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Macroeconomic Analysis: Michigan Climate Action Plan Final Report Summary

Analysis of the macroeconomic effects of [Michigan's Climate Action Plan](#) indicates that implementation of a set of recommendations by the [Michigan Climate Action Council \(MCAC\)](#) would significantly benefit Michigan's economy. The 54 recommended climate policy strategies focused on clean and renewable energy, energy efficiency, industrial process improvements, transportation improvements, forestry and agriculture conservation, and waste management. Based on a state of the art macroeconomic analysis using the REMI Policy Insight Plus Model (REMI), implementation of these actions would, on balance, result in the following outcomes for Michigan between 2010 and 2025:

- 129,000 net new jobs in 2025
- Direct net cumulative savings of about \$10 billion between 2010 and 2025, and direct average cost savings of \$10.20 per metric ton of carbon dioxide equivalent (MMTCO_{2e})
- \$25 billion net gain in Gross State Product (in Net Present Value terms) from 2010-2025
- Reduced GHG emissions from Michigan sources by 121 MMTCO_{2e} in 2025, or about 44 percent below expected emissions in 2025 compared to business as usual
- Residential energy price reductions by 2025 of:
 - -1.39% for electricity
 - -0.37% for gasoline
 - -0.40% for fuel oil
 - -0.60% for natural gas

On November 14, 2007 Governor Jennifer Granholm signed [Executive Order 2007-42](#) creating the MCAC and charged it with producing a [Greenhouse Gas \(GHG\) Emissions Inventory and Forecast](#) and a comprehensive climate action plan with recommended emissions reduction goals and policy actions to mitigate climate change in all sectors of the economy, including state and local government. Steve Chester, Michigan Department of Environmental Quality (DEQ) Director, chaired, the MCAC.

In February 2009, after a more than a year of intensive stakeholder collaboration through a [stepwise, fact based, joint policy development process](#), the MCAC recommended a suite of 54 climate mitigation policy actions. Of these, 33 were analyzed to quantify GHG cost effectiveness, environmental benefits, and the feasibility of implementation. Combined with actions already underway, recommendations would reduce GHGs to more than 20 percent below 1990 levels by 2020 and generate net savings of \$10 billion from 2009 to 2025. The MCAC also provided recommended guidance on federal policy integration with state and local programs.

A macroeconomic analysis was conducted as a supplement to the MCAC recommendations to support the development of implementation priorities. Analysis using the REMI model was conducted by Dr. Steve Miller of Michigan State University, and Dr. Adam Rose and Dr. Dan Wei of the University of Southern California, together with the technical team of the Center for Climate Strategies (CCS) a nonpartisan, non-profit organization that has assisted 22 U.S. states with climate action plan development. The REMI model has been extensively peer-reviewed and is the most widely used state-level economic modeling software package in the U.S. Among its many other uses, the REMI Model has been applied successfully to forecast the impacts of changes in tax rates, the exit or entry of major businesses, and the impacts of energy and environmental policy actions by many states.

Macroeconomic impact analysis was based on MCAC approved estimates of microeconomic impacts (cost effectiveness) and GHG reductions. In the course of the planning process, the detailed analytical methods, data sources, and assumptions need for cost effectiveness analysis for each were reviewed, tested and subjected to formal consensus determinations by the MCAC and numerous [Technical Work Group \(TWG\)](#) members. In the end, all but one of the 54 recommendations, including the 20 quantified and analyzed in the study reported here, were adopted by unanimous vote of the MCAC. Some measures were not quantified based on limited need or lack of data for complete analysis.

The results of the macroeconomic study affirm Governor Granholm's charge to the MCAC to achieve new opportunities through climate change policy to improve Michigan's economy, environment and energy future. Steven Chester, commented: "This was a truly comprehensive planning process and places Michigan in a strong position going forward to chose smart policies that benefit its economy and citizens. It confirms that 'where there is a will there is a way' in finding solutions to the problem of climate change."

"Of all the states that we have helped develop climate action plans in the last six years, none faced greater economic challenges than the state of Michigan, and no group of stakeholders worked harder to find win-win policy solutions that advanced a new economy and clean energy future," according to Tom Peterson, CCS President and CEO.

"This study is great news. Smart policies that protect the environment and reduce carbon pollution can and do create good jobs, keep energy costs in check, and inject vitality into Michigan's economy," said Chris Kolb, president of the Michigan Environmental Council. "We know that green jobs and clean energy were among the only sectors of Michigan's economy

that added jobs in the past several years. We’ve got a foot in the door of this new economy. It’s vital that we continue establishing strong policies that reward the kinds of decisions called for in the Climate Action Council recommendations.”

“The Michigan Climate Action Council’s recommendations underscore Michigan’s opportunity to be a national leader in environmental stewardship while creating thousands of jobs and a tremendous amount of economic value for the state,” said Dr. Gregg Zank, senior vice president and chief technology officer at Dow Corning Corporation and a member of the Michigan Climate Action Council. “Dow Corning and its joint venture Hemlock Semiconductor Group have invested \$5 billion in the past 5 years in the research, development and manufacturing of solar materials – with most of that investment right here in Michigan. A vibrant alternative energy industry is emerging in this state, and it is critical that we build the policy and business climate in Michigan to sustain this growth and encourage new investment.”

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**Summary Table of Michigan Climate Action Plan Recommended Policies
(Consolidated Policy Options for Macroeconomic Analysis)**

Updated MI Consolidated Options	Total 2009-2025 GHG Reductions (MMtCO₂e)	Net Policy Cost NPV 2009-2025 (Million \$)	Cost-Effectiveness (\$/tCO₂e)	GSP Benefit NPV 2009-2025 (Billion \$)	Employment Benefit 2025 (thousands FTE)
Energy Supply	188.92	\$5,509.00	\$29.16	\$2.16	4.50
ES Consolidated Option #1: Renewable Portfolio Standard	107.28	\$4,413.00	\$41.14	\$1.41	2.02
ES Consolidated Option #2: Nuclear	46.27	\$1,001.00	\$21.63	\$0.47	1.52
ES Consolidated Option #3: Coal Plant Efficiency Improvements and Repowering	35.38	\$95.00	\$2.67	\$0.16	0.21

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ES Consolidated Option #4: Combined heat and power	7.97	\$35.40	\$4.44	\$0.12	0.75
Residential, Commercial, and Industrial	522.46	-\$14,578.13	-\$27.90	\$11.05	43.05
RCI Consolidated Option #1: Demand Side Management Programs	229.23	-\$6,278.33	-\$27.39	\$5.07	19.12
RCI Consolidated Option #2: High Performance Buildings (private and public sector)	203.28	-\$5,567.57	-\$27.39	\$4.37	16.28
RCI Consolidated Option #3: Building Codes	81.98	-\$2,767.63	-\$33.76	\$1.62	7.64
Transportation and Land Use	68.10	\$384.34	\$5.64	\$4.12	14.18
TLU Consolidated Option #1: Anti-Idling Technologies and Practices	6.61	-\$316.71	-\$47.92	\$0.55	0.99
TLU Consolidated Option #2: Vehicle Purchase Incentives, including rebates	0.18	\$254.25	\$1,411.33	-\$0.22	-0.76
TLU Consolidated Option #3: Mode Shift from Truck to Rail	2.09	\$194.53	\$93.12	-\$0.33	-0.13
TLU Consolidated Option #4: Renewable Fuel Standard (biofuels goals)	52.89	\$219.71	\$4.15	\$3.23	11.16
TLU Consolidated Option #5: Transit	3.17	\$325.95	\$102.86	\$0.68	1.80
TLU Consolidated Option #6: Smart Growth/Land Use	3.16	-\$293.39	-\$92.84	\$0.21	1.13

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Agriculture, Forestry and Waste Management	311.50	\$8,962.85	\$28.77	-\$0.35	20.06
AFW Consolidated Option #1: Soil Carbon Management	15.56	-\$209.68	-\$13.47	\$0.12	0.37
AFW Consolidated Option #2: Nutrient Management	1.25	-\$27.33	-\$21.91	\$0.02	0.10
AFW Consolidated Option #3: Livestock Manure - Anaerobic Digestion and Methane Utilization	1.46	\$2.52	\$1.72	\$0.00	0.01
AFW Consolidated Option #4: MSW Landfill Gas Management	21.99	-\$48.82	-\$2.22	\$0.29	1.03
AFW Consolidated Option #5: Enhanced Recycling of Municipal Solid Waste	236.02	\$3,891.12	\$16.49	\$1.92	3.10
AFW Consolidated Option #6: Reforestation / Afforestation	7.98	\$362.48	\$45.44	-\$0.18	-0.38
AFW Consolidated Option #7: Urban Forestry	27.24	\$4,992.56	\$183.26	-\$2.53	15.83
Summation Total	1,090.00	\$278.06	\$0.25	\$16.98	81.79
Simultaneous Total	1,090.00	\$278.06	\$0.25	\$25.26	129.49