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2007-08

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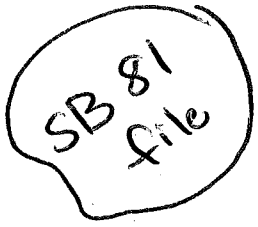

A Reality Check on Initiatives to Reduce Greenhouse Gas Emissions in California, Oregon, the Northeast and in Europe

by
Margo Thorning, Ph.D.
Senior Vice President and Chief Economist
American Council for Capital Formation

August 2007

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Executive Summary

Several U.S. states and the European Union have adopted caps on greenhouse gas emissions (GHGs) designed to reduce greenhouse gas emissions by curbing energy use, encouraging the use of renewables and increasing energy efficiency. California has enacted a series of bills to reduce GHGs, including Assembly Bill 32 which requires that emissions be cut to 1990 levels by 2020. Given the state's own projections of growth in population and in baseline GHG emissions, the reduction targets can only be achieved through significant reductions in economic growth and employment. Ten northeastern states formed the Regional Greenhouse Gas Initiative ("RGGI") to reduce carbon dioxide (CO_2) emissions from electric utilities. The evidence suggests that RGGI may be a "paper tiger" because RGGI's initial cap of 121.3 million short tons of carbon dioxide may be higher than actual emissions when the cap applies in 2009. In addition, reports that Portland, Oregon reduced GHG emissions to 10 percent below 1990 levels in 2004 are based on questionable data and one time events like changing landfills and to a slowing economy.

The European Union's mandatory emission trading system (ETS) has not been successful in slowing the growth of GHGs in the EU-15 (the original members like France, Spain, Germany, UK, and Italy). The United States on the other hand, with its voluntary approach, has made steady progress in reducing the amount of energy required to produce a dollar of output. In fact, the U.S. reduced its absolute level of CO_2 emissions by 1.3 percent in 2006 while its economy grew by 3.3 percent.

Climate change policies should continue to strive to reduce energy intensity as the capital stock is replaced over the business cycle, promoting the development of new, cost-effective technologies for alternative energy production and conservation while encouraging the spread of market based reforms in the developing world. This approach is likely to be much more productive than adopting mandatory CO_2 reduction targets that would sacrifice economic well-being and job growth with little or no long-term impact on global GHG emission growth.

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* The mission of the American Council for Capital Formation is to promote economic growth through sound tax, environmental and trade policies. For more information about the Council , please contact the ACCF, 1750 K Street, N.W., Suite 400, Washington, D.C. 20006-2302; telephone: 202.293.5811; fax: 202.785.8165; e-mail: info@accf.org; website: www.accf.org. This project was made possible, in part, by a grant from the Center for Energy and Economic Development.

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Introduction

Reducing the growth of greenhouse gas emissions (GHGs) is an important environmental policy goal intended to reduce the threat of human-induced climate change. Several U.S. states and the European Union have adopted mandatory caps on GHG emissions designed to reduce greenhouse gas emissions by curbing energy use, encouraging the use of renewables and increasing energy efficiency. This paper provides an overview of what impact current policies in California, Oregon, the Northeastern states and Europe are having on GHG emissions growth. It also examines the potential economic consequences when such policies are implemented. In addition, the paper describes emission trends in the United States and outlines cost-effective policies that can have a substantial impact on slowing global emission growth.

1. California's Greenhouse Gas Emissions: Myths and Reality

In August 2006, the California Legislature enacted a bill requiring the state to sharply reduce its greenhouse gas emissions. Assembly Bill (AB) 32 requires that California reduce its statewide GHG emissions to 1990 levels by 2020. Reductions are scheduled to begin in 2012. The law requires that utilities account for and include the carbon emissions of electricity imported into the State. California law already requires that 20 percent of electricity be produced from renewables by 2017. Achieving AB 32's emission targets will present a difficult challenge for Californians, given current emission trends and population growth.

Economic Analyses of the Impact of AB 32

The California Climate Action Team (CAT) report of March 2006 analyzed the GHG reduction targets adopted in AB 32 (reducing emissions to 1990 emission levels by 2020). While the CAT report stated in its analysis that "command and control" policies to reduce GHGs in California will increase state net income and create new jobs, other analyses suggest the opposite will prove to be the case. Several recent credible analyses conclude that AB 32 is likely to cause net job loss

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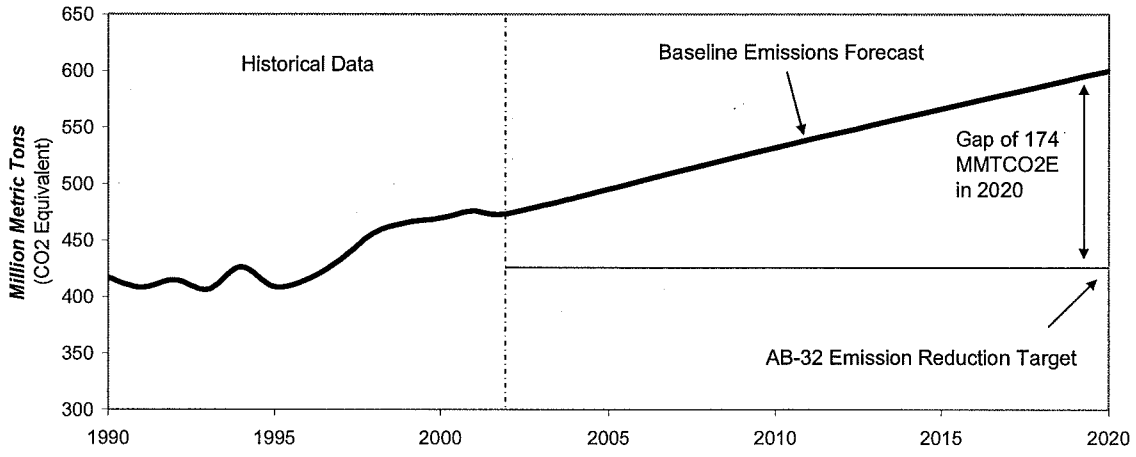
and "leakage" of industry to states and countries which do not have mandatory emission caps, and result in no net GHG reduction.

- **California's Projected Growth in Emissions and Population: Effect on Achievement of AB 32 Targets**

  A major stumbling block to California's meeting the AB 32 targets is its projected increases in emissions and population over the next fourteen years. California's GHG emissions are projected to grow 27 percent between 2000 and 2020 under the baseline forecast, according to estimates in the CAT report. The baseline forecast already includes assumptions about increased energy efficiency. Even so, California's GHG emissions are projected to rise to 600 million metric tons of carbon dioxide ($MMTCO_2$) by 2020, compared to AB 32's required reduction to 426 $MMTCO_2$ **(see Figure 1)**.

  The most recent data available from the U.S. Department of Energy's Energy Information Administration indicates California's CO_2 emissions rose by 2 percent from 2002 to 2003. Sharp cutbacks in California's energy use will be necessary to close the 41 percent gap ($174/MMTCO_2$) in 2020 between projected emissions and the AB 32 target. Further complicating California's challenge is projected increase in population from 30 million residents in 1990 to 37 million residents in 2004 and 44 million in 2020. More people means more energy needed to heat and cool homes, fuel job growth and provide transportation.

Figure 1. California Carbon Dioxide Emissions
(Million Metric Tons CO2 Equivalent)



Sources: ***Historical Data***: Gerry Bemis and Jennifer Allen, "Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2002 Update", June 2005.

Baseline Emissions Forecast: Baseline forecast includes the California Energy Commission's projections of anticipated energy efficiency improvements. Source for 2010 and 2020 forecasts is California Environmental Protection Agency, "Climate Action Team Report to Governor Schwarzenegger and the Legislature", March 2006, pg 64.

To illustrate the difficulty of reducing California's emissions to 1990 levels by 2020, consider that over the entire 1990-2000 period, per capita emissions in California fell by only 2.9 percent **(see Table 1 and Figure 2)**. California's projections show that, under its baseline forecast, emissions per capita will decline by 2.3 percent from 2000 to 2010 but will **increase** by 0.9 percent from 2010 to 2020 **(see Table 1).**

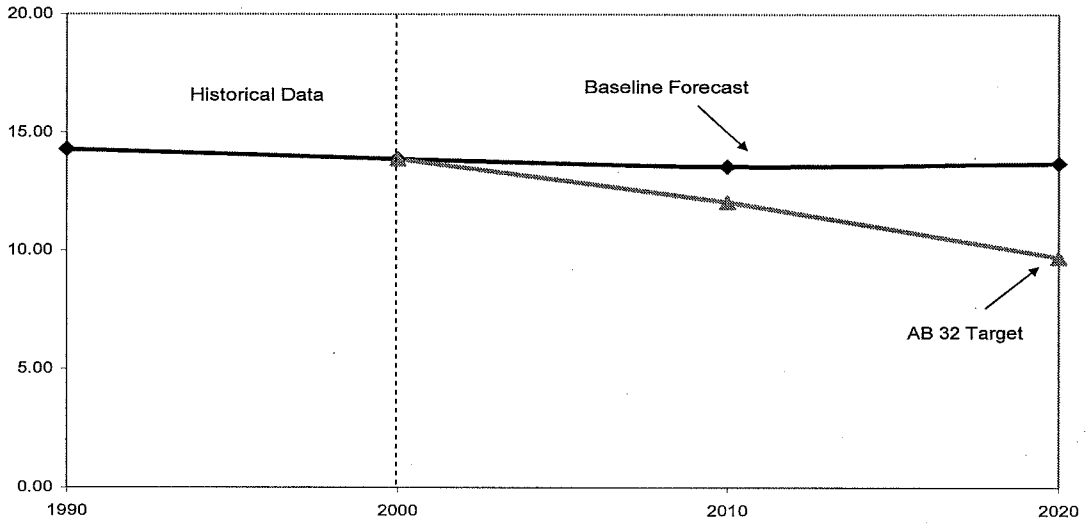
In order to meet the emission reduction target in AB 32, per capita emissions would have to fall by 13.1 percent over the 2000-2010 period and an additional 19.4 percent from 2010 to 2020 **(see Table 1)**. In other words, the required reductions in per capita emissions are 4.5 to 6.5 times greater than what occurred from 1990 to 2000. The technologies simply do not exist to reduce total (and per capita emissions) over the next 14 years by the amounts mandated in AB 32—to say nothing of the time and expense required to replace existing energy using equipment—without severely reducing growth in California's Gross State Product (GSP) and employment.

Table 1. California's Per Capita Emissions Under Baseline Forecast and Decrease Required for AB 32 Target

Year	Emissions (MMTCO2E)	Population (Millions)	Per Capita Emissions	Percentage Change	AB 32 Emissions Target (MMTCO2E)	Required Per Capita Emissions	Percentage Change
1990	426	29.83	14.28				
2000	473	34.10	13.87	-2.9%	473	13.87	
2010	532	39.25	13.56	-2.3%	473*	12.05	-13.1%
2020	600	43.85	13.68	0.9%	426	9.71	-19.4%
			2000-2020	-1.4%			-30%

Source: CalEPA, Climate Action Team Report to Governor Schwarzenegger and the Legislature, March 2006. Table 5-5 Baseline Inventory Estimates (pg 64). * Note that while AB 32 does not contain an emission reduction target for 2010, the CAT report does.

Figure 2. Emissions Per Capita
(Metric Tons CO2 Equivalent per Person)



Source: CalEPA, Climate Action Team Report to Governor Schwarzenegger and the Legislature, March 2006. Table 5-5 Baseline Inventory Estimates (pg 64)

- **Electric Power Research Institute**

A new macroeconomic analysis by the Electric Power Research Institute (June, 2007) analyzes six possible policy scenarios for implementing AB 32 (see report at http://www.epriweb.com/public/000000000001014641.pdf). The EPRI report concludes that while all six scenarios impose costs on California's economy, the policies differ in their cost per ton of GHG emissions avoided. The scenarios that significantly reduce GHGs entail costs to the California economy ranging from $100 to $511 billion through 2050. In addition, for every ton of CO_2 emission reduction in California, there could be an increase of 0.85 tons of electric sector emissions from the rest of the western states (the essence of the "leakage issue") due to "contract shuffling." EPRI's findings are in sharp contrast with those of the CAT report mentioned above.

- **AEI-Brookings Joint Center Report**

Another recent examination of the likely consequences of AB 32 was released by the AEI-Brookings Joint Center for Regulatory Studies in January, 2007 (see http://www.aei.brookings.org/admin/authorpdfs/page.php?id=1358). AEI-Brookings concludes that studies by the Climate Action Team, the Center for Clean Air Policy and by David Roland-Holst who is a professor at Mills College and is also an adjunct professor at the University of California at Berkeley (hereafter the California studies) substantially underestimate the cost of meeting the 2020 target. According to the report, the major flaws of the California analyses include: a) ignoring costs of energy investments to households and business, b.) inaccurate estimates of future saving from reduced energy use, c.) incorrect choice of discount rate to value energy saving, d.) underestimation of costs of policies to reduce emissions, and e.) incorrect estimates of consumer baseline behavior. As a result, the annual costs of AB 32 are understated by billions of dollars. Thus, the California studies do not offer reliable estimates of the cost to Californians of meeting the AB 32 target.

In summary, the costs of AB 32 are likely to be quite high and the benefits quite small. California's emissions were only about 2.5 percent of total global emissions in 2002 and will continue to shrink as a share of total global emissions. But more important, the most recent data indicate that California's emissions are trending upward, not down.

2. The Regional Greenhouse Gas Initiative: Myths and Reality

Ten northeastern states[1] formed the Regional Greenhouse Gas Initiative ("RGGI") in 2004, with the intention of reducing electric utility carbon dioxide emissions. In December 2005, the RGGI states agreed to a Memorandum of Understanding (MOU) limiting utility CO_2 emissions to "current" emission levels. From 2009 to 2014, the cap will be 121 million metric tons of CO_2, followed by a 10 percent reduction to be phased in between 2015 and 2018. Individual RGGI states now are pursuing state legislative and regulatory authority to implement Model Rules required to implement a CO_2 cap-and-trade program under the RGGI agreement.

[1] ME, NH, VT, CT, MA, RI, NY, NJ, DE and MD. Maryland joined RGGI in 2007 as a result of adoption of the Maryland Healthy Air Act in 2006. Pennsylvania served as an observer of the RGGI process, but did not join the RGGI MOU.

Utility CO_2 emissions represent about one-third of total greenhouse gas emissions in the RGGI states. While the RGGI agreement will cap CO_2 emissions from the utility sector, greenhouse gas emissions from transportation and other sectors are projected to increase. Overall, greenhouse gas emissions in the northeast RGGI region will grow, even when the RGGI program is fully operational.

The RGGI region is likely to import substantially greater amounts of power from coal-fueled sources located to their west and south. Several new power transmission projects have been designed to improve electric reliability in the northeast. States such as Connecticut, New Jersey and New York already are confronting serious power supply deficiencies due to the lack of new electric generating capacity construction.

State regulatory analysts estimate that a 3 percent increase in imported power to the RGGI area is sufficient to offset all of the CO_2 reductions projected for the RGGI program (by increasing emissions in neighboring states). The transmission projects now on the drawing board are capable of delivering tens of thousands of megawatts of power to reduce transmission congestion and to improve reliability in the northeast.

However, in March 2007, the RGGI "Imports and Leakage Committee" issued recommendations for studying the emissions impacts of increased power imports from other states and offered several proposals designed to minimize increased carbon emissions associated with such imports. The recommended state regulatory initiatives to tax or otherwise impede increased power imports, by requiring emission "offsets" for example, are suspect on constitutional grounds.

Evidence that RGGI's proposal actually lacks "teeth" is provided by a recent Congressional Research Service report, "Greenhouse Gas Reductions: California Action and the Regional Greenhouse Gas Initiative" (April 2007). CRS reports RGGI's initial cap of 121.3 million short tons of carbon dioxide may be higher than actual emissions when the cap occurs in 2009. Private estimates using data from the U.S. Department of Energy's Energy Information Administration (DOE/EIA) also suggest that most states will not face actual reductions until the middle of the next decade. If that proves to be the case, no GHG reductions will actually be necessary. Thus the vaunted RGGI program may be a "paper tiger" at least until the middle of the next decade.

3. Portland, Oregon: Emissions Myths and Realities

An analysis published in ClimateBiz by Dr. Mark C. Trexler, a noted climate expert with the World Resources Institute, questions whether the city of Portland, Oregon actually has achieved the emission reductions it reported in 2005 (see http://www.climatebiz.com/sections/news_detail.cfm?NewsID=28497). Portland was the first U.S. city (in 1993) to adopt a plan to reduce greenhouse gas emissions. In 2001, Oregon's Multnomah County (within which Portland sits) joined Portland in adopting a county-wide target of reducing GHG emissions by 10 percent below 1990 levels by 2010.

In 2005, Portland and Multnomah County released their *2005 Global Warming Progress Report*. It announced that 2004 emissions already had dipped below 1990 levels. The drop below 1990

emissions admittedly was only 0.1 percent — but it still is a far cry from the seemingly inexorable upward march of emissions across the nation, Dr. Trexler notes. However, in reviewing the numbers after the report's release, the authors discovered a mathematical error that when corrected showed aggregate emissions in 2004 to be above 1990 levels, albeit only marginally so.

Dr. Trexler believes there are several reasons to question Portland's reported emission cuts. First, the estimates are based on high-level approximations. For electricity, for example, aggregate utility estimates of the number of megawatt hours sold to residential, commercial, and industrial users were multiplied by the regional average CO_2 emissions factor. For the transportation sector, emissions were calculated based on fuel sales within Multnomah County rather than any estimate of vehicle miles traveled (VMTs) or any other measure.

Thus, due to the highly aggregated data, it's not easy to discern the real trends. Are VMTs really decreasing (which would be in marked contrast to national trends) or are relatively more people buying gasoline outside the city and county limits into which they commute? Is decreased electricity use being driven by energy conservation measures or by Oregon's economic woes over the last several years?

Overall, Portland's results for 2004 seem particularly affected by three factors:

1. A 56 percent reduction in estimated solid waste-related methane emissions (equivalent to almost 2 percent of total county emissions), attributable to the fact that Portland changed landfills during the decade and the current landfill has a better methane collection system.

2. Gasoline sales, which can bounce around considerably from year to year, were low in 2004 (with the reduction from 2003 being equivalent to almost 2 percent of total county emissions).

3. A dramatic fall in industrial energy use since 2000 (more than 20 percent, and equivalent to almost 5 percent of total county emissions).

Based on these facts, Dr. Trexler concludes that the assertion that 2004 emissions came out close to 1990 emissions appears to be significantly due to one-time events (e.g., changing landfills), overarching economic conditions (a slowed economy), and random factors such as relatively low county gasoline sales in 2004. These three factors are significant because they add up to 9 percent of total county emissions. Thus, he notes, it's not clear that all of these variables will continue to work in Portland's favor in helping it achieve its 2010 emission reduction target. Dr. Trexler concludes that it's not appropriate to point to Portland's and Multnomah County's 1990 vs. 2004 emissions as proof that the nation as a whole could as easily cut its GHG emissions back to 1990 levels.

In fact, recent data (April 2007) on state emissions released by the U.S. Department of Energy's Energy Information Administration indicate Oregon's emissions rose by 0.78 percent from 2002

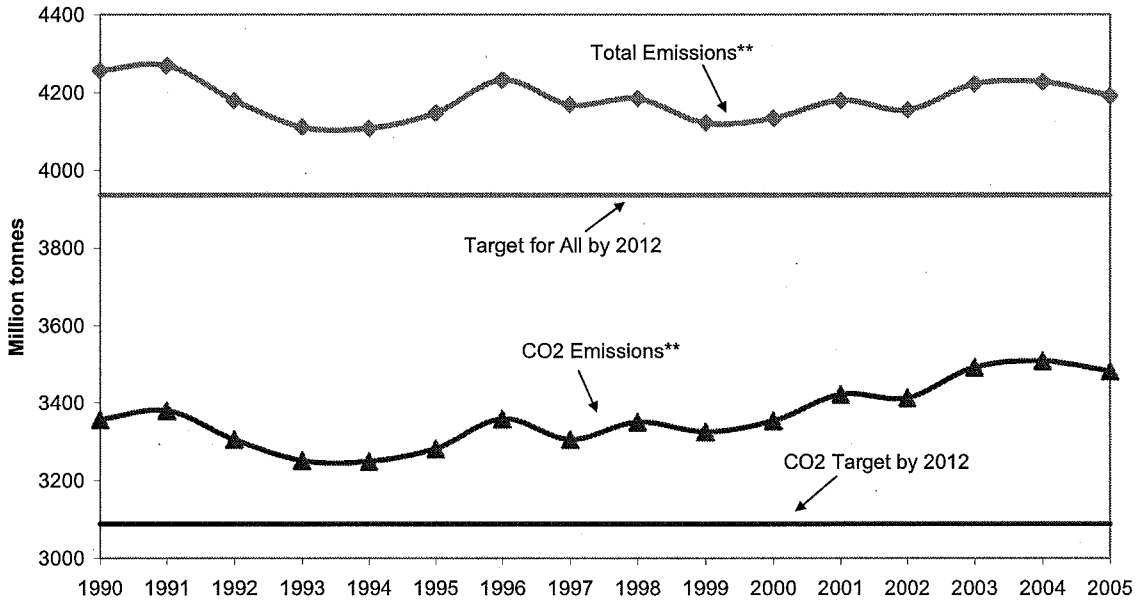
to 2003. This suggests that permanent reductions in Portland will be difficult unless its economy continues to lose industrial and manufacturing jobs

4. European Union Emissions: Myths and Reality

Many policymakers, the media, and public believe that the European Union's Emission Trading System (ETS) has produced reductions in GHG emissions and that the European system could serve as a model for how to reduce growth in GHGs here in the U.S. The ETS was created in 2005; it covers about 12,000 major emitters which produce about 40 percent of EU emissions. The ETS is a market-based, EU-wide system that allows countries to "trade" (i.e., buy and sell) permits to emit CO_2. The EU 15 (the major industrial countries) have a target of achieving an 8 percent reduction in GHGs by 2010.

As shown in **Figure 3**, CO_2 emissions in the EU 15 have risen sharply since 1990. The ETS itself has had little impact in reducing overall emission growth. In fact, overall emissions (including all six of the greenhouse gases) have held constant due to one-time events such as the collapse of industry in East Germany and a switch from coal to gas for electricity generation. As shown in **Figure 3,** in 2005 overall emissions were about 6 percent above the target.

Figure 3. Greenhouse Gas Emissions in the EU-15*



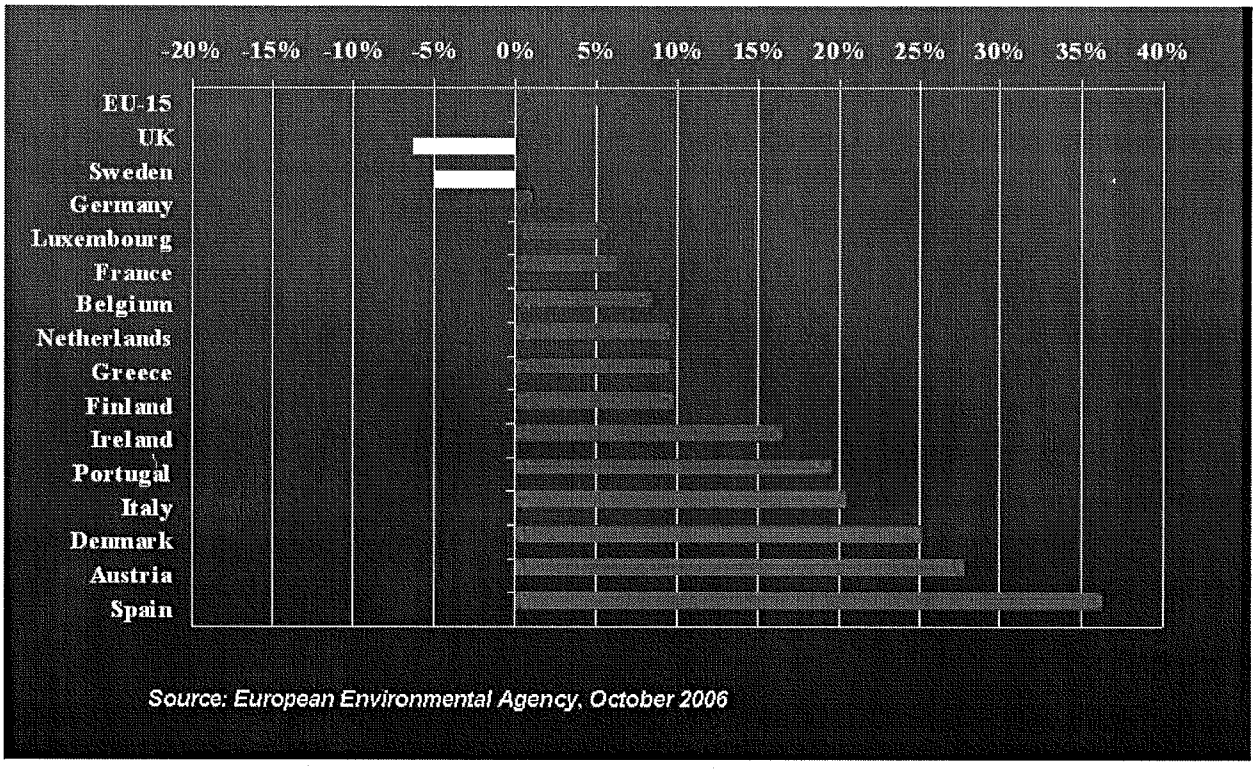
* In CO2 Equivalents

** Excludes land use, land use change and forestry.

Source: "Annual European community Greenhouse Gas Inventory 1990-2005 and Inventory Report 2007", European Environment Agency, version 27 May 2007.

The European Environmental Agency's latest projections (October 2006) for the EU 15 show that without strong new measures, EU 15 emissions will be 7.4 percent *above* 1990 levels in 2010 rather than 8 percent *below* as required by the Kyoto Protocol.**(see Figure 4).**

Figure 4. Greenhouse Gas Emissions in the European Union Projected to Exceed Kyoto Targets in 2010



Now that the ETS has been operational for two years, industry and households are feeling some of the system's effects even though its overall impact on emission growth has been small. As the *Washington Post* reported in "Europe's Problems Color U.S. Plans to Curb Carbon Gases" (April 9, 2007), the ETS has become a bureaucratic morass with a host of unexpected and costly side effects, including a much smaller effect on carbon emissions than planned and many companies complaining that it is unfair. An example is Kollo Holding's factory in the Netherlands which makes silicon carbide, a material used as an industrial abrasive and lining for high-temperature furnaces and kilns. Its managers like to think of their plant as an ecological standout. They use waste gases to generate energy and have installed the latest pollution-control equipment.

But Europe's program has driven electricity prices so high that the facility routinely shuts down for part of the day to save money on power. Although demand for its products is strong, the plant has laid off 40 of its 130 employees and trimmed production. Two customers have turned to cheaper imports from China, which is not covered by Europe's costly regulations, the *Post* reports.

> "It's crazy," said Kusters, the plant director, as he stood among steaming black mounds of petroleum coke and sand in northern Holland. "We not only have the most energy-efficient plant in the world but also the most environmentally friendly."

Of all the effects of the new rules, the rise in the price of power has aroused the most outrage according to the *Washington Post*. Much of the anger of consumers and industries has been aimed at the continent's utility companies. Like other firms, the utilities were given slightly fewer allowances than they needed. But instead of charging customers for the cost of buying allowances to cover the shortfall, utilities in much of Europe charged customers for 100 percent of the tradable allowances they were given—even though the government handed them out free. Electricity rates soared.

> The chief executive of one utility, Vattenfall, which owns a coal plant that is one of the continent's biggest carbon emitters, defended the decision. Lars G. Josefsson, who is also an adviser to German Chancellor Angela Merkel, said higher electricity prices are "the intent of the whole exercise. . . . If there were no effects, why should you have a cap-and-trade system?"

An examination of the actual European emissions data, combined with anecdotal reports like those above on actual operation in the EU, reinforce the idea that the ETS is not having a major impact on emission reductions.

5. Practical Strategies for GHG Reductions

- **The role of economic growth and technology in GHG reduction**

Economic growth can have a positive impact on GHG emission reductions. The U.S., with its dynamic economy and voluntary approach to emission reductions, has cut its energy intensity by 12.2 percent between1997 and 2003 compared to only 7.6 percent in the EU with its mandatory approach (see **Figure 5**).

Technology development and deployment offer the most efficient and effective ways to reduce GHG emissions. A strong economy tends to pull-through capital investment faster. Given the extremely long life of much of the capital stock, the voluntary approach will allow emissions intensity to be reduced in a cost-effective way (see **Figure 6**).

There are only a few basic ways to reduce CO_2 emissions from fossil fuel use: use less fossil fuel or develop technologies to use energy more efficiently, capture emissions or substitute for fossil energy. There is an abundance of economic literature demonstrating the relationship between energy use and economic growth, as well as the negative impacts of curtailing energy use. Long term, new technologies offer the most promise for affecting GHG emission rates and atmospheric GHG concentrations.

Consumers and industry already are responding to market-driven energy prices increases in the past three years by changing their energy use patterns and adopting new, more efficient technologies. For example, gasoline prices increased more than 10 percent a year in each of the

Figure 5. Comparison of EU and US Energy Intensity Reduction 1991-2003

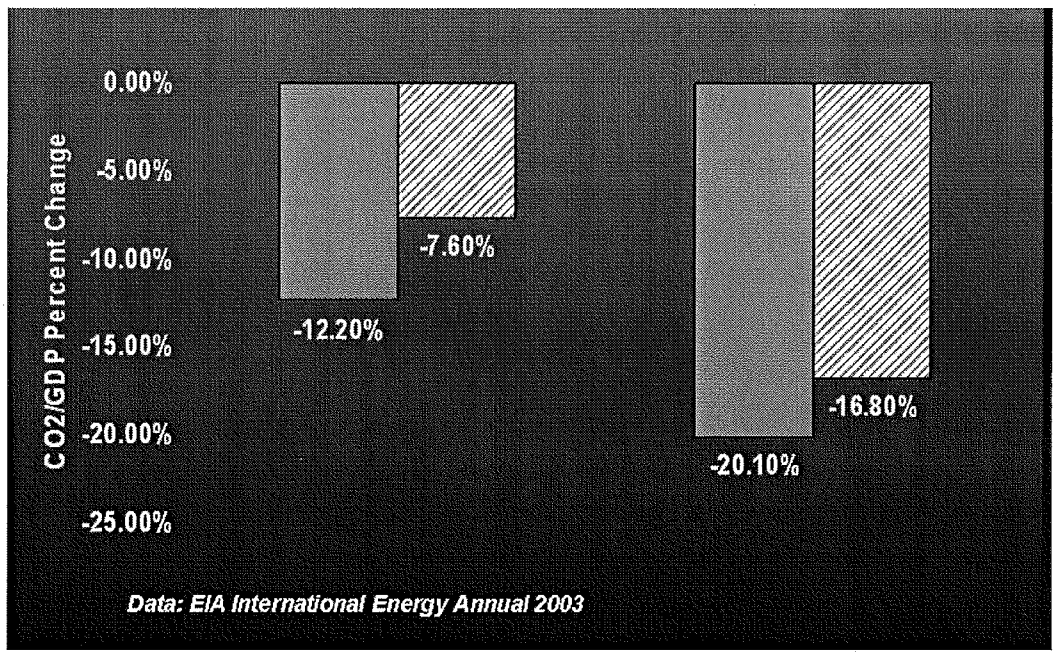
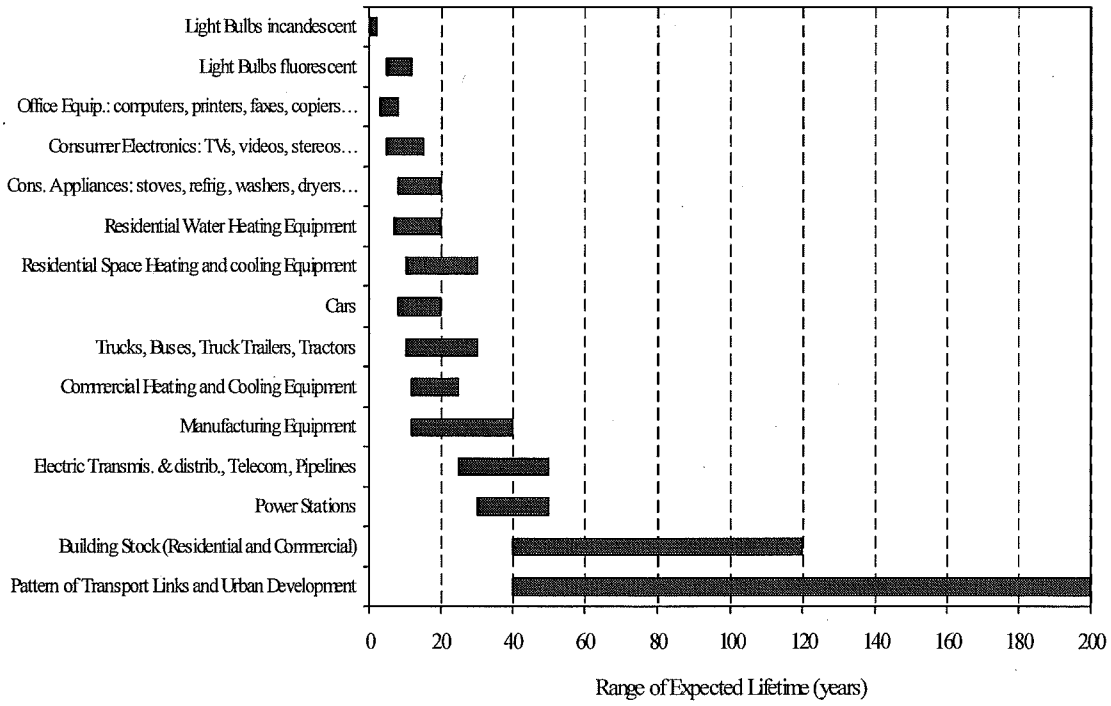


Figure 6. Average Life Spans for Selected Energy-Related Capital Stock



last three years. The impetus of market forces is contributing to the adoption of cost-effective changes in the capital stock and the transportation fleet over the normal capital replacement cycle. According to recent DOE/EIA data, U.S. energy-related CO_2 emissions declined in absolute terms in 2006 by 1.3 percent even though the economy grew by 3.3 percent. In addition, the total carbon intensity of the economy (CO_2 per real dollar of GDP) fell by 4.5 percent in 2006. This is the largest decline since 1990. The market is clearly responding to higher energy prices leading to changes in consumer behavior.

- **Accelerating the uptake of new technology by private as well as nonprofit entities.**

The development of various high technology programs can be accelerated through government programs as well as by encouraging private sector investment. For example, in the electric utility sector, some policies may be of particular help to taxable entities (typically investor-owned utilities or "IOUs" while others would be of more benefit to rural electric cooperatives (which pay no federal income tax.)

One positive step for encouraging the uptake of new technology by IOUs would be to provide more rapid write offs for new investment. Improving the U.S federal tax code to provide more rapid cost recovery through faster depreciation, investment tax credits, and making permanent the 15 percent tax rate on dividends and capital gains received by individuals are positive steps that reduce the cost of capital for investment. U.S. capital cost recovery for energy investments lags that of many of our trading partners. New ACCF research shows that U.S. companies receive only 29 cents after 5 years through depreciation allowances on each dollar of investment in a combined heat and power facility while a company in India gets 56 cents and a Canadian company gets 80 cents back. (see http://www.accf.org/pdf/Energy-Depreciation-Comparison.pdf for full report). Thus, slow capital cost recovery in the U.S. federal tax code places domestic companies at a disadvantage compared to our trading partners and slows the development and installation of new energy-efficient technology.

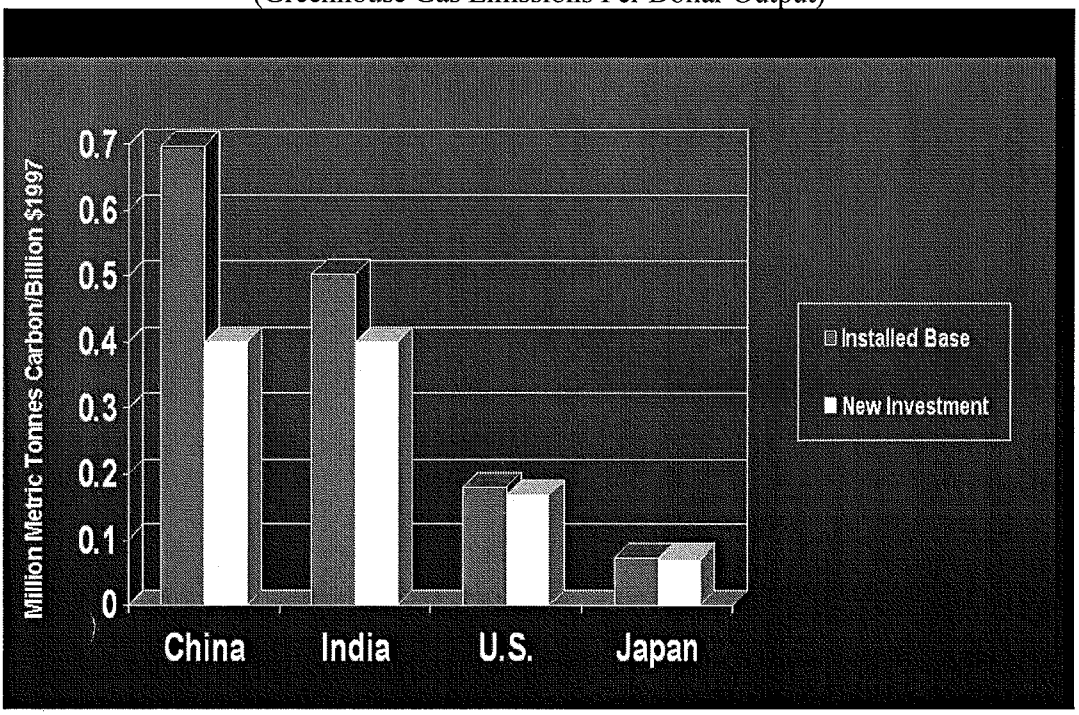
For non-taxable entities such as rural electric cooperatives, encouraging the more rapid adoption of new technologies to reduce emissions could be accelerated by special government bonds, grants or low interest loans. Such policies would ensure that the competitiveness of rural cooperatives is not impaired by tax code reforms which benefit IOUs.

- **International partnerships and technology transfer**

Encouraging the world's top emitters to work together to transfer clean technology is key to global greenhouse gas emission reduction. China's CO_2 emissions surpassed those of the U.S. this year. This fact illustrates how important it is to secure the cooperation and participation of major developing countries to have a real impact on global GHG emissions growth.

Figure 7. Impact of New Technologies on Carbon Emissions

(Greenhouse Gas Emissions Per Dollar Output)

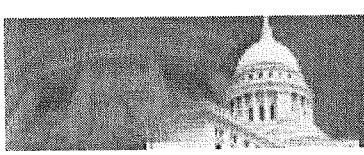


The Asia Pacific Partnership on Clean Development and Climate (APP) — signed in July 2005 between India, China, Korea, Japan, Australia and the United States — is a good start at promoting economic development and the spread of cleaner, less-emitting energy technology. Research by Dr. David Montgomery of CRA International shows that current installed capital equipment in China and India produces almost four times the GHG emissions per dollar of output as U.S capital equipment (see **Figure 7**). Even though China is becoming more energy efficient and is reducing its energy intensity, its new equipment still is far less efficient than that of the United States and Japan. Meanwhile, India is not making much progress in reducing energy intensity. If the APP can encourage the kind of institutional changes in developing countries that help them acquire new and more energy-efficient equipment and production processes it would be a substantial help in reducing the growth of GHGs worldwide. If China and India had access even to current U.S. levels of technology for electricity generation, manufacturing, transportation and building heating and cooling, their carbon emission reductions would be four times larger than those of the EU-15 by 2012 (assuming the EU can meet its Kyoto target).

Conclusions:

Energy use and economic growth go hand-in-hand. Helping the developing world improve its use of its abundant energy resources in ways that are cleaner should be the focus of global climate policies. While climate change is a global issue, reducing emissions in the developed countries should not take priority over maintaining strong economic growth in the United States and other industrial nations as they are the key engines for global economic growth.

Climate change policies should continue to strive to reduce energy intensity as the capital stock is replaced over the business cycle in order to develop new, cost-effective technologies for alternative energy production and conservation, and to encourage the spread of market-based reforms in the developing world. This approach is likely to be much more productive than adopting mandatory CO_2 reduction targets, thereby sacrificing economic well-being and job growth with little or no long-term impact on global GHG emission growth.



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VOICES

for the Land & People

Alerting, informing & calling to action – people of faith in defense of Creation

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What's in future for CCLP?

Projects show promise; support needed in transition

I don't know how the center made it through the winter.

Last year, we had $24,000 in grant income. This winter, we had $4,000.

Last year, with grant money, paid and volunteer help, we held more than 20 winter farmers' market benefit sales for farm crisis funding. This year, we sponsored 45 of them in 25 cities with less help and a fraction the resources.

Trying to do so much more on so much less funding has taken a heavy toll. These are harsh and uncertain times for non-profits.

Generosity of scores of people kept us afloat. A dairy farmer I've known and respected for years reminded me of that last week.

Months after I sent out an appeal for help with our projects, I got his reply and a $100 gift. I saw and thanked him in person at Wisconsin's Future of Farming conference in Madison.

My dairy friend said he lets non-profit requests pile up each year until spring. Some years there's no money to reply. "This year, I looked through the stack," he said, "I decided I'd help you. I respect what you're doing."

The former St. Benedict Center (now Holy Wisdom Monastery) is tearing down the building where we rent office space; we must find a new home base.

Looking ahead to a new fiscal year in July, Churches' Center for Land and People moves forward with hope and vision to meet persistent challenges. Here's a summary:

- ***New grants*** In recent months, I've authored 6 full grant applications, received pledges of $14,500 from 2 of them, entered a 2nd and 3rd phase of review on 2 more and have begun more inquiries.
- ***Collaboration*** Partners in new grant application projects include two agricultural extension agents, the CSA Learning Center, Iowa Farmers Union, City Colleges of Chicago and Electronic Distance Learning staff.
- ***Forced move*** The former St. Benedict Center (now Holy Wisdom Monastery) is tearing down the building where we rent office space in September, and we must find a new home base.
- ***Church home?*** A state-line church has agreed to undertake an exciting new project with our Center and allow us to relocate offices to their parish hall, pending approval of

- Continued on Page 3

Mark your Calendars

Feb. 1, 2008

Rural & Urban Life Gathering 2008

Watch *Voices* newsletters for details later this year

Why everyone should care about outcome of 2007 Farm Bill and speak up in June

Moonlight bathes our little pencil of country road set down upon this manuscript of land we call home.

I stand in a spring wind that's heaving and sighing across all that's been written upon Scotch Hill Road. I travel along the pavement with my eyes, past barren fields, the Amish country bakery, one of the last clusters of trees here, and Spring Valley Township's cemetery on the hill a mile from our farm.

I think of the 1,000s of roads spanning this great, vast countryside, 100s of thousands of miles of roads, all joining one to other, on and on, and finally connecting to our little rural byway.

Over into Iowa, down across Illinois, up into Wisconsin, upon this fertile soil that has fed generations for many centuries.

Millions of frame farmhouses, like this farmhouse, where Dela and I've

- Continued, next page

New Farm Bill will shape U.S. and world

Continued from Page 1

raised 4 children since we stopped - ***our*** wanderings 14 years ago. Many of those structures burned or bulldozed along with outbuildings into craters following each exodus of broken people from this land.

I try to recall what it was like when my daddy drove me down these roads 50 years ago. What God wrote here has been transformed so many times, with so many public policies, programs and laws.

North and south our road runs, a little more than a mile long. Horses pulling Amish carriages still echo through Spring Valley. Mechanized farm equipment as big as our house moves up and down this road, too.

Almost treeless now, all life along our road has made way for Loan Deficiency payments, commodity payments, price supports and now federal ethanol subsidies 8 and 9 times greater than for gasoline.

Each federal program and public policy has deformed our countryside in some way. Successive generations of farmers have tilled or no-tilled; planted or held off planting, adopted or discarded farming practices. Almost always, what was done chased subsidies that keep from collapse what we call agriculture.

Each policy and response has reshaped our landscape. Each re-directed and rewrote the meaning of life here for microscopic soil life, seed and plant, animal and bird; man, woman and child. Whether you live in a city or a rural area, whether you farm or not, these policies and responses affect your life.

Absolute power – in government or business – corrupts. History has documented this fact in dictatorships, fascist regimes, robber barony, monopolies since the beginning of recorded time.

Do we believe in democracy, or not? Do we believe in free enterprise and a free-market system, or not? Do we live and die for these principles, yet let our income tax money fund policies that clearly:

- Concentrate money, power and influence in the hands of fewer and fewer people;
- Limit the number of enterprises and stifle both independence and cooperative capacity;
- Dominate all commerce and production with gigantic, fossil fuel dependent industrial operations?

What's at stake? Nothing less than clean water, food security, climate change, biodiversity, health, safety, choice, livelihoods, life itself.

For nearly 2 years, groups and individuals have been asking me what we the people should seek in a new farm bill. For the Earth, for its dwindling resources, for vital water, soil and food, I believe we must:

- Begin over 5 years to shift *away from* commodity payments, direct and indirect federal subsidies for food and farming that cost us more than $100 billion per year.
- Develop and implement a sound strategy for moving this nation *away from* a Trade Tower system of agriculture, a precarious and unstable food vulnerability, and *toward* a secure food system that does not depend on foreign oil, does not burn up fossil fuel to make fuels from cash grains, does not follow a path of ever larger yields, depressed prices for commodities and ever rising production expenses.
- Invest in local food systems that can sustain themselves, the land and our people, food systems that no longer enrich few at expense of many.
- Invest in policies and systems that nurture democratic action and free enterprise.
- Publicly finance and support markets based on safety, health, thriving local economies, and secure relationships.
- Turn away from anonymous pooling of commodities across great distances, endless cycles of farm expansion and shakeouts, and bankrupting of farmers, local economies, natural resources.

Each of us must ensure our tax money serves and protects Creation. I've written a list of 6 specific ways government can invest in these changes. I can email or mail this prescription for change to you. Contact me at scotchhillfarm@wekz.net or call me at 608 897-4288.

Farm Bill process: Just 1 month to act

After months of speculation about what will happen to U.S. agriculture and food production under new legislation, the House Agriculture Committee got the ball rolling on the 2007 Farm Bill in late May.

Both the Conservation/Credit/ Energy/ Research subcommittee and the Livestock/Dairy/Poultry sub-committee were set to "mark up" law for the new farm bill before the Memorial Day recess.

The National Farmers Union reports that subcommittees were writing this farm bill in ways that reflect priorities of their members. They were set to release their "markups" for the bill after the Memorial Day recess, with a goal of finishing subcommittee work by the week of ***June 4***. The timetable for full committee completion remains ambitious, sticking to a deadline of the ***July 4*** recess.

Contact your U.S. Senate and House members. Tell them as a consumer or farmer how you want our nation to protect land and resources, grow and manufacture food that feeds us. Act to frame a new Farm Bill that protects the public's interest..

What's in future for Center for Land & People?

Continued from Page 1

Local foundation support. If funded, this project will link consumers and farmers in artisan fiber and food production in a Renaissance-style guild and outreach ministry.

➢ ***New programming*** We held two trial brunches of all-local and regional foods this past winter. We plan to include these benefit meals in our winter farmers' markets next year. Nutrition education, cooking demonstrations, music, talks and film will all be part of increased market programming.

Carrying forward the mission of this center for farming people in Iowa, Illinois and Wisconsin these past 4 years has been an honor and a challenge.

We've enjoyed strong support of our board and people of 9 denominations in this tri-state. We're so close to meeting our goal of obtaining project funding to make the winter farmers' markets self-sufficient. This grant money will help us get the paid staff this project so badly needs.

Until all outstanding grant applications are decided and during our relocation of the center over the next 4 months, we need financial assistance. Until Sept. 1, you can still write, email or call us at our office in the former St. Benedict Center.

Donations can be mailed to Churches' Center for Land and People, 4200 County Hwy M, Middleton, WI 53562. Any ideas you have for helping us continue ecumenical advocacy for farmers Illinois, Iowa and Wisconsin farmers and consumers are most welcome.

Contact us at www.cclpmidwest.org / 608 897-4288 / cclp@tds.net , and keep us in your thoughts and prayers.

What people of faith can do to stop global warming

Climate change and global warming are getting a lot of public attention.

This is a welcome change for everyone who recognizes that time is running out (possibly less than 10 years) for the Earth before it will be too late to do something about these issues.

Yet what can people of faith do to increase public understanding of these compelling issues? What can we do to ensure more people come to reverence Creation and act to protect it?

Two new versions of *The Great Warming* have been developed in response to those questions. You can get either DVD from Churches' Center for Land and People – and each purchase will help us act to stop global warming, too.

New Version – You can purchase a new version of *The Great Warming*, that includes (in addition to the 85-minute documentary narrated by Alanis Morissette and Keanu Reeves) 70 minutes of never-before-seen stories and extended interviews .

Purchasing this DVD directly from Churches' Center for Land and People brings you a 10 percent discount off the $29.99 retail prices.

Send a check for $26 for this film to our center, and a portion from every purchase will help us promote winter farmers' market benefit sales.

An estimated 20 percent of U.S. fossil fuel consumption is attributed to our mass food and farming systems, which greatly distance consumers and producers.

Churches' Center for Land and People's winter farmers markets bring farmers and buyers together in parish halls for benefit sales greatly cut overall fuel consumption.

Church & Synagogues Version – You can also purchase the complete version of The Great Warming, with 70 minutes of extras, plus a downloadable Sunday School discussion guide and a 60-page sermon preparation guide sourced from the Old and New Testaments.

Purchasing this DVD directly from Churches' Center for Land and People also earns you a 10 percent discount off the $39.99 retail price.

Send a check for $35 for this DVD version to our center, and a portion from every purchase will help the winter farmers' market project. Use the enclosed order form and return envelop to make your purchase for individual home or faith community purchase of *The Great Warming*.

Help us change climate change.

This book can help us change the world

It clearly defines why everyone – especially in these uncertain times, especially people of faith – needs to understand the world of farming and food-making.

It gives us facts and details to cut through advertising lies and false impressions. It helps us act in truth and walk in light.

It restores economy and ecology to their roots in ecos – "the world as God's household in which we live."

For summer reading, group and family discussion and Christian education sessions next fall, this anthology of 40 essays is a must-read.

- What is the ecological and human cost of a bag of French Fries?
- Why do 3 huge companies want massive river dredging projects to barge and ship soybeans in *both* Latin America and the United States? Does this concentrated production of a single grain help local farmers in *both* parts of the world stay competitive?

Every purchase will help fund CCLP projects to increase economic justice, earth stewardship, community and spirituality for farming people and consumers.

- How can we tolerate what the World Bank estimates hunger costs the world - $16 billion annually, when about $6.2 billion or less would end world hunger?
- How can America restore its "home view" of the world over its present "hotel view" of the world, and why is this so important?
- What does all this have to do with the Gospel of Luke and many other precepts of the Living Word?

Earth Ministry developed *"Food and Faith: Justice, Joy and Daily Bread"* over 10 years, They then used it with more than 120 congregations (15 denominations) in Washington state, where it has helped many people.

It retails for $14.95, but you can buy it now from Churches' Center for Land and People at a 10 percent discount.

Food and Faith comes with a 46-page study guide that includes suggested action steps. It has spawned farmers' markets in church parking lots, connected local farmers and religious communities and gotten local food in school cafeterias.

It works very well with our *Shared Values* and *Crafting Farmers for People and the Land* DVDs (about 25 minutes in length, each).

To bring about positive, healing change in our food and farming systems will take an informed public. It will take strong, individual and collective grassroots responses.

By promoting the reading, discussion and use of this text, you can help make this possible. You'll also help fund our work.

Use the enclosed order form to purchase one or more copies of this text. Email or call me with any questions you may have at scotchhillfarm@wekz.net or 608 897-4288 / 831-9319

Tony Ends, Director, CCLP
www.cclpmidwest.org

Churches' Center for Land and People
4200 County Highway M
Middleton, WI 53562

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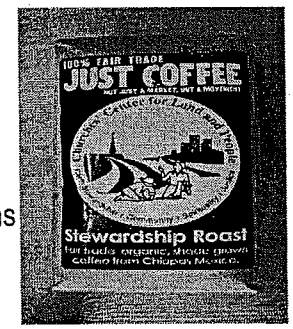
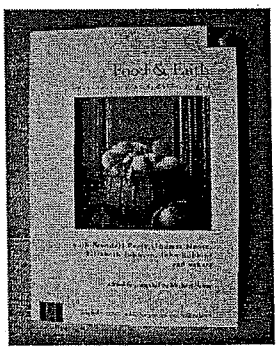
Four ways you can help

Just coffee! Stirring DVDs! Great text! Good cause!

You can now ***enjoy*** great coffee flavor, ***inform*** yourself and others through DVDs or interesting reading – *AND* – **help farmers at home *and* abroad.** Churches' Center for Land & People is a 501 (c)(3) non-profit advocate for Iowa, Illinois and Wisconsin farmers. People of Lutheran, Episcopal, Catholic, United Methodist, United Church of Christ, Presbyterian, Quaker, Mennonite and Unitarian faiths support our work. **We need your help**. Read about our initiatives at *www.cclpmidwest.org.* Contribute to our work and challenges we all face in *the following four ways:*



- **Stewardship Roast** – We buy quantities of Fair Trade coffee from Chiapas, Mexico. We then sell this coffee in 1 lb. bags of Dark Roast, Light Roast or Decaf as a fund-raiser *($8.75, dark & light roast; $9, decaf)*. From every bag you purchase, about 25 percent goes to a self-help and farm crisis initiative for U.S. farmers. The balance helps indigenous coffee producers who use shade grown and organic practices and their U.S. roaster and representative – Just Coffee.
- ***Food and Faith*** – For summer reading, group and family discussion and Christian ed sessions next fall, this anthology of 40 essays is a must read. Earth Ministry developed this text over 10 years and has used it with more than 120 congregations in 15 denominations on the West coast, where it has changed many lives. Great action steps in a thought-provoking study guide. Buy this book now for *$13.50* (a 10 percent discount off the retail price) and help fund CCLP's work.



- ***The Great Warming* DVDs** – You can buy **(a)** the *new* **Standard Version** of this 85-minute documentary film that includes 70 minutes of never-before-seen stories and extended interviews. Alanis Morissettee and Keanu Reeves narrate this film produced by Karen Koshof and Stonehaven Productions (available to you for $26, a 10 percent discount off the retail price). ***Or*** you can buy **(b)** the *new* **Churches and Synagogues version** of this same film, with 70 minutes of extras, plus a downloadable Sunday School discussion guide and 60-page sermon preparation guide sourced from Old and New Testaments ($35, a 10 percent discount off the retail price).
- **Donation** – Help us cover officer expenses, hire new staff, pay for Voices printing, expand winter farmers market programming. Help bridge our work this summer to new grant projects next winter and transition to our office to a new home base before fall.

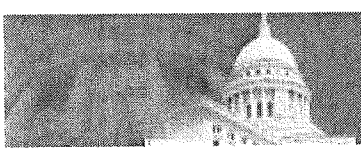
Organic Coffee, *Great Warming* DVDs, *Food & Faith*, 2007 Donation

Fill out and mail this order form and with a check to **Churches' Center for Land and People,** 4200 County Hwy M, Middleton, WI 53562. These items *make great gifts! Plan ahead! Donations are tax-deductible!*

Item/Variety	Quantity	Ground *OR*	Unit price	Discounted Price	Sub Total
	(1 lb bags)	Whole Bean	($8.75 each)	($8.25 for orders of 6 or more)	
Dark Roast					
Light Roast					
	(1 lb. bags)	Ground/Whole	($9.50 each)	($9 - orders of 5 lbs. or more)	Sub Total
Decaffeinated					
	Quantity	*New* DVD - $26	*New* Faith DVD - $35		Sub Total
Great Warming					
Food & Faith				($13.50 each, a $1.45 savings)	
Donation					

(Add $4 for shipping orders 1 lb. Add 75 cents for shipping each extra pound). TOTAL _____

Contact Tony Ends, Churches' Center for Land and People, 608 831-9319 or **cclp@tds.net**. *www.cclpmidwest.org*



WISCONSIN STATE LEGISLATURE

THE AMERICAN INSTITUTE OF ARCHITECTS

Issue Brief

The American Institute of Architects • Government Advocacy • Current Issue Position and Analysis

Green Building Provisions

Key Points:

- *Benefits of sustainable architecture include:*
  - *Cleaner indoor air quality*
  - *Improved occupant health*
  - *Increased student/worker productivity*
  - *Lower energy costs*
  - *Conservation of natural resources, water and energy*
  - *Reduced on-site pollution (storm water runoff) and waste (trash)*
  - *Reduced air pollution*
  - *Less sprawl*
- *Currently, over 5% of non-residential building construction are seeking green certification.*
- *Green House Gas emissions have increased by 2% per year since 1990 in the building sector, 71% of which comes from the use of electricity.*
- *Americans spend 90% of their time indoors. By incorporating green design, indoor air quality can be significantly improved.*
- *According to the EPA, building–related illnesses account for $60 billion in lost productivity each year in the U.S*

Green Buildings and Sustainable Architecture

AIA Position

The American Institute of Architects seeks to dramatically increase the number of high-performance, energy-efficient "green" buildings constructed in both the private and public sectors. Green buildings use resources, such as energy and water more efficiently and have systems in place to take advantage of existing natural resources. To facilitate these goals, below are some resources to help understand the importance of policies promoting energy efficiency and green buildings.

Action Sought

The AIA urges the following actions:

(1) introduce measures requiring all government-funded building projects and substantial building renovations utilize green building standards;
(2) provide funding for one or more pilot projects demonstrating the financial feasibility of green building, and utilizing Life Cycle Assessment (LCA) in evaluating the environmental performance of the building(s);
(3) introduce measures that would provide tax incentives for green building projects undertaken by the private sector, granted that they meet certain set requirements;
(4) establish GHG emissions reduction targets and outline the energy efficiency measures necessary to meet those targets.

Explanation and Justification

At a time when the United States is trying to reduce its dependence on foreign oil, while at the same time trying to decrease the human impact on the environment, building high-performance, energy-efficient buildings is a universal solution. Building green can:

Reduce Negative Impacts on the Environment: Buildings are the greatest source of emissions and energy consumption in America. They consume between one third and one half of the energy expended in the United States. Buildings use two-thirds of all electricity and produce approximately one-third of carbon dioxide emissions. These numbers are only expected to rise. Architects know that there are technologies and design tools available that can help minimize this pollution.

Raise Indoor Air Quality and Improve the Health and Productivity of Everyone: Although there is widespread knowledge of the dangers of outdoor air pollution, many remain unaware that levels of pollution indoors are often twenty-five times higher, and in some circumstances, more than 100 times higher. These pollutants can cause many ailments ranging from eye and throat irritation to respiratory disease or cancer. 60 million Americans have asthma or allergies which can, in part, be attributed to poor indoor air quality. These conditions account for almost 4,500 deaths and over $20 billion in lost

For more information contact the State and Local Affairs team at 202-626-7507 or govaffs@aia.org.

Updated: August 2006

Green Building Provisions

Key Points:

- *If 10% of homes in the United States incorporated solar water-heating systems, 8.4 million metric tons of carbon emissions would be avoided each year.*
- *Incorporating water efficiency methods in commercial buildings can reduce water usage by 30% or more and can save thousands of dollars per year.*
- *Studies show that lighting control increases productivity by 7.1%, ventilation control increases it by 1.8% and thermal control increases it by 1.2% - a 1% increase in productivity translates to $600-$700 per employee per year.*
- *Studies show that energy efficiency measures are not fully developed in the building sector without government intervention.*
- *295 cities have independently "ratified" CO2 reductions requested in the Kyoto Treaty.*

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Phone: 202-626-7505
Fax: 202-626-7583
E-mail: govaffs@aia.org
Website: www.aia.org

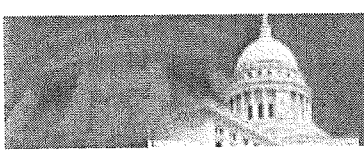
productivity, hospitalization and medical services each year. By improving ventilation systems, eliminating the use of interior finishes that release toxins and managing waste, the quality of indoor air will rise. By cleaning this air, we can not only increase worker productivity, but can ensure better health conditions for everyone.

Save Money: Building green can actually save money in the long term. Although the upfront costs associated with incorporating green design may be higher, the overall costs, including maintenance, are much less over the lifetime of the building.

Green technology and design offers comprehensive solutions to many problems. The proper positioning of buildings will not only provide health benefits of natural daylight, but will take advantage of the sun's heat in cooler months and shade in warmer months, thus reducing electric and gas bills. Waste management can decrease landfill usage and reduce toxins in the air. Reusing or recycling construction materials decreases waste and saves money in building costs. We must dispel common myths that building green is more expensive and fruitless. Incorporating sustainable architecture is a win-win solution for all.

Cities Can Make a Difference: In a Green Guide study, which polled mayors from cities across the nation with a population of 100,000 or more, 29 cities, or 46.8% of the participants, reported having policies in place to encourage green design. In Eugene Oregon, 85% of power is contributed by hydroelectricity and wind and Mayor Calson plans to allot money in 2007 to purchase 25% wind power for all existing general fund buildings. The city of St. Paul in Minnesota has already surpassed its 1997 goal of reducing carbon dioxide emissions and now has a new goal of reaching a 20% reduction of its 1988 CO2 levels by 2020. A first-of-its-kind industrial park is being developed in Huntsville, Alabama, with the hopes of having 100% of all water runoff biofiltered with swales, wet ponds and dry ponds. Rooftop runoff will be separated from parking and street runoff to capture pollutants on site before reaching the subsurface aquifer.

What America Thinks: A recent nationwide poll of voters (1,000 sample, margin of error +/- 3.1%) conducted January 3-5, 2006, by two respected national pollsters — The Tarrance Group, a Republican firm, and Lake Research Partners, a Democratic firm — indicated that the "government should take the lead in promoting real estate development that conserves our natural resources such as oil, gas and electricity."



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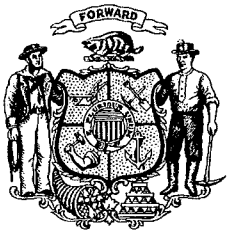
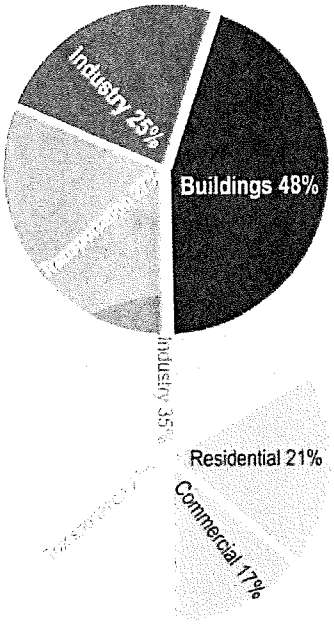


AIA Architects and Climate Change

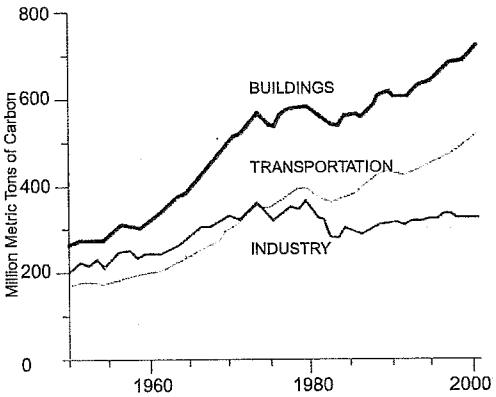


GRAPHIC 1: Combining the annual energy required to operate residential, commercial, and industrial buildings along with the embodied energy of industry-produced building materials like carpet, tile, glass, and concrete exposes buildings as the largest energy consuming and greenhouse gas emitting sector.

Key Points

- *The biggest source of emissions and energy consumption both in this country and around the globe: buildings.*
- *The Building Sector, as the major U.S. and global source of demand for energy and materials that produce by-product greenhouse gases, is poised to fuel the world's rush toward climate change.*

Buildings Account For Half Of All Greenhouse Gas Emissions



GRAPHIC 2: U.S. CO2 Emissions by Sector.

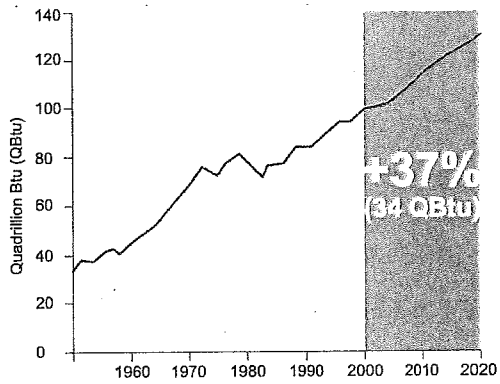
In our quest to dramatically cut greenhouse gas emissions and lessen our dependence on fossil fuels, we have overlooked the biggest source of emissions and energy consumption both in this country and around the globe: buildings and the energy they consume each year. Buildings and their construction account for nearly half of all the greenhouse gas emissions and energy consumed in this country each year. This includes energy used in the production and transportation of materials to building construction sites, as well as the energy used to operate buildings, Globally the percentage is even greater. The Building Sector is the key source of demand for energy and materials that produce by-product greenhouse gases.

U.S. annual energy consumption is projected to increase by 37% (34 quadrillion Btu) and greenhouse gas emissions by 36% over the next twenty years. Annual global energy consumption is projected to increase by 54% (230 quadrillion Btu) over this same period.

Building Sector Emissions Are Increasing Dramatically

Buildings have a lifespan that lasts for 50 to 100 years throughout which they consume energy and produce emissions. The Building Sector as the major U.S. and global greenhouse gas emitting sector, is poised to fuel the world's rush toward climate change. The U.S. alone is projected to need 1,300 to 1,900 new power plants over the next 20 years (about one power plant per week). Most of this new energy will be needed to operate buildings.

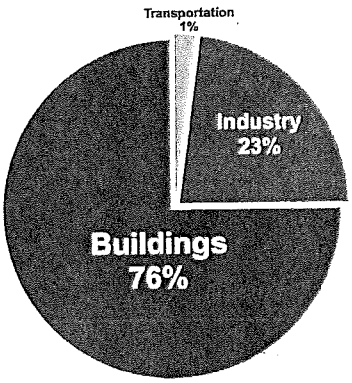
The United States will add 22 million buildings that will not only consume electricity produced at a central power plant, but also directly burn oil, natural gas and/or propane in boilers, furnaces and hot water heaters. In fact, 58% of end-use energy needed to operate a building is consumed by the burning of fuel onsite.



GRAPHIC 3: U.S. Energy Consumption Projections

1 quadrillion Btu is equal to annual energy output of 40 - 1,000MW power plants.

AIA Architects and Climate Change



GRAPHIC 4: 76% of all power plant generated electricity is used just to operate buildings.

Key Points

- *Architects know that buildings can be designed to operate with less than half the energy of today's average U.S. building at little or no additional cost*

- *By the year 2035, three quarters of the built environment in the U.S. will be either new or renovated.*

This Background Sheet was prepared in collaboration with Edward Mazria AIA, founder of Architecture 2030. For further information see www.architecture2030.org or contact: info@architecture2030.org. The AIA, through its Sustainable Design Task Force and its Committee on the Environment, is working to develop a detailed action plan to meet the greenhouse gas reduction goals set out above.

A Perspective On How To Curb Emissions

Scientists tell us that in order to avoid dangerous climate change we must keep global warming under 2°C above pre-industrial levels (we are currently at 0.7°C above pre-industrial levels). To avoid exceeding this threshold a way forward would involve:

- Promoting sustainable design including resource conservation to achieve a minimum 50 percent reduction from the current level of consumption of fossil fuels used to construct and operate new and renovated buildings by the year 2010.

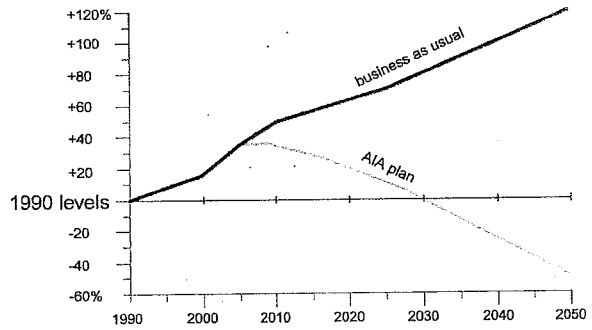
- Promoting further reductions of fossil fuel consumption by 10 percent or more in each of the following five year intervals so that the cumulative reduction from today's baseline is:

  60% in 2010
  70% in 2015
  80% in 2020
  90% in 2025
  carbon-neutral by 2030 (Meaning that the construction and operation of buildings will no longer require the consumption of fossil fuel energy or the emission of greenhouse gases.)

- Driving these reductions through: 1) creating building performance standards in building codes and standards to address private sector structures, and 2) creating governmental mandates that federal and state buildings meet energy efficiency targets.

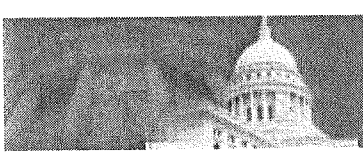
- Supporting government action to use incentive-based regulatory means to reduce greenhouse gas emissions.

Architects know that buildings can be designed to operate with far less energy than today's average U.S. building at little or no additional cost. This is accomplished through proper siting, building form, glass properties and location, material selection and by incorporating natural heating, cooling and ventilation and day-lighting strategies.



GRAPHIC 5: By enacting a Building Sector initiative like this we can meet a greenhouse gas reduction target of 40% to 60% below 1990 levels by 2050.

With about 5 billion square feet (sf) of new construction, 5 billion sf of renovation and 1.75 billion sf of demolition taking place in the U.S. each year, by the year 2035, three quarters of the built environment in the U.S. will be either new or renovated. This transformation over the next 30 years represents a historic opportunity for the U.S. architecture and building community, with the support of the federal government, to lead in addressing greenhouse gas emission reductions.



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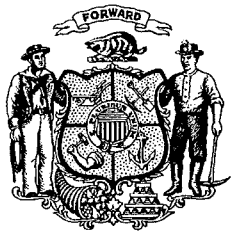
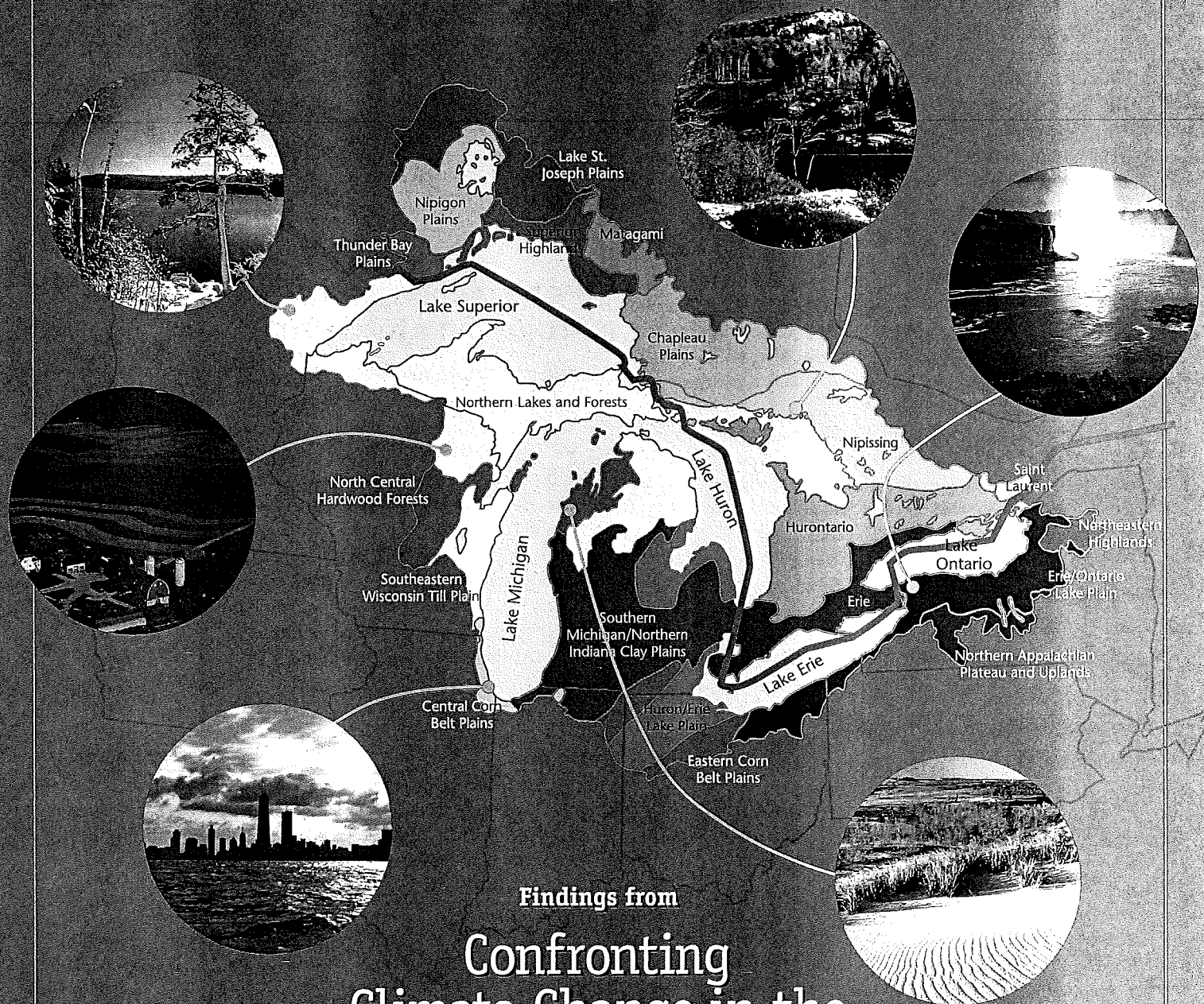


Wisconsin



Findings from

Confronting Climate Change in the Great Lakes Region

Impacts on Wisconsin Communities and Ecosystems

Climate Change in America's Dairyland

Wisconsin's northernmost border is defined by Lake Superior, while the allure of Lake Michigan draws vacationers to the ever-popular Door County. Renowned for its dairy farms and world famous cheese, Wisconsin's streams and smaller lakes are also highly cherished. This summary highlights the potential impact of climate change on Wisconsin's economy, people, and the places they love.

Scientists are now convinced that human activity, primarily burning fossil fuels to produce electricity and drive our cars, is changing our climate. These activities emit gases, principally carbon dioxide (CO_2), that blanket the planet and trap heat. Already, we are seeing signs of climate change throughout the Great Lakes region: average annual temperatures are increasing; severe rainstorms have become more frequent; winters are getting shorter; and the duration of lake ice cover is decreasing.

Climate Projections

The latest, most reliable projections of future climate change combine 100 years of historical data for Wisconsin with the most up-to-date general circulation models of the Earth's climate system. In general, Wisconsin's climate will grow considerably warmer and probably drier during this century, especially in the summer.

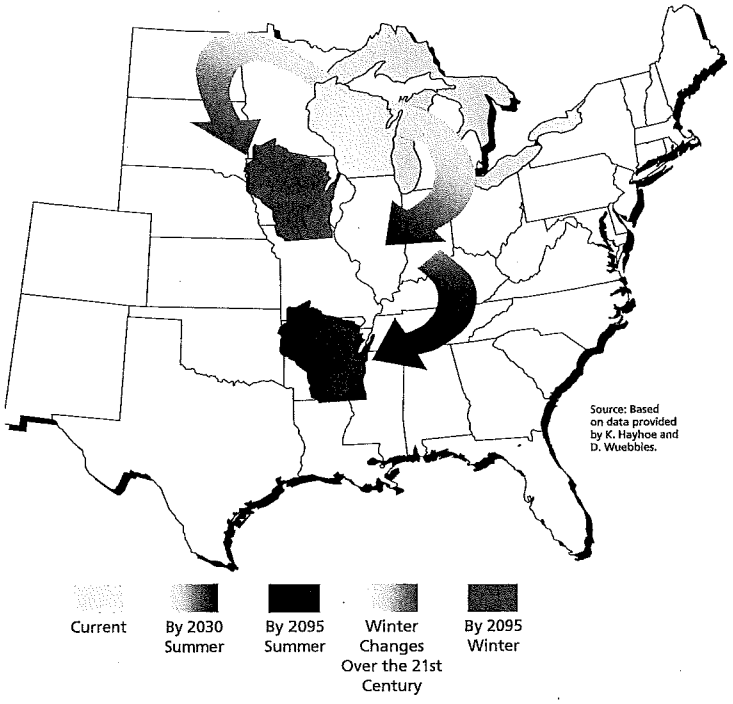
- *Temperature:* By the end of this century, temperatures will rise 6–11°F in winter and 8–18°F in summer. This dramatic warming is roughly the same as the warming since the last ice age. Overall, extreme heat will be more common and the growing season could be 4–7 weeks longer.

Warmer winters mean trouble for Wisconsin, where winter recreation is part of people's sense of place.

- *Precipitation:* While annual *average* precipitation may not change much, the state may grow drier overall because rainfall cannot compensate for the drying effects of a warmer climate, especially in the summer. Seasonal precipitation in the state is likely to change, increasing in winter by 15–30% and decreasing in summer by up to 20%. Wisconsin, then, may well see drier soils and perhaps more droughts.
- *Extreme events:* The frequency of heavy rainstorms, both 24-hour and multiday, will continue to increase, and could be 50–100% higher than today.
- *Ice cover:* Declines in ice cover on the Great Lakes and inland lakes have been recorded during the past 100–150 years and are expected to continue.

How the Climate Will Feel

These changes will dramatically affect how the climate feels to us. By 2030, Wisconsin summers may resemble those of Illinois in terms of average temperature and rainfall. By century's end, the Wisconsin summer climate will generally resemble that of current-day Arkansas, and the winter will feel much like current-day Iowa.



Potential Impacts from Climate Change

Water Supply and Pollution

Wisconsin depends heavily on groundwater, on fresh water from inland lakes and Lakes Michigan and Superior, and on rainfall for agriculture, drinking, and industrial uses. As the state's population grows to six million by 2025, projected changes in rainfall, evaporation, and groundwater recharge rates will affect all freshwater users in the state.

- Reduced summer rainfall and more evaporation is likely to diminish the recharge of groundwater, cause small streams to dry up, and reduce the area of wetlands, resulting in poorer water quality and less wildlife habitat.
- Lake levels are expected to decline in inland lakes and Lakes Michigan and Superior, as more moisture evaporates due to warmer temperatures and less ice cover.
- Pressure to increase water extraction from the Great Lakes will grow, exacerbating an already contentious debate in the region.
- Development and climate change will degrade the flood-absorbing capacities of wetlands and floodplains, resulting in increased erosion, flooding, and runoff polluted with nutrients, pesticides, and other toxins.

Agriculture

Wisconsin ranks first in the country in cheese production and second for milk. The state's farmers also raise a great deal of corn, hay, and soybeans. There are likely to be some positive impacts for agriculture from a warmer climate, although current evidence suggests that the negative consequences could outweigh the positive. In general, however, regional development, technological advances, and market fluctuations have as much influence on farmers as the climate.

Overall, optimal weather conditions are expected to shift northward and eastward in the region. Wisconsin agriculture may benefit from warmer temperatures and a longer growing

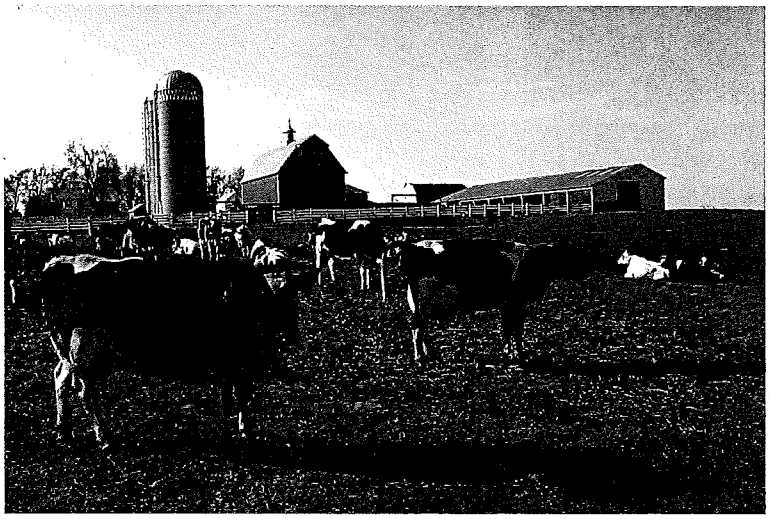
season, but may be constrained by declining soil moisture and thin and acidic soils. Climate variability will likely pose greater risk for smaller farms and thus may reinforce the trend toward increasing farm size and industrialization of agriculture in the region. These changes will affect local farming communities, and, in turn, change the character of rural landscapes across the state.

- Increased atmospheric CO_2 and nitrogen as well as a longer growing season could boost yields of some crops, such as soybeans and corn.
- Warmer summer temperatures suppress appetite and decrease weight gain in livestock; warmer winters and less snow cover likely will reduce the quantity and quality of spring forage, and thus, milk quality.
- Severe rainstorms and floods during planting and harvest seasons will likely depress crop productivity. Similarly, hotter and drier conditions during the main growing season also disrupt production and may require irrigation of currently rain-fed crops.
- Higher ozone concentrations can damage soybeans, countering positive impacts of a warmer climate.
- More flooding can result in increased soil erosion and runoff of agricultural wastes.
- Several climate changes will likely combine to create more favorable conditions for a number of pests and pathogens. The (soy)bean leaf beetle and the European corn borer may expand northward.

Human Health

Climate projections suggest that extreme heat periods are likely to become more common in a warmer climate, as will severe storm events.

- Winter cold-related morbidity or mortality will decrease, while summer heat-related morbidity or mortality is likely to increase. The number of hot days is projected to increase, with years later in the century experiencing up to 40 days exceeding 90°F. Of even greater concern is the projected increase in extreme heat days (exceeding 97°F). By 2080–2100, Wisconsin may experience up to 20 such days annually, which will require improved warning systems and preparation to avoid severe health impacts.
- Higher temperatures and more electricity generation for air conditioning increase the formation of ground-level ozone, likely exacerbating asthma and other respiratory diseases.
- Some waterborne infectious diseases such as *cryptosporidiosis* or *giardiasis* may become more frequent or widespread if extreme rainstorms occur more often. Milwaukee experienced such a *cryptosporidium* outbreak in 1993, when extended rainfalls and runoff overwhelmed the city's municipal drinking water purification system, causing 403,000 cases of intestinal illness and 54 deaths.
- The occurrence of many infectious diseases is strongly seasonal, suggesting that climate plays a role in influencing transmission. Some diseases carried by insects such as Lyme disease (ticks) or, more recently, West Nile encephalitis (mosquitoes) have expanded across the region. While this spread is attributed largely to land-use changes, future changes in rainfall or temperatures could encourage greater reproduction or survival of the disease-carrying insects.



Minnesota Extension Service, Don Breneman

Property and Infrastructure

Cities are particularly vulnerable to the risks of climate extremes, incurring direct economic losses or requiring costly adaptations.

- More frequent extreme storms and floods, exacerbated by stream channeling and more paved surfaces, result in greater property damage, place heavier burdens on emergency management, increase cleanup and rebuilding costs, and exact a financial toll on businesses and homeowners.
- Municipalities in Wisconsin will have to upgrade water-related infrastructure including levees, sewer pipes, and wastewater treatment plants in anticipation of more frequent extreme downpours and floods.
- Lower lake levels have costly implications for shipping on Lakes Michigan and Superior, requiring more frequent dredging of channels and harbors and adjusting docks, water intake pipes, and other infrastructure. On the other hand, a longer ice-free season will extend the shipping season.

Lakes, Streams, and Fish

Wisconsin's numerous lakes, rivers, and streams draw millions of visitors each year. Native aquatic plant and animal species will differ in their responses to changing water temperature and hydrology.

- Cold-water species such as lake trout, brook trout, and whitefish may decline dramatically as cool-water species such as muskie and walleye along with warm-water species such as bluegill and smallmouth bass expand their ranges northward.
- These disruptions will likely be compounded by invasions of nonnative organisms such as the common carp and zebra mussels, fundamentally changing native fish communities.
- In all lakes, the duration of summer stratification will increase, adding to the risk of oxygen depletion and formation of deep-water "dead zones" for fish and other organisms, although "winterkill" in shallow lakes will likely decrease.
- Lower water levels coupled with warmer water temperatures may accelerate the accumulation of mercury and other contaminants in the aquatic food chain.

Wetlands and Shorebirds

Earlier spring runoff, more intense flooding, and lower summer water levels generally translate into growing challenges for Wisconsin wetlands. Already, development and agriculture have significantly reduced wetland habitat.

• The combined pressures of development and climate change will degrade the flood-absorbing capacities of wetlands and floodplains, resulting in increased erosion, additional water pollution, and delayed recovery from acid rain.

• Changes in flood pulses, as well as wetland losses in productive estuaries such as Green Bay and in inland marshes such as Horicon National Wildlife Refuge will likely reduce safe breeding sites for amphibians, migratory shorebirds, and waterfowl.

• Increased evaporation will likely shrink wetland habitat, although new wetlands may be created along lake edges as water levels drop.

Recreation and Tourism

Birders, boaters, hikers, hunters, winter sports enthusiasts, and other visitors are drawn to Wisconsin's lakeshores and inland waters. Tourism and recreation comprise one of the state's top income-producing industries, tallying nearly $7 billion a year.

• Millions of anglers and charter fishing outfits will be affected by range shifts, loss of habitat, and increases or declines of their preferred catch, both on the Great Lakes and small inland lakes.

• Loss of habitat or food resources for migratory songbirds, shorebirds, and waterfowl will affect Wisconsin's multimillion-dollar birdwatching and hunting industries.

• Warmer winters mean trouble for Wisconsin, where winter recreation—such as Madison's Kites on Ice Festival or the northland's famous American Birkebeiner ski race—has long been an integral part of people's sense of place. Skiing, snowmobiling, and, especially, ice fishing businesses could be hard-hit.

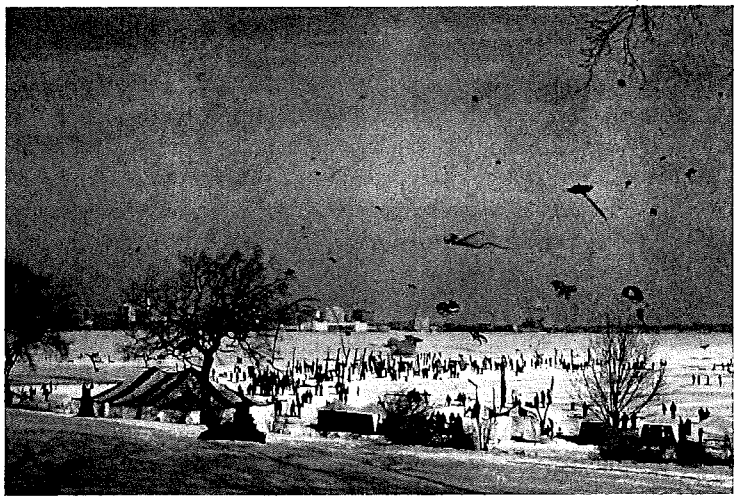
• The summer recreation season will likely expand as temperatures warm further, but extreme heat, heavy downpours, elevated ozone levels, and possible increases in risk from insect- and waterborne diseases may dampen outdoor enthusiasm.

Forests and Terrestrial Wildlife

Northern Wisconsin's forests are another important economic sector, employing 74,000 workers and generating more than $18 billion in shipments. Factors other than climate are important drivers of change in forestry and forest ecosystems, but climate change may exacerbate existing stresses.

• Warmer temperatures will likely cause the northernmost forests of spruce, hemlock, and fir to shrink and other forest species to move northward unless hindered by obstacles.

• Increasing atmospheric CO_2 and nitrogen will likely spur forest growth in the short term, but higher concentrations of ground-level ozone, more frequent droughts and forest fires, and a greater risk from insect pests could damage long-term forest health.



John J. Magnuson

• Resident birds such as northern cardinals and chickadees might be able to breed earlier and raise more broods. Bigger resident bird populations, however, could reduce the food available for migratory songbirds such as grosbeaks.

• Climate warming may benefit some resident mammals such as raccoons, skunks, and the already prolific white-tailed deer. Moose could be negatively affected by warming and more deer-carried parasites.

Climate Change Solutions

Wisconsin residents, business leaders, and policymakers can help reduce the potential impacts from climate change by pursuing three necessary and complementary strategies:

• *Reducing heat-trapping gas emissions* by increasing energy efficiency in buildings, investing even more heavily in renewable energy such as wind, and enhancing clean transportation choices.

• *Minimizing pressures on the environment* by improving air quality, protecting the quality and supply of water resources, protecting habitat, and limiting sprawl.

• *Preparing for those impacts from global warming that cannot be avoided* through better planning and emergency preparedness, adaptations in agriculture and shipping, strengthening public health response, and adjusting infrastructure.

With smart planning and a commitment to responsible management, Wisconsin can be a solutions leader and an exemplary steward of its rich environment and resources in the face of climate change.

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions
esa

This fact sheet is based on 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. The report was written by regional experts under the leadership of George Kling (University of Michigan). Experts from Wisconsin included John J. Magnuson and Richard Lindroth, both at the University of Wisconsin.

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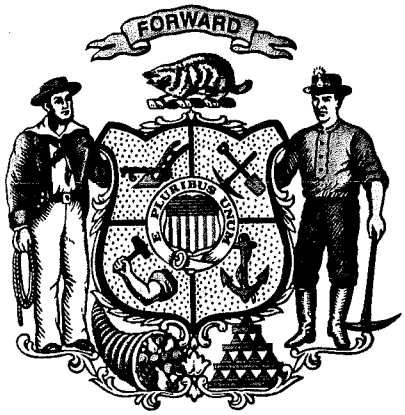
The full report is available from UCS at www.ucsusa.org/greatlakes or call (617) 547-5552.


FORWARD
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Confronting Climate Change in the Great Lakes Region

Impacts on Our Communities and Ecosystems

Global Warming Solutions

Reducing Heat-Trapping Emissions in the Great Lakes Region

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.**

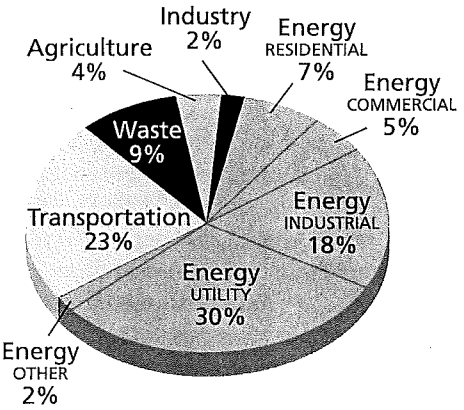
Personal Solutions

The activities of the average American result in 5.6 tons of CO_2 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 (CO_2) emissions blanketing the Earth will continue to have a warming effect for decades, but the most extreme outcomes for the region 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.

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

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 agricultural soil management offer the potential for reducing emissions and storing carbon, a process that can be thought of as "negative emissions."

GE Wind Energy

Energy Solutions

Emissions from power plants, industry, businesses, and homes account for nearly two-thirds of heat-trapping emissions in the Great Lakes region. Power plants alone account for nearly one-third of total emissions, due to the region's heavy reliance on coal.

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 should:

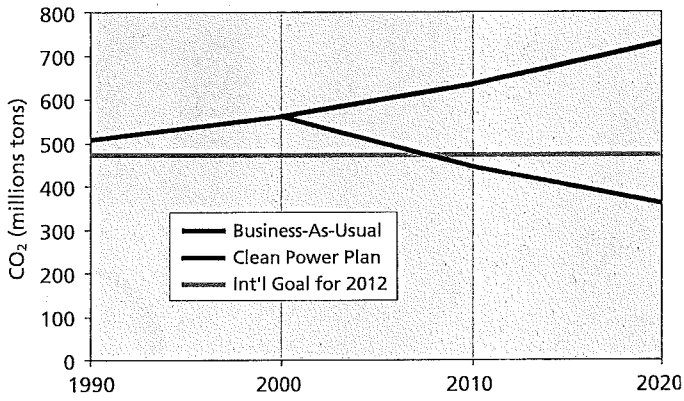
- **Establish a renewable electricity standard** for the region requiring all electricity suppliers to provide 20 percent of their electricity from clean, renewable sources such as wind, solar, and bioenergy by 2020. A strong renewable standard would also provide an incentive to generate electricity from landfill gas, which would reduce methane emissions, a powerful heat-trapping gas. A "renewable energy credit" trading system could help states achieve the standard at the lowest cost. To date, 13 states have enacted minimum renewable electricity standards, including Wisconsin and Pennsylvania in the Great Lakes region. Minnesota has a renewable energy requirement for one utility.

CO_2 emissions from power plants could be cut in half by 2020.

- **Establish clean energy investment funds** in each state 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 state 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 Midwest 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 Chicago found that by implementing similar policies in 10 Midwest states, CO_2 emissions from power plants could be cut in half by 2020 relative to "business as usual" scenarios. They would also reduce sulfur dioxide emissions, which cause acid rain, by 56 percent, and nitrogen oxide emissions, which cause smog, by 71 percent, while creating 200,000 new jobs and generating $5.5 billion (US) in income. These benefits could be achieved with only slightly higher electricity costs of 1.5 percent in 2010 and 3.4 percent in 2020.

CO_2 Pollution Reductions from the Clean Energy Development Plan Great Lakes Region



Source: Environmental Law & Policy Center, 2001

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 the Great Lakes, the region has a unique opportunity to effect change that not only improves the environment at home, but could 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.** Tax incentives or rebates pegged to fuel economy increases or reductions in global warming gases can attract buyers and help build the market for automakers. They 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.** Most states purchase large numbers of vehicles for their government fleets. By requiring state-purchased

vehicles to be highly fuel efficient, states can not only demonstrate leadership on global warming and build the market for high-efficiency cars, but can also demonstrate fiscal responsibility by delivering savings at the gas pump.

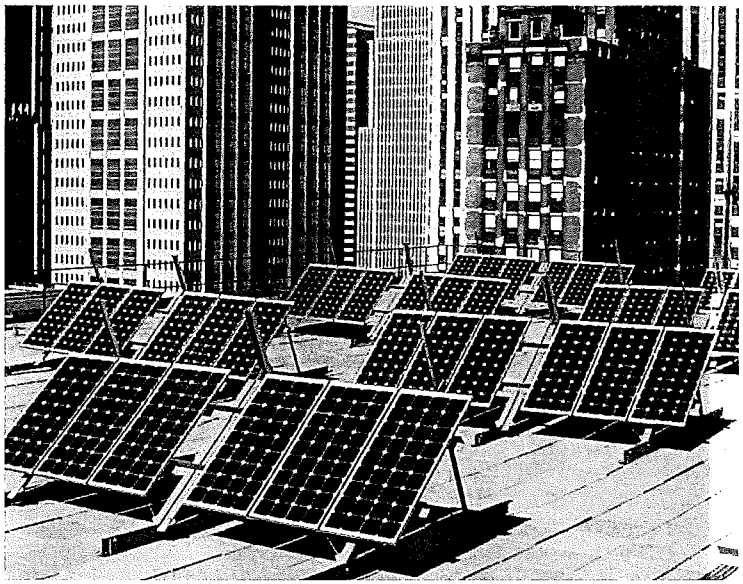
- **Support research and demonstration projects** for fuel cells and other advanced vehicle technologies. Michigan and Ohio have launched state-sponsored efforts to promote fuel cell vehicles, which have the potential to deliver pollution-free transportation while boosting local economies with a new 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 states 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. Two Great Lakes states, Michigan and Minnesota, have pilot nutrient-trading programs under way.
- **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 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.

Warren Gretz, NREL

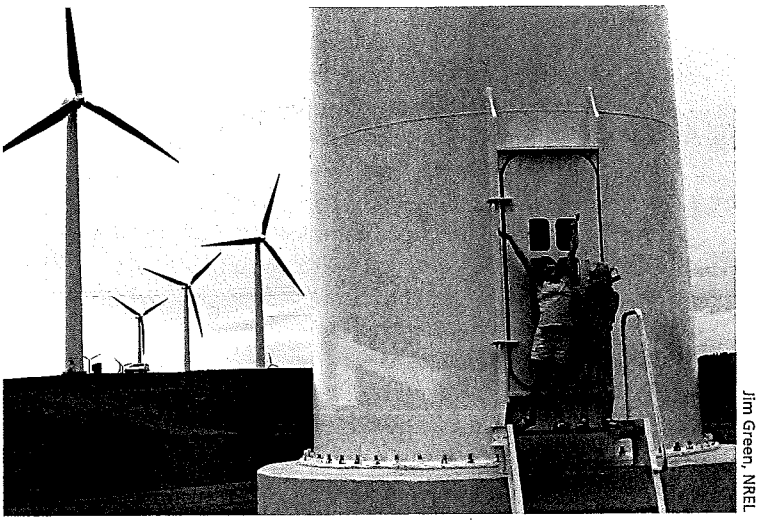

NREL

Forestry Solutions

With 243 million acres of public and private forestlands in the region, 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. Great Lakes states should undertake the following practices to get the most climate benefit from their forestland:

- **Leverage public funds for forest acquisition and management.** Funding is available through 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 the Great Lakes region. 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.

- **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.



Jim Green, NREL

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.** Several states in the Great Lakes region have developed comprehensive climate change action plans, although none currently specifies reduction targets or timelines. In addition, at least 14 American municipalities in the region have committed themselves to local emission reductions through the International Cities for Climate Protection Campaign. In Ontario, more than 20 municipalities participate in the Canadian equivalent, the Partners for Climate Protection program of the Federation of Canadian Municipalities.

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

- **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 strategies. Michigan senators should be encouraged to co-sponsor strong carbon-trading legislation.
- **Regulating CO_2 with other pollutants.** In 2002, Congress introduced a bill to reduce power plant emissions responsible for global warming, acid rain, smog, and mercury contamination. This legislation, known as the Clean Power Act (S. 556) and the Clean Smokestacks Act (H.R. 1256), would cut CO_2 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.

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 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 North America's heartland.

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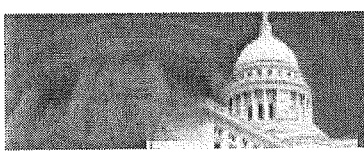
Global Warming Solutions: Reducing Heat-Trapping Emissions in the Great Lakes Region supplements the findings of *Confronting Climate Change in the Great Lakes Region*, a report published in April 2003 by the Union of Concerned Scientists and the Ecological Society of America. This report is available 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.



WISCONSIN STATE LEGISLATURE

Selected Findings from

Confronting Climate Change in the Great Lakes Region

Impacts on Our Communities and Ecosystems

Impacts on Water: Our Region's Vital Resource

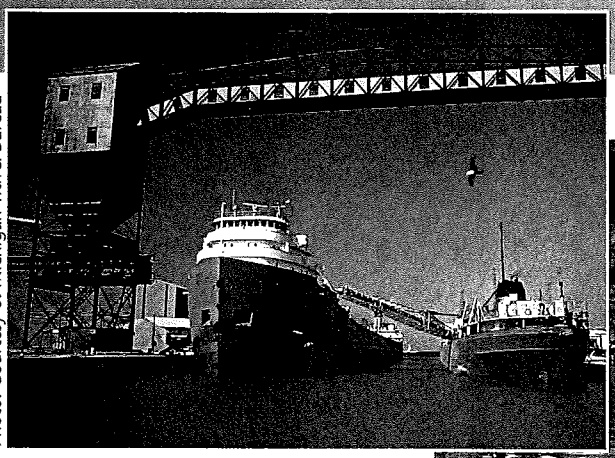


Photo: Courtesy of Michigan Travel Bureau

Photo: David Saville/FEMA News Photo

ABOVE: Port Calcite, Rogers City, MI. RIGHT: East Grand Forks, MN, 1997.

The Great Lakes basin contains 20 percent of Earth's surface fresh water. A rapidly changing climate will alter water availability and quality, not only in the Great Lakes but also in the region's groundwater and in the hundreds of thousands of smaller lakes, wetlands and streams that dot or flow acrros the area.

Climate Projections

In general, throughout this century, the region's climate is expected to become considerably warmer in both summer and winter. Although average annual precipitation may not change much, projected changes in seasonal precipitation patterns are more distinct: winter and spring precipitation is expected to increase while summer rain could decrease by as much as 50 percent. Yet at the same time, heavy summer downpours are likely to become more frequent with dry periods in between. Soil moisture and stream flow will reflect these changes in rainfall, and lake levels are expected to drop overall. Some of these changes have already been detected in regional climate trends.

People Depend on Water

Countless small communities and major cities such as Chicago, Detroit, and Toronto are situated on the shores of the Great Lakes. Sewage and run-off, especially during heavy downpours, can overwhelm outdated water infrastructure and contaminate streams and lakes. Moreover, the region's economy is large and diversified, and freighters ply the lakes and seaway corridors to the Atlantic Ocean carrying goods and commodities worth billions of dollars. All of these activities rely on water for drinking, irrigation, industrial processes, and shipping. In the process, communities and industries can and do pollute and overdraw both surface and groundwater.

The Changing Character of Our Region

Some of the expected impacts on the water-rich Great Lakes region include:*

- More heavy rainfall and flooding;
- Worsening water quality due to higher water temperatures and heavy run-off that transports pollutants, nutrients, and sediment;
- Lower groundwater recharge rates;
- Less soil moisture in summer, harming crops, forests, and ecosystems;
- Wetland and wildlife habitat losses and reduction of flood-retention and water-purifying functions;
- Drying up of smaller streams during the summer season as a result of earlier ice-out and snow melt and lower summer water levels;
- Changes in fish distribution due to warmer lake and stream water temperatures; increased risk of dead-zones in lakes; and
- Lower lake levels due to higher evaporation and reduced ice cover.

[* To review the level of scientific confidence accorded each of the impacts listed above, see *Confronting Climate Change in the Great Lakes Region* pages 68–69.]

Preparing for Water Supply and Quality Changes

The continued and increasing impact of humans on water will coincide with changes in rainfall, runoff, lake levels, and soil moisture. Water and fisheries managers must increase their flexibility and adaptive capacity to respond to rising temperatures, shifting precipitation patterns, increasing climate variability, and changing water quality and availability. Managers must ensure that:

- Ground and surface water quality and supplies, as well as aquatic habitats and the species living in them, are protected;
- Effective water-conservation strategies are implemented for all users during summer months, and are considered year-round for water-intensive users;
- Sewer and septic systems are upgraded, and non-point source pollution from urban areas, farmland, etc. are reduced;
- Water extractions and diversions are planned with climate change in mind to reduce conflicts within and beyond the region; and
- Heat-trapping gases are reduced as quickly and aggressively as possible to avoid the worst impacts of a changing climate.

Union of Concerned Scientists

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The full report is available from UCS at

This fact sheet is based on 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. The report was written by 10 regional experts under the leadership of George Kling (University of Michigan).

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THE CASCADING EFFECTS OF CLIMATE CHANGE ON GREAT LAKES WATER RESOURCES

CLIMATE CHANGES IN THE GREAT LAKES REGION DURING THE TWENTY-FIRST CENTURY

Warmer: Average temperatures rise 5-20°F (3-11°C) in summer, 5-12°F (3-7°C) in winter.

Seasonal shifts, overall drier: Little change in annual average, but higher temperatures = more evaporation = drier, especially in summer and fall.

More extremes: More extreme downpours, dramatic increases in extreme-heat days, more droughts.

Growing season: Lengthening by several weeks, but varying across region.

Lake levels drop: More evaporation and declining ice cover likely to lower lake levels.

MORE WATER AT THE WRONG TIME

LESS WATER WHEN IT'S NEEDED

IMPLICATIONS

More run-off in winter and spring from rain-on-snow events and in summer from intense downpours causes more flooding and erosion.

Extreme run-off could increase heavy metal pollution, sedimentation, high nutrient levels, and toxic organisms.

Increased spring flooding delays planting; intense summer downpours and more run-off leads to soil erosion and fertility losses.

Higher summer temperatures increase evaporation, making drought conditions more frequent and likely more severe.

Decreased summer stream flow and warmer stream and lake waters affect fish and other aquatic organisms.

Lake levels likely to drop as evaporation increases and ice cover shortens.

Intense summer downpours may not alleviate dry conditions but can increase pollution in lakes; algal growth leading to oxygen depletion may increase.

Heavy storms could increase shore and bank erosion; lower lake levels and less ice cover could decrease bluff failures and ice damage.

More moisture and warmer winter temperatures boost agricultural, forest, and other pests' survival and reproduction.

Decreased soil moisture in summer due to more evaporation and less rainfall penetration affects plant growth and soil processes.

Less rain infiltration, decreased summer stream flow, and lower lake levels reduce groundwater recharge.

POSSIBLE SOCIETAL IMPACTS

Flooding and shoreline erosion damage private property and public infrastructure, affecting the construction, real estate, and insurance industries.

Beach closures due to public health hazards from toxic algal blooms and other organisms would affect the important recreation and tourism industries.

Soil fertility losses, combined with an increase in pests, create higher costs and losses for the agriculture and forestry industries.

Crops currently not irrigated may need it; those already irrigated may need more. Long-lived perennials such as fruit trees are especially vulnerable to greater variability in moisture and temperature.

Greater demand for water and summer shortages increase water extraction, lower the water table, and drive up costs; more conflicts over water allocation likely.

Warmer water, pollution, "dead zones," and changes in aquatic food webs, species, and productivity would affect recreational and commercial fisheries.

Additional resources would be required to maintain, repair, and upgrade flood response infrastructure, manage run-off, and recover from flood damages.

Increased risk of vector-borne (e.g., ticks, mosquitoes) and water-borne (e.g., *Cryptosporidium*) diseases would require greater education, surveillance, prevention, and response from the public health system.

Threat of wildfires may increase and forest composition may change, affecting bird and animal species, recreation, and the timber industry.

Lower lake levels would affect recreational boating, hydropower generation, and shipping; require more dredging; and force changes to shore facilities and water infrastructure.