Averting Climate Change: Wisconsin Can Lead

Martin David, Professor emeritus UW-MSN
Department of Economics and Nelson Institute

1 Summary

1.1 What to do

A. Enact a carbon tax on *all* purchasers of carbon-based fuels, except facilities subject to continuous monitoring under the 1990 Amendments to the Clean Air Act.

B. Auction permits to emit carbon to facilities excluded from the carbon tax under A.

C. Empower and finance an extension program to aid farmers, businesses, builders, and communities paying the carbon tax to examine their energy efficiency and make use of capacity to harness renewable energy.

D. Re-engineer the electricity grid. If wind power is to be used effectively, it must be pooled over an area large enough to average supply on a geographical scale of distance from low to high barometric pressures. Otherwise it will not be reliably available in areas temporarily without wind. New technologies can reduce transmission losses substantially.

1.2 How we do it

E. Annually, set the rate of carbon tax and the level of permits issued. Rates must be set for a 20-year horizon whose end-point is anchored at GHG levels for 1990. If GHG abatement targets are not met, tax rates must be raised and the level of permits issued reduced for remaining years in the horizon.

F. Proceeds of the tax and auction accrue to the general fund of the State of Wisconsin.

G. Compliance must be assured by statutory stipulated forfeitures for violations. Monitoring of GHG emissions must be continuous and captured in real time into an emissions database. Permits to emit may be transferred electronically through an exchange which records the beginning and end of ownership by all parties holding permits at any time.

1.3 Why we do it

H. Adapting to a different climate regime requires change in every corner of our economy. Consumption patterns will shift; investment in housing, energy production, agriculture, and transport will favor more renewable energy and conservation; operation of dense urban housing, shopping centers, hospitals, office space, and condominiums will squeeze more energy efficiency from climate control, lighting. Cities, rights-of-way, parks, golf courses, and other open land will manage open space to reduce energy intensity. Transportation will shift to higher density and high speed ground transport from personal automobiles and aircraft intensive travel for trips of less than 600 miles.

To make all these things happen, every decision-maker in the economy will need a strong signal that penalizes the *status quo* and favors millions of small changes that reduce our dependence on fossil fuels. That signal is a heavy carbon tax.

I. Wisconsin has led the nation in solving complex economic and social problems. The income tax and sharing that tax with localities, water treatment and sewerage, workman's compensation, stewardship of natural resources, unemployment compensation, and pensions for the aged are all systems where Wisconsin leaders and governments have innovated.

J. Wisconsin entrepreneurs have historically turned little ideas in little businesses into major players in the US economy. By leading in systems and technologies to achieve lower GHG emissions, the Wisconsin economy can flourish as suppliers to the rest of the country.

K. Gold (energy conservation, renewable energy) is to be found in our economy. McKinsey (2007, ix) appraised opportunities for reducing carbon intensity throughout the US economy. Their analysis finds legions of opportunities to achieve 3.0-4.5 gigatons reduction of CO2e. We must act now – and with collaboration between government, business, and the educational system (the Wisconsin Idea) – to get a share of the new gold rush!

2 My Qualifications

A University-WI DNR partnership designed and successfully implemented a rule for CAP-and-TRADE control of ambient environmental quality (BOD) in the Fox River Valley in 1981. Erhard Joeres and I were the University members of the partnership. Donald Theiler, Roy Christenson, and Elizabeth David were our counterparts at DNR. This is an ambitious trading system that takes into account variation in impacts of BOD discharges on dissolved oxygen (DO) associated with river flow, and water temperature.

I was a member of the Governor's Tax Reform Commission that federalized the state income tax system. My knowledge of Wisconsin's major tax sources, tax reform agendas, and practices informs my recommendations for carbon taxes.

From 1992 to 2000, I specialized in understanding Global Climate Change induced by greenhouse gases (GHG). The IPCC identified serious health and environmental risks associated with global increases in GHG over 15 years ago. Cline (1992) summarized net benefits from abating emissions of GHG. I taught students from science, engineering, and economics to examine models used to assess benefits from GHG abatement from 1992-1998.

I served on the DNR Clean Air Task Force from approximately 1992-1998. The task force provided public input to regulations to achieve EPA ground-level ozone standards.

3 What does my experience teach us?

The Fox River cap and trade became moot for three reasons. Each is relevant to our policies for controlling GHG. (1) The paper industry could economically meet its BOD discharge limits by redesigning its paper-making process. When additional pulp was recovered from waste and made into paper, the industry made a net profit, over the expense of waste water treatment facilities put in place! (2) Equally important, the transfer of rights to discharge BOD required DNR staff endorsement. The time required for endorsement vitiated the market in temporary transfers. (3) Information about DO levels in the Fox River was not instantaneously available. As a consequence demand for permits could not be registered in a timely way.

Applying cap and trade history to our present need for policies that reduce GHG emissions implies:

(1) Appropriately designed regulations will produce incentives for emitters to "discover", invent, and deploy changes in production processes. These innovations are not exploited when the bottom line only includes money profit (and fails to include measures of environmental quality). This lesson was also demonstrated by SOx control measures enacted in the 1990 Amendments to the Clean Air Act (1990 CAAA). A priori guesses of the cost of SOx abatement were in excess of $1000/ton. Three years after implementation, tradable permits were below

$200/ton, indicating that process changes (principally fuel switching and transport) achieved the environmental goal with far less expense than projected by knowledgeable industry experts.

(2) Trading permits under 1990 CAAA does not require bureaucratic review. An electronic exchange for emission rights makes it possible to transfer ownership of emission rights quickly, without uncertainty about ownership, and for a short period of time.

(3) The 1990 CAAA requires large emitters to monitor continuously for NOx and SOx. That assures a continuous record for enforcement. Regulators can determine whether actual emissions exceed the rights to emit owned by the emitter at any point in time. An effective market to transfer permits does not hamper enforcement against sloppy plant managers and responsible corporate officers. Plants can make emergency repairs to efficient production units and substitute older, more polluting technologies. Additional emissions are sanctioned by permits purchased instantly.

To summarize: We now know what it takes to make Cap and Trade work. We have concrete evidence that it need not be a system for endorsing a toothless policy. WI can create strong incentives to change standard operating procedures in environmentally friendly ways.

Now I wish to talk about "leveling the playing field" on which we conduct environmental policy, particularly the multi-generational policy that must be pursued to abate GHG.

4 Principles

4.1 Wisconsin's constitutional right relating to a clean environment

The WI Constitution establishes a public right to environmental quality. The Wisconsin Constitution guarantees that navigable water is a public resource, available to all regardless of riparian ownership. Water quality must be maintained for all people and for the biota that live in our lakes and streams. Wisconsin aggressively assured that hydropower would be exploited to maximize market, recreational, and environmental values. (A 1907 statute created the WI Valley Improvement Corporation, owned by the corporations owning dams on the Wisconsin River and tasked the Corporation to plan for the public good).

I strongly believe that the same arguments that support public rights to water resources apply to air resources. The public is entitled to health – unencumbered by asthma, emphysema, or allergies that follow from man-made ozone, particulates, and pollutants. The public is entitled to forests, wetlands, fish, and parks that are not fouled by ground level ozone and methyl mercury whose origin is air pollution. The public is entitled to trees, crops, and orchards whose yield is not diminished by man-made ozone, GHGs, and their concomitants.

4.2 Climate change can be modestly reduced

Acting now reduces sizable risks in the future. Doing nothing implies: Extreme weather, such as *Katrina* events, will be more frequent. Treasured seashores in Florida will disappear. More people will die because of high temperatures. Damage to agriculture will be the largest risk (Cline 1992).

Nicholas Stern (2007) estimated that remediation some decades in the future will cost many times the cost of equivalent prevention undertaken today.

4.3 Who gets the benefit of controlling GHG? Two perspectives

All of us in this room will live longer. We will not need to spend as much of our resources on remediating the impact of higher temperatures – including more air conditioning and scarcer

supplies of clean water. Those who practice agriculture will have less need to change crops, orchards, and animals. Species we value will survive, including polar bears and brook trout. Water will not be evaporated from our lakes by the heat of summers with little rain.

The second perspective relates to time. Our children will live in an environment that is less hostile. Our grandchildren will be spared some of the risks species loss and some increases in the price of food that come from agriculture under increasing climatic stress. The grandchildren of our friends and of people outside Wisconsin will benefit.

5 Policies we need now

5.1 Continuous monitoring and automatic enforcement

No program to reduce CO2 emissions can be effective without monitoring and automatic enforcement. Monitoring must record every exceedance – emissions are larger than the permitted level. Monitoring is demonstrated by all the facilities that now record SOx, NOx, and particulates continuously.

Instantaneous enforcement must penalize every violation of permitted emissions. Penalties have six essential dimensions. (1) Penalties must be stipulated forfeitures. That means the schedule of fines is enacted in law. (2) The level of fines must grow with inflation. (3) The fines must increase radically for repeated failures to comply. (4) The fines should be proportional to the scale of the operation being regulated. (For example, the fine could be the larger of a proportion of gross annual sales or some minimum amount.) (5) The fines need to be payable immediately after the event. (6) Interest must be charged on the penalty. Penalty interest must exceed the rate of inflation (for example, interest three to five percent above LIBOR).

Lastly, the obligation to pay fines must be automatic. That can be achieved by comparing the continuously monitored emission with the emission permits owned at the time of emission. (That is just the way a camera identifies your violation when you drive through an E-Z pass tollgate without paying.) Penalties must be immediate. Failing to plan in advance how monitoring and enforcement will be in place for *all the relevant players* implies that quick-change artists will steal our environmental quality gains, leaving little benefit from the policy enacted.

5.2 Foundations for carbon taxes and cap and trade

Economic analysis and experience indicate that both carbon taxes and cap and trade can be effective in reducing GHG. Three big problems must be carefully resolved: scope, year-to-year adjustments that are needed to achieve desired reductions, and who benefits financially from the program.

Scope. Electricity generation and process-steam using industries are few in number and account for most emissions from coal-fired boilers. We can not possibly advance CO2 reductions without creating incentives for those industries to reduce. We know they respond to cap and trade.

Other large facilities – shopping centers, universities, hospitals, and state government offices also need to have incentives to abate GHG. Increasing co-generation to make more efficient use of energy inputs is vital. Leadership and vision must change the current situation where neither the state administration nor the University of Wisconsin effectively addresses reduction in GHGs.

Facilities that are now exempted from taxation under various rubrics must be included in every proposal to create incentives for GHG reductions. For example, farmers are not required to pay taxes on off-highway fuels used. Non-profits and governments are exempted from taxation. They should pay in-lieu taxes to account for their release of GHG to the environment. That group includes hospitals, continuing-care retirement communities, colleges and universities, cooperatives, and credit unions. Careful drafting of law is needed to carve out the necessary obligations of this rapidly growing sector of the economy.

Year-to-year adjustments. Planning and building electricity generation that emits less GHG requires lead time in most cases. That conflicts with the need to adjust the level of carbon tax (and the tons of CO2 that may be emitted) annually. Longer range guidance is necessary and can be accomplished by publishing a provisional rate extrapolated to 2030. The carbon tax is set to reach the target of 1990 CO2 emissions by 2030. The Task Force must forcefully convince the current and future legislatures to endorse carbon taxation increases (reductions in permitted CO2 emissions). The specter of tax increases can be made more palatable by a clear decision on who benefits.

Beneficiaries of cap and trade or carbon taxes. In the past WI and the US distributed transferable permits to emit in proportion to a baseline of emission by the polluters. That system gave the polluters an incentive to game the regulators and delay clean-up. Effective control of emissions was aggravated by "grandfathering" use of historically polluting equipment and allowing "repairs" to that equipment without bringing it up to standards for new equipment. Hindsight reveals that evasion of "new source permitting" for major repairs shot the bottom out of our pollution control programs – especially with respect to electric power generation. Rewarding emitters can not be allowed to continue.

The solution to both gaming and grandfathering is to require emitters to *purchase* permits to emit from the very beginning. Under cap and trade, permits for one year's emissions should be sold. When auctioned at a price that clears the market, buyers determine the value of the permits. This procedure has been adopted by the New England states in their GHG reduction program (New York Times 3/15/2008). (Regulators can specify a reserve price to assure that tacit collusion does not keep permits from reflecting the cost of making necessary adjustments to reduce CO2.)

What should be done with auction proceeds? They should be paid into the general fund. Proceeds should not be earmarked for any use – not even research on effective control measures for GHG. Research is needed, but its funding must be weighed in relation to all other claims on the state's resources. Putting proceeds into the general fund denies immediate financial benefit to emitters from auction proceeds. It keeps policy-makers from having to argue about baseline emissions and avoids indemnifying industry for the level of past emissions.

Proceeds of the carbon tax should also be paid into the general fund. In that way legislators can adjust the entire tax system to meet desired expenditure, allowing reductions in revenue elsewhere.

5.3 Cap and trade or carbon taxes?

Carbon taxes appear appropriate wherever the number of entities affected is large: retailers and commercial entities.

The mechanism for collecting highway taxes is in place and could be used for taxing carbon emitted by existing road-using vehicles. Farmers and users of off-road construction machinery would need to be included in the base for carbon taxes.

The carbon tax would need to be extended to in-lieu payments by non-profits, governments and school districts. In all these cases, a carbon tax creates a financial incentive to reduce dependence on fossil carbon fuels.

An auction market for permits to emit carbon could be enhanced by trading of rights between emitters. In fact, few of the 1990 CAAA permits were traded, except in connection with business reorganizations. If permits are valid for one year only, trading will be minimal. It is clear that many small energy users would not be comfortable with bidding in an auction market. (Citizen groups did purchase SOx permits and retired them, to reduce the level of aggregate emissions.)

5.4 Re-engineer the grid

Disparate interests of electric utilities, consumers, and local planning review have kept Wisconsin from rationally redesigning the transmission grid. Transmission losses can be reduced, bottlenecks between Eastern and Western Wisconsin can be eliminated, and the system can be engineered to accommodate transmission from wind power that is not near to the population centers of the state. This is a high priority activity and necessary for long term efficiency of power use.

A second, and concomitant action is to assure that renewable energy sources receive market prices for their input into the grid. That is essential to widespread use of photo-voltaic power in the future.

6 Other Recommendations

6.1 Raise the cost of emitting CO2 now

When monitors and enforcement are assured, requiring that emitting one ton of CO2 costs about $60 is appropriate. McKinsey (2007) finds that many CO2-reducing possibilities cost less than $50, and would be undertaken to reduce carbon tax liability. With this level of cost electric power generators would find it cost-effective to use natural gas fired co-generating facilities continuously, instead of letting them idle most of the time.

A $60/ton carbon tax will cause dispatch of generation to the capacity of *existing* co-generating facilities. Immediate reduction in CO2 emissions follows. For those generators who can not immediately adjust, a rise in the cost structure will lead to intense search for ways of reducing CO2 emitted.

References

Cline, William R. 1992. *Economics of Global Warming*. Washington DC: Institute for International Economics.

McKinsey&Co. 2007. *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?* (DNR web page)

Stern, Nicholas. 2007. *Economics of Climate Change*. NY, NY: Cambridge University Press.