Review of Southern Region Climate Policy Options, Recent Federal and State Actions

NC LCGCC, November 17, 2009

Center for Climate Strategies

1899 L Street, NW, Washington, DC 20036

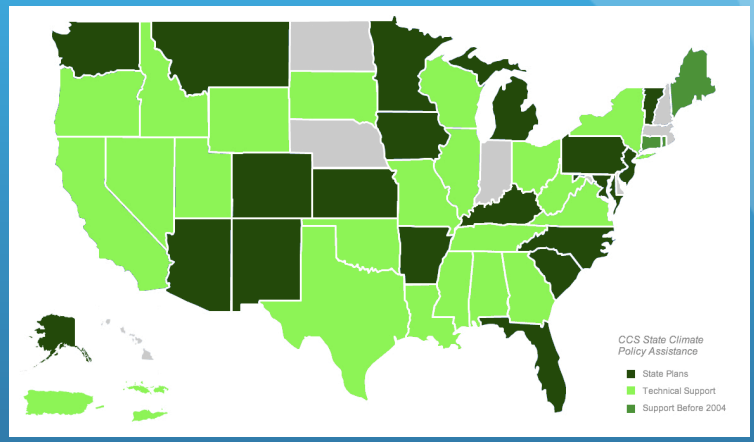
www.climatestrategies.us, (202) 540-9121

Project Overview

- Study Objective:
  - Advance understanding of climate mitigation policy options, issues and impacts specific to the SGA region
- Task 1:
  - Conduct aggregate economic analysis of a full range of potential climate policy options in the SGA region
- Task 2:
  - Review and compare independent economic studies of climate policy options in the SGA region
- CCS Assistance Commissioned by SGA

Center for Climate Strategies

- Nonpartisan, Non Advocacy, 501c3, 30+ team members in US, Canada and Mexico
- Projects with 40+ states, 4 regions, over 1,500+ stakeholders
- Facilitation, technical support, training and capacity building, information and education
- Policy options, design, measurements, instruments, programs, integration, goals
- Energy, industry, transportation, waste, agriculture, forestry

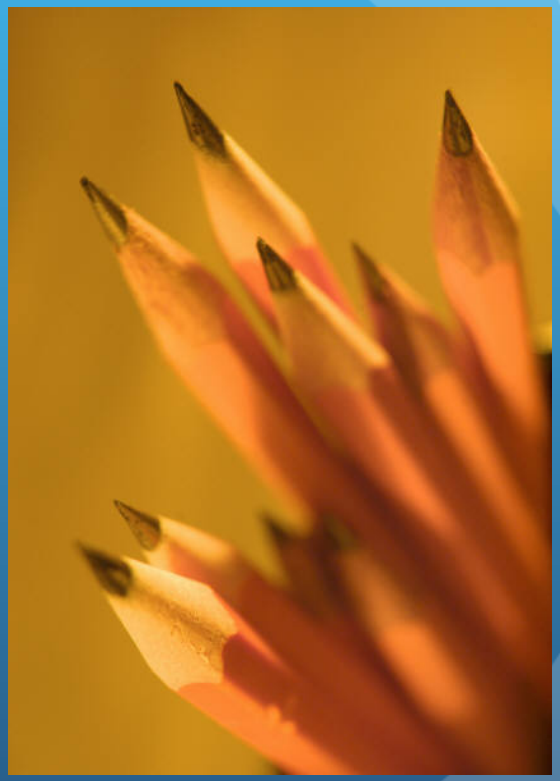


CCS Assisted States, 2004-2009

Task 1: SGA Regional Economic Analysis: *Draft Preliminary Results*

Task 1: SGA Regional Analysis

1. Start with five state's climate action plans (AR, FL, MD, NC, SC)
2. Update business as usual (BAU) emissions forecast and cost/savings estimates of policy options based on effects of recent actions, recession, energy prices
3. Focus on 23 major policy action areas that comprise 83 percent of impacts
4. Construct new cost/savings estimates
5. Project to 13 states/territories based on 37 key economic factors and geographic characteristics



Task 1: Five State's Plans

- Comprehensive mitigation action plans from 2006-2008
- Nonbinding and advisory, state convened
- Fact based, stakeholder and work group driven
- Focused on multiple objectives: GHG reductions, cost containment, co-benefits, feasibility
- Development of "balanced portfolio": all economic sectors, implementation tools, levels of government
- Estimated GHG reductions, costs/savings per ton GHG removed; energy and other resource shifts

Task 1: Five State's Plans

- Sector based action areas:
  - Heat and power supply
  - Residential, commercial and industrial energy use and processes
  - Transportation and land use improvements
  - Agriculture and forestry conservation, and
  - Waste management
- Short and mid term actions (through 2020)
- All GHG emissions and sinks

Task 1: Five State's Plans

Multiple policy tools (Not one size fits all):

- Codes and standards
- Funding mechanisms and incentives
- Voluntary agreements
- Technical assistance
- Emissions pricing
- Information and education
- Pilots and demos
- Reporting and disclosure

Task 1: Five State's Plans

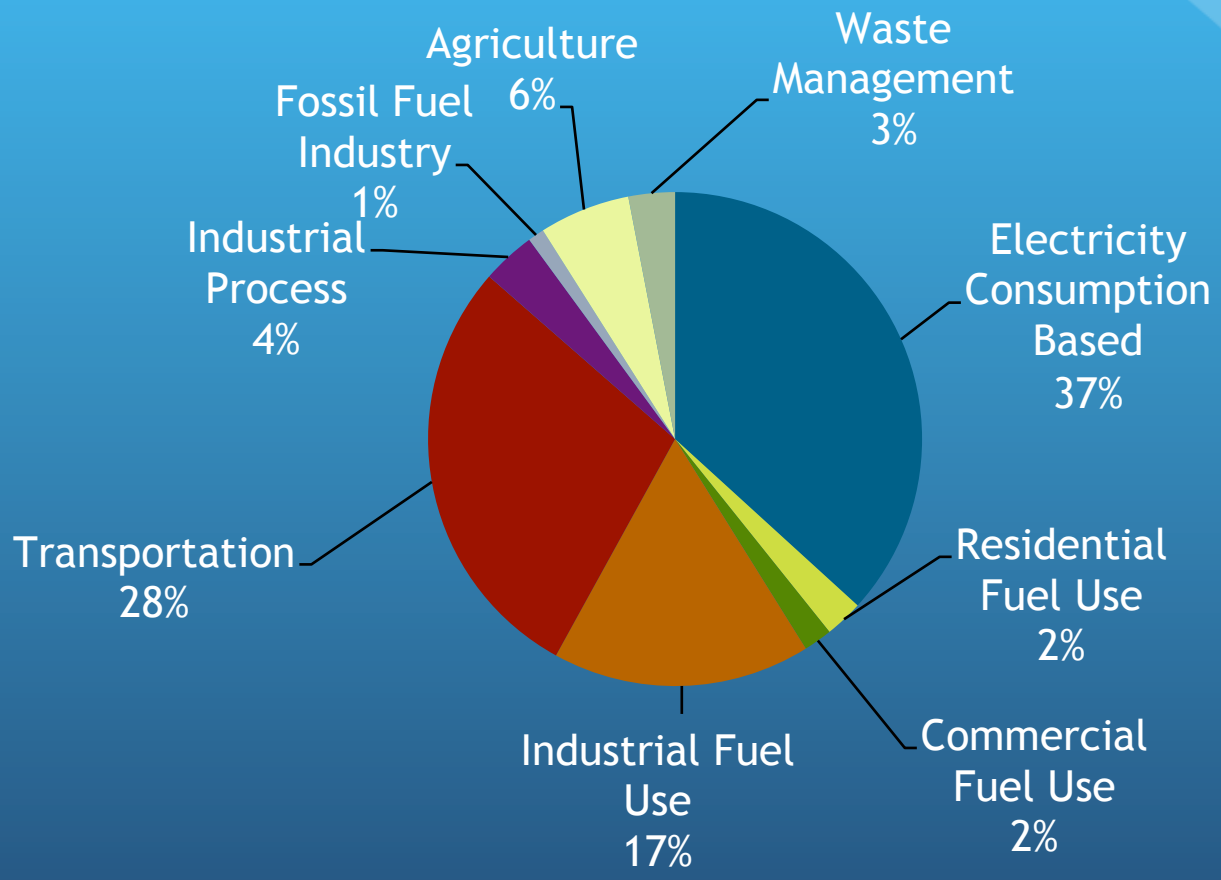
Planning decisions:

1. Existing actions and BAU emissions?
2. Full range of potential new actions?
3. Policy actions in the plan?
4. How to design (timing, level of effort, coverage)?
5. How to implement (which tools, programs, level of government)?
6. How to analyze?
    1. Best available data sources?
    2. Most appropriate methods?
    3. Key assumptions?

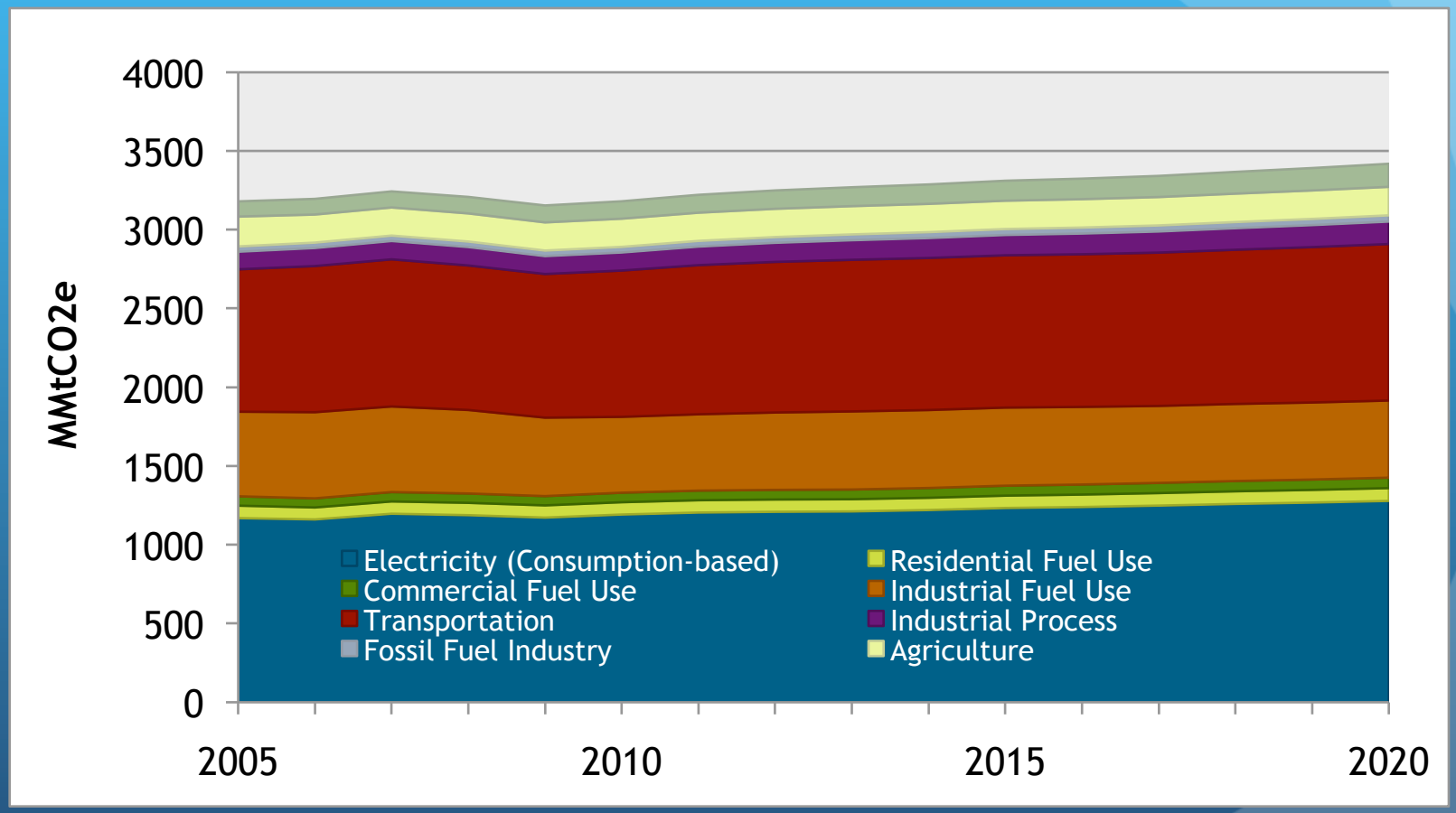
Task 1: Five State's Plans Updates

- Recent federal and state actions, such as:
  - CAFE, Renewable Fuel Standard, Energy Efficiency from Energy Independence and Security Act, etc.
  - State Executive Orders and laws, state programs (provided by SGA participants)
- Recession (Annual Energy Outlook 2009)
  - Short term effects greater than long term
- Energy price forecasts (AEO 2009)
  - Upward shifts in some areas

Task 1: SGA 2005 GHG Snapshot



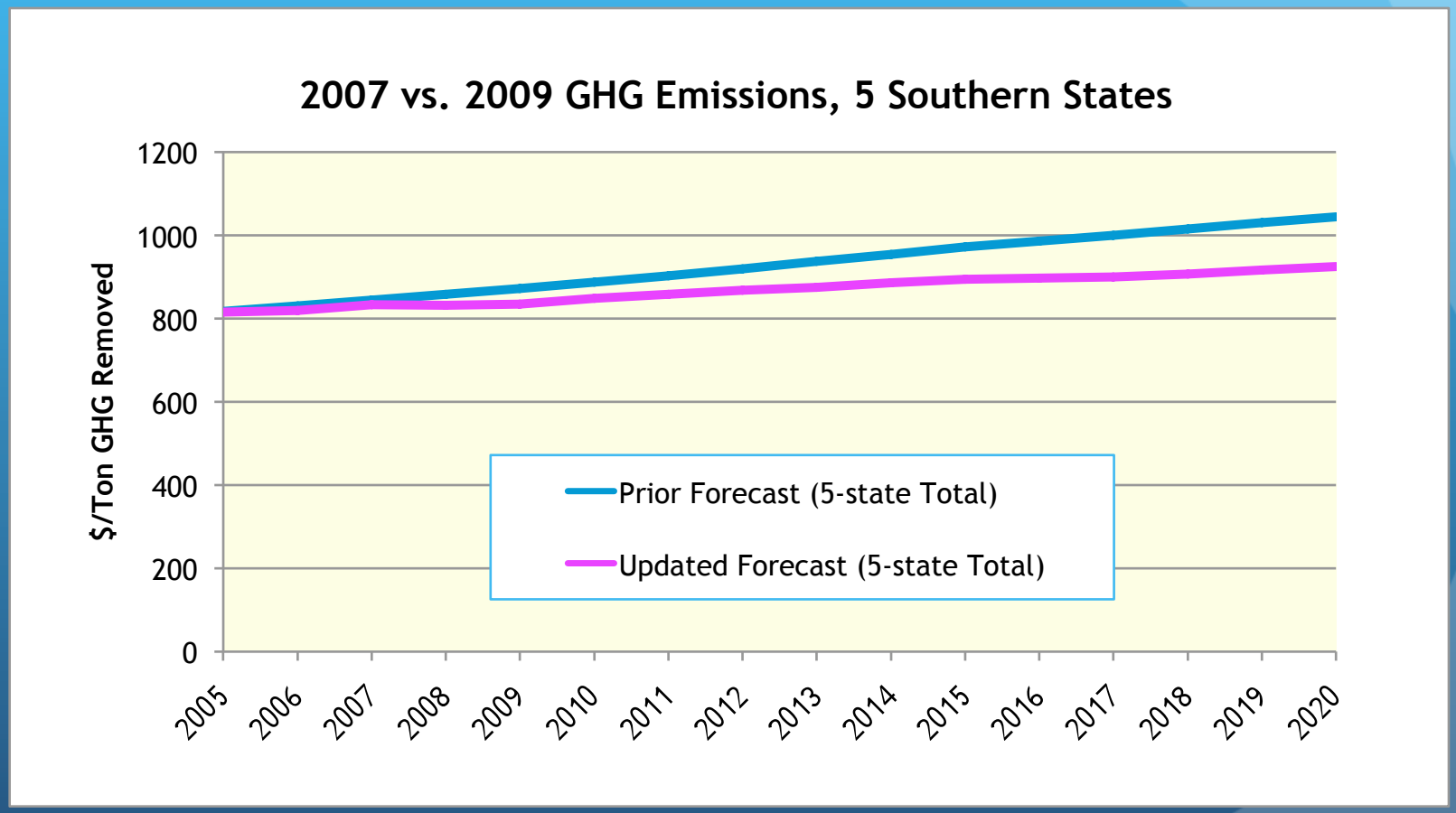
Task 1: SGA GHG Forecast



Task 1: SGA GHG Forecast Data

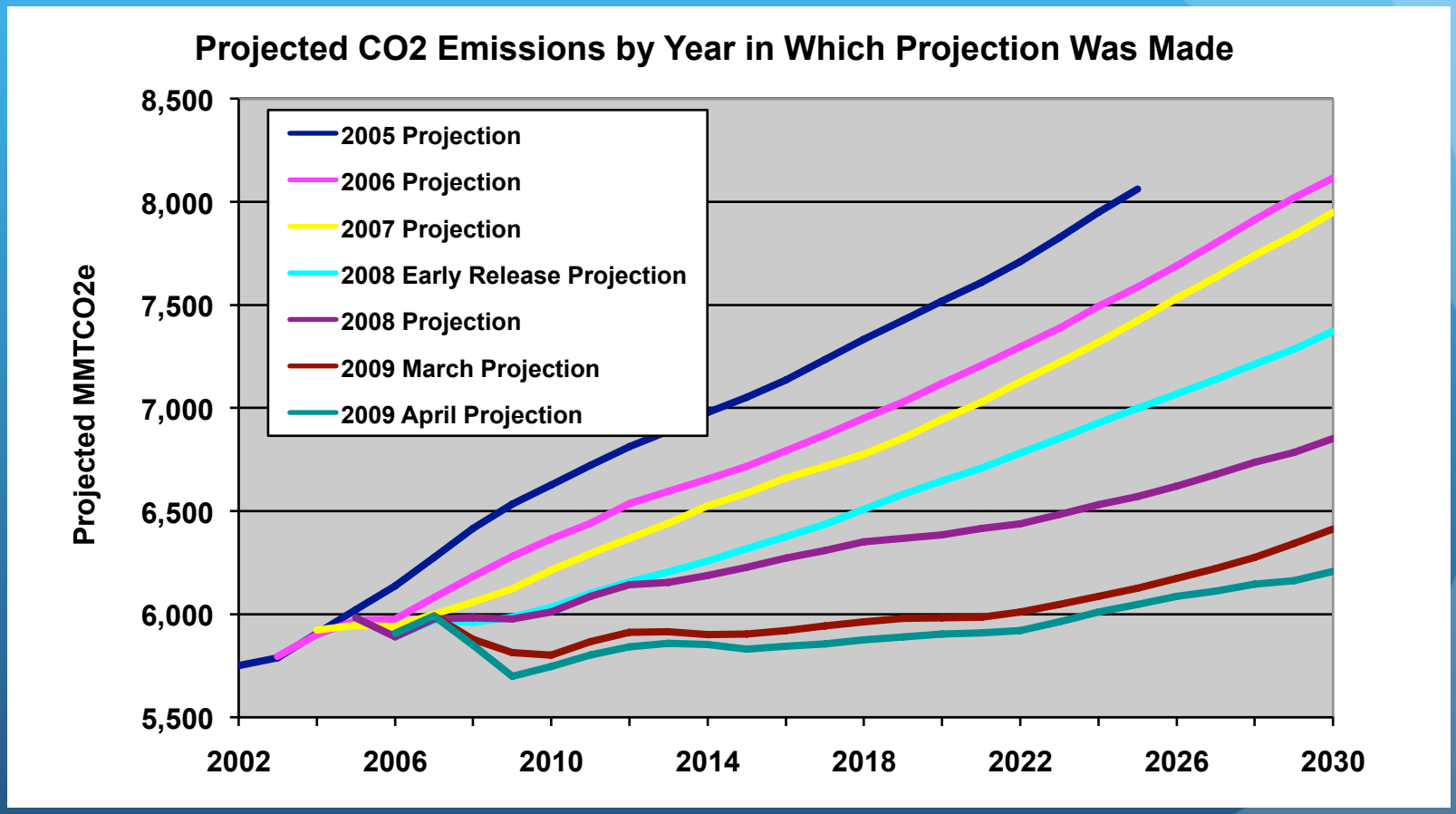
Emissions Source/Sector	2005 $MMtCO_2e$	2010 $MMtCO_2e$	2015 $MMtCO_2e$	2020 $MMtCO_2e$
Electricity Production Based	1,183.2	1,211.3	1,252.3	1,297.1
Electricity Consumption Based	1,169.0	1,191.8	1,233.3	1,278.3
Residential Fuel Use	79.2	78.2	78.4	81.2
Commercial Fuel Use	59.3	60.3	63.1	66.2
Industrial Fuel Use	537.0	481.5	495.9	489.8
Transportation	903.8	928.8	966.6	993.4
Industrial Process	111.7	114.4	128.9	142.4
Fossil Fuel Industry	33.9	35.8	37.9	39.7
Agriculture	189.1	178.9	179.8	180.9
Waste Management	96.6	110.4	126.7	146.5
Total Gross Emissions (Consumption Based)	**3,179.7**	**3,180.2**	**3,310.7**	**3,418.4**

Task 1: SGA GHG Forecast



Supplemental Inventory and Forecast Information

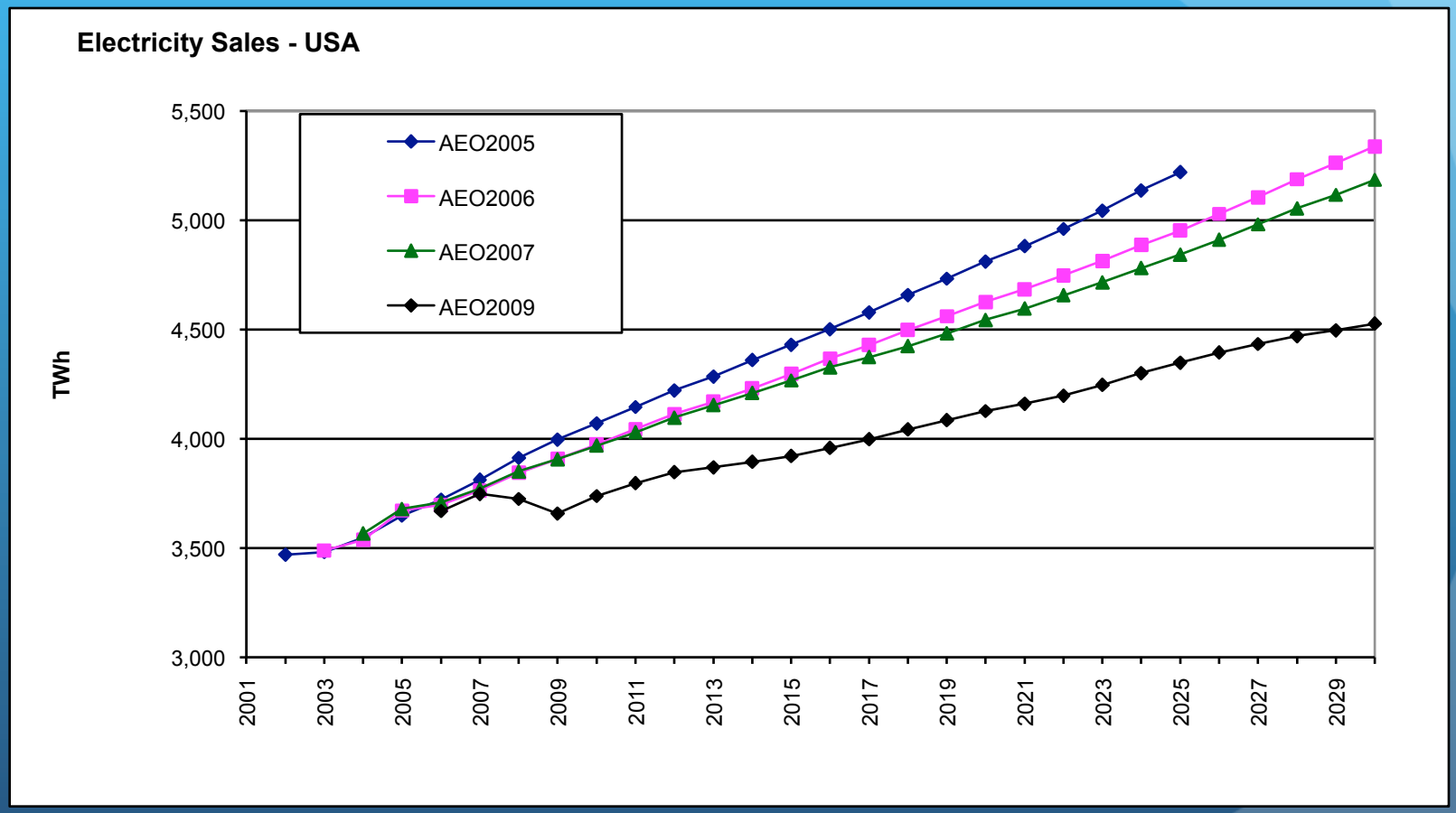
U.S. GHG Forecast Changes



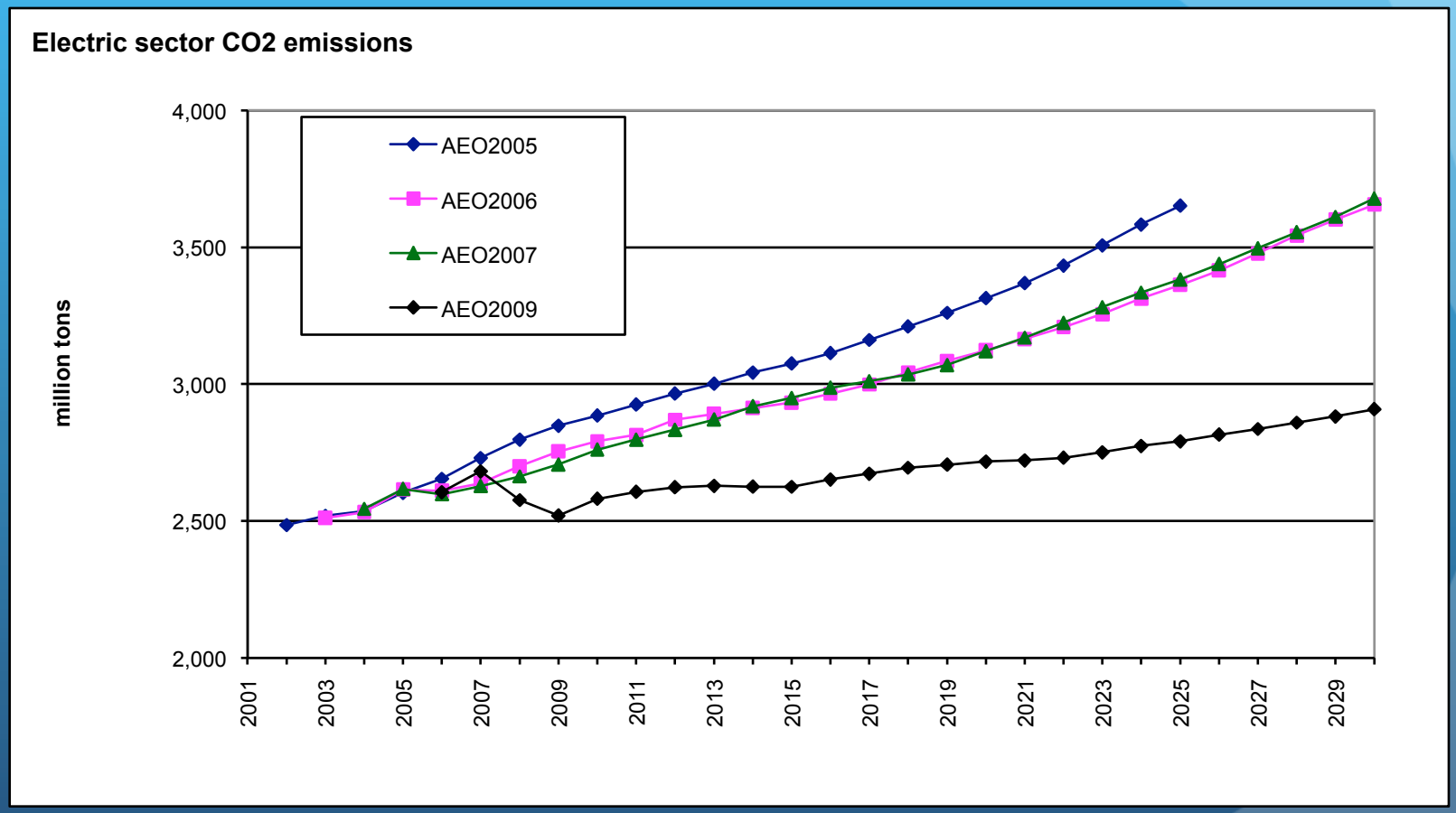
Factors Reducing Emissions

- Recent and planned federal actions
- Recent and planned state and local actions
- Anticipatory actions
- Unrelated actions
- Price changes
- Recession effects

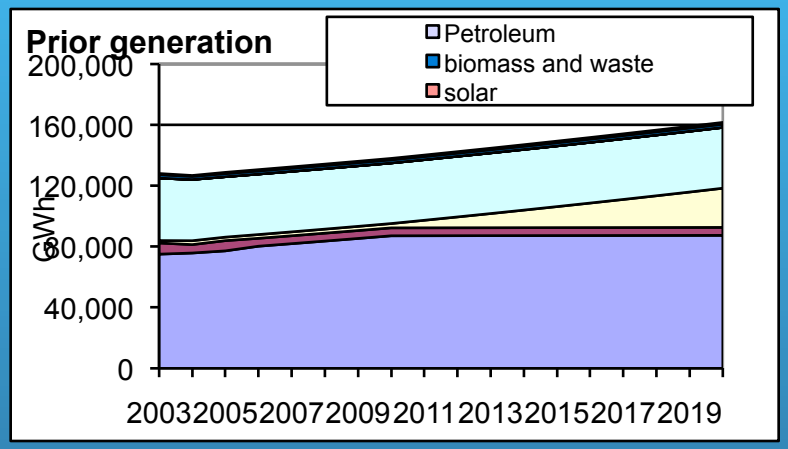
U.S. Electricity Sales Projections

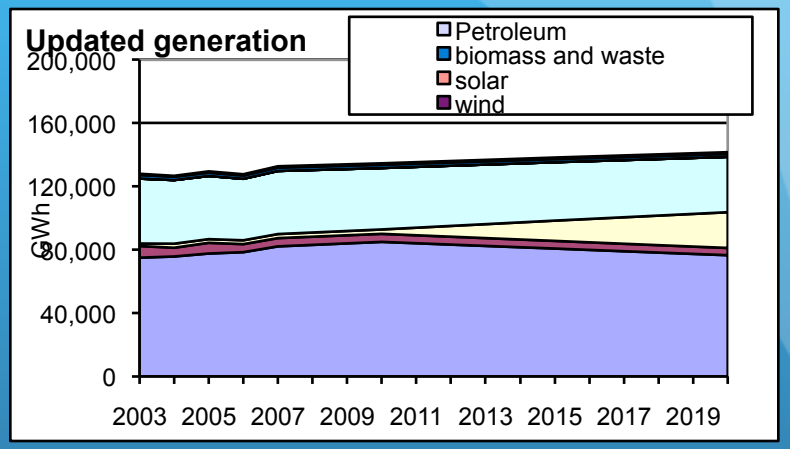


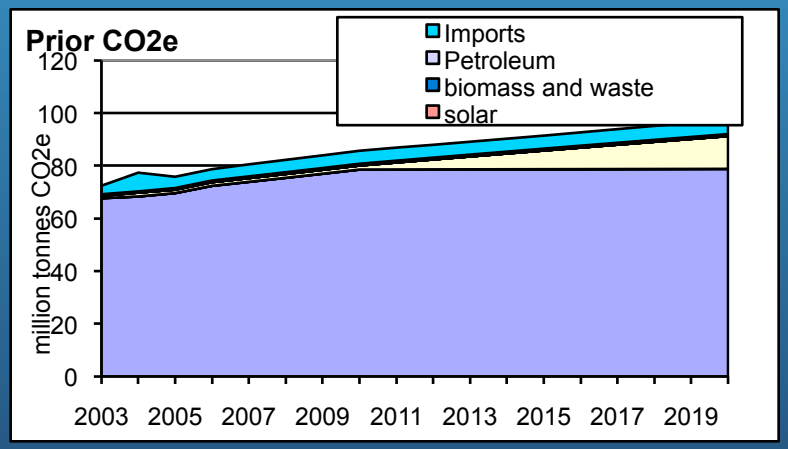
U.S. Electricity CO2 Emissions

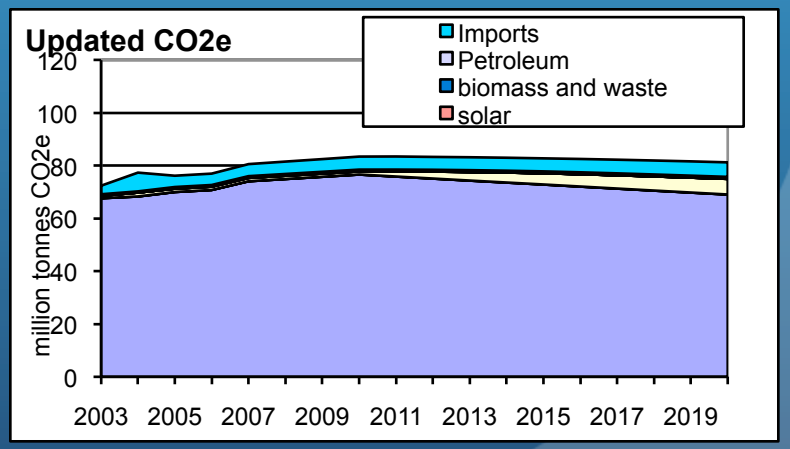


NC Electricity Projections

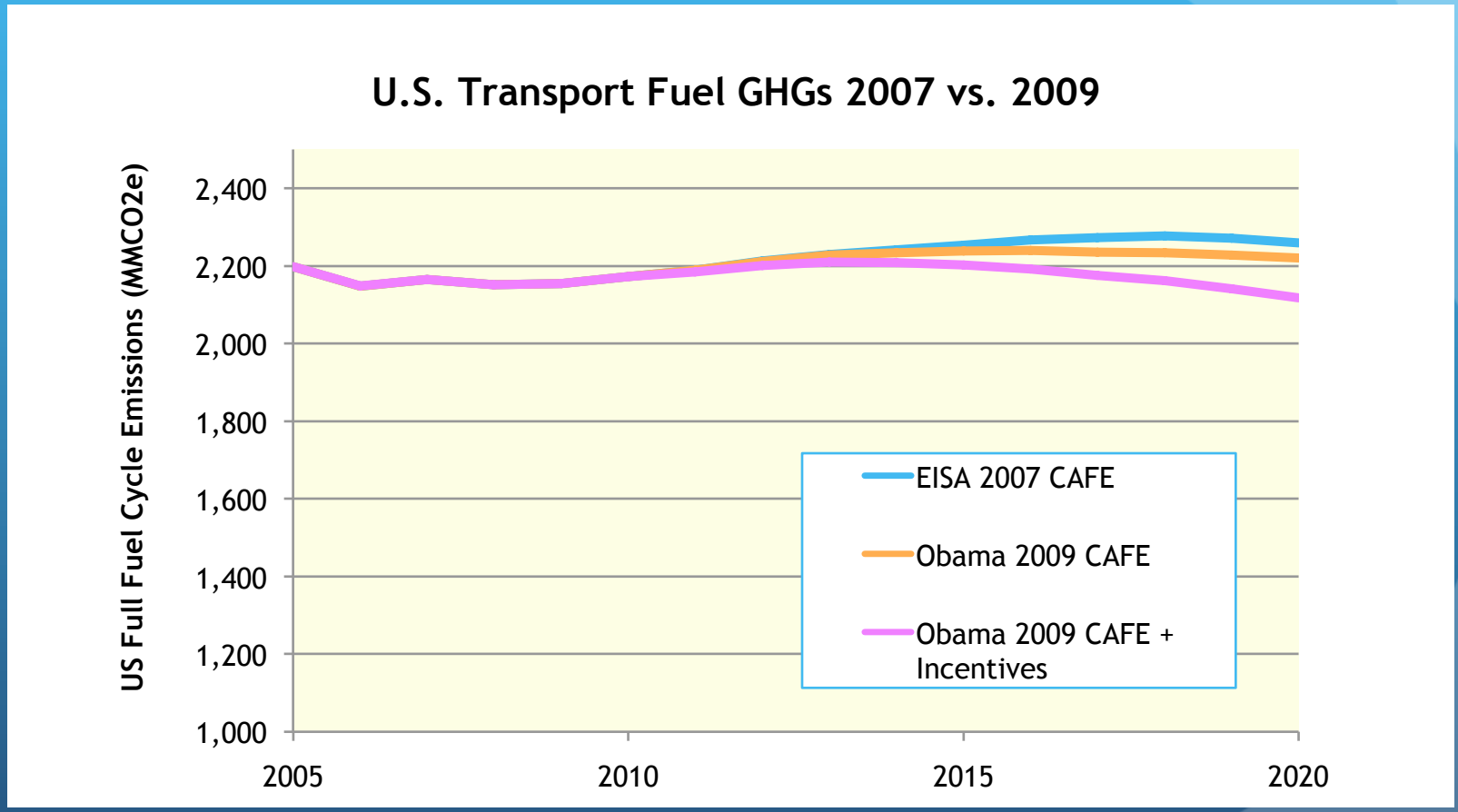




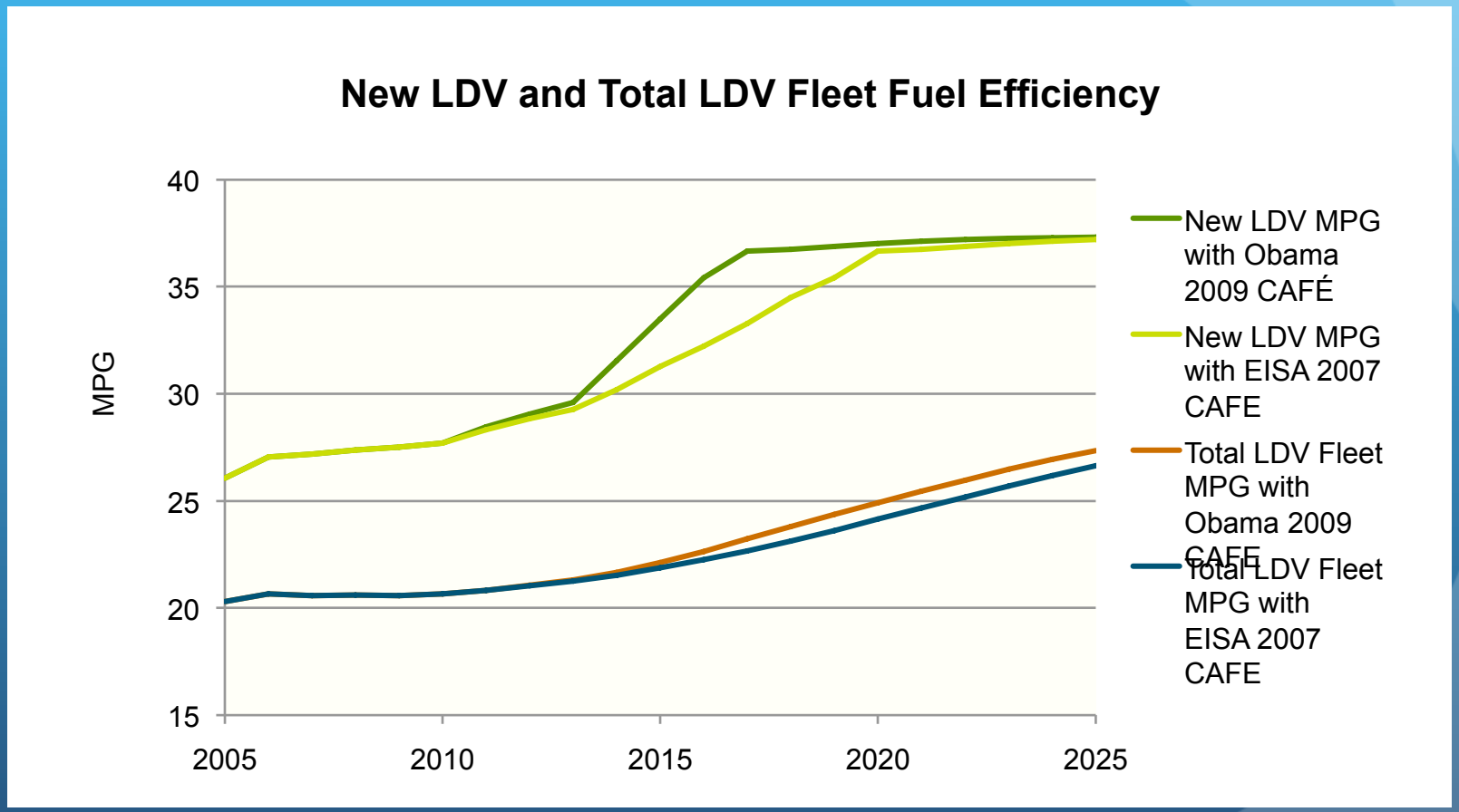




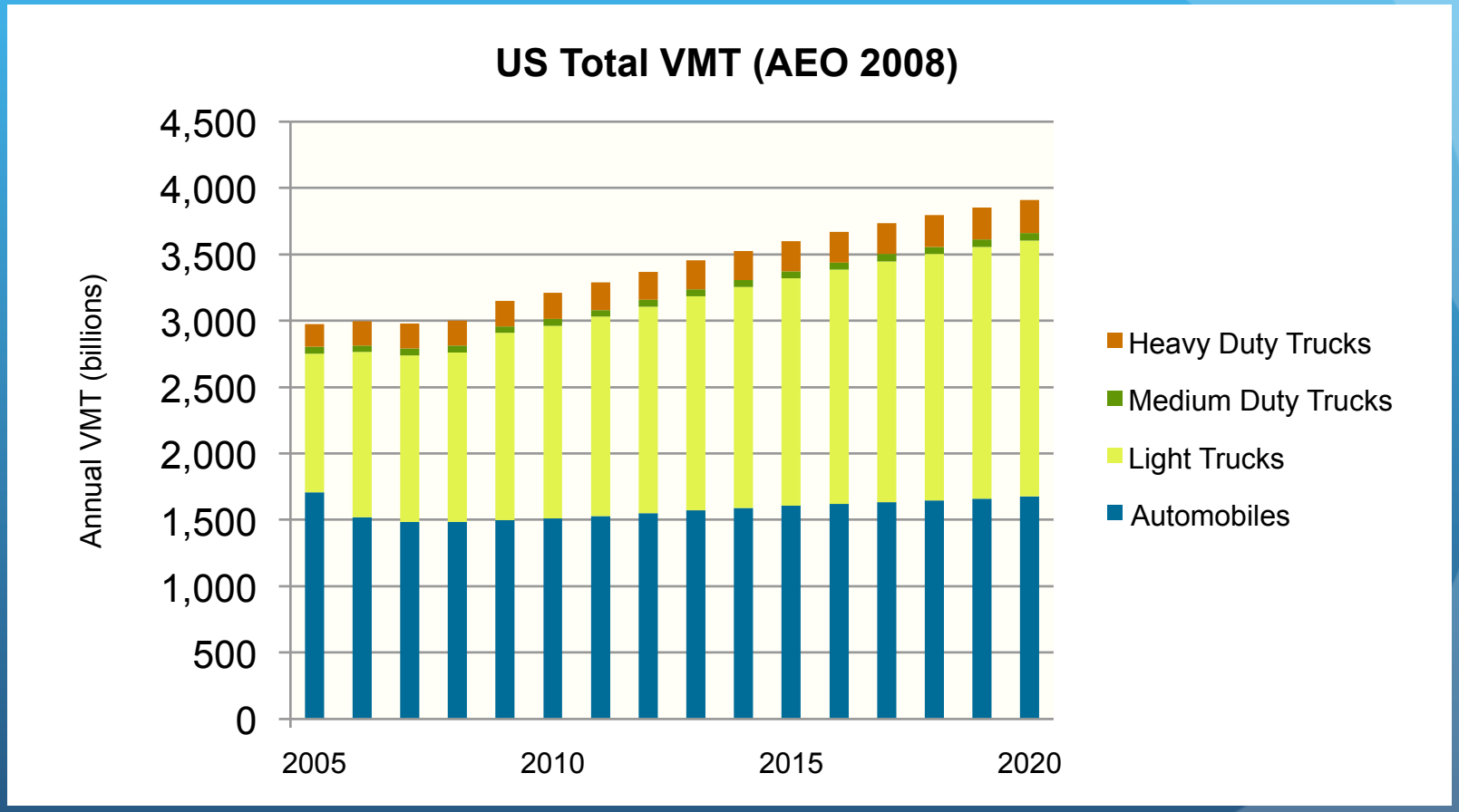
U.S. Transport Fuels Projection



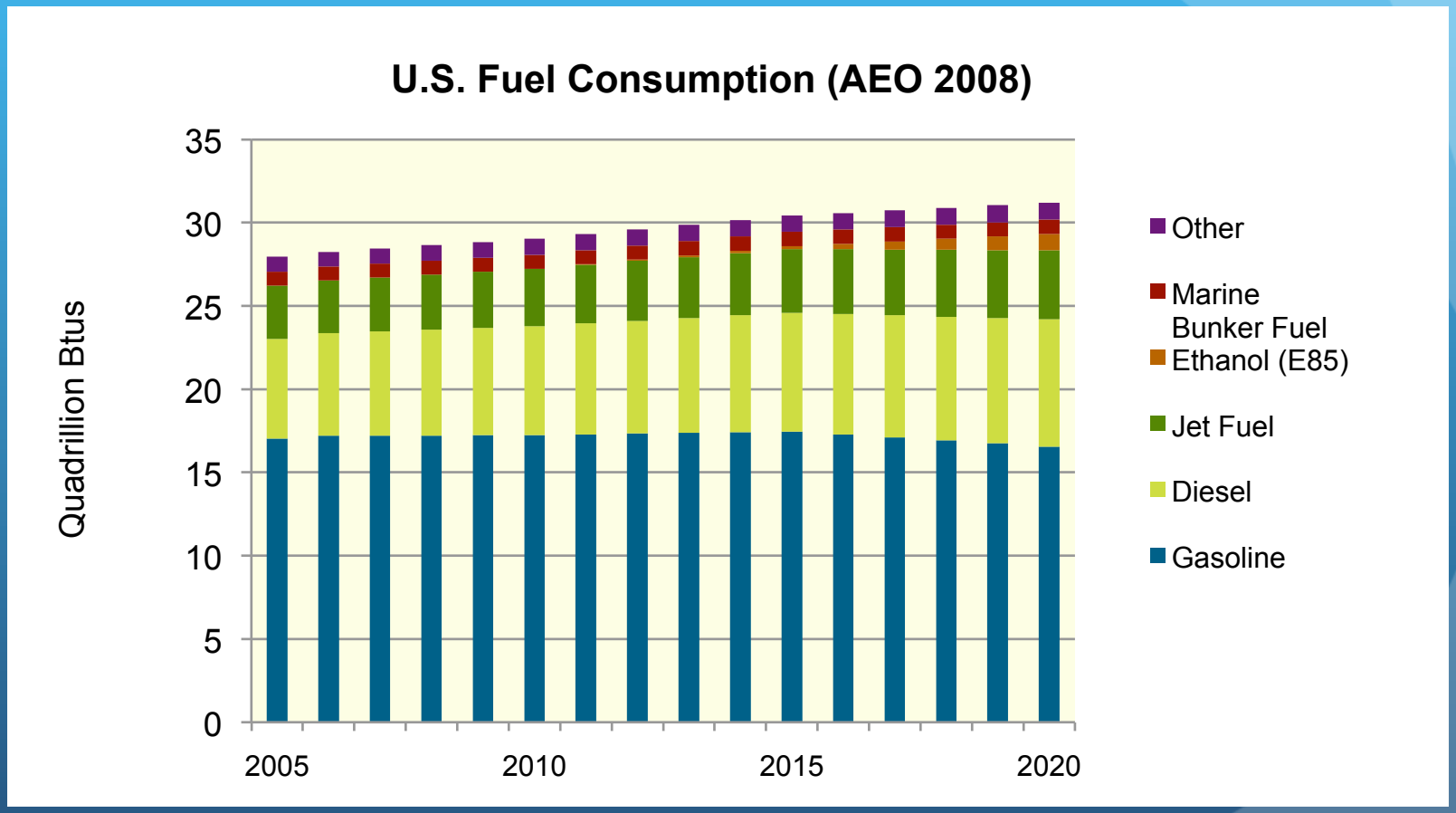
Effects of New CAFE Updates



Vehicle Miles Traveled Growth



Transport Fuel Use Growth



Federal Actions

- Energy Security and Independence Act
  - Lighting standards
  - Fuel standards
- New appliance and lighting standards
- CAFE and Tailpipe Standards
- Economic Recovery Act spending on energy efficiency, renewable energy
  - Building codes
- EPA Mandatory Reporting Rule

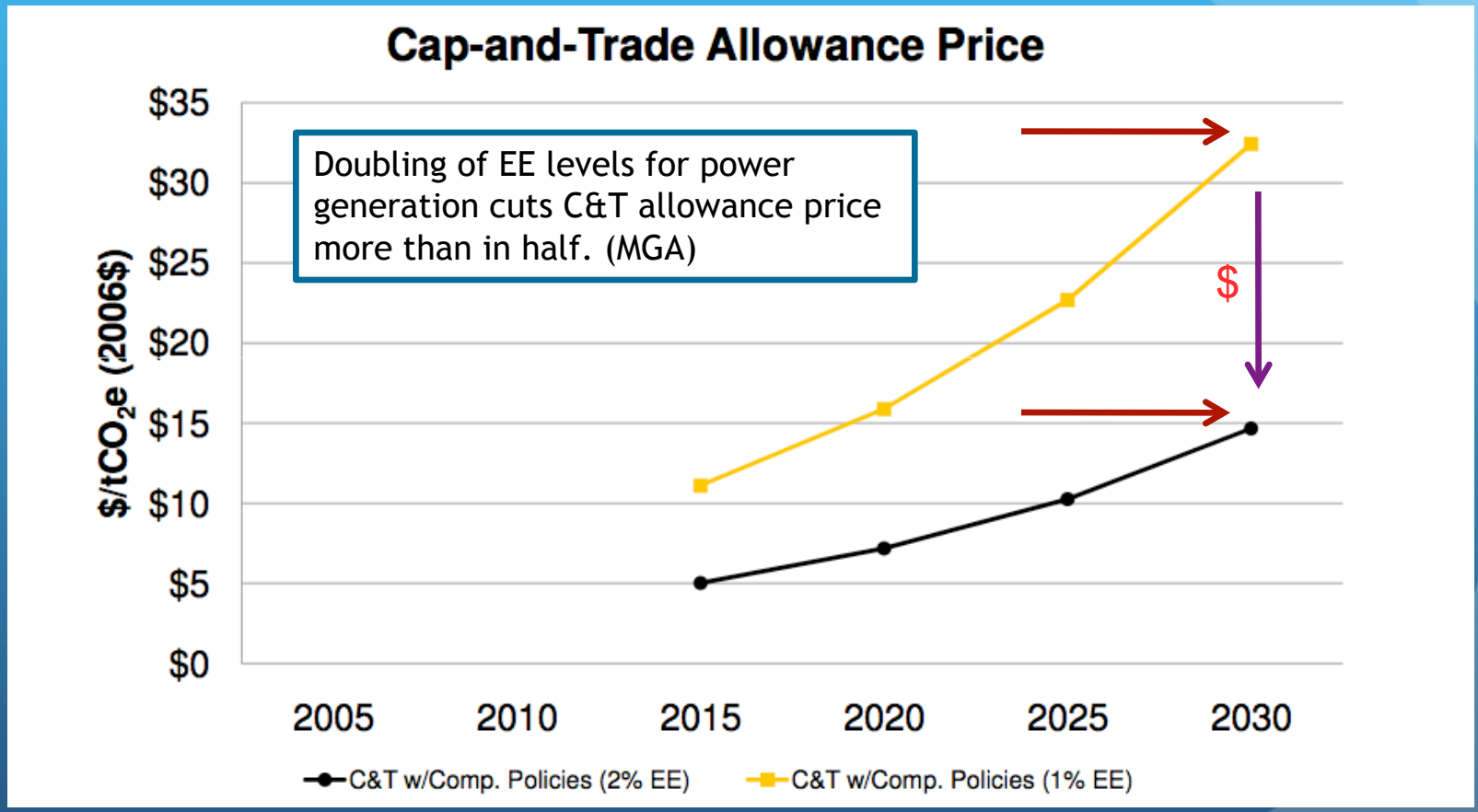
State Actions

- State Mitigation Plans: 32 developed or underway, new plans in KY, NY
- States Adaptation Plans: several in formative stages
- Renewable Energy: 29 state renewable standards
- Efficiency: 22 state efficiency standards, many new building codes
- VMT reduction: SB 375 and many other measures
- Binding State Targets: CA, CT, HI, MA, MD, NJ

U.S. State Plan Results (Sample)

State	Policy Options	Degree of Unanimity	Amount of GHG Reductions	Overall NPV Cost or Savings	Net Job Gain
AZ	49	92%	• 2000 level by 2020 • Half 2000 level by 2040	$5.5 billion savings 2007-2020	289,000
CA	n/a	n/a	• AB-32: 1990 level by 2020	AB-32 $4 billion savings	AB-32 83,000
CO	70	87%	• 37% below projected emissions by 2020	~$3 billion savings 2007-2020	Not assessed
FL	50	High	• 33% below 1990 level by 2025	$28 billion savings 2009-2025	148,000
MD	42	100%	• 25% below 2006 level by 2020	$2 billion savings 2008-2020	Not assessed
MN	46	83%	• 15% below 2005 level by 2015 • 30% below 2005 level by 2050	~$1.3 billion energy savings 2009-2025; $725 million cost	Not assessed
MT	54	98%	• 1990 level by 2020	$78 million savings 2007-2020	Not assessed
NC	56	85%	• 47% below projected emissions by 2020	$7.5 billion savings 2007-2020	15,000
NM	69	97%	• 2000 level by 2012 • 10% below 2000 level by 2020	$2.2 billion savings 2007-2020	Not assessed

EE Reduces Cost of Cap and Trade

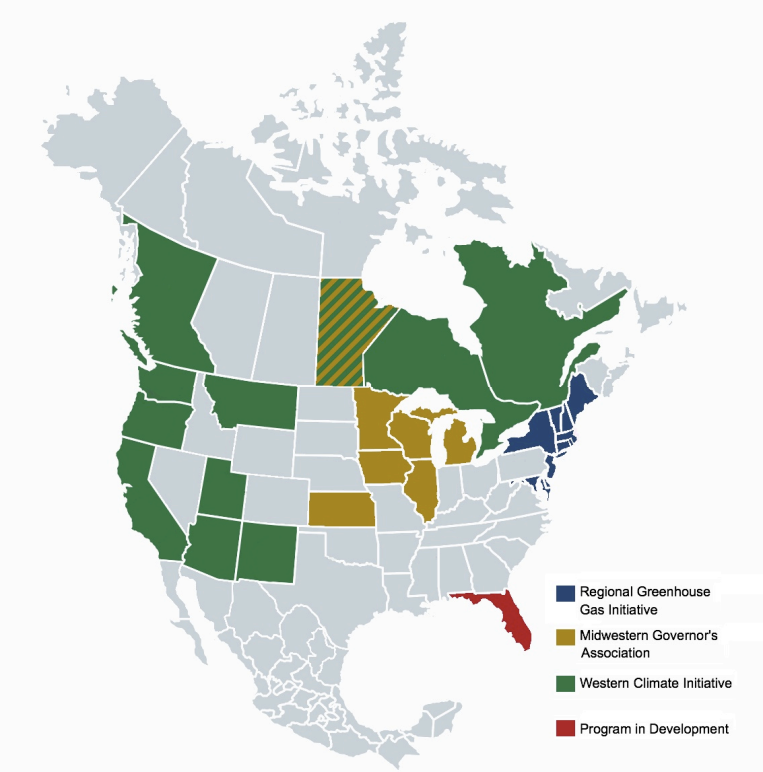


Cap and Trade

Efficiency Role

- Reduce demand for C&T allowances
- Reduce and control target attainment costs
- Remove non-price market barriers
- Integrate supply and demand side programs
- Recycle auction revenues

Regional Programs

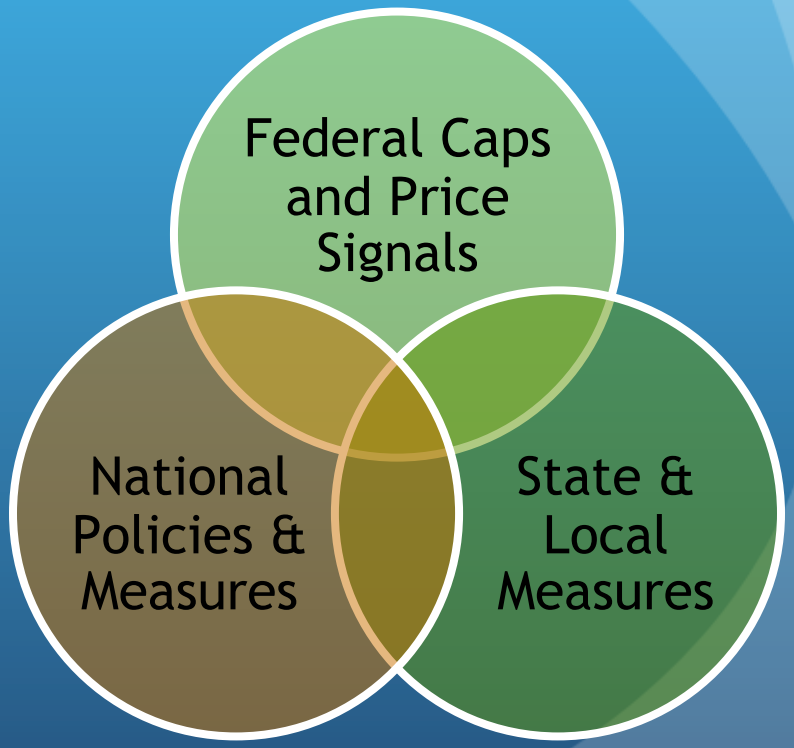


Comprehensive Climate Policy

Objectives

- ✓ Achieve GHG Targets
- ✓ Minimize Costs
- ✓ Maximize Savings
- ✓ Maximize Co-benefits
- ✓ Maximize Consensus
- ✓ Address Governance
- ✓ Integrate Policy Objectives

Tools



Task 1: New Policy Projections

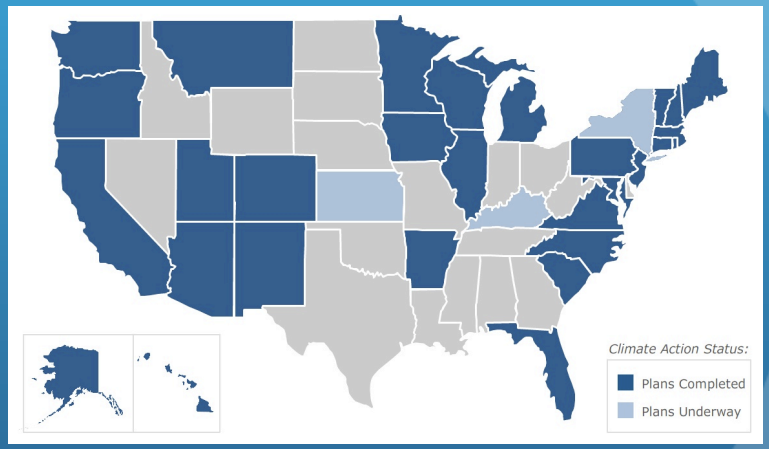
- 23 major policy option areas
  - Comprise 83 percent of total GHG impacts in plans
- 37 key geographic, demographic and economic factors and characteristics for each state or territory
  - Factors designed to reflect unique profile of each sector, each state and territory
- Applied to each state and territory determine the likely effect of new climate policy measures
  - Used weighted average approach

Task 1: State Actions Database

Contents

- 31 climate action plans completed or in progress
- Cover 2/3 of U.S. economy and population
- Cover ½ of US GHG emissions
- Cover all sectors, tools, levels of government
- Include cost effectiveness

Coverage



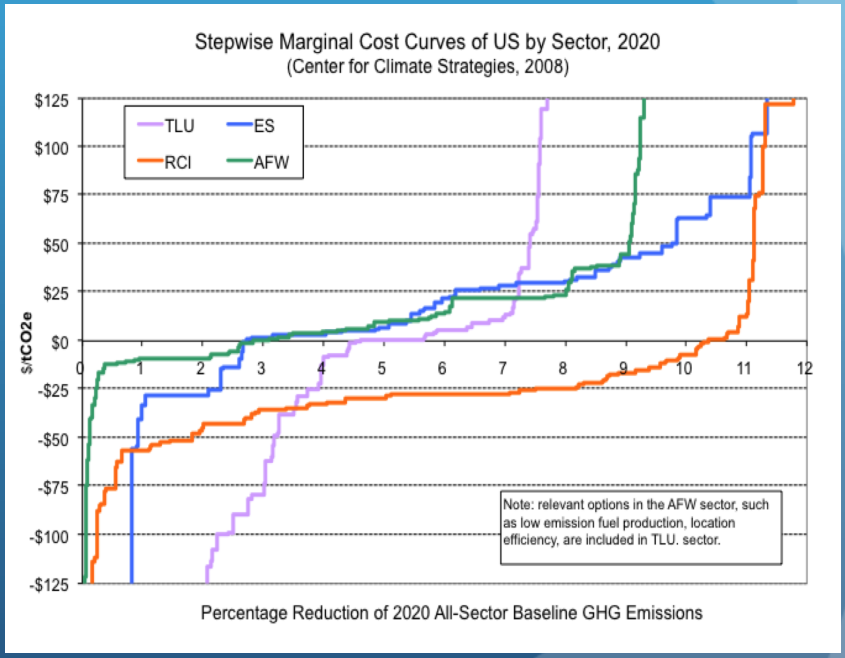
Task 1: State Actions Database

Key Action Areas

1. Transportation & Land Use (TLU)
   - Vehicle & Location Efficiency
   - Low Carbon Fuels
2. Energy Supply, Heat & Power (ES)
   - Renewable Energy
   - Advanced & Low Emitting Generation
3. Residential, Commercial, Industrial (RCI)
   - Energy Efficiency & Conservation,
   - Process Improvements
4. Agriculture, Forestry & Waste (AFW)
   - Land Protection
   - Renewable Energy
   - Conservation Practices

Quantified Results

Over 900 proposed policy options

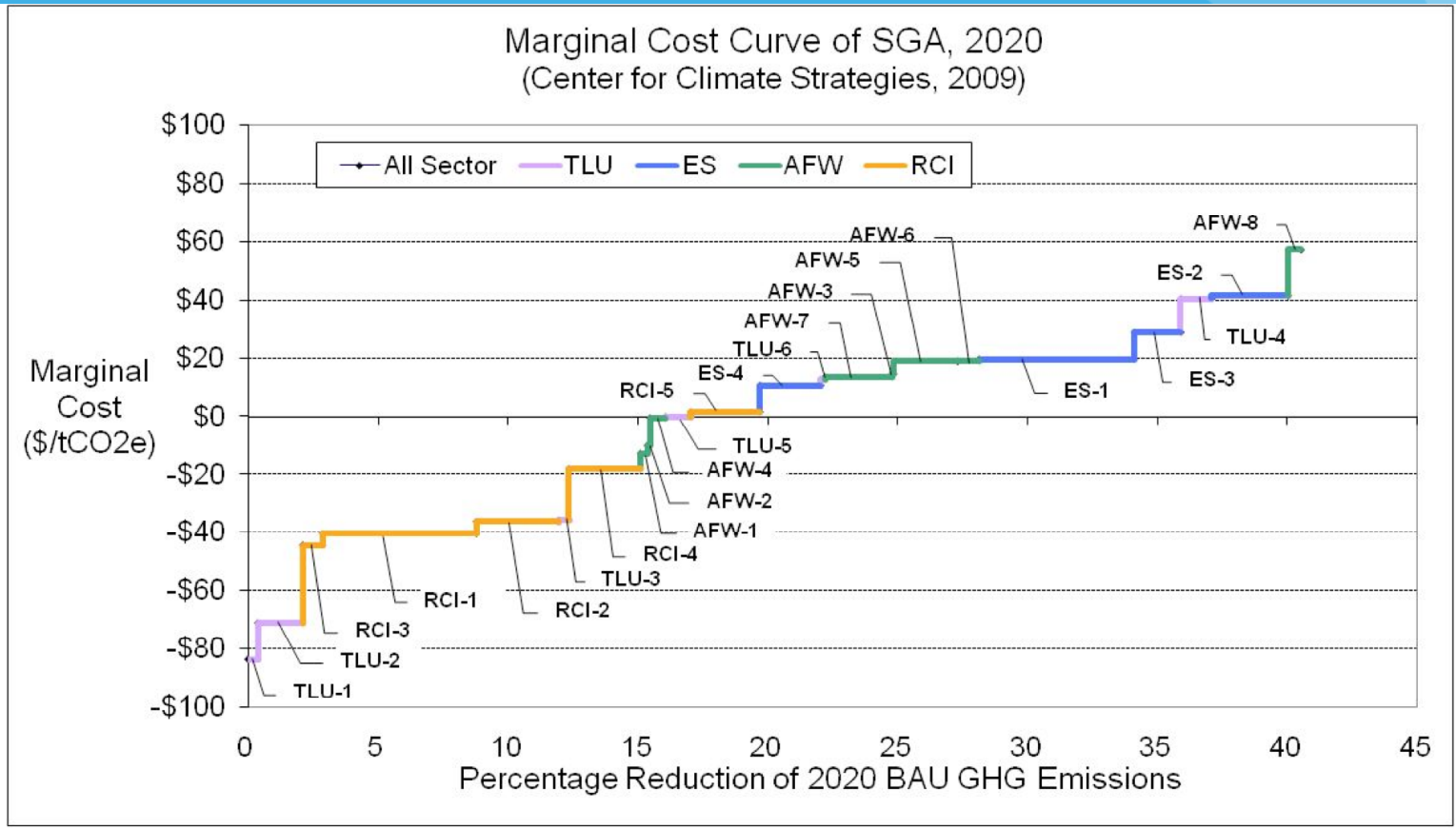


Analysis by CCS, 2009

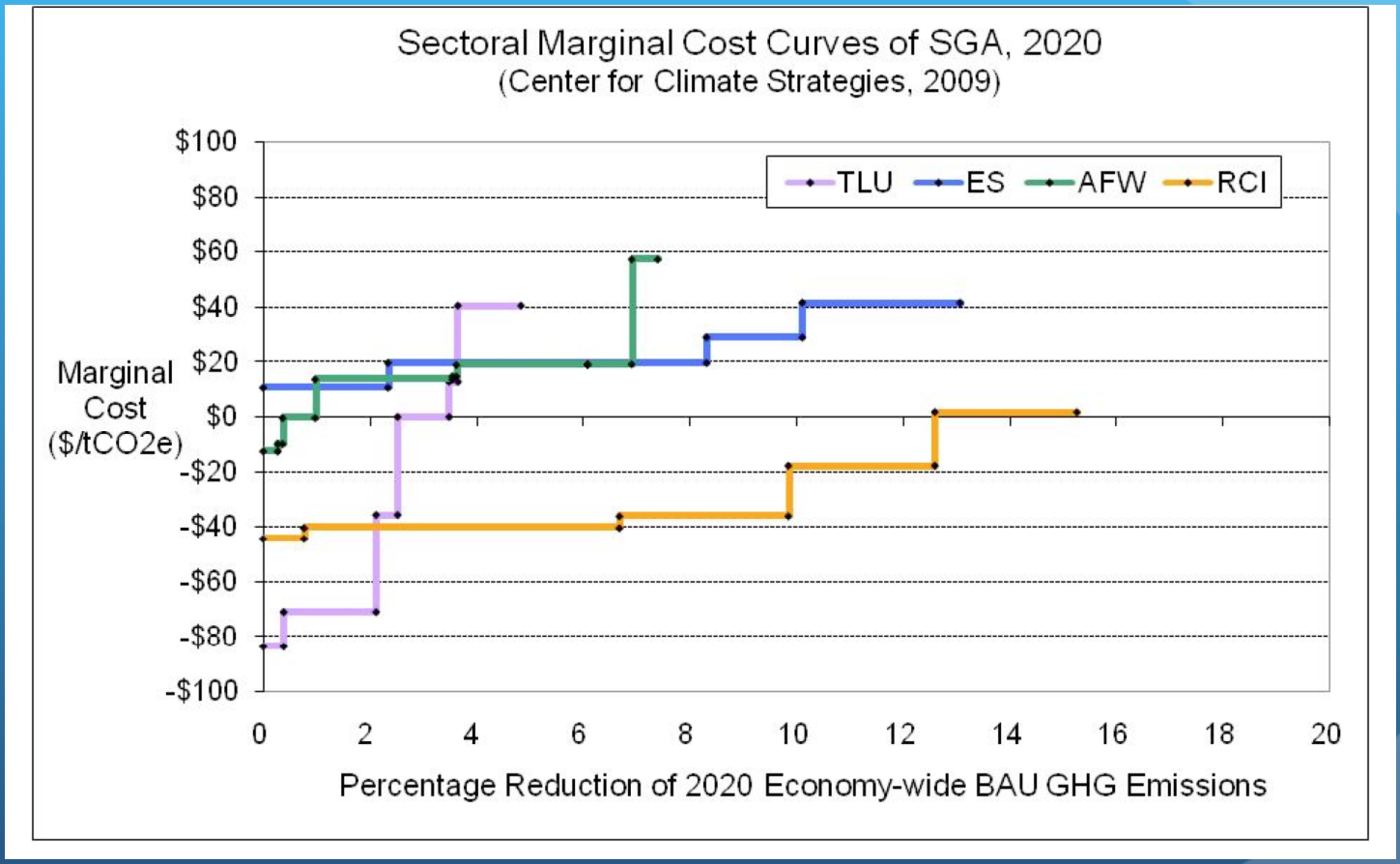
Task 1: SGA "Super" Options

Agriculture, Forestry and Waste (AFW)	Transportation and Land Use (TLU)	Residential, Commercial and Industrial (RCI)	Energy Supply/Heat and Power (ES)
• Forest Retention	• Smart Growth/Land Use	• Building Codes	• Coal Plant Efficiency Improvements and Repowering
• Urban Forestry	• Transit	• Demand Side Management Programs	• Renewable Portfolio Standard
• Reforestation/ Afforestation	• Renewable Fuel Standard (biofuels goals)	• High Performance Buildings	• Carbon Capture Storage and Reuse
• Soil Carbon Management	• Vehicle Purchase Incentives, including rebates	• Appliance standards	• Nuclear Power
• Nutrient Management	• Anti-Idling Technologies and Practices	• Combined Heat and Power	
• Manure - Anaerobic Digestion and Methane Use	• Mode Shift from Truck to Rail		
• Recycling of Municipal Solid Waste			
• Landfill Gas Management			

Task 1: Results – All Sectors



Task 1: Results – All Sectors



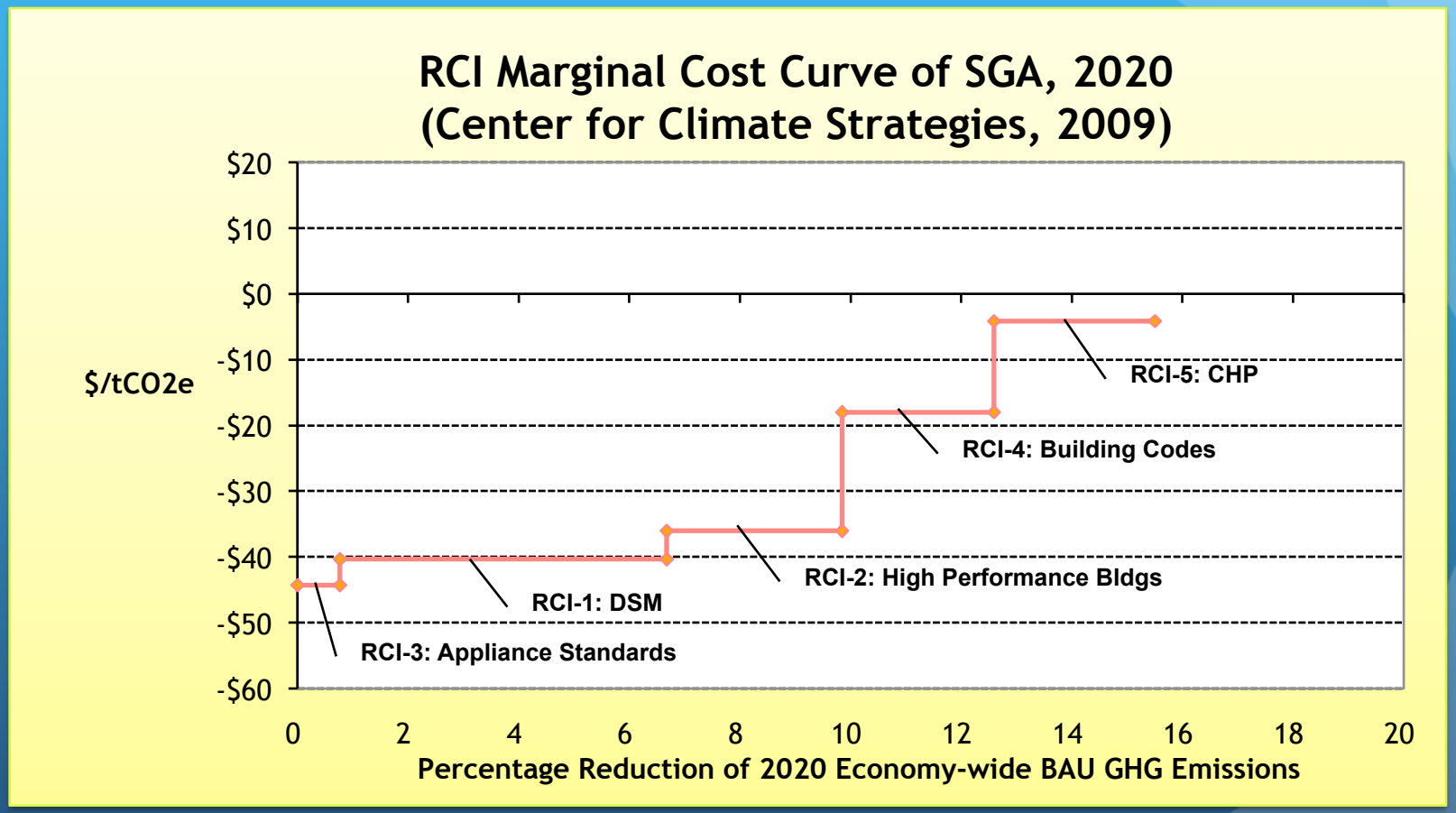
Task 1: Results (Net Savings)

Sector	"Super Options"	2020 Annual GHG Reduction Potential	Cost or Cost Savings per ton GHG Removed
TLU	Anti-Idling Technologies and Practices	13.13	-$82.22
RCI	Appliance standards	26.32	-$44.29
TLU	Vehicle Purchase Incentives, including rebates	54.44	-$41.36
RCI	Demand Side Management Programs	201.94	-$40.33
RCI	High Performance Buildings	108.33	-$36.05
TLU	Mode Shift from Truck to Rail	13.71	-$33.49
RCI	Building Codes	93.83	-$18.00
AFW	Soil Carbon Management	9.24	-$12.76
AFW	Nutrient Management	3.25	-$10.10
RCI	Combined heat and power	99.51	-$4.14
AFW	MSW Landfill Gas Management	20.81	-$0.42
TLU	Smart Growth	33.02	$0.00

Task 1: Results (Net Costs)

Sector	"Super Options"	2020 Annual GHG Reduction Potential	Cost Savings per ton GHG
ES	Coal Plant Efficiency Improvements and Repowering	80.04	$10.72
TLU	Transit	5.54	$12.72
AFW	Reforestation/Afforestation	87.89	$13.60
AFW	Livestock Manure - Anaerobic Digestion and Methane Utilization	2.53	$14.63
AFW	Enhanced Recycling of Municipal Solid Waste	84.03	$18.84
AFW	Forest Retention	28.22	$19.11
ES	Renewable Portfolio Standard	203.93	$19.62
ES	CCSR	61.45	$28.84
TLU	Renewable Fuel Standard (biofuels goals)	41.18	$36.20
ES	Nuclear	100.94	$41.55
AFW	Urban Forestry	16.75	$57.20

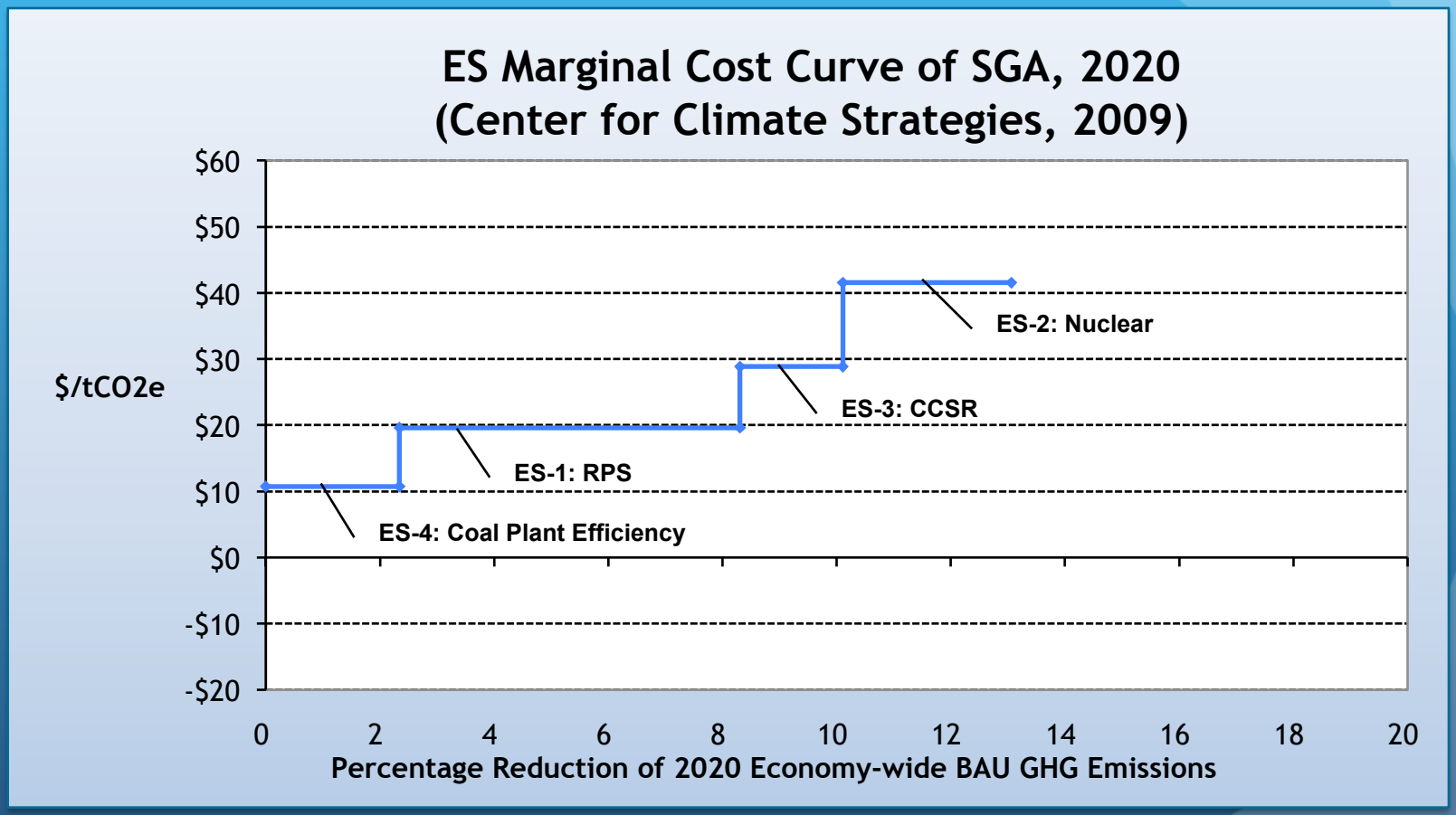
Task 1: RCI Cost Effectiveness



Task 1: RCI Cost Effectiveness

Sector	Policy Options	2020 GHGs Removed (MMtCO2e)	$/GHG Removed	GHGs Removed vs. 2020 Baseline Emissions	Cumulative GHGs Removed
RCI-3	Appliance standards	26.32	-$44.29	0.77%	0.77%
RCI-1	Demand Side Management Programs	201.94	-$40.33	5.91%	6.68%
RCI-2	High Performance Buildings	108.33	-$36.05	3.17%	9.85%
RCI-4	Building Codes	93.83	-$18.00	2.74%	12.59%
RCI-5	Combined heat and power	99.51	-$4.14	2.91%	15.50%

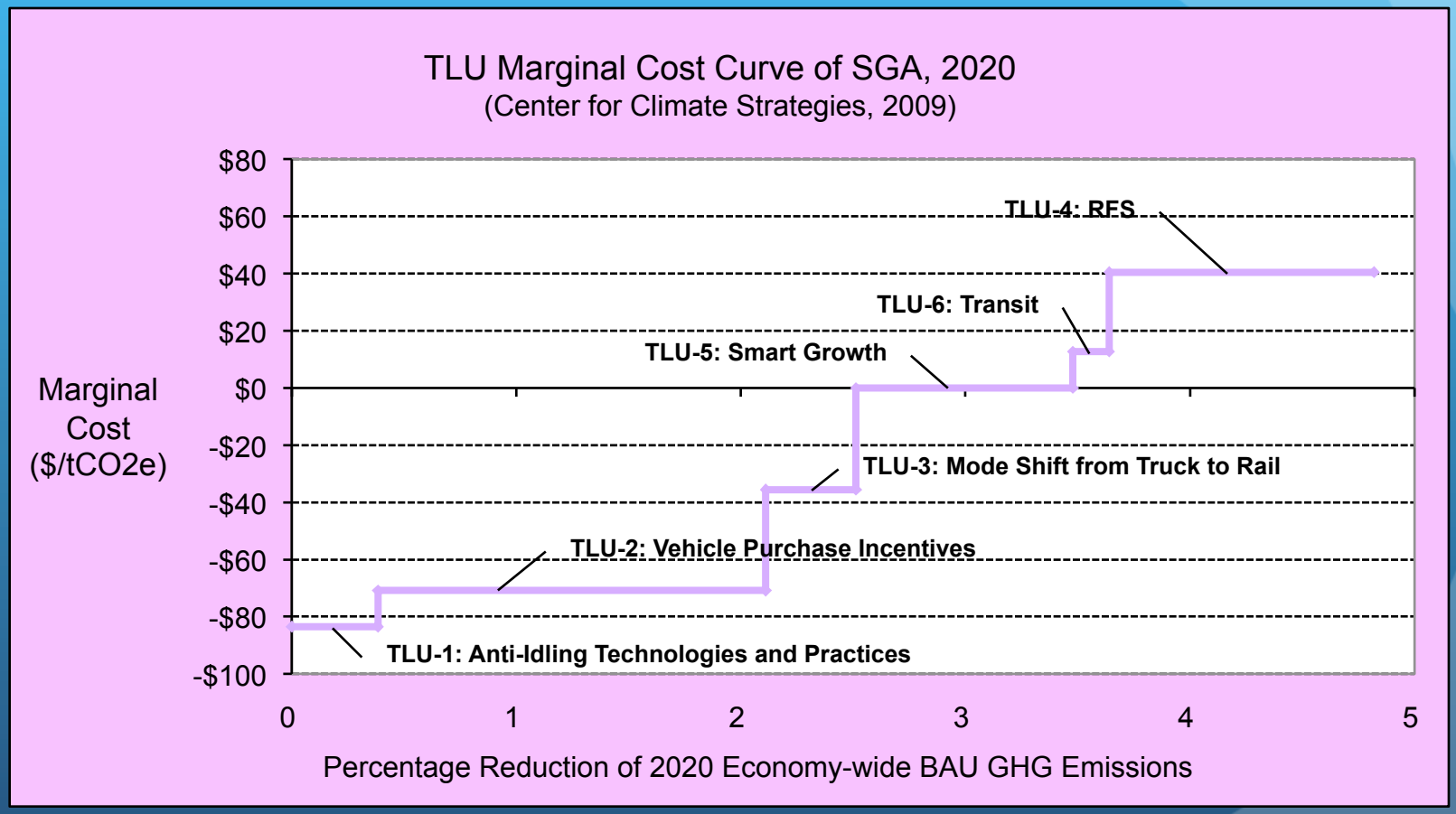
Task 1: ES Cost Effectiveness



Task 1: ES Cost Effectiveness

Sector	Policy Options	2020 GHGs Removed (MMtCO2e)	$/GHG Removed	GHGs Removed vs. 2020 Baseline Emissions	Cumulative GHGs Removed
ES-4	Coal Plant Efficiency and Repowering	80.04	$10.72	2.34%	2.34%
ES-1	Renewable Portfolio Standard	203.93	$19.62	5.97%	8.31%
ES-3	CCSR	61.45	$28.84	1.80%	10.10%
ES-2	Nuclear	100.94	$41.55	2.95%	13.06%

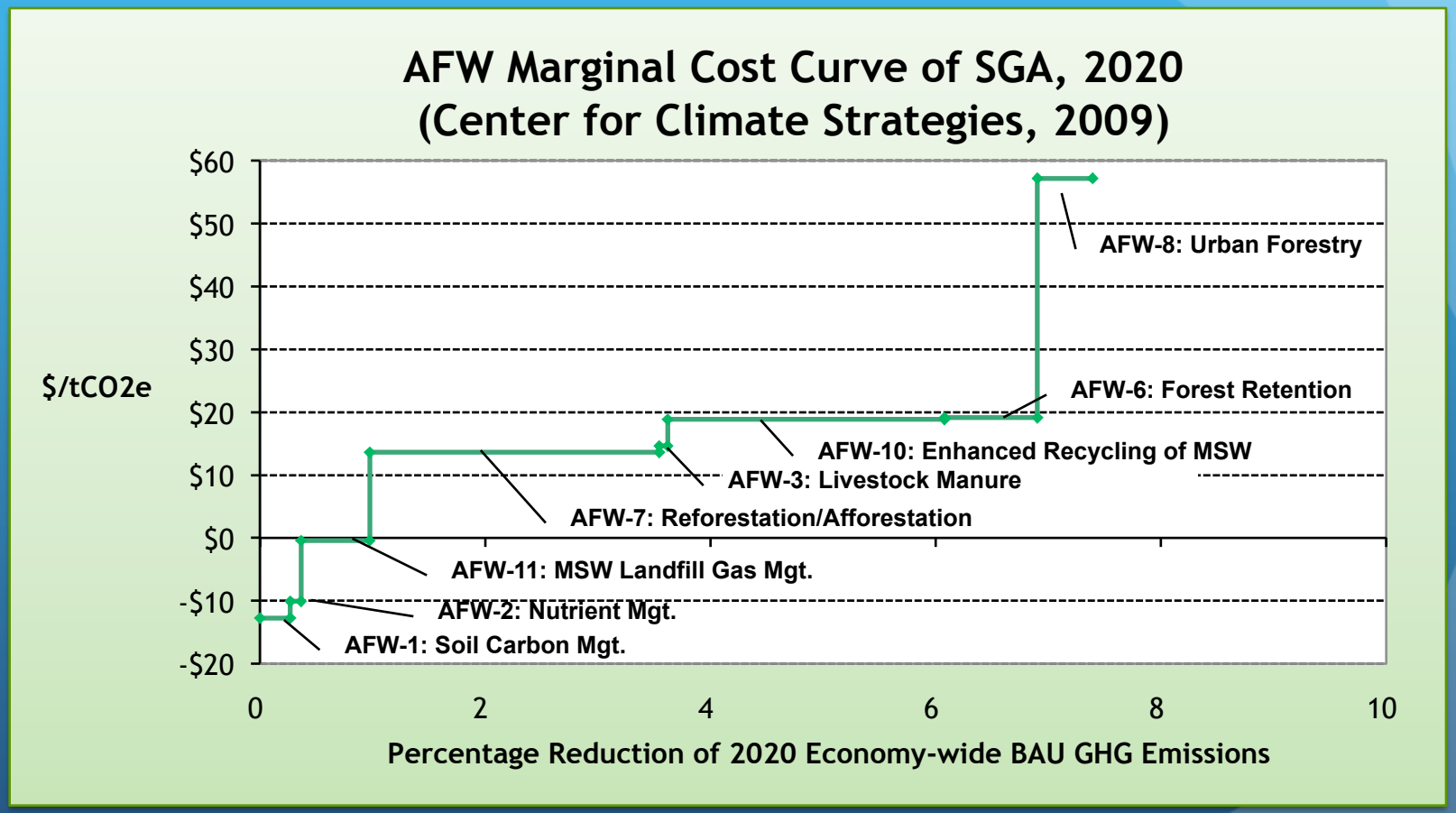
Task 1: TLU Cost Effectiveness



Task 1: TLU Cost Effectiveness

Sector	Transportation and Land Use Climate Mitigation Options	Estimated 2020 Annual GHG Reduction Potential ($MMtCO_2e$)	Estimated Cost or Cost Savings per Metric Ton of GHG Removed ($)
TLU -1	Anti-Idling Technologies and Practice	13.13	- $82.22
TLU-2	Vehicle Purchase Incentives, Including Rebates	54.44	- $41.36
TLU-3	Mode Shift From Truck to Rail	13.71	- $33.49
TLU-4	Renewable Fuel Standard (Biofuels Goals)	41.18	$36.20
TLU-5	Smart Growth/Land Use	33.02	$0.00
TLU-6	Transit	5.54	$12.72

Task 1: AFW Cost Effectiveness



Task 1: AFW Cost Effectiveness

Sector	Policy Options	2020 GHGs Removed (MMtCO2e)	$/GHG Removed	GHGs Removed vs. 2020 Baseline Emissions	Cumulative GHGs Removed
AFW-1	Soil Carbon Management	9.24	-$12.76	0.27%	0.27%
AFW-2	Nutrient Management	3.25	-$10.10	0.10%	0.37%
AFW-11	MSW Landfill Gas Management	20.81	-$0.42	0.61%	0.97%
AFW-7	Reforestation/Afforestation	87.89	$13.60	2.57%	3.55%
AFW-3	Manure Digestion and Methane Utilization	2.53	$14.63	0.07%	3.62%
AFW-10	Enhanced Recycling of Municipal Solid Waste	84.03	$18.84	2.46%	6.08%
AFW-6	Forest Retention	28.22	$19.11	0.83%	6.90%
AFW-8	Urban Forestry	16.75	$57.20	0.49%	7.39%

Task 2: Economic Studies

Task 2: Review of Policy Studies

- Compile independent studies on economics of potential climate action in the SGA region
- Focus on microeconomic and macroeconomic impacts
- Profile key factors used in study design and analysis
- Identify and test effects of key factors on end results
- Summarize and compare differences between end results based on key factors

Task 2: Study Review

- Purpose: Identify factors that affect economic results
  - Informal analysis (expert survey and review)
  - Formal statistical method (meta-analysis)
- Value: Use the analysis to chose and design policies
  - Minimize factors that dampen the economy or lead to high costs
  - Maximize factors that stimulate the economy or reduce costs, provide savings
  - Understand the role and value of co-benefits in policy selection and design

Task 2: Types of Economic Studies

Microeconomic

- Also known as "direct effects," or "cost-effectiveness"
- Typically focus on specific, individual policy actions
- May not include effects of policy tools, stakeholder views

Macroeconomic

- Typically focused on jobs, income, economic growth
- May focus on specific sectors and policy actions
- May also include impacts on specific demographic groups

Study design and transparency varies significantly

Task 2: Microeconomic Factors

Key factors that affect cost/savings estimates:

1. Mix of policy actions
   - Which sectors, action types
2. Design specifications
   - Timing, level of effort, coverage
3. Policy instrument
   - Price vs. non price mechanisms
4. Specifications for analysis
   - Data sources
   - Methods
   - Assumptions

Task 2: Microeconomic Findings

- Studies using static and worst case assumptions, or older data sources, generally show higher costs.
- Studies using more dynamic methods, better case assumptions, and newer data sources generally show lower costs.
- Stakeholder and technical work group participation in analysis significantly affects these choices and results.

Task 2: Macroeconomic Impacts

- Complex question
  - Not just on-site jobs
  - May stimulate jobs in other sectors
  - May displace jobs in other sectors
- Dozens of recent studies
  - -4% to +3% change in GSP
  - Variety of data, assumptions & models
- Why do they reach different conclusions?

Task 2: Macroeconomic Factors

- Results of meta-analysis and key factors on estimates
  - Primary driver:
    - Microeconomic cost inputs
  - Secondary drivers:
    - Cost or savings pass through
    - Macroeconomic linkages
    - Assumptions on economic efficiency, technology change
    - Data sources
    - Model type
    - Characteristics of a state or region

Task 2: Macroeconomic Linkages

- How individual businesses interact and add up to the sectoral or market level
- How sectors/markets interact to the economy-wide level
- How the supply of labor and capital interacts with the demand in factor markets
- How the supply and demand for goods and services interacts through product markets
- How some income payments translate into consumer expenditures
- How some income payments and business profits result in savings and then investment
- How some income payments and business profits result in government revenues
- What shapes government expenditures
- What shapes imports and exports

Task 2: Macroeconomic Findings

- Higher microeconomic cost inputs generally show higher negative impacts on jobs, income and economic growth.
- However, high microeconomic costs may lead to positive offsets where multiplier effects are stronger for new versus old spending areas (e.g. alternative or indigenous energy).
- Low costs or cost savings (e.g. energy efficiency) may reduce jobs and income producing activity in other sectors, but this effect will likely be offset by increased purchasing power and overall expansion in investment from increased savings from within the state and an inflow from the outside.
- A rapid pace of technological change will improve the impacts.

Task 2: Study Review Conclusions

- The outcome of climate policy is not predestined, but can be shaped by choice of options, design
- Strategies to minimize costs and maximize value:
  - Use the least-cost, highest co-benefit policy mix
  - Focus on alternative and indigenous energy supply
  - Focus on long term competitive advantage
  - Minimize displacement/substitution
  - Minimize transaction costs & market obstacles