



Policy Maker Summary

Economic Impacts of Comprehensive Climate and Energy Policy: National Climate Change Stakeholder Recommendations and U.S. Senate Proposals Would Advance Economy and Employment

April 26, 2010

A new state of the art macroeconomic study by the Center for Climate Strategies (CCS), using extensive microeconomic analysis combined with the Regional Economic Models, Inc. (REMI) Policy Insight Plus (PI⁺) macroeconomic model, documents the reductions in household energy prices and greenhouse gases (GHGs), as well as the expansion of jobs, income and Gross Domestic Product (GDP), that would result from local, state and federal implementation of 23 important energy, transportation and natural resource policies designed to achieve national GHG targets and co-benefits.

These actions and supporting assessments were proposed by over 1,500 stakeholders and technical work group experts appointed by governors and state legislatures in 16 states to address climate, energy and economic needs through comprehensive, fact-based, consensus-driven, climate action planning processes conducted over the past five years.

Findings show national improvements of:

- 2.5 million net new jobs in 2020 and a \$134.3 billion expansion in GDP in 2020;
- Over \$5 billion net direct economic savings in 2020, at an average net savings of \$1.57 per ton of GHG emissions avoided or removed;
- Consumer energy price reductions of 0.56% for gasoline and oil; 0.60% for fuel oil and coal; 2.01% for electricity; and 0.87% for natural gas by 2020;

The results from the 16 state climate action plans were updated to account for recent federal and state actions, the effects of the recession, and more recent fuel price projections. Policy action results for the remaining 34 states were custom projected using 37 state and sector-specific characterizing factors and a method that estimates the scaled effects of state-level implementation and performance of each of the 23 policies.

Assuming full and appropriately scaled implementation of all 23 actions in all U.S. states, the resulting GHG reductions would surpass national GHG targets proposed by President Obama and congressional legislation, and would reduce U.S. emissions to 27 percent below 1990 levels in 2020, equal to 4.46 billion metric tons of carbon dioxide equivalent (BMtCO_{2e}).

The study also examined the effects of using a cap-and-trade program applied to the electricity generation and industrial sectors, and a transportation fuel fee. It was assumed that 100 percent of cap-and-trade allowances will be auctioned, and that 75 percent of the auction and transportation fuel fee revenue returned back to consumers and 25 percent invested in technology improvement in clean/renewable energy and energy efficiency.

If full and appropriately scaled implementation of all 23 actions in all U.S. states is coupled with a Senate proposed cap-and-trade program and transportation fuel fee, national improvements are expected to include:

- 2.8 million net new jobs in 2020 and \$154.7 billion expansion in GDP in 2020;
- Over \$5 billion net economic savings in 2020, at an average of \$1.57 net savings per ton GHG emissions removed;
- Consumer energy price increases of 0.67% for gasoline and 0.15% for electricity; and price reductions of 0.13% for natural gas by 2020;
- \$38.4 billion in new government revenues, including \$13.1 billion in new transportation fuel fee revenue and \$25.3 billion in cap-and-trade allowance auction revenue (prior to recycling to consumers and investment in energy technology).

If all 23 actions are implemented at a more modest level, scaled to the recently proposed congressional targets (17 percent below 2005 levels in 2020, or equal to 5.98 BMtCO₂e), and combined with a cap-and-trade program and transportation fuel fee described above, national improvements are expected to include:

- 1.8 million net new jobs in 2020 and \$107.6 billion expansion in GDP in 2020;
- Over \$2.7 billion net economic savings in 2020, at an average of \$1.57 net savings per ton GHG emissions removed;
- Consumer energy price increases of 1.02% for gasoline, 2.02% for electricity; and 0.54% for natural gas by 2020;
- \$44.7 billion in new government revenues, including \$14.8 billion in new transportation fuel fee revenues and \$30 billion in cap-and-trade allowance revenues; the analysis assumed that 75 percent of these new revenues are recycled back to consumers and 25 percent to investment in technology advancement.

Recommended actions included policies and measures in all sectors, at all levels of government (under a national framework), and a variety of specific matching policy instruments needed for achieving GHG targets, economic and energy benefits. For instance, policy tools for the 23 actions include targeted funding support, tax incentives, price incentives, reform of codes and standards, technical assistance, information and education, reporting and disclosure, and voluntary or negotiated agreements.

Analysis also shows the importance of integrating local, state and federal actions, as well as policy instruments, to minimize costs and maximize co-benefits. For example:

- 38 percent of total potential emissions reductions can be achieved through measures under shared federal and state jurisdiction;

- 31 percent of potential emissions reductions can be achieved through measures primarily under state jurisdiction;
- 31 percent of potential emissions reductions can be achieved through measures primarily under local or shared local/state jurisdiction.

The study underscores the strategic benefits of comprehensive approaches to managing GHG emissions, the need for a national framework to support a balanced portfolio of actions, and the importance of stakeholder involvement in policy development and management of the economy.

The 16 states on whose climate plans the work is based are: Alaska, Arkansas, Arizona, Colorado, Florida, Iowa, Maryland, Michigan, Minnesota, Montana, New Mexico, North Carolina, Pennsylvania, South Carolina, Vermont, and Washington.

Table 1. Summary of GHG Reductions, Directs Costs/Savings, and Macroeconomic Results

Scenario	2020 GHG Reductions (BMtCO _{2e}) ^a	2020 Direct Net Cost (\$Billion) ^b	2020 Net New Jobs (\$Million)	2020 GDP Impact (\$Billion)	Total 2020 New Gov't Revenue ^c (\$Billion)
23 Stakeholder Policy Recommendations at full implementation	3.2	-\$5.1	2.52	\$134.3	NA
23 Stakeholder Policy Recommendations, Full Implementation, plus Cap-and-Trade & Transportation fuel fee	3.2	-\$5.1	2.81	\$154.7	\$38.4
23 Stakeholder Policy Recommendations at Congressional Economy-Wide Target levels, plus Cap-and-Trade & trans. fuel fee	1.7	-\$2.7	1.84	\$107.6	\$44.7

^a Reductions from estimated business-as-usual 2020 baseline emissions of 7.7 BMtCO_{2e}; BMtCO_{2e} = billion metric tons of carbon dioxide equivalent.

^b Negative numbers indicate net savings, positive numbers indicate net costs.

^c Direct revenues from Cap-and-Trade program allowance sales and transportation taxes, not including use or distribution of revenues.

Key Findings

- Carefully selected and designed sector-based GHG reduction policies can result in net positive outcomes for employment, income, and Gross Domestic Product.
- *Comprehensive approaches* that draw upon the best choices in all sectors, all levels of government, and all applicable policy instruments can attain GHG targets while minimizing costs and maximizing co-benefits.
- In the view of stakeholders, no single policy or tool can achieve the desired GHG reductions needed to meet GHG targets and simultaneously meet economic, energy and environmental objectives.
- State Climate Action Plans have demonstrated that the specifics of policy design and implementation; i.e., stringency, coverage, timing, implementation tools, and other factors, can dramatically affect the performance of individual policies.
- Applying 23 policies recommended by state-stakeholders for climate, energy, transportation, and resource actions all 50 states through combined federal, state and local approaches would yield national economic benefits.
- Most state stakeholder-recommended climate and energy actions will have net positive impacts to the economy and employment, but some, while substantially reducing GHGs, will have net negative impacts.
- Federal preemption of these policies through state programs could impede some of the nations' most cost-effective and job-creating actions.
- Federal, state and local jurisdictions must be partners to capture the efficiencies of comprehensive policy. The broadest jurisdictional reach rests with the states.
- Locally and regionally derived policies can be translated to action in all 50 states, but require a national framework for full implementation.
- The two most significant barriers to full implementation of climate and energy policies are adequate investment and authority at the program level.
- If caps and taxes are combined with appropriate sector based policies and measures, their cost will be lower and their co-benefits will be higher.
- Auctions of allowances and taxes/fees in key sectors will have negative impacts on economic performance if funds are not recycled effectively. However, reinvestment to targeted support for consumers and key industries can significantly reverse these impacts.
- Emissions caps can provide certainty for achieving emissions reduction targets and raise revenue.
- Policy strategies applicable to the next decade must be combined with longer term policies to address future decades, and provide an important transition.

Figure 1. State Government and Shared Responsibility for GHG Reductions

**2020 Stakeholder Implementation
 Potential GHG Emissions Reductions
 by Jurisdiction**
 Center for Climate Strategies, 2010

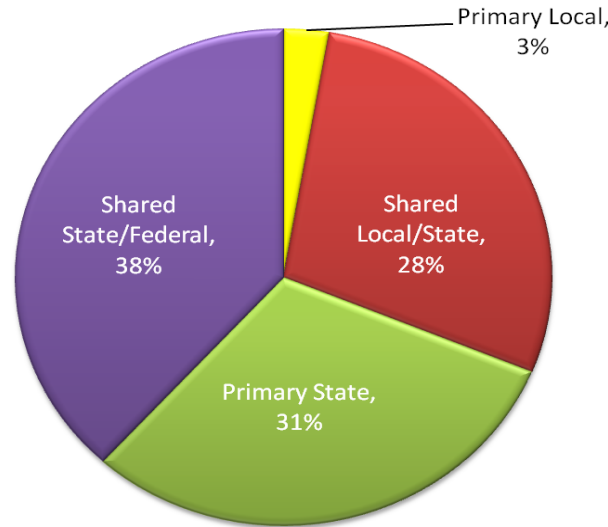
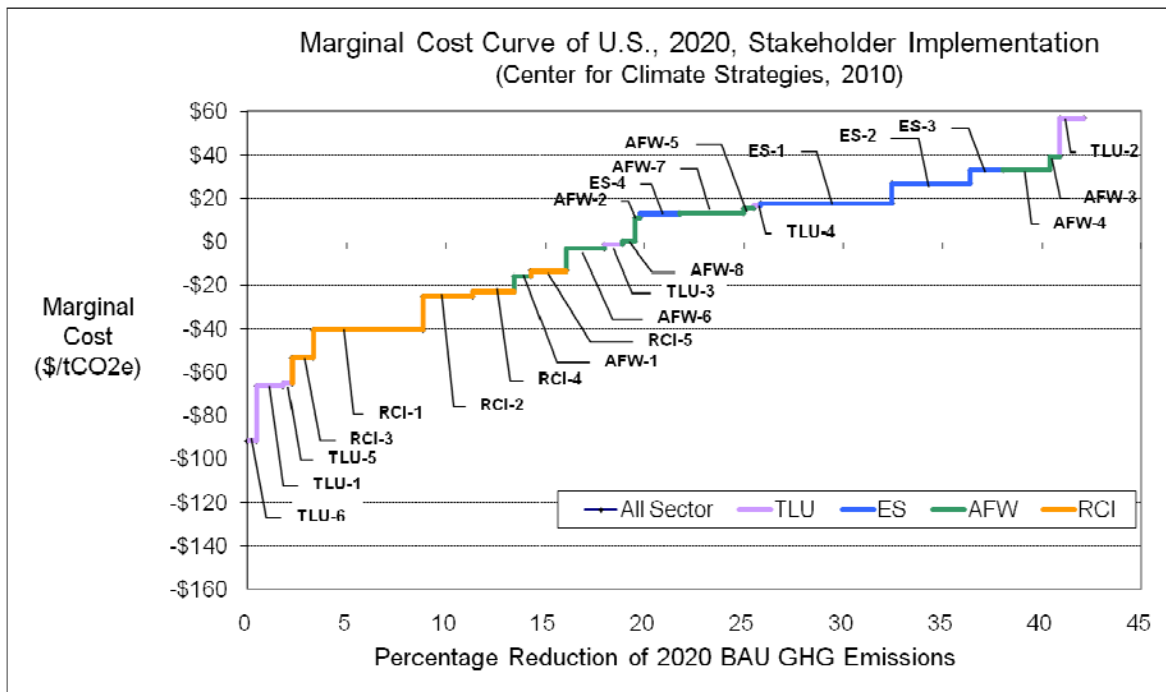


Figure 2. Cost Curve for 23 Stakeholder-Selected Policies and Measures



MMtCO₂e = million metric tons carbon dioxide equivalent; GHG = greenhouse gases; BAU = business as usual (no action to reduce emissions) Table 2, below, lists the sector options: TLU = Transportation & Land Use; ES = Energy Supply; AFW = Agriculture, Forestry and Waste Management; RCI = Residential, Commercial and Industrial [buildings and energy/fuel use]

Figure 3. GHG Reduction Potential of Stakeholder Options by Sector

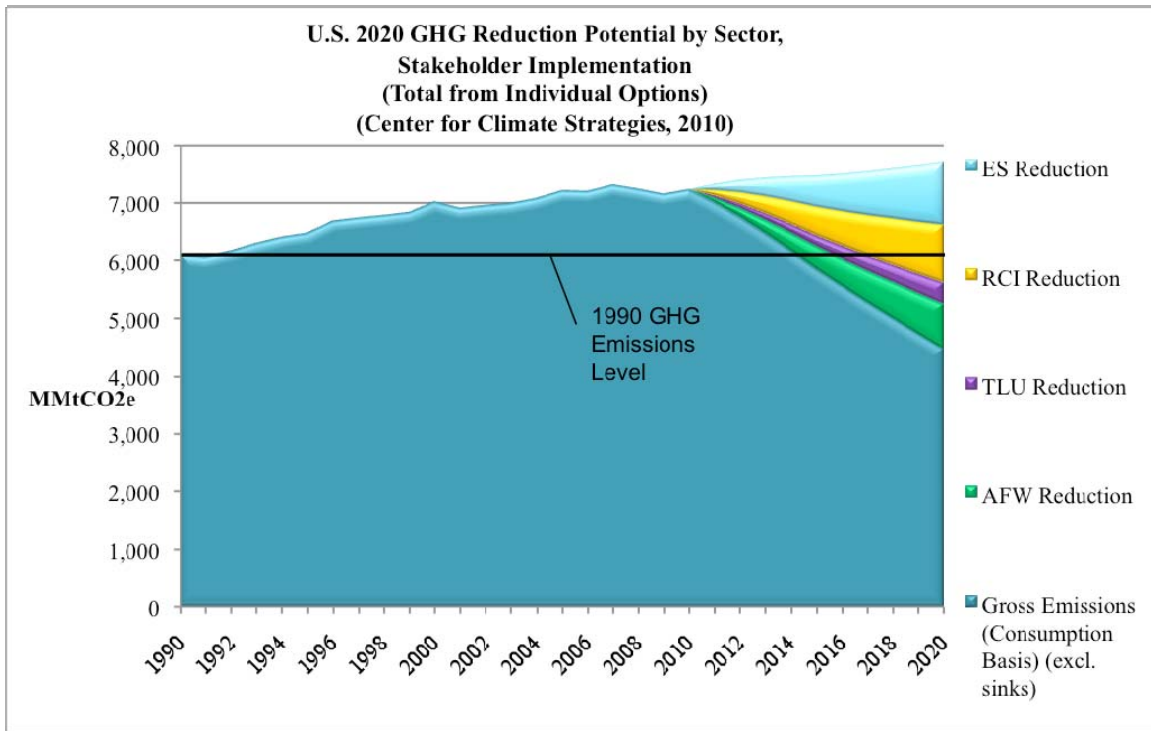
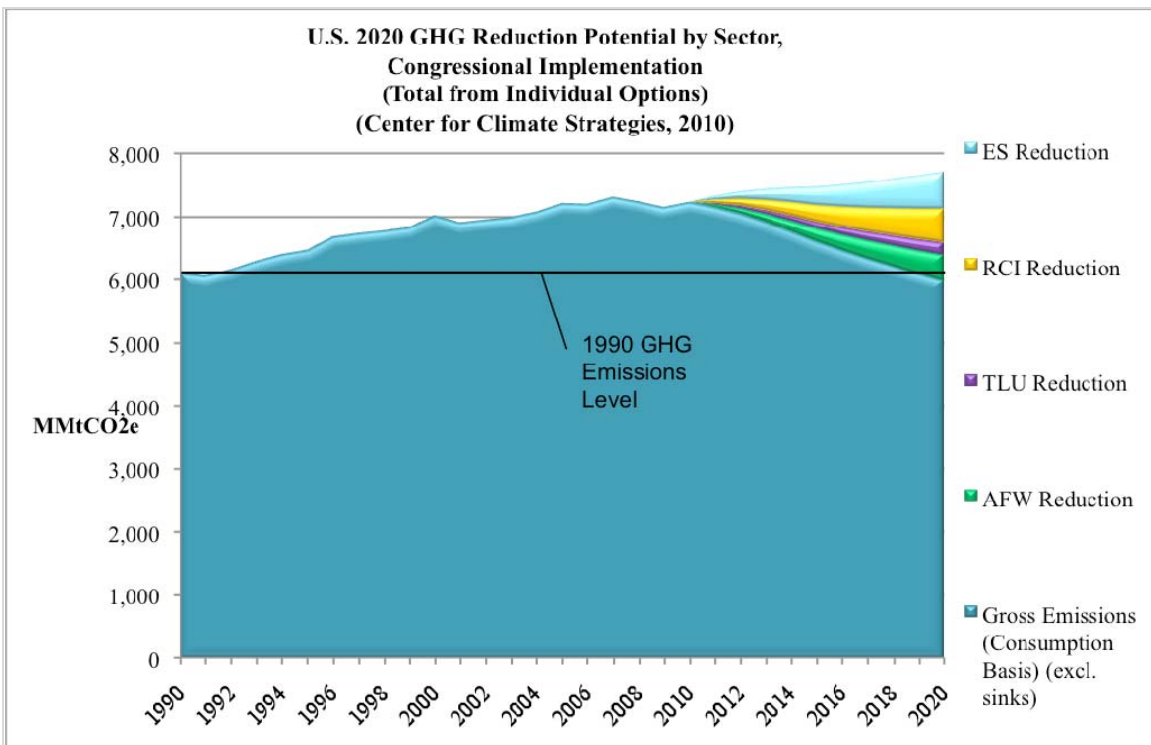


Figure 4. Stakeholder Policies Scaled to Achieve Congressional GHG Target



MMtCO₂e = million metric tons carbon dioxide equivalent; GHG = greenhouse gases;
 ES = Energy Supply; RCI = Residential, Commercial and Industrial [buildings and energy/fuel use];
 TLU = Transportation & Land Use; AFW = Agriculture, Forestry and Waste Management

Figure 5. GHG Reduction Potential of Stakeholder Policies by Level of Government

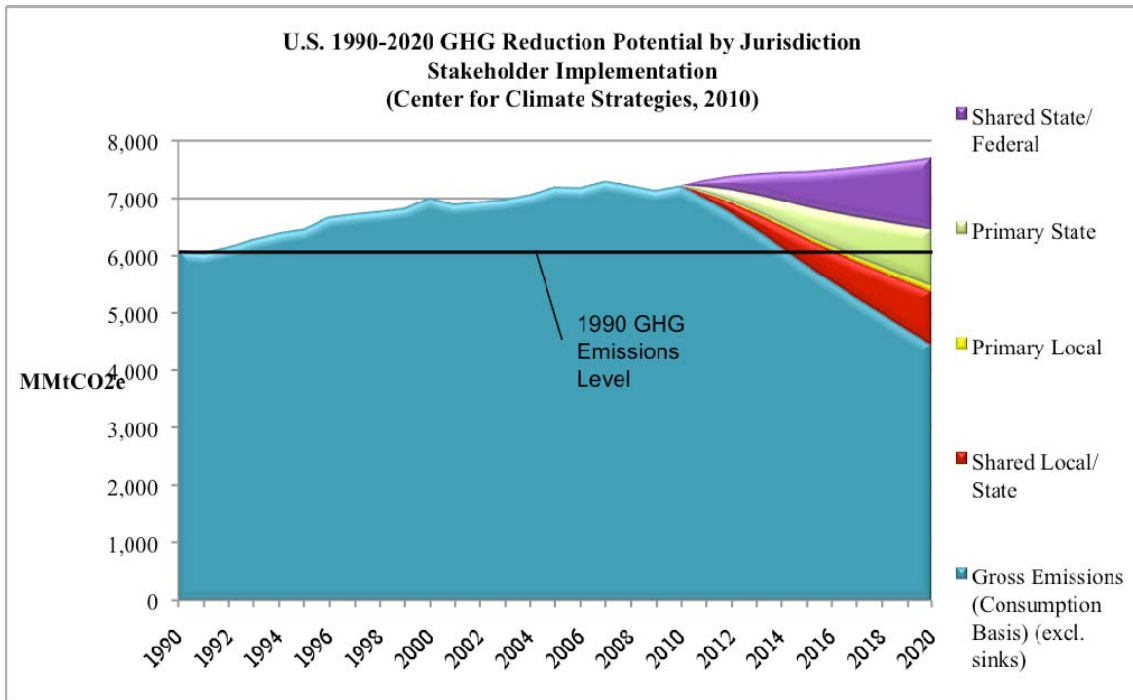
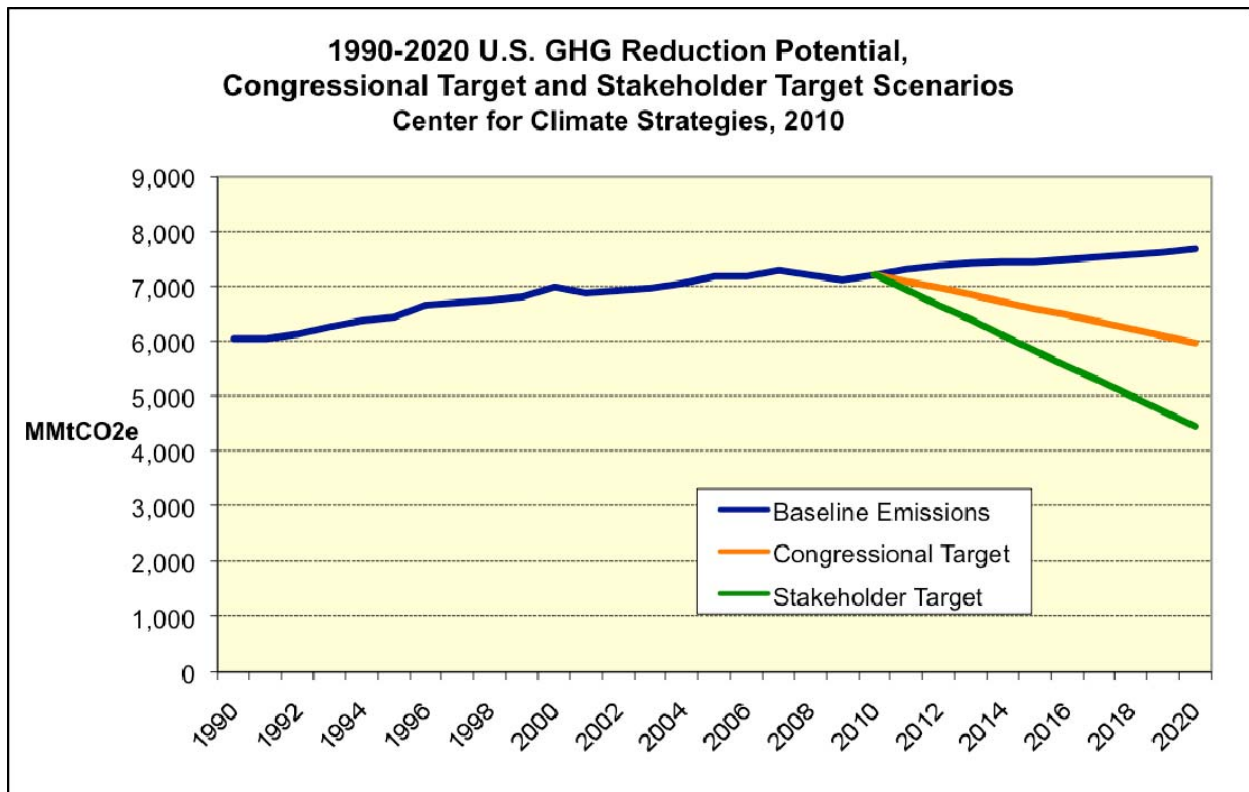


Figure 6. GHG Reductions – Stakeholder and Congressional Target Scenarios



GHG = greenhouse gases; MMtCO_{2e} = million metric tons carbon dioxide equivalent

**REMI Results on Consumer Energy Prices for Year 2020
(Percent Price Change from Baseline Level)**

Table 2. Scenario 1: Stakeholder Target Only

	Mitigation Activities (Full implementation of the 23 super options)
Gasoline	-0.56%
Electricity	-2.01%
Natural Gas	-0.87%

Table 3. Scenario 2: Stakeholder Target + C&T + Transportation Fuel Fee

	Mitigation Activities (full implementation of the 23 super options)	Allowance Purchases from Auction	Fuel Fee Payments	Auction/Fee Revenue Recycling — Households	Auction/fee Revenue Recycling — Technology Improvement	Total
Gasoline	-0.56%	0.44% ^a	0.96%	0.02%	-0.19%	0.67%
Electricity	-2.01%	3.16%	0.05% ^b	0.02%	-1.07%	0.15%
Natural Gas	-0.87%	0.98%	0.08% ^b	0.02%	-0.34%	-0.13%

^a Indirect effects of allowance purchases.

^b Indirect effects of transportation fuel fee

Table 4. Scenario 3: Congressional Target + C&T + Transportation Fuel Fee

	Mitigation Activities (scale-back implementation of the 23 super options)	Allowance Purchases from Auction	Fuel Fee Payments	Auction/Fee Revenue Recycling — Households	Auction/Fee Revenue Recycling — Technology Improvement	Total
Gasoline	-0.30%	0.43% ^a	1.09%	0.02%	-0.22%	1.02%
Electricity	-1.07%	4.26%	0.06% ^b	0.02%	-1.25%	2.02%
Natural Gas	-0.46%	1.29%	0.09% ^b	0.02%	-0.40%	0.54%

^a Indirect effects of allowance purchases.

^b Indirect effects of transportation fuel fee

Table 5. Impacts of 23 Stakeholder Recommended, Sector Based Climate and Energy Policy Options on the U.S. Economy – Stakeholder Target Proposals

Sector	Climate Mitigation Actions	2020 Annual GHG Reduction (MMtCO ₂ e)	Cost or Cost Savings per ton GHG Removed (\$)	2020 Annual Cost or Cost Savings (Million \$)	2020 Net Employment Impact (Thousands)	2020 GDP Impact (Billions \$)	Impact on GDP 2010–2020 NPV (Billions \$)
AFW-1	Crop Production Practices to Achieve GHG Benefits	65.01	–\$15.69	–\$1,020	87.7	\$3.83	\$14.73
AFW-2	Livestock Manure – Anaerobic Digestion and Methane Utilization	19.25	\$11.27	\$217	–0.9	–\$0.14	–\$0.49
AFW-3	Forest Retention	39.21	\$39.38	\$1,544	71.2	\$0.40	\$2.90
AFW-4	Reforestation/Afforestation	178.77	\$33.18	\$5,932	–117.8	–\$9.32	–\$61.84
AFW-5	Urban Forestry	39.96	\$15.35	\$613	505.3	\$4.58	\$33.77
AFW-6	MSW Source Reduction	147.09	–\$3.20	–\$471	25.7	\$2.13	\$8.73
AFW-7	Enhanced Recycling of Municipal Solid Waste	249.27	\$13.39	\$3,339	114.4	\$8.74	\$43.44
AFW-8	Landfill Gas Management	48.38	\$0.34	\$17	94.0	\$8.79	\$22.28
Agriculture, Forestry, Waste Management (AFW) Totals		786.96	\$12.76	\$10,170	779.5	\$19.01	\$63.52
ES-1	Renewable Portfolio Std.	508.39	\$17.84	\$9,071	–58.6	–\$4.50	–\$29.90
ES-2	Nuclear	300.77	\$26.98	\$8,116	–73.3	–\$5.77	–\$6.85
ES-3	Carbon Capture Sequestration/Reuse	130.23	\$32.92	\$4,287	–35.4	–\$3.76	–\$13.95
ES-4	Coal Plant Efficiency Improvements and Repowering	151.05	\$12.95	\$1,956	1.1	\$0.40	\$0.72
Energy Supply (ES) Totals		1090.45	\$21.49	\$23,430	–166.3	–\$13.63	–\$49.98
RCI-1	Demand Side Management Programs	424.80	–\$40.71	–\$17,293	886.2	\$75.80	\$256.78
RCI-2	High Performance Buildings (private and public)	193.88	–\$24.99	–\$4,845	183.3	\$10.20	\$33.79
RCI-3	Appliance standards	80.86	–\$53.21	–\$4,302	25.1	\$0.04	–\$0.36
RCI-4	Building Codes	161.08	–\$22.86	–\$3,682	181.1	\$11.49	\$41.29
RCI-5	Combined heat and power	136.37	–\$13.18	–\$1,798	–127.9	–\$17.82	–\$87.86
Residential, Commercial and Industrial (RCI) Totals		996.98	–\$32.02	–\$31,919	1,147.8	\$79.70	\$243.64
TLU-1	Vehicle Purchase Incentives, including rebates	103.07	–\$66.37	–\$6,841	179.5	\$13.90	\$33.37
TLU-2	Renewable Fuel Standard (biofuels goals)	92.34	\$57.14	\$5,277	–25.2	–\$4.02	–\$14.38
TLU-3	Smart Growth/Land Use	71.04	–\$1.11	–\$79	165.7	\$5.18	\$16.45
TLU-4	Transit	27.05	\$16.72	\$452	52.2	\$0.99	\$2.07
TLU-5	Anti-Idling Technologies and Practices	33.82	–\$65.19	–\$2,205	16.7	\$1.62	\$2.49
TLU-6	Mode Shift - Truck to Rail	36.85	–\$91.56	–\$3,374	40.9	\$5.63	\$2.46
Transportation and Land Use (TLU) Totals		364.17	–\$18.59	–\$6,771	429.8	\$23.30	\$42.47
23 Policy Totals (summation)		3238.56	–\$1.57	–\$5,090	2,191	\$108.38	\$299.64
Stakeholder Recommendations Scenario Results (simultaneous)		3238.56	–\$1.57	–\$5,090	2,524	\$134.34	\$342.37
Stakeholder Recommendations w/Cap & Trade + trans. fuel fee		3238.56	–\$1.57	–\$5,090	2,807	\$154.70	NA

Notes on next page

GHG = greenhouse gases; MMtCO₂e = million metric tons carbon dioxide equivalent; GDP = Gross Domestic Product; NPV = net present value; Negative numbers indicate cost savings

Note for Tables 5 and 6: The 23 Policy Totals is a simple summation of each policy's estimated results; the Stakeholder Scenario simultaneous results of the REMI analysis take into account the interactive economic effects of policies.

Table 6. Impacts of 23 Stakeholder Recommended, Sector Based Climate and Energy Policy Options on the U.S. Economy – U.S. Senate Target Plus Cap-and-Trade and Transportation Fuel Fee Scenario Estimated Results

Sector	Climate Mitigation Actions	2020 Annual GHG Reduction Potential (MMtCO ₂ e)	Cost or Cost Savings per ton GHG Removed (\$)	2020 Annual Cost or Cost Savings (Million \$)	2020 Net Employment Impact (Thousands)	2020 GDP Impact (Billion \$)	Impact on GDP 2010-2020 NPV (Billion \$)
AFW-1	Crop Production Practices to Achieve GHG Benefits	34.50	-\$15.69	-\$541	46.5	\$2.03	\$7.81
AFW-2	Livestock Manure - Anaerobic Digestion and Methane Utilization	10.22	\$11.27	\$115	-0.5	-\$0.07	-\$0.26
AFW-3	Forest Retention	20.81	\$39.38	\$819	37.8	\$0.21	\$1.54
AFW-4	Reforestation/Afforestation	94.86	\$33.18	\$3,148	-62.5	-\$4.94	-\$32.81
AFW-5	Urban Forestry	21.20	\$15.35	\$325	268.1	\$2.43	\$17.92
AFW-6	MSW Source Reduction	78.05	-\$3.20	-\$250	13.6	\$1.13	\$4.63
AFW-7	Enhanced Recycling of Municipal Solid Waste	132.27	\$13.39	\$1,772	60.7	\$4.64	\$23.05
AFW-8	Landfill Gas Management	25.67	\$0.34	\$9	49.9	\$4.66	\$11.82
Agriculture, Forestry, Waste Management (AFW) Totals		417.57	\$12.92	\$5,396	413.6	\$10.09	\$33.70
ES-1	Renewable Portfolio Standard	269.76	\$17.84	\$4,813	-31.1	-\$2.39	-\$15.87
ES-2	Nuclear	159.60	\$26.98	\$4,306	-38.9	-\$3.06	-\$3.63
ES-3	Carbon Capture Sequestration/Reuse	69.10	\$32.92	\$2,275	-18.8	-\$2.00	-\$7.40
ES-4	Coal Plant Efficiency Improvements and Repowering	80.15	\$12.95	\$1,038	0.6	\$0.21	\$0.38
Energy Supply (ES) Totals		578.61	\$21.49	\$12,432	-88.2	-\$7.23	-\$26.52
RCI-1	Demand Side Mngt. Programs	225.41	-\$40.71	-\$9,176	470.2	\$40.22	\$136.25
RCI-2	High Performance Bldgs. (private & public)	102.87	-\$24.99	-\$2,571	97.3	\$5.41	\$17.93
RCI-3	Appliance standards	42.90	-\$53.21	-\$2,283	13.3	\$0.02	-\$0.19
RCI-4	Building Codes	85.47	-\$22.86	-\$1,954	96.1	\$6.10	\$21.91
RCI-5	Combined heat and power	72.36	-\$13.18	-\$954	-67.9	-\$9.45	-\$46.62
Residential, Commercial and Industrial (RCI) Totals		529.01	-\$32.02	-\$16,937	609.0	\$42.29	\$129.28

Table continued next page (Transportation and Land Use and Totals)

Table 6 cont'd. Impacts of 23 Stakeholder Recommended, Sector Based Climate and Energy Policy Options on the U.S. Economy – U.S. Senate Target Plus Cap-and-Trade and Transportation Fuel Fee Scenario Estimated Results

Sector	Climate Mitigation Actions	2020 Annual GHG Reduction Potential (MMtCO ₂ e)	Cost or Cost Savings per ton GHG Removed (\$)	2020 Annual Cost or Cost Savings (Million \$)	2020 Net Employment Impact (Thousands)	2020 GDP Impact (Billion \$)	Impact on GDP 2010-2020 NPV (Billion \$)
TLU-1	Vehicle Purchase Incentives, including rebates	54.69	-\$66.37	-\$3,630	95.2	\$7.38	\$17.71
TLU-2	Renewable Fuel Std. (biofuels goals)	49.00	\$57.14	\$2,800	-13.4	-\$2.13	-\$7.63
TLU-3	Smart Growth/Land Use	37.70	-\$1.11	-\$42	87.9	\$2.75	\$8.73
TLU-4	Transit	14.35	\$16.72	\$240	27.7	\$0.53	\$1.10
TLU-5	Anti-Idling Technologies and Practices	17.95	-\$65.19	-\$1,170	8.9	\$0.86	\$1.32
TLU-6	Mode Shift from Truck to Rail	19.55	-\$91.56	-\$1,791	21.7	\$2.99	\$1.30
Transportation and Land Use (TLU) Totals		193.24	-\$18.59	-\$3,593	228.1	\$12.36	\$22.54
23 Policy Totals (summation)		1,718.43	-\$1.57	-\$2,701	1,163	\$57.51	\$158.99
Congressional Target Results w/o C&T + transportation fuel fee		1,718.43	-\$1.57	-\$2,701	1,339	\$71.28	\$181.67
Congressional Target Results w/Cap &Trade + trans. fuel fee		1,718.43	-\$1.57	-\$2,701	1,841	\$107.60	NA

GHG = greenhouse gases; MMtCO₂e = million metric tons carbon dioxide equivalent; GDP = Gross Domestic Product; NPV = net present value; Negative numbers indicate cost savings.

Note for Tables 5 and 6: The 23 Policy Totals is a simple summation of each policy's estimated results; the Stakeholder Scenario simultaneous results of the REMI analysis take into account the interactive economic effects of policies.

The Center for Climate Strategies (CCS) is the nation's premiere catalyst for climate policy development and integration at the state and federal levels.

CCS combines expertise in facilitation, technical analysis, and policy design to provide cutting edge, collaborative decision-making. Our work builds high levels of consensus for the implementation of specific policy actions that address multiple public policy objectives --including economic and energy security -- and harnesses the creative power of stakeholders and policy makers to find the solutions that consistently yield the highest value and lowest cost.

For more information contact Thomas D. Peterson at tpeterson@climatestrategies.us, or Jefferey Wennberg at jwennberg@climatestrategies.us, or June Taylor at jtaylor@climatestrategies.us.

Center for Climate Strategies
1899 L St., NW
Washington, DC 20036,
Phone: 202-540-9121