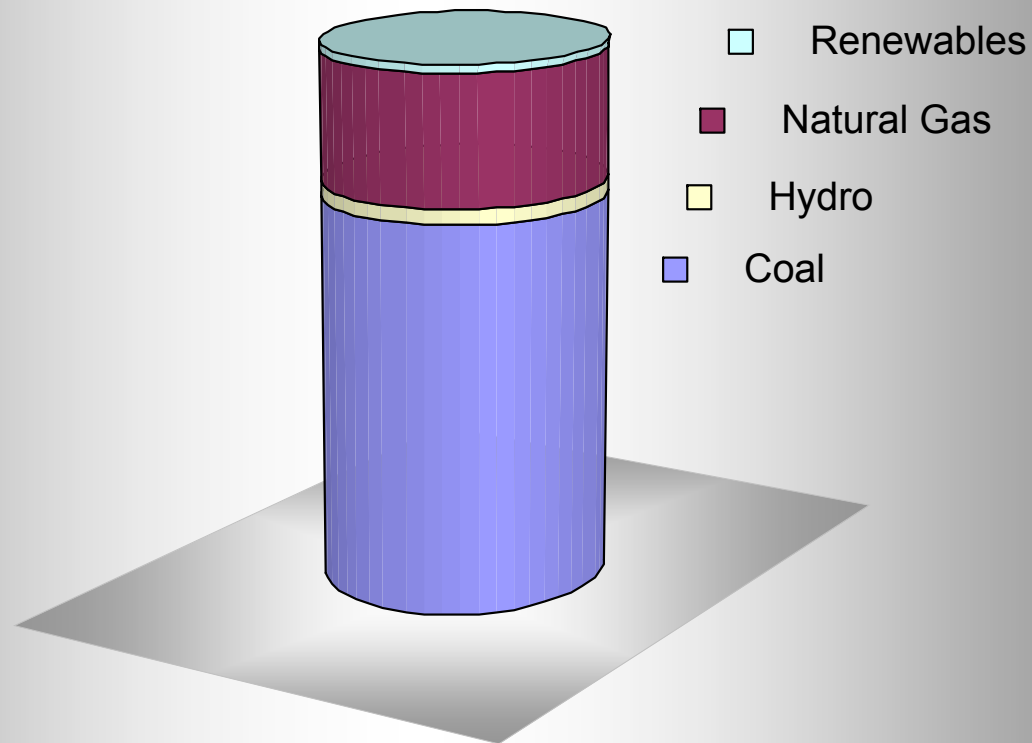
Jim Tarpey

# The Challenge We Face

**Energy Supply, Energy Efficiency,  
Consumer Prices and Climate Change**

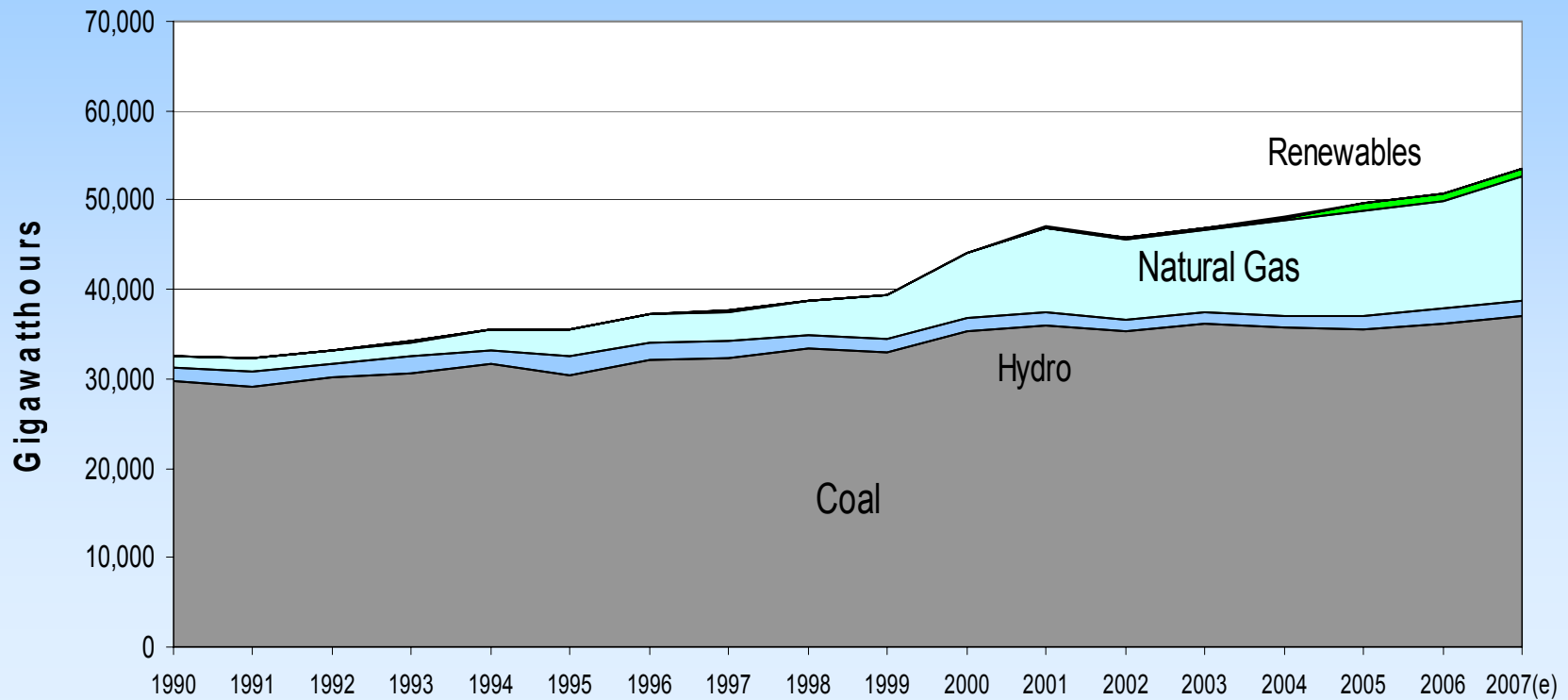
# Colorado Electric Generation by Fuel

## Colorado Electric Generation by Fuel Type -- 2005

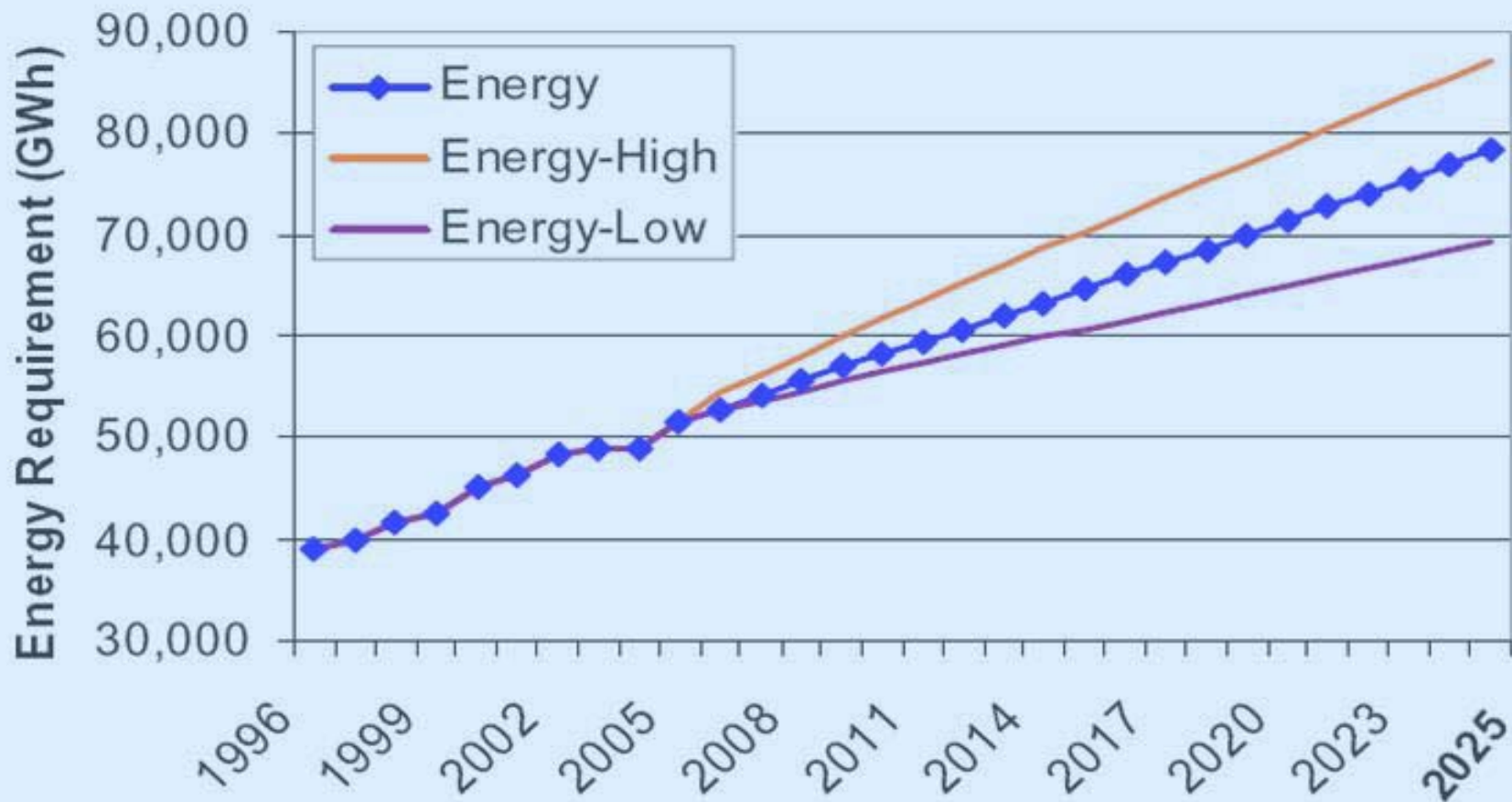


# Generation Fuels in Colorado

Colorado Electric Generation  
by Fuel Source 1990-2007



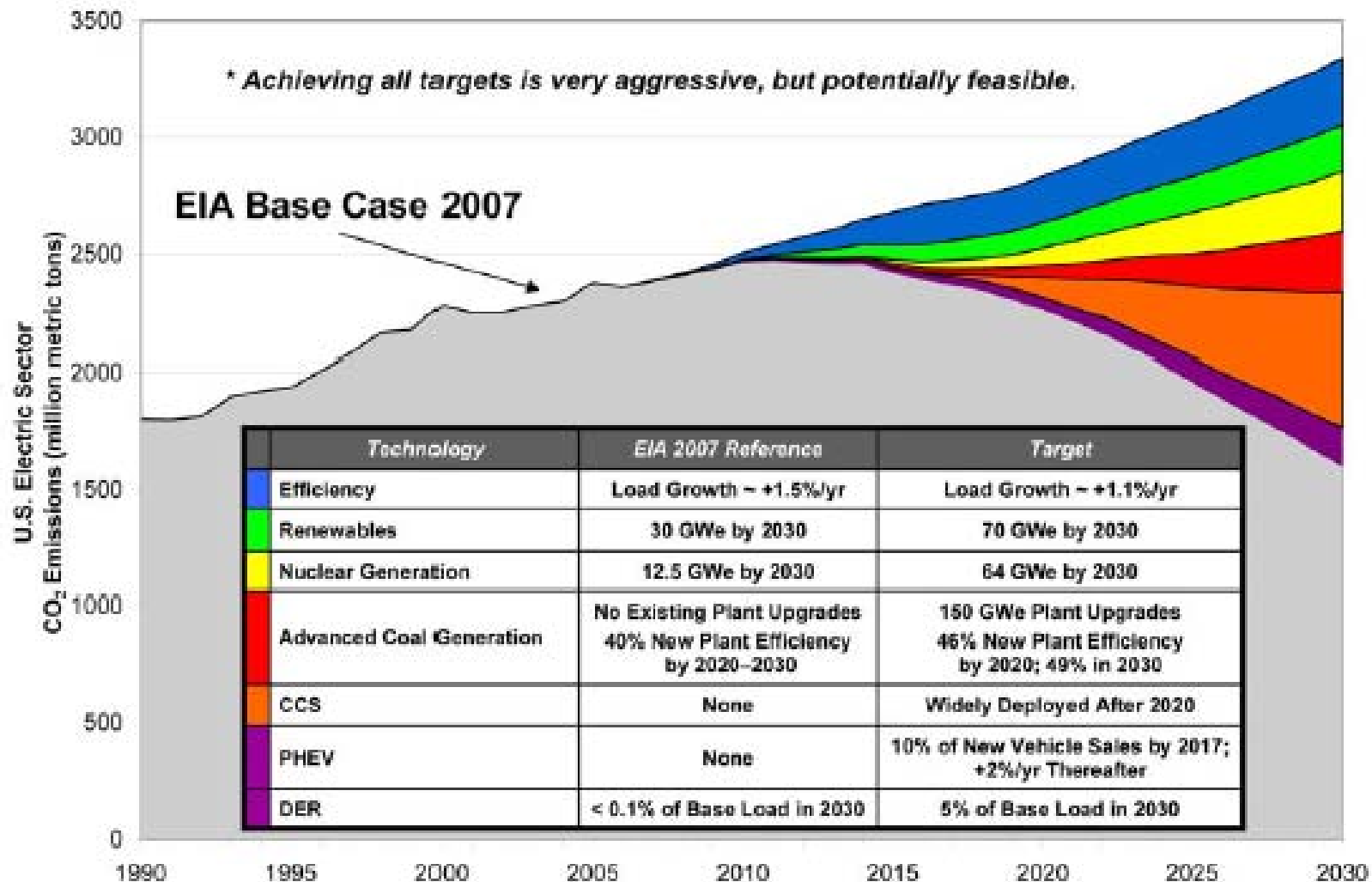
# Projected Colorado Electric Energy Growth 2007-2025



## The Take-Aways

- Colorado's demand for electric energy services is projected to grow 60% in the next seventeen years.
- Think of this curve as demand for energy services denominated in kilowatt-hours
- Projection does not include transportation applications for electricity (plug-in hybrids).

# EPRI "Prism" Analysis



# ASES “Wedge” Analysis

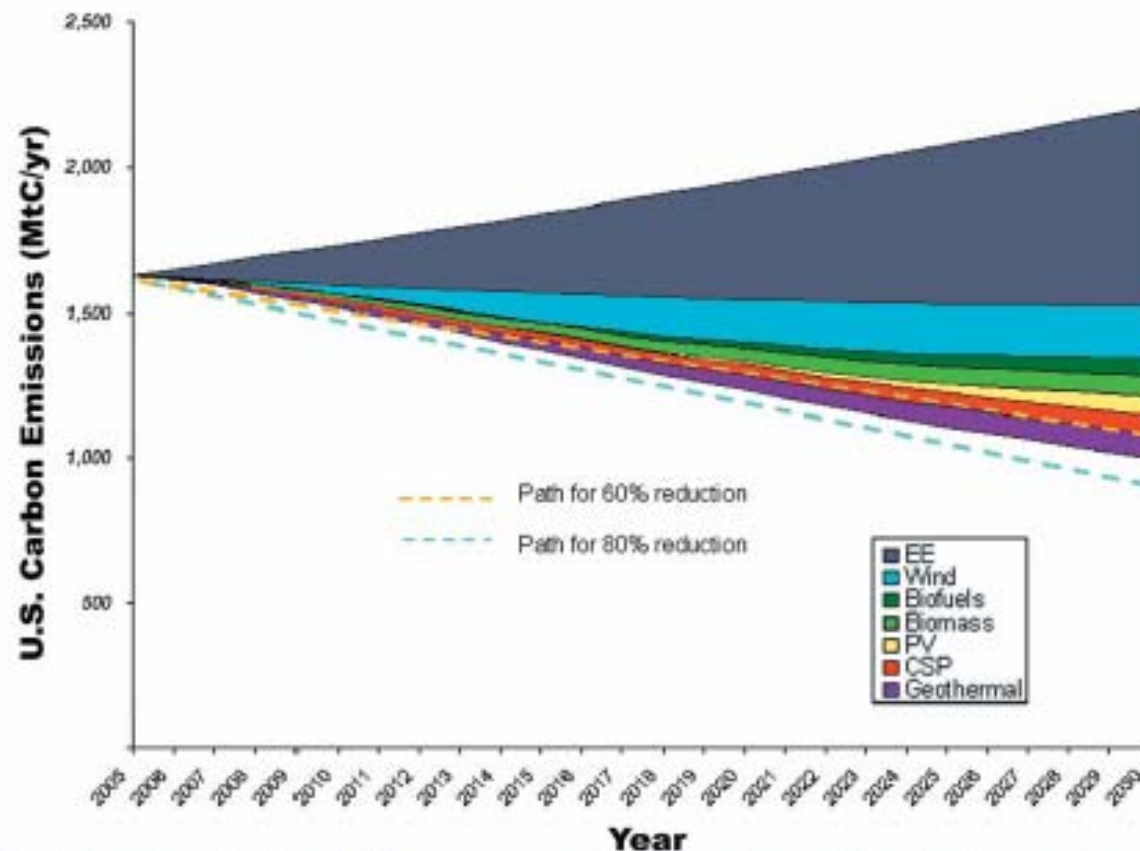
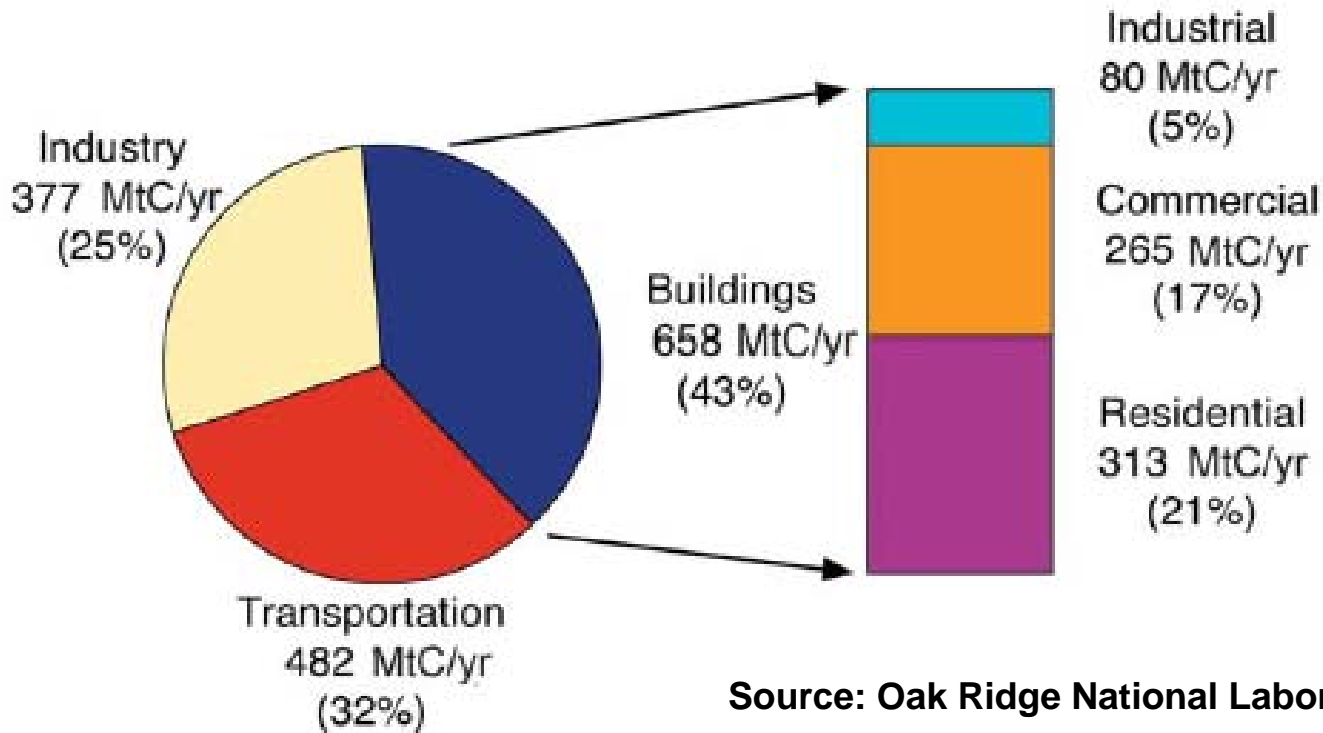


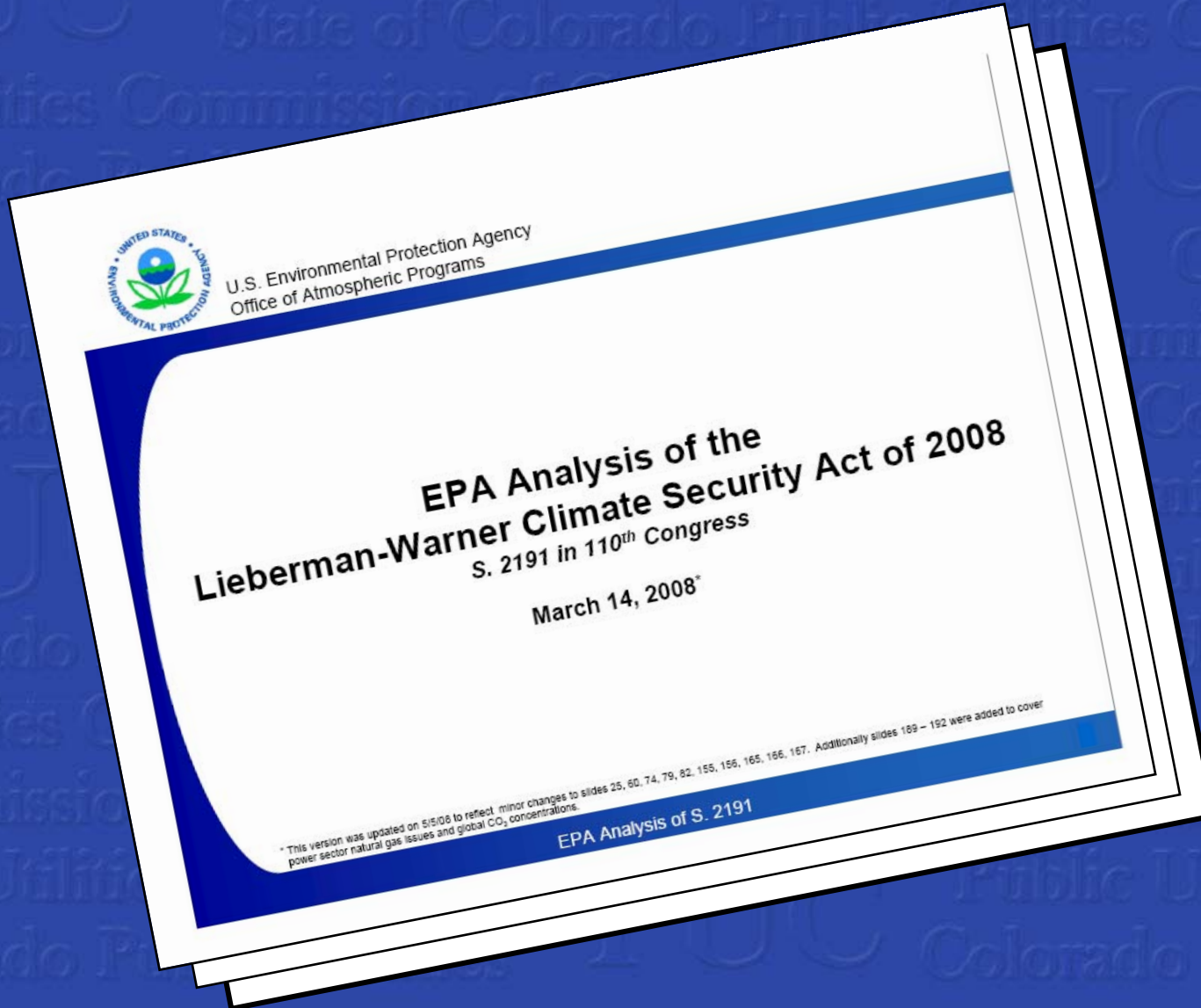
Figure 2. Potential carbon reductions in 2030 from energy efficiency and renewable technologies and paths to achieve reductions of 60% and 80% below today's emissions value by 2050.

# Sources of US Carbon Emissions (2002)



Source: Oak Ridge National Laboratory

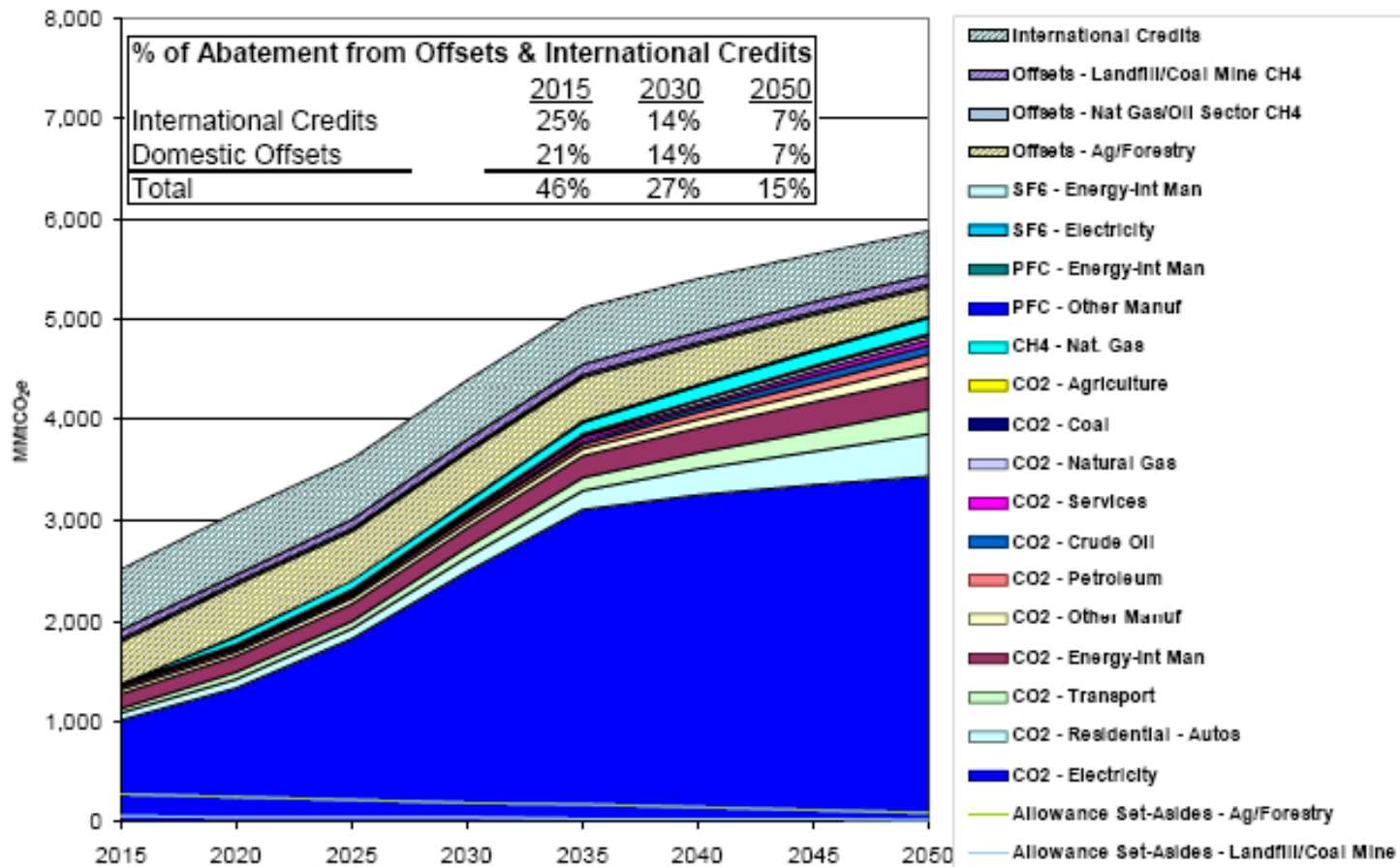
# EPA Analysis of S. 2191, the Lieberman Warner Bill





# Results: Scenario 2 - S. 2191

## Sources of GHG Abatement (ADAGE)



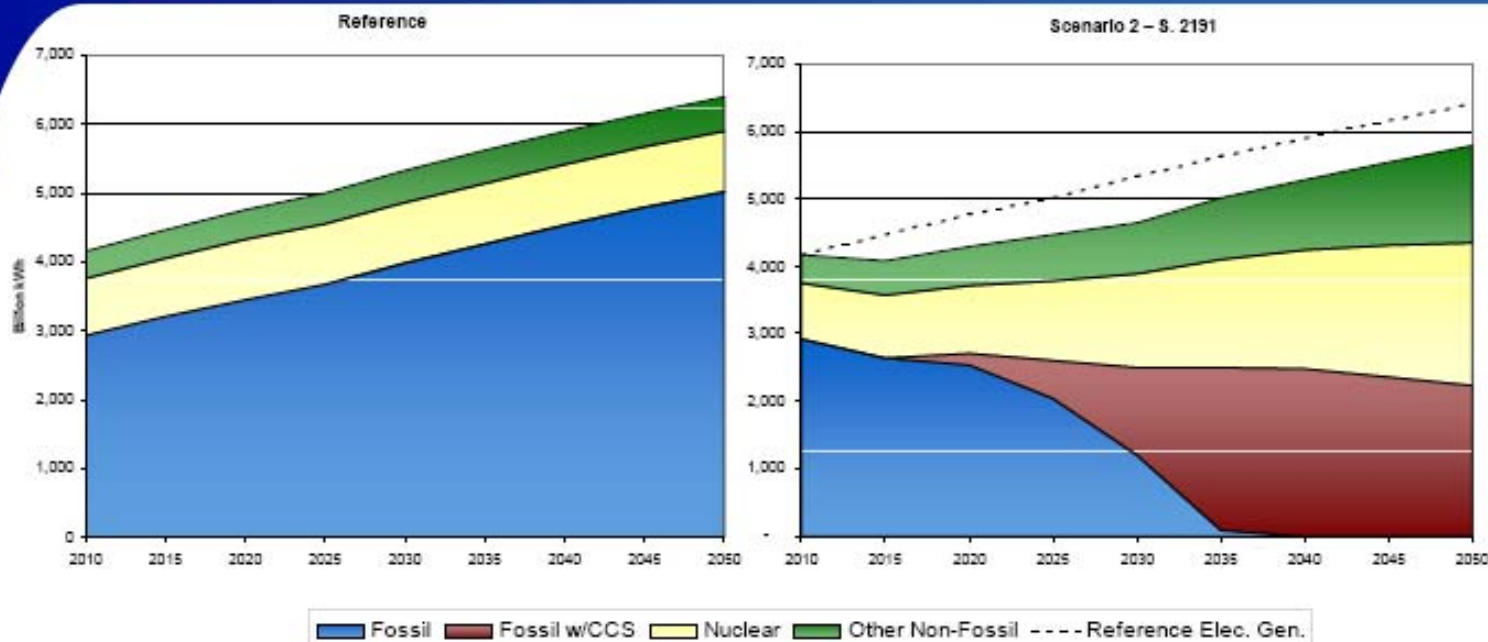
- S. 2191 allows offsets and international credits to each make up 15% of the total allowance submissions requirement.
- The quantity of offsets and international credits allowed decreases as allowance submissions decrease.
- Since the quantity of offsets allowed is decreasing over time and the quantity of abatement is increasing over time, offsets make up a large fraction of abatement in the early years of the policy, and their contribution to total abatement decreases over time.

## S. 2191 Scenario 2 Assumptions

- This policy scenario uses the same assumptions about technology and international action used in the main policy scenarios in the EPA analyses of S. 280 and S. 1766
- Bill as written
- Substantial growth in nuclear power (nuclear power generation increases by  $\approx 150\%$  from 782 bill. kWh in 2005 to 1,982 billion kWh in 2050) reflecting possible future policies to promote this technology in S. 2191 and elsewhere
- Widespread international actions by developed and developing countries over the modeled time period. International policy assumptions are based on those used in the recent MIT report, “Assessment of U.S. Cap-and-Trade Proposals”
  - Group 1 countries (Kyoto group less Russia) follow an allowance path that is falling gradually from the simulated Kyoto emissions levels in 2012 to 50% below 1990 in 2050
  - Group 2 countries (rest of world) adopt a policy beginning in 2025 that returns and holds them at year 2015 emissions levels through 2034, and then returns and maintains them at 2000 emissions levels from 2035 to 2050



# Addressing Climate Change Requires Electricity Sector Transformation



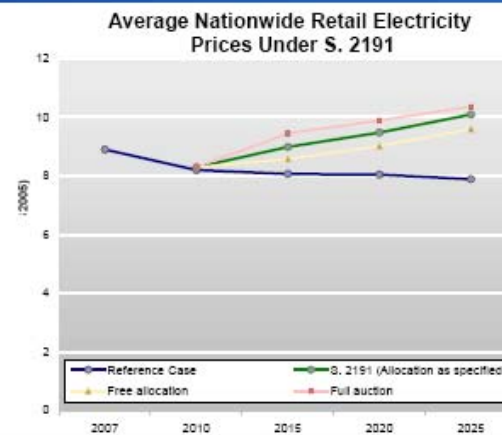
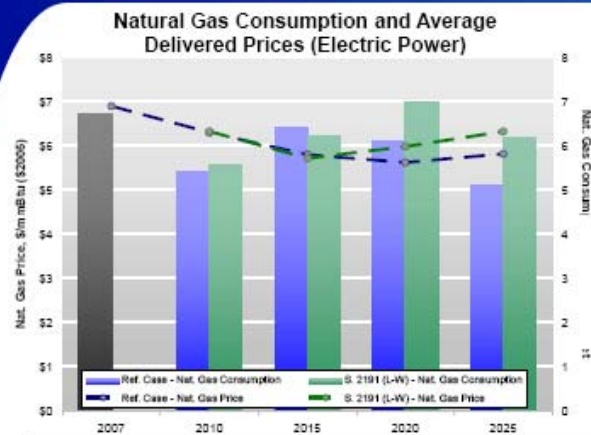
- Under S. 2191, both nuclear and renewable electricity generation expands above the reference levels.
- In addition, CCS deployment on fossil-fuel generation begins after 2015. By 2030, 175 GW of new CCS capacity is projected to be built, which is the equivalent of 318 CCS units of 550 MW each. By 2050, 299 GW of new CCS capacity is projected to be built, which is the equivalent of 543 CCS units 550 MW each.
- By 2035, almost all fossil electricity generation is capturing and storing CO<sub>2</sub> emissions. (Note that because ADAGE does not represent peak versus base load generation requirements, the use of CCS technology on almost all fossil fuel generation by 2035 may be overly optimistic).

Note: Other non-fossil includes hydro, geothermal, wind, solar, biomass and municipal solid waste.

# EPA's Modeled Impact of S. 2191 on electricity prices



## Power Sector Natural Gas Consumption, Prices, and Retail Electricity Prices (IPM)



		Natural Gas Consumption and Prices					Retail Electricity Prices (¢/kWh)					
		2007	2010	2015	2020	2025	2007	2010	2015	2020	2025	
Nat. Gas Consumption (TCF)	Ref. Case	6.8	5.4	6.4	6.1	5.1	Ref. Case	8.9	8.2	8.1	8.0	7.9
	S. 2191		5.6	6.3	7.0	6.2	S. 2191 (allocation as specified)		8.3	9.0	9.5	10.1
Nat. Gas Price (\$/mmBtu)	Ref. Case	6.00	6.30	5.80	5.60	5.80	S. 2191 (free allocation)		8.3	8.6	9.0	9.6
	S. 2191		6.30	5.70	6.00	6.30	S. 2191 (full auction)		8.3	9.4	9.9	10.4

Source: 2007 data is from EIA, projections are from EPA's IPM Outlook 2008 and analysis of S. 2191 using IPM.  
 Note: Natural gas prices and consumption presented here are determined endogenously in IPM and do not reflect changes in supply/demand (and thus prices) outside the power sector as a result of S. 2191 (the ADAGE model is the economy-wide model that EPA uses to reflect this dynamic). To the extent that natural gas demand increases outside the power sector, the price impacts reflected here may be a bit lower than if the total demand for natural gas were reflected in IPM. However, demand for natural gas in ADAGE outside the power sector is not projected to increase significantly, so the price projections presented here would not be greatly impacted by demand from other sectors.

\* This slide was added 5/5/08.

# Key (Sensitive) EPA Assumptions

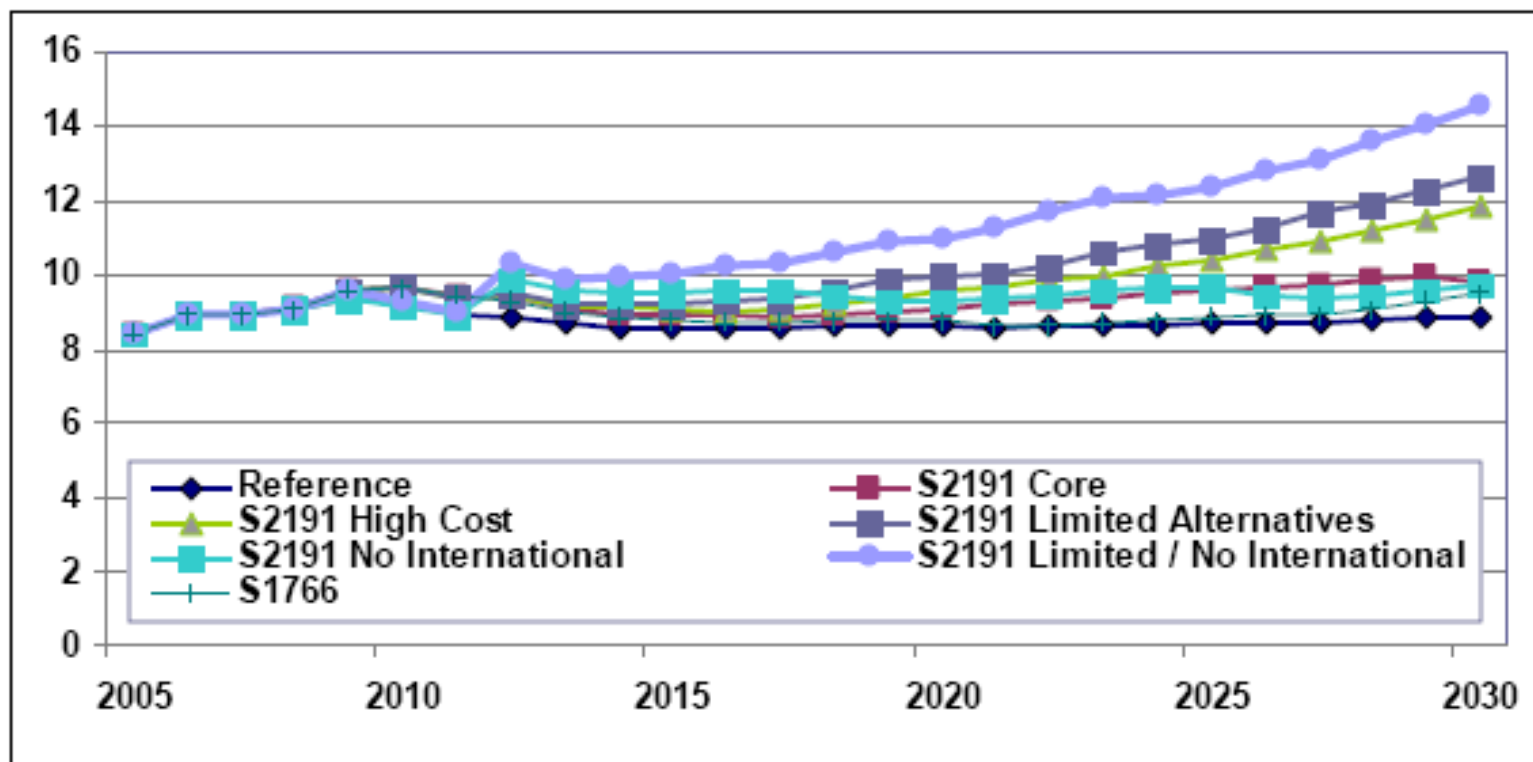
- Growth of nuclear generation 2020-2050
- Efficacy of CCS for new coal generation 2019-2050
- Stability in natural gas prices delivered for electric generation (\$6 to \$7 in \$2005)

## Potential Alternate Assumptions for EPA Reference Case

- Nuclear growth is modest
- CCS is substantially more costly for new coal generation
- Natural gas prices stabilize at higher level
- PHEV development impacts transportation emissions
- Energy efficiency gains are greater

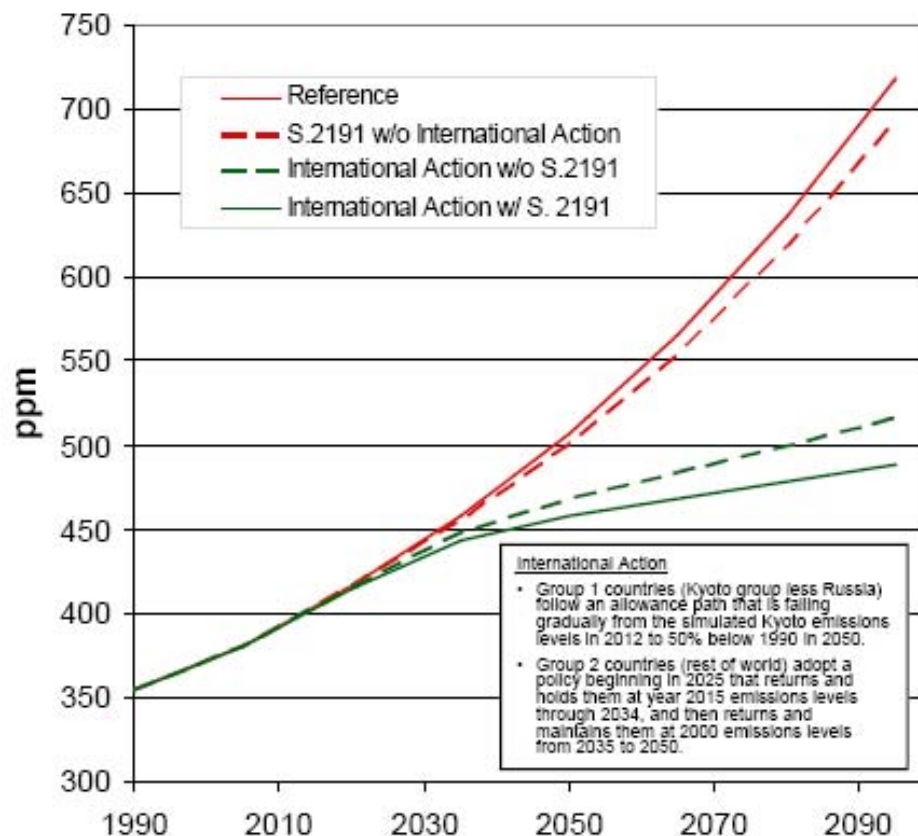
# EIA Analysis of Electricity Prices under S. 2191

**Figure 16: Electricity Prices**  
(2006 cents per kilowatthours)





# Global CO<sub>2</sub> Concentrations (MiniCAM) Results



In the reference scenario,\* Global CO<sub>2</sub> concentrations rise from historical levels of 354 parts per million (ppm) in 1990 to 718 ppm in 2095.

### Effect of S. 2191

Assuming the international community adopts no additional policies or measures, the global CO<sub>2</sub> concentrations in 2095 are estimated to be 694 ppm, which is 25 ppm lower than the reference case. Note that this incremental effect accounts for emissions leakage.

### Effect of International Action plus S. 2191

Assuming the international community takes the actions described in the diagram to the left and the U.S. takes no action, the global CO<sub>2</sub> concentrations in 2095 are estimated to be 516 ppm; and if the U.S. adopts S. 2191 global CO<sub>2</sub> concentrations in 2095 would be 488 ppm, which is an additional 28 ppm lower than the case without U.S. action.

While CO<sub>2</sub> concentrations are significantly reduced in the scenarios with international action, they are not on a stabilization trajectory.

\* Reference scenario emissions come from the Climate Change Science Program (CCSP) Synthesis and Assessment Product 2.1a MiniCAM reference case.

# Colorado's Balanced Approach

- Coal producing state (8<sup>th</sup> in US)
- Gas producing state (7<sup>th</sup> in US)
- Substantial wind and solar resources
- Moderate electric rates
- Popular governor with a focus on the “New Energy Economy”

- **Reduce Colorado's carbon emissions by 20% below 2005 levels by 2020**
- **Reduce Colorado's carbon emissions by 80% below 2005 levels by 2050**



# Elements Of A State Energy Strategy

- **Boost Energy Efficiency**

- Customer: education
- Utility: engagement
- Rate structure changes
- Smart grid test bed in Boulder, Colorado

- **Stress renewable resources**

- Regulators and utilities with a commitment to addressing climate change
- State RPS
- Progressive resource planning at Commission
- Healthy renewables industry

- **Advanced generation development**

- Research and demonstration for carbon sequestration

# Areas of Regulatory Focus

- Compliance with Colorado RPS
- Revised Resource Planning
- Utility Incentives Investigation
- Customer Rate Structure Investigation
- Customer Education

# Colorado Regulatory Response

-- Resource Planning --

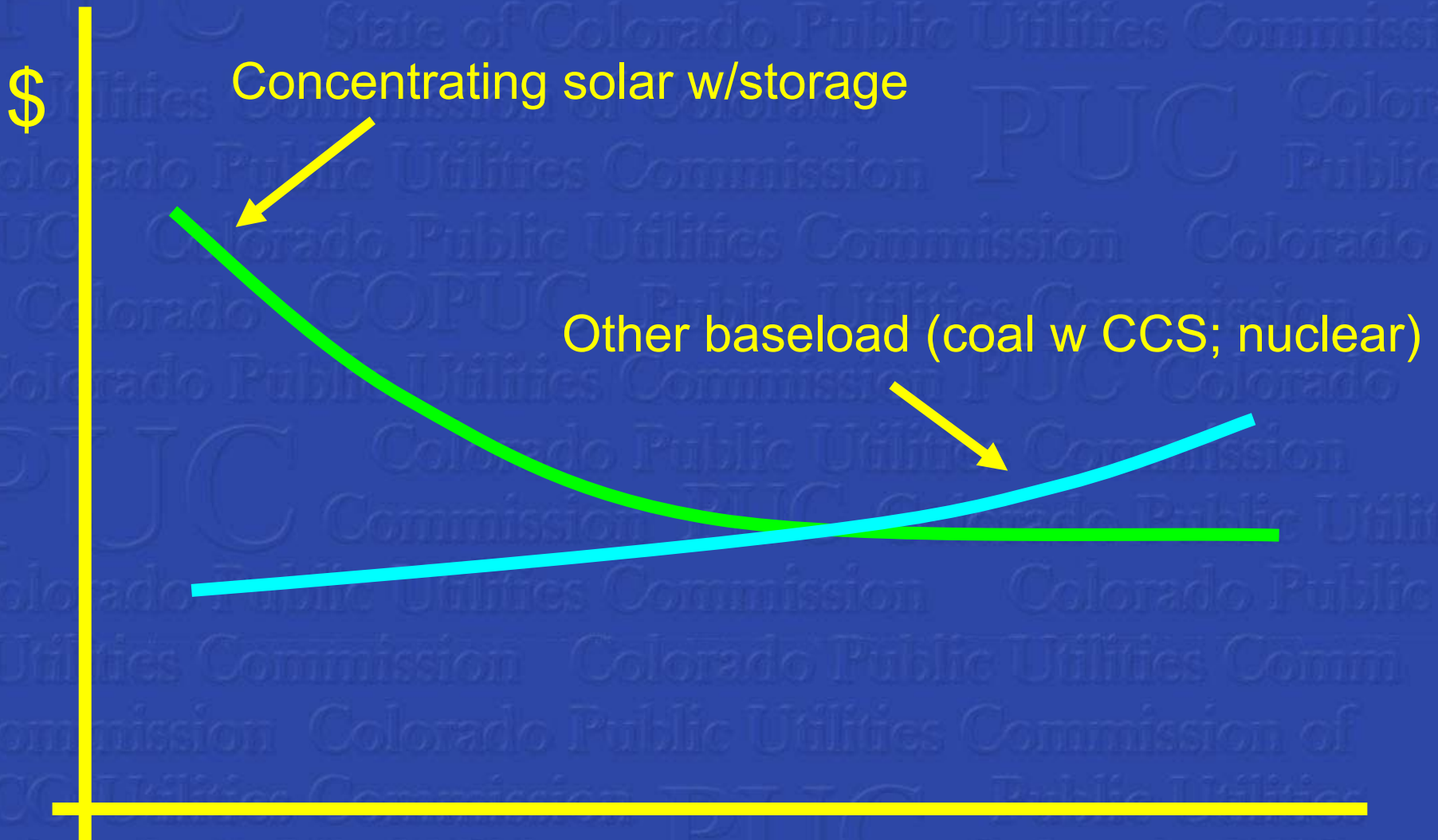
## Prior Rule

- ~~Least Cost Planning~~
- ~~Fuel Neutrality~~
- ~~Utility models new portfolio~~
- ~~Utility selects bid resources~~

## New Rule

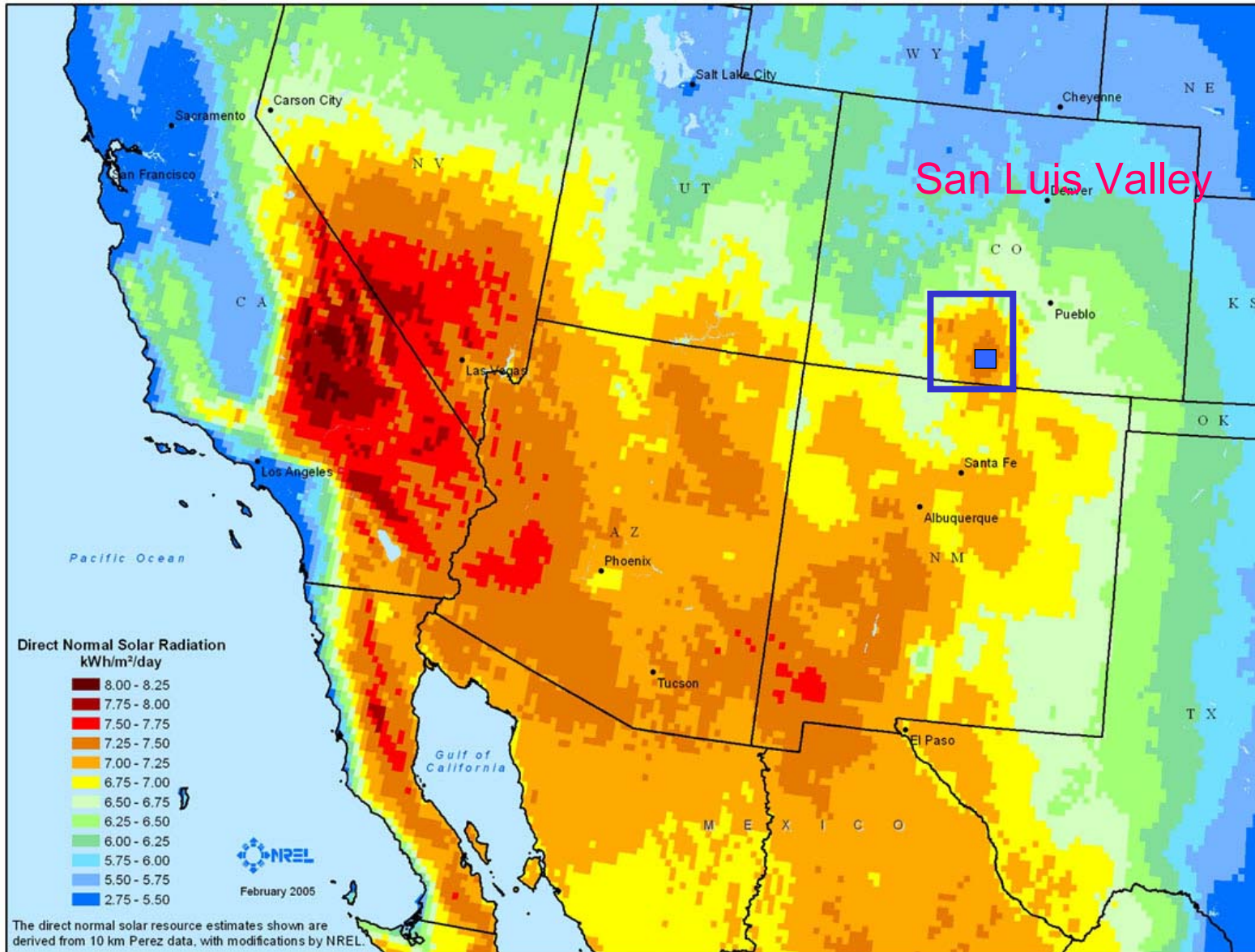
- Resource Planning
- Clean Energy Preference
- Independent Evaluator
- Optional Post-bid Review
- New DSM emphasis

# Concentrating Solar in Colorado



# Solar Thermal Electric Density

- Use: 100 MW(ac)/mile<sup>2</sup>
- Colorado Peak Integrated Demand: 11GW
- Result: 110 mile<sup>2</sup> required land area



# Customer Education

**Two 75-watt Compact Fluorescent Lights  
will reduce CO<sub>2</sub> emissions by  
One Metric Ton over their lifetime**



## Some thoughts about energy efficiency

- This is no time for small ideas.
- Most states' energy efficiency activities are too small, probably by an order of magnitude. We need transformation opportunities.
- Demand reductions and demand response are important to pursue in addition to energy reductions.
- Leadership and political will are needed.
- “We are the leaders we’ve been waiting for”

## What can ELCON members do?

- Temper a short-run focus on rates with a longer run emphasis on least cost solutions to the challenge of climate change
- Advocate for additional federal R&D in all promising areas for generation alternatives
- Recognize regional comparative advantages
- Assist state regulators in traditional markets to improve regulation

**Thanks for the invitation.**

**I look forward to your questions.**