

## SECTION FIVE

## » Conclusions

This study summarizes the analysis of the impacts of 23 major, sector-based GHG mitigation policy options on the U.S. economy in combination with U.S. Senate proposed cap and trade programs for the Electricity and Industrial sectors. We linked state of the art microeconomic analyses and macroeconometric model to perform this analysis. The data, assumptions, and methods used in this study are based on the results of formal agreements by over 1,500 stakeholders made through intensive, deliberative processes that used formal consensus building, fact finding, and analysis techniques. They further include scale-up of costs and savings estimates reported in the climate action plans of sixteen U.S. states to the national level.

Findings show potential national improvements from implementation of a top set of major sector-based policies and measures, to be implemented at all levels of government, of:

- » 2.5 million net new jobs in 2020 and a \$159.6 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.

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% below 1990 levels in 2020, equal to 4.46 billion metric tons of carbon dioxide equivalent (BMtCO<sub>2</sub>e) (see Figure 5-1).

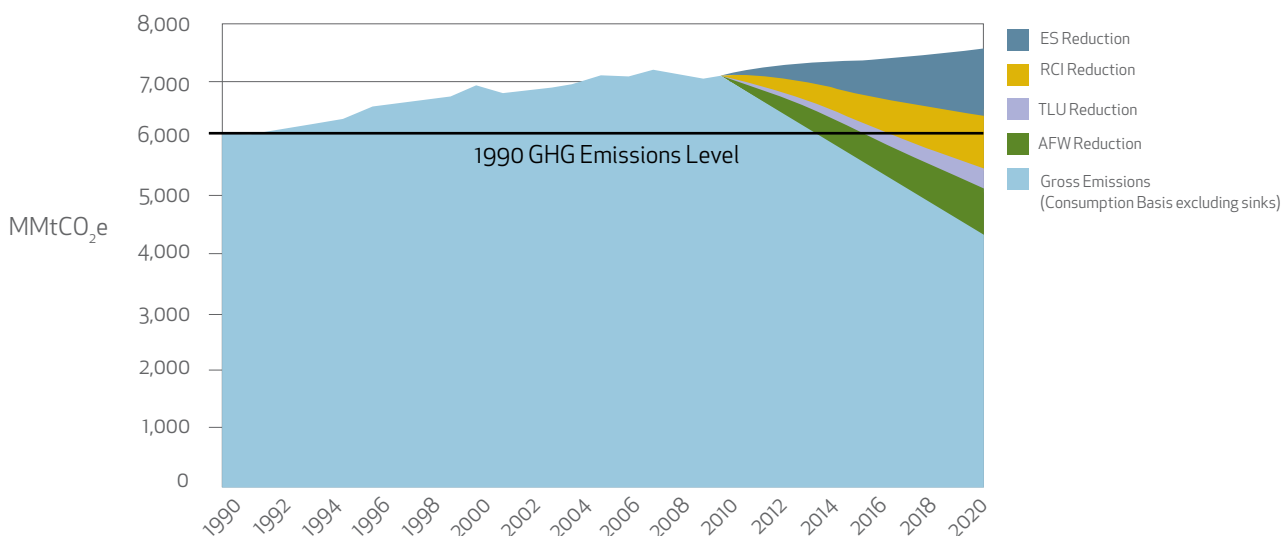
The study also examined the effects of a stylized version of a cap-and-trade program as specified in the May, 2010 version of the Kerry-Lieberman climate bill. It was assumed that about 21% of cap-and-trade allowances from the Electricity and Industrial sectors will be auctioned in 2020, and that about 50% of the auction revenue will be returned back to low-income consumers and the remaining revenue will be used in Highway Trust Fund and deficit reduction.

If full and appropriately scaled implementation of all 23 actions in all U.S. states is coupled with the Senate proposed cap-and-trade program for the Electricity and Industrial sectors, with strong revenue recycling to low-income consumers, national improvements are expected to include:

- » 2.1 million net new jobs in 2020 and \$116.9 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 decreases of 0.18% for gasoline, 1.74% for electricity; and 0.31% for natural gas by 2020;
- » \$19.2 billion in new government revenues (prior to recycling to consumers and Highway Trust Fund).

**Figure 5-1. GHG Reduction Potential of Stakeholder Options by Sector**

U.S. 2020 GHG Reduction Potential by Sector, Stakeholder Implementation (Total from Individual Options)  
Center for Climate Strategies, 2010



MMtCO<sub>2</sub>e = million metric tons carbon dioxide equivalent; GHG = greenhouse gas; ES = Energy Supply; RCI = Residential, Commercial and Industrial [buildings and energy/fuel use]; TLU = Transportation & Land Use; AFW = Agriculture, Forestry and Waste Management.

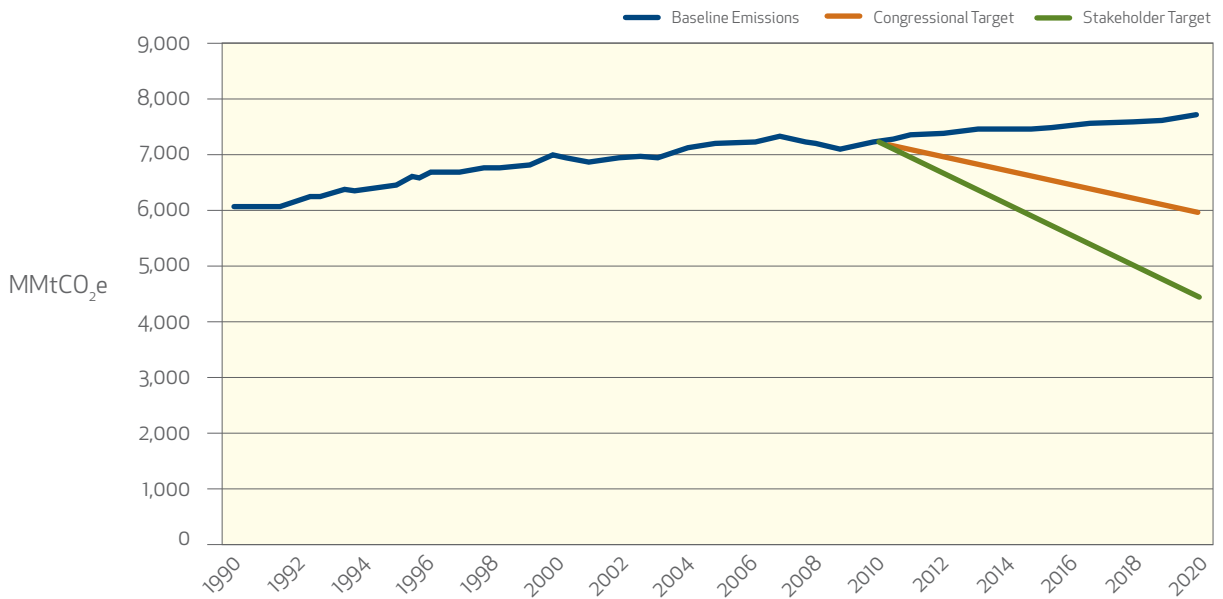
If all 23 actions are implemented at a more modest level, scaled to the recently proposed congressional targets (17% below 2005 levels in 2020, or equal to 5.98 BMtCO<sub>2</sub>e) (see Figures 5-2 and 5-3), and combined with the cap-and-trade program described above, national improvements are expected to include:

- » 0.9 million net new jobs in 2020 and \$50.7 billion expansion in GDP in 2020;
- » Over \$6.7 billion net economic savings in 2020, at an average of \$3.89 net savings per ton GHG emissions removed;
- » Consumer energy price decreases of 0.02% for gasoline, 1.65% for electricity; and 0.11% for natural gas by 2020;
- » \$19.2 billion in new government revenues (prior to recycling to consumers and Highway Trust Fund).

This moderate implementation scenario does not perform as well economically as the full implementation scenarios because it does not provide the same level of cost-saving actions, or high employment and income stimulating actions, as the more aggressive scenarios.

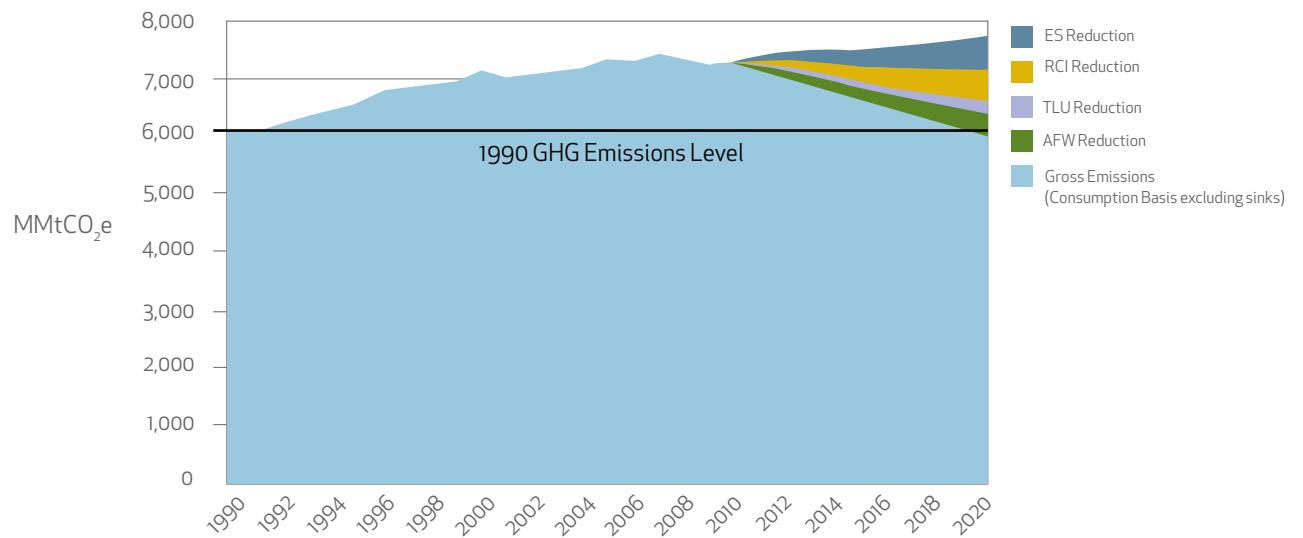
Results indicate that the majority of GHG mitigation options have positive impacts on the nation's economy individually. On net, the combination of the 23 options has a Net Present Value of increasing GDP by about \$406.74 billion and increasing employment by 2.52 million full-time-equivalent jobs by the year 2020. The Demand Side Management option contributes the highest GDP gains, which accounts for about half of the total positive gains. The Demand Side Management option and Urban Forestry option contribute the highest employment gains, which combined to account for nearly half of the total job creation. See Tables 5-1 and 5-2 for comprehensive microeconomic and macroeconomic results for each super option and each scenario, and Table 5-3 for scenario total results.

**Figure 5-2. GHG Reductions – Stakeholder and Congressional Target Scenarios**  
 U.S. 1990-2020 GHG Reduction Potential, Congressional Target and Stakeholder Target Scenarios  
 Center for Climate Strategies, 2010



MMtCO<sub>2</sub>e = million metric tons carbon dioxide equivalent; GHG = greenhouse gas.  
 Stakeholder Target = 27% below 1990 levels by 2020; Congressional Target = 17% below 2005 levels by 2020.

**Figure 5-3. Stakeholder Policies Scaled to Achieve Congressional GHG Target**  
 U.S. 2020 GHG Reduction Potential by Sector, Congressional Implementation (Total from Individual Options)  
 Center for Climate Strategies, 2010



MMtCO<sub>2</sub>e = million metric tons carbon dioxide equivalent; GHG = greenhouse gas; ES = Energy Supply; RCI = Residential, Commercial and Industrial [buildings and energy/fuel use]; TLU = Transportation & Land Use; AFW = Agriculture, Forestry and Waste Management.

The economic gains result primarily from the ability of mitigation options to lower the cost of production. This stems primarily from their ability to improve energy efficiency and thus lower production costs and higher consumer purchasing power. The results are also due to the stimulus of increased investment in plant and equipment.

Several tests were performed to determine the sensitivity of the results to major changes in key variables such as capital costs and avoided fuel costs. The sensitivity tests indicate that lower capital cost or higher value of avoided energy costs of the mitigation policy options would result in more favorable outcomes to the economy.

The estimates of economic benefits reported in this study represent a lower bound from a broader perspective. They do not include the avoidance of damage from the climate change that continued baseline GHG emissions would bring forth, the reduction in damage from the associated decrease in ordinary pollutants, the reduction in the use of natural resources, the reduction in traffic congestion, etc.

Overall, the findings from this study suggest that implementing the various mitigation policy options recommended in the state climate change action plans at the federal level would generate net positive economic impacts to the nation's economy.

Recommended actions by state climate change stakeholders included policies and measures in all sectors, at all levels of government (under a national framework), and a variety of specific matching policy instruments (including price and non price approaches) needed for achieving GHG targets, economic and energy benefits. For instance, policy tools for the 23 actions selectively 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% of total potential emissions reductions can be achieved through measures under shared federal and state jurisdiction;
- » 31% of potential emissions reductions can be achieved through measures primarily under state jurisdiction;
- » 31% 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.

#### **Key findings of this study include:**

- » Sector-based GHG reduction policies that are carefully selected and designed can result in net positive outcomes for employment, income, and gross domestic product, as well as reducing energy prices.
- » Applying 23 major policies recommended by state-stakeholders for climate, energy, transportation, and resource actions in all 50 states, through combined federal, state and local approaches, would yield significant 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 and improving energy security, will have net negative impacts without additional policy support, such as revenue recycling to low income consumers and key industries.

- » Comprehensive approaches that draw upon the best choices in all sectors, all levels of government, and all applicable policy instruments (including price and non price approaches) can attain GHG targets while minimizing costs and maximizing co-benefits (including energy and environmental security).
- » 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 in a socially and politically acceptable manner; a combined approach is needed.
- » State Climate Action Plans have demonstrated that decisions on the specifics of policy design and implementation (i.e., stringency, coverage, timing), implementation tools, and other factors, can dramatically affect the economic and social performance of individual policies.
- » The two most significant barriers to full implementation of climate and energy policies are adequate investment and authority at the program level.
- » Federal preemption of these 23 policies where state and local programs are needed 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.
- » If caps and taxes are combined with appropriate sector-based policies and measures, their cost will be lower and their co-benefits will be significantly higher than if they are implemented alone.
- » Auctions of allowances in key sectors will have negative impacts on economic performance if funds are not recycled effectively. However, reinvestment to targeted support for low-income consumers and key industries can significantly reverse these impacts.
- » Policy strategies applicable to the next decade must be combined with longer term policies to address future decades, and provide an important transition.

**Table 5-1. Impacts of 23 Stakeholder-Recommended, Sector-Based Climate and Energy Policy Options on the U.S. Economy – Fully Implemented Stakeholder Proposals Plus Cap-and-Trade and Revenue Recycling**

Sector	Climate Mitigation Actions	2020 Annual GHG Reduction (MMtCO <sub>2</sub> 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	65.01	–\$15.69	–\$1,020	87.7	\$4.55	\$17.50
AFW-2	Livestock Manure – Anaerobic Digestion and Methane Utilization	19.25	\$11.27	\$217	–0.9	–\$0.17	–\$0.58
AFW-3	Forest Retention	39.21	\$39.38	\$1,544	71.2	\$0.48	\$3.45
AFW-4	Reforestation/Afforestation	178.77	\$33.18	\$5,932	–117.8	–\$11.07	–\$73.47
AFW-5	Urban Forestry	39.96	\$15.35	\$613	505.3	\$5.44	\$40.12
AFW-6	MSW Source Reduction	147.09	–\$3.20	–\$471	25.7	\$2.53	\$10.37
AFW-7	Enhanced Recycling of Municipal Solid Waste	249.27	\$13.39	\$3,339	114.4	\$10.38	\$51.61
AFW-8	Landfill Gas Management	48.38	\$0.34	\$17	94	\$10.44	\$26.47
<b>Agriculture, Forestry, Waste Management (AFW) Totals</b>		<b>786.96</b>	<b>\$12.92</b>	<b>\$10,170</b>	<b>779.6</b>	<b>\$22.58</b>	<b>\$75.46</b>
ES-1	Renewable Portfolio Std.	508.39	\$17.84	\$9,071	–58.6	–\$5.35	–\$35.52
ES-2	Nuclear	300.77	\$26.98	\$8,116	–73.3	–\$6.85	–\$8.14
ES-3	Carbon Capture Sequestration/Reuse	130.23	\$32.92	\$4,287	–35.4	–\$4.47	–\$16.57
ES-4	Coal Plant Efficiency Improvements and Repowering	151.05	\$12.95	\$1,956	1.1	\$0.48	\$0.86
<b>Energy Supply (ES) Totals</b>		<b>1,090.45</b>	<b>\$21.49</b>	<b>\$23,430</b>	<b>–166.2</b>	<b>–\$16.19</b>	<b>–\$59.38</b>
RCI-1	Demand Side Management Programs	424.80	–\$40.71	–\$17,293	886.2	\$90.05	\$305.05
RCI-2	High Performance Buildings (Private and Public)	193.88	–\$24.99	–\$4,845	183.3	\$12.12	\$40.14
RCI-3	Appliance standards	80.86	–\$53.21	–\$4,302	25.1	\$0.05	–\$0.43
RCI-4	Building Codes	161.08	–\$22.86	–\$3,682	181.1	\$13.65	\$49.05
RCI-5	Combined Heat and Power	136.37	–\$13.18	–\$1,798	–127.9	–\$21.17	–\$104.38
<b>Residential, Commercial and Industrial (RCI) Totals</b>		<b>996.98</b>	<b>–\$32.02</b>	<b>–\$31,920</b>	<b>1,147.80</b>	<b>\$94.70</b>	<b>\$289.44</b>
TLU-1	Vehicle Purchase Incentives, Including Rebates	103.07	–\$66.37	–\$6,841	179.5	\$16.51	\$39.64
TLU-2	Renewable Fuel Standard (Biofuels Goals)	92.34	\$57.14	\$5,277	–25.2	–\$4.78	–\$17.08
TLU-3	Smart Growth/Land Use	71.04	–\$1.11	–\$79	165.7	\$6.15	\$19.54
TLU-4	Transit	27.05	\$16.72	\$452	52.2	\$1.18	\$2.46
TLU-5	Anti-Idling Technologies and Practices	33.82	–\$65.19	–\$2,205	16.7	\$1.92	\$2.96
TLU-6	Mode Shift - Truck to Rail	36.85	–\$91.56	–\$3,374	40.9	\$6.69	\$2.92
<b>Transportation and Land Use (TLU) Totals</b>		<b>364.17</b>	<b>–\$18.59</b>	<b>–\$6,770</b>	<b>429.8</b>	<b>\$27.68</b>	<b>\$50.44</b>
<b>23 Policy Totals (summation)</b>		<b>3,238.57</b>	<b>–\$1.57</b>	<b>–\$5,090</b>	<b>2,191</b>	<b>\$128.77</b>	<b>\$355.97</b>
<b>Stakeholder Recommendations Scenario Results (simultaneous)</b>		<b>3,238.57</b>	<b>–\$1.57</b>	<b>–\$5,090</b>	<b>2,524</b>	<b>\$159.60</b>	<b>\$406.74</b>
<b>Stakeholder Recommendations w/Cap &amp; Trade + Revenue Recycling</b>		<b>3,238.57</b>	<b>–\$1.57</b>	<b>–\$5,090</b>	<b>2,132</b>	<b>\$116.90</b>	<b>n.a.</b>

GDP = gross domestic product; GHG = greenhouse gas; MMtCO<sub>2</sub>e = million metric tons carbon dioxide equivalent; MSW = municipal solid waste; NPV = net present value. Note: The 23 Policy Totals are a simple summation of each policy's estimated results; interactions and double counting between policies have been accounted for in individual policy results; the Stakeholder Scenario simultaneous results of the REMI analysis take into account the interactive economic effects of policies.

**Table 5-2. Impacts of 23 Stakeholder-Recommended, Sector-Based Climate and Energy Policy Options on the U.S. Economy – U.S. Congressional Target Plus Cap-and-Trade and Revenue Recycling**

Sector	Climate Mitigation Actions	2020 Annual GHG Reduction Potential (MMtCO <sub>2</sub> 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	17.30	-\$15.69	-\$271	23.34	\$1.21	\$4.66
AFW-2	Livestock Manure - Anaerobic Digestion and Methane Utilization	5.12	\$11.27	\$58	-0.24	-\$0.05	-\$0.15
AFW-3	Forest Retention	10.43	\$39.38	\$411	18.95	\$0.13	\$0.91
AFW-4	Reforestation/Afforestation	47.57	\$33.18	\$1,578	-31.35	-\$2.95	-\$19.55
AFW-5	Urban Forestry	10.63	\$15.35	\$163	134.46	\$1.45	\$10.68
AFW-6	MSW Source Reduction	39.14	-\$3.20	-\$125	6.84	\$0.68	\$2.76
AFW-7	Enhanced Recycling of Municipal Solid Waste	66.33	\$13.39	\$888	30.44	\$2.77	\$13.73
AFW-8	Landfill Gas Management	12.87	\$0.34	\$4	25.01	\$2.78	\$7.04
<b>Agriculture, Forestry, Waste Management (AFW) Totals</b>		<b>209.40</b>	<b>\$12.92</b>	<b>\$2,706</b>	<b>207.45</b>	<b>\$6.01</b>	<b>\$20.08</b>
ES-1	Renewable Portfolio Standard	312.93	\$17.84	\$5,584	-36.07	-\$3.29	-\$21.86
ES-2	Nuclear	185.13	\$26.98	\$4,995	-45.12	-\$4.22	-\$5.01
ES-3	Carbon Capture Sequestration/Reuse	80.16	\$32.92	\$2,639	-21.79	-\$2.74	-\$10.20
ES-4	Coal Plant Efficiency Improvements and Repowering	92.98	\$12.95	\$1,204	0.68	\$0.30	\$0.52
<b>Energy Supply (ES) Totals</b>		<b>671.20</b>	<b>\$21.49</b>	<b>\$14,422</b>	<b>-102.30</b>	<b>-\$9.97</b>	<b>-\$36.54</b>
RCI-1	Demand Side Management Programs	261.48	-\$40.71	-\$10,644	545.48	\$55.43	\$187.76
RCI-2	High Performance Bldgs. (Public and Private)	119.34	-\$24.99	-\$2,982	112.83	\$7.46	\$24.71
RCI-3	Appliance Standards	49.77	-\$53.21	-\$2,648	15.45	\$0.02	-\$0.26
RCI-4	Building Codes	99.15	-\$22.86	-\$2,266	111.47	\$8.40	\$30.19
RCI-5	Combined Heat and Power	83.94	-\$13.18	-\$1,107	-78.73	-\$13.03	-\$64.25
<b>Residential, Commercial and Industrial (RCI) Totals</b>		<b>613.67</b>	<b>-\$32.02</b>	<b>-\$19,647</b>	<b>706.50</b>	<b>\$58.28</b>	<b>\$178.16</b>
TLU-1	Vehicle Purchase Incentives, Including Rebates	63.44	-\$66.37	-\$4,211	110.49	\$10.17	\$24.40
TLU-2	Renewable Fuel Std. (Biofuels Goals)	56.84	\$57.14	\$3,248	-15.51	-\$2.93	-\$10.51
TLU-3	Smart Growth/Land Use	43.73	-\$1.11	-\$49	101.99	\$3.79	\$12.03
TLU-4	Transit	16.65	\$16.72	\$278	32.13	\$0.72	\$1.51
TLU-5	Anti-Idling Technologies and Practices	20.82	-\$65.19	-\$1,357	10.28	\$1.19	\$1.82
TLU-6	Mode Shift from Truck to Rail	22.68	-\$91.56	-\$2,077	25.17	\$4.12	\$1.79
<b>Transportation and Land Use (TLU) Totals</b>		<b>224.16</b>	<b>-\$18.59</b>	<b>-\$4,168</b>	<b>264.55</b>	<b>\$17.04</b>	<b>\$31.05</b>

Table 5-2, continued from previous page

Sector	Climate Mitigation Actions	2020 Annual GHG Reduction Potential (MMtCO <sub>2</sub> 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 \$)
23 Policy Totals (summation)		1,718.43	-\$3.89	-\$6,687	1,076	\$71.36	\$192.74
Congressional Target Results w/o C&T + Revenue Recycling		1,718.43	-\$3.89	-\$6,687	1,147	\$76.91	\$195.50
Congressional Target Results w/Cap & Trade + Revenue Recycling		1,718.43	-\$3.89	-\$6,687	922	\$50.73	n.a.

GHG = greenhouse gas; MMtCO<sub>2</sub>e = million metric tons carbon dioxide equivalent; GDP = gross domestic product; MSW = municipal solid waste; NPV = net present value. Negative numbers indicate cost savings.

Note: The 23 Policy Totals are a simple summation of each policy's estimated results; interactions and double counting between policies have been accounted for in individual policy results; the Stakeholder Scenario simultaneous results of the REMI analysis take into account the interactive economic effects of policies.

Table 5-3. Summary of GHG Reductions, Direct Costs/Savings, and Macroeconomic Results

Scenario	2020 GHG Reductions (BMtCO <sub>2</sub> e) <sup>a</sup>	2020 Direct Net Cost (billion \$) <sup>b</sup>	2020 Net New Jobs (million \$)	2020 GDP Expansion (billion \$)	Total 2020 New Gov't Revenue (billion \$) <sup>c</sup>
23 Stakeholder Policy Recommendations at Full Implementation	3.2	-\$5.1	2.52	\$159.6	n.a.
23 Stakeholder Policy Recommendations, Full Implementation, plus Cap-and-Trade & Revenue Recycling	3.2	-\$5.1	2.13	\$116.9	\$19.2
23 Stakeholder Policy Recommendations at Congressional Economy-Wide Target levels, plus Cap-and-Trade & Revenue Recycling	1.7	-\$6.7	0.92	\$50.7	\$19.2

a Reductions from estimated business-as-usual 2020 baseline emissions of 7.7 BMtCO<sub>2</sub>e; BMtCO<sub>2</sub>e = 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 auction, not including use or distribution of revenues.

## SECTION SIX

## » References and Data Sources

In addition to these references and data sources used directly in the study, each of the individual state plans that served as the basis for this report relied on a significant number of additional studies and information sources. For listings of these studies and sources, see the appendixes of the individual state reports available on the CCS Web site at [www.climatestrategies.us](http://www.climatestrategies.us).

## References

American Association of State Highway and Transportation Officials. *Transportation Invest in America Freight-Rail Bottom Line Report*. Available at: [www.freight.transportation.org/doc/FreightRailReport.pdf](http://www.freight.transportation.org/doc/FreightRailReport.pdf).

Center for Climate Strategies (CCS). 2009. *Southern Regional Economic Assessment of Climate Policy Options and Review of Economic Studies of Climate Policy*. Available at: [www.climatestrategies.us/template.cfm?FrontID=6081](http://www.climatestrategies.us/template.cfm?FrontID=6081).

Coase, R. 1960. "The Problem of Social Cost," *Journal of Law and Economics* 3(1): 1-44.

Doniger, David. May 2010. *American Power Act: "First Read" of the Kerry-Lieberman Climate and Energy Legislation*, Natural Resources Defense Council.

Ellerman, A.D. 2008. "The EU Emission Trading Scheme: Prototype of a Global System?" Discussion Paper 08-02, The Harvard Project on International Climate Agreements.

Ellerman, A.D., Joskow, P.L., Schmalensee, R., Montero, J., and Bailey, E.M. 2000. *Markets for Clean Air: The U.S. Acid Rain Program*. Cambridge, UK: Cambridge University Press

Granade, H.C., Creyts, J., Derkach, A., Farese, P, Nyquist, S., and Ostrowski, K. 2009. *Unlocking Energy Efficiency in the U.S. Economy*. McKinsey Global Energy and Materials.

Kerry, John, and Lieberman, Joseph. 2010. *American Power Act*. U.S. Senate. [www.lieberman.senate.gov/assets/pdf/APA\\_full.pdf](http://www.lieberman.senate.gov/assets/pdf/APA_full.pdf).

Laitner, J.A. "Skip." 2009. *Climate Change Policy as an Economic Redevelopment Opportunity: The Role of Productive Investments in Mitigating Greenhouse Gas Emissions*. ACEEE Report E098. Washington, DC, American Council for an Energy-Efficient Economy.

McKinstry, R.B., Peterson, T.D., Rose, A., and Wei, D. 2009. "The New Climate World: Achieving Economic Efficiency in a Federal System for GHG Regulation through State Planning," *North Carolina Journal of International Law and Commercial Regulation* 34(3): 767-850.

Miller, S., Wei, D., and Rose, A. 2010. *The Economic Impact of the Michigan Climate Change Action Plan on the State's Economy*. Report to the Michigan Department of Environmental Quality, The Center for Climate Strategies, Washington DC.

Montgomery, W. D., Plewes, J., Smith, A.E., and Tuladhar, S.D. 2007. *Economic Analysis of Florida's Executive Order 07-127*. Charles Rivers Associates. Prepared for Florida Chamber of Commerce and US Chamber of Commerce.

- National Commission on Energy Policy. 2004. *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenge*, [www.energycommission.org](http://www.energycommission.org).
- Partridge, M.D., and Richman, D.S. 1998. "Regional Computable General Equilibrium Modeling: A Survey and Critical Appraisal," *International Regional Science Review* 21(3), 205-248.
- Regional Economic Models, Inc. 2009. *REMI PI\* Model Document*. Available at: [www.remi.com](http://www.remi.com).
- Roland-Holst, D., and Karhl, F. *The Florida Economy and a Federal Carbon Cap: A Quantitative Analysis*. 2009. Department of Agricultural and Resources Economics Working Paper, University of California, Berkeley.
- Rose, A. 2009. *The Economics of Climate Change Policy: International, National and Regional Strategies*, Cheltenham, UK: Edward Elgar Publishing Company.
- Rose, A., and Miernyk, W. 1989. "Input-Output Analysis: The First Fifty Years," *Economic Systems Research* 1(2): 229-271.
- Rose, A., and G. Oladosu. 2002. "Greenhouse Gas Reduction in the U.S.: Identifying Winners and Losers in an Expanded Permit Trading System," *Energy Journal* 23(1): 1-18.
- Rose, A., and Wei, D. 2009a. *The Economic Impact of the Florida Energy and Climate Change Action Plan on the State's Economy*. Report to the Office of the Governor of the State of Florida, The Center for Climate Strategies, Washington DC.
- Rose, A., and Wei, D. 2009b. "Macroeconomic Assessment," Chapter 11 in Pennsylvania Climate Action Plan. [www.depweb.state.pa.us/energy/cwp/view.asp?q=539829](http://www.depweb.state.pa.us/energy/cwp/view.asp?q=539829).
- Rose, A., Wei, D., Wennberg, J., and Peterson, T. 2009. "Climate Change Policy Formation in Michigan: The Case for Integrated Regional Policies," *International Regional Science Review* 32(4): 445-465.
- Ross, M.T., Murray, B.C., Beach, R.H., Depro, B.M., and RTI International. 2008. *State-level Economic Impacts of a National Climate Change Policy*. Pew Center on Global Climate Change. White Paper.
- Tietenberg, T. 1985. *Emissions Trading: An Exercise in Reforming Pollution Policy*. Washington, DC: Resources for the Future).
- Tietenberg, T. 2007. "Tradable Permits in Principle and Practice," in J. Freemand and C. Kolstad (eds.), *Moving to Markets: Lessons from Twenty Years of Experience*. New York: Oxford University Press.
- Transportation Research Board. 2004. "Long-Haul Tractor Idling Alternative." Table 1. See [epa.gov/smartway/documents/dewitt-study.pdf](http://epa.gov/smartway/documents/dewitt-study.pdf).
- Treyz, G. 1993. *Regional Economic Modeling: A Systematic Approach to Economic Forecasting and Policy Analysis*. Boston: Kluwer.
- U.S. Census Bureau. 2002. *2002 Economic Census: Vehicle Inventory and Use Survey*. Available at: [www.census.gov/prod/ec02/ec02tv-us.pdf](http://www.census.gov/prod/ec02/ec02tv-us.pdf).
- U.S. Environmental Protection Agency (EPA). 2009. *The Effects of H.R.2454 on International Competitiveness and Emission Leakage in Energy-Intensive Trade-Exposed Industries*. An interagency Report Responding to a Request from Senators Bayh, Specter, Stabenow, McCaskill, and Brown. Available at: [www.epa.gov/climatechange/economics/economicanalyses.html#interagency](http://www.epa.gov/climatechange/economics/economicanalyses.html#interagency).
- Ward, J. *VISION 2008 User's Guide*. Washington, DC: U.S. Department of Energy. October, 2008.

## Data Sources

American Council for an Energy-Efficient Economy. 2008. *The 2008 State Energy Efficiency Scorecard*. [www.aceee.org/pubs/e086\\_es.pdf](http://www.aceee.org/pubs/e086_es.pdf).

Central Intelligence Agency. 2009. *The World Factbook*. <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html>.

ONSITE SYCOM Energy Corporation. 2000. *The Market and Technical Potential for Combined Heat and Power in the Commercial/Institutional Sector*, pp.57–58. [www.eere.energy.gov/de/pdfs/chp\\_comm\\_market\\_potential.pdf](http://www.eere.energy.gov/de/pdfs/chp_comm_market_potential.pdf).

U.S. Bureau of the Census. 2002. *2002 Economic Census: Vehicle Inventory and Use Survey*. Available at: [www.census.gov/prod/ec02/ec02tv-us.pdf](http://www.census.gov/prod/ec02/ec02tv-us.pdf).

U.S. Bureau of the Census, Population Division. 2004. *State Interim Population Projections by Age and Sex: 2004–2030*. [www.census.gov/population/www/projections/projectionsagesex.html](http://www.census.gov/population/www/projections/projectionsagesex.html).

U.S. Bureau of the Census. 2009. Heating- and Cooling-Degree Days. [www.census.gov/compendia/statab/tables/09s0379.xls](http://www.census.gov/compendia/statab/tables/09s0379.xls).

U.S. Bureau of Economic Analysis. 2009. *Gross Domestic Product by State*. [www.bea.gov/regional/gsp](http://www.bea.gov/regional/gsp).

U.S. Bureau of Economic Analysis and Bureau of the Census. 2008. *State Personal Income 2008*. [www.bea.gov/newsreleases/regional/spi/spi\\_newsrelease.htm](http://www.bea.gov/newsreleases/regional/spi/spi_newsrelease.htm).

U.S. Department of Energy, Energy Information Administration. 2008. *State Energy Data System*. [www.eia.doe.gov/emeu/states/hf.jsp?incfile=sep\\_sum/plain\\_html/sum](http://www.eia.doe.gov/emeu/states/hf.jsp?incfile=sep_sum/plain_html/sum).

U.S. Department of Energy, Energy Information Administration. 2009. *Electric Power Annual 2007*. [www.eia.doe.gov/cneaf/electricity/epa/epa\\_sprdshts.html](http://www.eia.doe.gov/cneaf/electricity/epa/epa_sprdshts.html).

U.S. Department of Energy, Energy Information Administration. 2009. *State Electric Profile*. [www.eia.doe.gov/cneaf/electricity/st\\_profiles/e\\_profiles\\_sum.html](http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html).