

Confronting Climate Change in the Great Lakes Region

Impacts on Our Communities and Ecosystems

Global Warming Solutions

Reducing Heat-Trapping Emissions in Michigan

A COMPREHENSIVE APPROACH

Reducing heat-trapping gases is essential, but cannot solve all the problems related to global warming. We must also minimize human pressures on our environment to reduce the severity of climate change impacts and the vulnerability of ecosystems to further stresses from climate change. Because some warming is inevitable, we also must anticipate and plan for the unavoidable impacts of change through long-term management strategies.

For more discussion of minimizing impacts on ecosystems and managing the effects of climate change, read the full report, **Confronting Climate Change in the Great Lakes Region: Impacts on our Communities and Ecosystems**, available at www.ucsusa.org/greatlakes.

Personal Solutions

The activities of the average American result in 5.6 tons of CO₂ emissions a year. Visit our website at www.ucsusa.org/greatlakes to find out what choices your family can make to reduce its global warming impact.

Our climate is changing because humans are adding large amounts of heat-trapping gases to the atmosphere. The good news is that practical solutions exist today to address this growing problem. Some warming is inevitable because past carbon dioxide (CO₂) emissions blanketing the Earth will continue to have a warming effect for decades, but the most extreme outcomes for Michigan can be avoided if responsible measures are taken locally, nationally, and elsewhere in the world now.

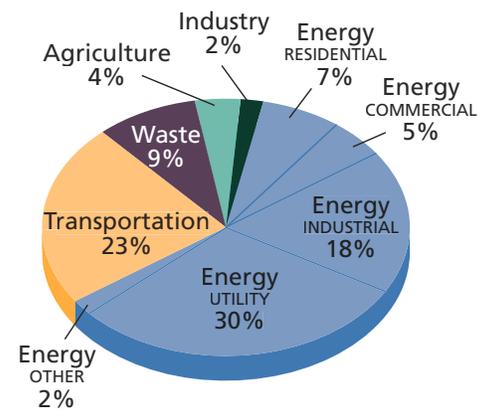
Many of the solutions to climate change provide immediate additional benefits including energy cost savings, cleaner air and water, and new jobs. Ignoring climate change is not an option. Waiting 10, 20, or more years to reduce emissions will increase the eventual severity, expense, and likelihood of irreversible losses—a terrible legacy to leave our children and grandchildren.

Tackling the Problem at the Source

Power plants and motor vehicles are the biggest sources of emissions in the Great Lakes region. But in order to tackle the problem, emissions from industry, businesses, and homes as well as other locally important sources such as landfills will need to be reduced.

In addition, improvements in forestry practices and agriculture offer the potential for reducing emissions and storing carbon, a process that can be thought of as “negative emissions.”

**Total Heat-Trapping Gas Emissions by Sector (1990)*
Great Lakes Region**



* The EPA's 1990 data provide the only complete greenhouse gas inventory for all sectors. Michigan is excluded from this analysis as complete data is not available for this state.

Source: US EPA, 2003



Curjin Corporation, NREL

Energy Solutions

Emissions from power plants, industry, businesses, and homes account for nearly two-thirds of heat-trapping emissions in the region. Michigan generates 70 percent of its electricity from polluting coal-fired plants and must import all of its coal from other states.

Forward-thinking energy policies that promote energy efficiency, renewable energy, and cleaner fossil fuel generation can significantly reduce emissions from these sources. Clean energy policies for Michigan should:

- **Establish a renewable electricity standard** for Michigan requiring all electricity suppliers to provide 20 percent of their electricity from clean, renewable sources such as wind, solar, and bioenergy by 2020. It would also provide

an incentive to generate electricity from landfill gas, which would reduce methane emissions, a powerful heat-trapping gas. A “renewable energy credit” trading system could help Michigan achieve the standard at the lowest cost. To date, 13 states have enacted minimum

CO₂ emissions from power plants could be cut nearly in half by 2020.

renewable electricity standards. Renewable energy makes economic sense for Michigan, a state with significant wind resources that is also home to the world’s largest manufacturing facility of thin-film photovoltaic (solar) cells.

- **Build upon clean energy investment funds** in Michigan to support investments in energy-efficient technologies and emerging renewable energy technologies such as solar photovoltaics. The fund should be supported by a charge of 0.4¢ per kWh on consumer electricity bills (about \$2 per month for a typical household).

- **Evaluate and update Michigan’s energy efficiency standards and building codes** to model codes established in 1999 and 2000, and to more advanced codes by 2010. One study estimates that existing standards have already saved 2.5 percent of annual US electricity use and that these savings could rise to nearly 8 percent in 2020.

- **Provide incentives for cleaner fossil fuel generation**, such as combined heat and power (CHP) systems that produce both heat and electricity for a facility or surrounding community from a single source of fuel. Some CHP technologies can reach efficiency levels of greater than 80 percent compared with the 33 percent average for conventional coal-burning power plants.

- **Support the same policies at the federal level**, which would create a level national playing field and additional economic opportunities for Michigan clean energy resources.

These global warming solutions have several valuable benefits including cleaner air, economic development, job growth, and, often, financial savings to consumers and industry. A study by the Environmental Law and Policy Center in

CO₂ Pollution Reductions from the Clean Energy Development Plan Michigan



Source: Environmental Law & Policy Center, 2001

Chicago found that by implementing similar policies in Michigan, CO₂ emissions from power plants could be cut nearly in half by 2020 relative to “business as usual” scenarios. They would also reduce sulfur dioxide emissions, which cause acid rain, by 41 percent, and nitrogen oxide emissions, which cause smog, by 77 percent, while creating more than 38,000 new jobs and generating \$3.4 billion in economic activity. These benefits could be achieved with only slightly higher electricity costs of 1.5 percent in 2010 and 3.4 percent in 2020.

Vehicle Solutions

With nearly one-third of all heat-trapping emissions coming from the transportation sector in the United States, it is critically important to reduce emissions from the cars we drive. Because most of the nation’s car manufacturing capacity is in Michigan and neighboring states, it has a unique opportunity to effect change that not only improves the environment at home, but could also help Detroit regain its technological leadership among automakers and preserve jobs vital to the region. To reduce emissions from the transportation sector, we should:

- **Increase fuel economy standards.** Federal fuel economy standards already in place save more than 720 million tons of heat-trapping gases per year, the equivalent of taking nearly 80 million cars off the road. Automakers have the technology in hand to deliver additional gas mileage improvements in their fleets, thereby reducing heat-trapping gas emissions and oil consumption while saving consumers money at the pump. Higher standards will help automakers get on track with the worldwide trend toward addressing the global warming and energy security implications of vehicles.

- **Provide state incentives for hybrids and other fuel-efficient vehicles.** As part of NextEnergy legislation, tax incentives or rebates pegged to fuel economy increases or reductions in global warming gases can attract Michigan buyers to less polluting cars and help build the market for automakers. This type of program can also cut gasoline bills and global warming emissions from new vehicles by as much as 50 percent.

- **Set efficiency requirements for state vehicle purchases.** Michigan purchases large numbers of vehicles for its government fleets. An executive order requiring state-purchased vehicles to be highly fuel efficient would demonstrate Michigan's leadership on global warming, help auto-makers by building the market for high-efficiency cars, and demonstrate fiscal responsibility by delivering savings at the gas pump.

- **Support research and demonstration projects** for fuel cells and other advanced vehicle technologies. Michigan has launched a state-sponsored effort to promote fuel cell vehicles, which have the potential to deliver pollution-free transportation while boosting local economies with a new high-technology industry.

- **Provide state incentives for low-carbon fuels.** Many states offer tax incentives for the use of one or more alternative fuels, such as renewable ethanol and biodiesel. The level of these incentives should be tied to how much heat-trapping emissions are associated with the fuel's production.

- **Pursue smart growth projects** that reduce the need to drive, such as rideshare, bicycle, and pedestrian programs, mass transit promotions, and parking management.

Agricultural Solutions

Nitrous oxide emissions, primarily from the breakdown of nitrogen fertilizers, make up 64 percent of agricultural emissions. Methane is the next largest source at 34 percent. Aside from climate benefits, reducing the use of nitrogen fertilizers has the important health benefits of cleaner drinking water and improved health of our streams, rivers, lakes, and wetlands. The most promising strategies suggest Michigan should:

- **Establish "nutrient-trading" programs to reduce water pollution and heat-trapping emissions.**

A 2000 study by the World Resources Institute found that a nitrogen-trading program under the Clean Water Act would provide a means for industrial and municipal wastewater dischargers to pay farmers to reduce their nutrient losses into waterways. This model has a net financial benefit to farmers, allows water treatment facilities to meet their water quality obligations cost-effectively, and has the potential to reduce nitrous oxide emissions from agriculture significantly. Michigan

currently has a phosphorus-trading program under way, which could be expanded to include nitrogen.

- **Address methane from livestock and livestock waste.** The Environmental Protection Agency supports several programs (e.g., AgSTAR, RLEP) that can reduce methane and nitrous oxide emissions from livestock and livestock wastes while improving production efficiency and, in some cases, converting the methane gas into energy for the farm. Further



United Solar Systems Corporation, NREL

study is necessary to determine the effectiveness of these programs.

- **Improve soil management on our farmlands.** Numerous studies have shown that certain best practices in soil management such as no-till, low input, and use of cover crops can enhance short-term soil carbon storage.

Forestry Solutions

With more than 19 million acres of public and private forestlands in Michigan, there are substantial opportunities for storing carbon in trees and forest soils, as well as avoiding new emissions. Protecting and restoring native forests and reduced-impact logging can both increase carbon storage and provide biodiversity and other environmental benefits. Michigan should undertake the following practices to get the most climate benefit from its forestland:

- **Leverage public funds for forest acquisition and management.** Funding is available through various programs funded by the US Forest Service for forest conservation and improved management on privately owned lands. The Forest Legacy Program, for example, supports acquisition of private forests, which make up the vast majority of forestlands in Michigan. In addition, the USDA's Conservation Reserve Program provides financial resources to landowners to restore native tree cover to unproductive agricultural lands. All of these programs provide a cost-effective means for private landowners to store additional carbon by boosting forest biomass.



GE Wind Energy

- **Increase and maintain urban tree cover to reduce the urban “heat island” effect.** This strategy not only stores additional carbon, but also conserves energy by reducing solar radiation and air temperature. The Chicago Urban Forest Climate Project, for example, reduced the city’s air pollutants by more than 6,000 tons in 1991. Planting trees resulted in net savings of annual heating and cooling costs equal to more than \$200 per tree.

- **Manage forests for climate and other environmental values.** As of 2000, New York, Minnesota, Wisconsin, and Michigan had a total of 1.7 million acres of forest certified as sustainably managed by the Forest Stewardship Council (FSC). Such certification should be expanded and coupled with a sound “carbon market” that provides incentives to reduce net emissions and protect and restore the region’s forests.

Integrated Strategies

There are several initiatives that address multiple sources of emissions and can play an important role in reducing heat-trapping emissions in the Great Lakes region.

- **Climate change action plans** can help states integrate their emissions-reduction efforts. Michigan would benefit from developing a strong plan with specific reduction targets and timelines. Currently, Ann Arbor, Washtenaw County, and Delta County have committed themselves to local emission reductions through the International Cities for Climate Protection Campaign.

- **Emissions trading**, with a mandatory carbon “cap” or ceiling, is another possible strategy for reducing emissions cost-effectively. A mandatory carbon-trading bill was introduced by Senators John McCain (R-AZ) and Joseph Lieberman (D-CT) to set up a “cap and trade” system at the federal level. The Chicago Climate Exchange is a US leader in developing carbon-trading

Innovative, affordable and prudent solutions are available to help reduce the severity of climate change.

strategies. Michigan senators should be encouraged to co-sponsor strong carbon-trading legislation.

- **Regulating CO₂ with other pollutants.** In 2002, Congress introduced a bill to reduce power plant emissions responsible for global warming, acid rain, smog, and mercury



Jim Green, NREL

contamination. This legislation, known as the Clean Power Act (S. 556) and the Clean Smoke-stacks Act (H.R. 1256), would cut CO₂ emissions by 25 percent—reducing them to 1990 levels, nitrogen oxide and sulfur dioxide emissions by 75 percent, and mercury emissions by 90 percent. Addressing all four major pollutants at once allows utilities to take an integrated approach to pollution control, reducing compliance costs while greatly improving public health. Michigan’s congressional delegation should be encouraged to support these efforts.

Responsible Action Starts Today

Global warming is under way and already causing changes to our environment. However, the size of this challenge should not paralyze us. Innovative, affordable, and prudent solutions are available to help reduce the severity of climate change. Leadership at all levels in Michigan is needed to solve this human-caused problem. Citizens must take action in their own lives and insist that local and national elected leaders and corporate CEOs implement responsible solutions that will slow climate change.

Immediate steps are necessary to increase the health and resilience of ecological and economic systems vital to the region, and we must begin planning and preparing to manage those future changes that cannot be avoided. By acting now, we can protect the rich natural heritage, vibrant economy, and well-being of people and communities in Michigan and throughout the region.



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Global Warming Solutions: Reducing Heat-Trapping Emissions in Michigan supplements the findings of *Confronting Climate Change in the Great Lakes Region*, a report published in April 2003 by the Union of Concerned Scientists and the Ecological Society of America. This report is available at www.ucsusa.org/greatlakes. For a printed copy of the report or more information on practical solutions to climate change contact the Union of Concerned Scientists at (617) 547-5552.