



Peer Review

Minnesota Climate Mitigation Action Plan Cost-Benefit Analysis

April 2008

Executive Summary

The Beacon Hill Institute conducted a peer review of the methodology employed by the Center for Climate Strategies (CCS) partnered with the Minnesota Climate Change Advisory Group (MCCAG) in creating the Minnesota Climate Mitigation Action Plan (MCMAP). Our review finds several serious flaws with the MCMAP report. Primarily, the report lacks any meaningful cost-benefit analysis, or scientifically verifiable figures that could be employed to that purpose.

The MCMAP report recommends 46 policy actions aimed at reducing Minnesota's greenhouse gas emissions by an estimated 50 million metric tons by 2025. The report's estimated net cost of these reductions is \$726 million.

The costs and benefits of the proposed policy actions are not quantified in a way by which they can be meaningfully compared and the estimates omit key factors resulting in an understatement of actual costs. Further, no scientific basis for the report's claims of cost savings can be found.

The MCMAP report **fails to perform the most basic task of any cost-benefit analysis** – quantifying both the costs and benefits in monetary terms so that they can be directly compared. It also finds net economic savings from many policies intended to reduce greenhouse gasses, even without counting the value of those reduced emissions.

An examination of the cost-benefit analysis for four sample policy recommendations found the **analysis to be seriously flawed**. Despite the MCMAP claim that these four programs have a net benefit of more than \$2.8 billion, we can find no sound scientific basis for their claim. MCMAP's **cost savings estimates are not just wildly optimistic; they are the product of a purely fictitious analysis**. MCMAP's cost (savings) estimates of other mitigation options suffer from similar problems causing their estimate of a \$726 million cost to their overall package to grossly understate the true costs.

The MCMAP report **provides no worthwhile guidance for policy makers**. Its cost savings estimates cannot be believed, and it fails to quantify the monetary benefits of reduced carbon emissions. Thus policy makers are left with no basis on which to judge the merits of the MCMAP report's recommendations for action on the mitigation of emissions of greenhouse gases.

Introduction

Minnesota Climate Change Advisory Group partnered with the Center for Climate Strategies (CCS) to create the Minnesota Climate Mitigation Action Plan (MCMAP) to develop recommendations to reduce greenhouse gasses in Minnesota and to estimate the costs and benefits of their recommendations.

The Beacon Hill Institute has previously reviewed the cost-benefit methodology employed by CCS in three other states, and found three serious problems:

1. CCS failed to quantify benefits in a way that they can be meaningfully compared to costs;
2. The estimates of costs left out important factors, causing CCS to understate the true costs of its recommendations; and
3. When estimating economic impacts, CCS often misinterpreted costs to be benefits

Unfortunately for Minnesota policy makers, two of these problems, failing to meaningfully quantify benefits and leaving out important factors when estimating costs, plague the MCMAP study, rendering it useless for making any informed policy choices.

In this brief document, we first summarize the main findings of the MCMAP report. We then briefly review the problem with their method of quantifying benefits, and then we provide a more detailed analysis of the second problem, where we examine the individual cost and benefit assumptions of one mitigation option in each of the four main reform areas proposed in the MCMAP report.

The Minnesota Climate Mitigation Action Plan

The MCMAP report contains 46 recommended policy actions to reduce greenhouse gas (GHG) emissions. These policy options are classified as falling into five areas:

- 1) Residential, Commercial, and Industrial;
- 2) Energy Supply;
- 3) Transportation and Land Use;
- 4) Agriculture and Forestry and Waste Management; and,
- 5) Cross-Cutting Issues (policies that impact more than one of the above sectors).¹

The MCMAP report quantifies forecasted emissions reductions for 31 of their recommended policies. They estimate that, if these policies were fully implemented, Minnesota would reduce its greenhouse gas emissions by 22 million metric tons by 2015 and by 50 million metric tons by 2025.

The MCMAP report claims that the implementation of these measures would result in a modest net cost to the State's economy. The MCMAP report quantifies costs for 25 of the 46 recommended options; of these, it is claimed that 11 would generate net cost savings. If all options were implemented, MCMAP estimates that the mitigation options would cost the state \$726 million (in present value terms) between now and 2025.

The estimated \$726 million net cost to Minnesota grossly underestimates the true cost of these mitigation options. As we show below, the cost-benefit methodology of CCS often leaves out important costs or misrepresents savings that cause them to underestimate the true cost of mitigation options.

¹ It also contains a separate analysis of cap and trade proposals.

Problem 1: MCMAP fails to quantify benefits in a way that can be meaningfully compared to costs

A scientifically sound cost-benefit analysis should clearly spell out all of its assumptions, estimate the physical impacts that a particular policy change will have over time, and then estimate the present value, in dollars, of both the benefits and the costs of the physical impacts. On this basis, a study should be able to conclude whether a given policy change is expected to provide benefits in excess of its costs.

However, the MCMAP report fails to estimate the dollar value of the main intended benefit – reduced greenhouse gases. The authors are explicit about this:

Regarding GHG benefits, market prices (monetized benefits) are normally taken as good proxies of societal costs and benefits in standard analysis unless there are market imperfections or subsidies that create distortionary effects. Because accurate information on the dollar value of GHG reductions benefits is typically not available, physical benefits are used instead, measured as MMTCO₂e (p. E2).

However, without this information, the MCMAP report is unable to conduct a cost-benefit analysis at all. The goal, reduced greenhouse gas emissions, is measured in purely physical terms, not in dollars, and leaves us with no way to compare the value of reduced GHG to the costs associated with reducing the emissions.

Are the mitigation options desirable? For a cost-benefit analysis to provide any guidance in answering this question the MCMAP would need to compare the dollar value of reduced GHG emissions to the cost it estimates (incorrectly) of \$726 million. Since they only quantify the physical benefits we are left comparing reduced metric tons of GHG to dollars – essentially comparing apples and oranges.

Estimating a dollar value of reduced GHG emissions would require a number of steps. First, a full accounting of both societal costs and benefits from higher emissions would have to be constructed. Then the impact on these costs of the marginal changes in Minnesota's emissions would have to be estimated.

In the absence of such analysis, one might consider a proxy, such as comparing the proposed Minnesota carbon dioxide reductions to total worldwide emissions. The MCMAP report estimates that Minnesota emitted a total of 143.8 million metric tons (MMt) of carbon dioxide in the year 2000. In this same year, the World Resources Institute estimated worldwide global carbon dioxide emissions to be 31,640 MMt and U.S. emissions to be 5,364 MMt. Accordingly, Minnesota accounts for 2.7% of U.S. carbon dioxide emissions and a minuscule 0.45% of worldwide emissions.

The MCMAP study suggests that its recommendations, combined with existing initiatives, would result in a 44% reduction in Minnesota emissions by 2025 (112.4 vs. 200.5 MMt), which would amount to a net decrease of 0.02% in projected 2025 global emissions. Because Minnesota's carbon dioxide emissions are so small relative to the rest of the world's emissions, it is quite apparent that no policy adopted by Minnesota would have any discernable impact on global climate change and thus no measurable economic benefit.

Problem 2: The estimates of costs leave out important factors, causing MCMAP to understate the true costs of its recommendations

Although the MCMAP report does not estimate the monetary value of benefits (reduced GHG emissions), it does attempt to quantify the monetary costs of 26 of their policy recommendations and it finds a net cost of \$726 million. But as mentioned above, the report also claims that there would actually be net savings, not net costs, for 11 of its mitigation recommendations.

This finding – that mitigating GHG emissions amounts to a free lunch in 11 of MCMAP’s proposals – does not hold up under scrutiny, and is an artifact of MCMAP report’s unrealistic assumptions and incomplete listing of costs. To highlight these shortcomings, we now examine in more detail four policies that, according to the MCMAP report, would generate net cost savings. The four policies, one from each of the four major areas, are listed in Table 1, next to the net cost savings that MCMAP claims would result if the policies were implemented.

Program title		Net Cost Savings to MN by 2025 (\$ millions)
TLU-6	Adopt California Clean Car Standards	263
RCI – 10	Support strong federal appliance standards and high state standards	1,895
ES – 4	Transmission System Upgrading	92
AFW – 1	Agricultural Crop Management	577

Source: MCMAP report

TLU-6 Clean Car Program for Autos and other Light-duty Vehicles

This proposal would require California Clean Car standards for new light-duty vehicles in Minnesota. It would require new vehicles to emit less greenhouse gas and thus result in greater fuel efficiency.

It is not clear that all of such a reduction in GHG emissions could be attributed to the measures proposed by the MCMAP report; after all, high oil prices, coupled with technological advances, are expected to improve the fuel efficiency of vehicles anyway. Any efficiency gains should be measured relative to the relevant counterfactual – what would have happened in the future – and not to the current levels of fuel use. Instead the MCMAP uses the new federal minimum CAFE standard as a counterfactual.

The MCMAP report estimates that by implementing this program, the state would become more than \$263 million dollars wealthier between now and 2025. These gains are entirely attributable to cost savings associated with greater fuel efficiency. MCMAP estimates that new restrictions will only raise the cost of vehicles by approximately \$1,000 and that reduced fuel consumption will more than offset this cost (p. H37). MCMAP admits that other studies estimate greater compliance costs that do not get offset by fuel savings and that others believe that manufacturers will have to reduce model choices in order to comply (p. H37-40).² For example, the MCMAP notes the automobile industry estimates that the new restrictions would raise vehicle costs by \$3,000 and that fuel savings would offset less than half the cost to consumers (p. H37). Had MCMAP used the automobile industry estimates, the \$263 million in net cost savings would become a net cost to consumers. Given the range of estimates, a more responsible cost benefit study would have constructed multiple scenarios and attached a probability to each in order to estimate an expected value.

² MCMAP makes elementary economic errors in this discussion. It claims that analysis by the Sierra Research Inc., which it is critical of, is internally inconsistent because it claims that people will drive more because of greater fuel economy and simultaneously claims fuel cost saving will not offset the higher cost of more efficient cars. “If consumers do not see net savings from the purchase of a California Clean Car, then there is no extra money for them to spend on additional driving” (p. H-39). This statement confuses marginal and total cost. Total cost, the cost of car plus cost of gas has increased, but the marginal cost of additional driving once a car is bought has decreased. So the price of driving relative to all other activities has gone down thus leading people to drive more. MCMAP is making an error that reveals a failure to grasp basic concepts taught in Econ 101.

Moreover, If MCMAP is right that fuel savings will offset compliance costs without negatively impacting model choices, then surely drivers will demand such choices to reduce their fuel use out of their own self interest, and there is no need for the public policy. The appropriate counterfactual then is one where the market produces the recommended results without public policy and thus the benefits of the proposed program are zero. On the other hand, if we observe that people are not demanding these products, then there is good reason to believe that MCMAP's estimates of the cost savings are simply wrong; indeed, the presumption here is that the policy imposes a net cost.

RCI-10 Support Strong Federal Appliance Standards and Require High State Standards in the Absence of Federal Standards

MCMAP estimates a whopping net cost savings of nearly \$1.9 billion by mandating greater energy efficiency of appliances. The entirety of the net savings stems from money saved from reduced energy consumption in excess of the greater cost of making more energy efficient appliances. This raises the same fundamental problem that arose with the clean car program: if the private benefits are really so large, why are people not taking advantage of them already? Once again, either the program matters, in which case it imposes costs; or it is irrelevant because the changes would have been made anyway, in which case the policy generates no benefits. In either case, there is not the \$1.9 billion in cost savings that the MCMAP report estimates.

ES-4 Transmission System Upgrading, Including Reducing Transmission Line and Distribution System Loss

MCMAP recommends improving the transmission system to reduce barriers and bottlenecks and reducing leaks to result in greater throughput. The report estimates cost savings of \$92.2 million if fully implemented.

The cost savings from implementing this policy would accrue to the utility companies. If there are net benefits in excess of costs the utilities companies would adopt the recommended policies to maximize profits anyway so there should be no net savings from the program. However, if the MCMAP estimates are wrong and companies would not adopt the recommended policies there would be net costs – not savings and implementing this policy would make Minnesota poorer.

MCMAP explicitly recommends that the policy include provisions for “financial incentives” for smart energy technologies and allowing “financial recovery credit for related efficiency savings resulting in GHG reductions, even if it is not shown to be cost-effective from a consumer standpoint” (p. G-13). If financial incentives are necessary to get a firm to implement these technologies then it demonstrates that the private cost exceeds the benefit so we should expect a net economic cost – not the \$92.2 million savings that MCMAP estimates.³

AFW-1 Agricultural Crop Management

MCMAP estimates that Minnesota can save \$577 million by improving crop management through soil carbon management programs involving no-till and strip-till practices and by improving nutrient

³ If financial incentives are given the funds must come from somewhere. No attempt is made to account for the economic costs that arise from raising revenue to offer incentives. State borrowing will crowd out some private borrowing and taxes distort behavior. Both result in some net economic costs that are left out of the MCMAP analysis.

management by increasing fertilizer application efficiency. However, there are several problems with their analysis that undermine their estimate of savings.

The first problem, common to all the policies analyzed in this review, is that if the gains accrue to the farmers then they already have an incentive to implement the recommended policies so there are no gains from having the government implement the recommendation. If farmers wouldn't make these changes without financial incentives of the policy then there are net costs – not savings to implementing the policy. This needs no further elaboration here.

A second problem with this estimate relates to the extremely speculative nature of the gains. MCMAP (p. I-6) admits that:

- Research will be needed to help farmers effectively convert current farming practices
- Research will be needed to speed the adoption of global positions system based technology
- Research will be needed to determine the best management practices of animal and commercial based fertilizers
- Incentives may be necessary for these desired farming practices may be necessary , but the amount and type of incentives are not known at this time

If all this research is necessary how do they estimate the effects of the policy? Under the heading “Key Uncertainties” they essentially admit that their forecast is little more than a guess (p. I-13-15).

- “Key uncertainties surround the potential GHG benefits associated with... conservation tillage practices.”
- “The Soil sequestration rates associated with land management practice... remain uncertain and studies highlight this uncertainty”
- “An additional uncertainty surrounds the current uptake of conservation tillage within Minnesota. While states elsewhere in the United States have been adopting no-till practices, the trend in Minnesota has been away from such practices because of Minnesota’s climate.” Yet they use a study of tillage systems in North Carolina to forecast their estimated cost savings per acre of \$2.75 (p. I-9 footnote 11).
- “When measured by crop output per unit of fertilizer applied, the fertilizer efficiency goal under this policy may be difficult to achieve.”
- “Uncertainty also surrounds the difference in yield as a consequence of implementing these policies. The effect of adopting alternative crop management practices on yields has not been factored in.”

Given all of these uncertainties one should doubt the economic cost savings MCMAP estimates. In fact, the report even admits so much by concluding the key uncertainties section writing, “Given the level, type, and importance of key assumptions and feasibility issues, the quantified impact is highly uncertain. Thus, these policy proposals need much more thorough analysis prior to their implementation.”

Given this admission it is rather astonishing that the CCS sponsored facilitation resulted in unanimous group support and lists “Not applicable” under Barriers to Consensus (p. I-16)!

The great degree of uncertainty surrounding this policy highlights an important shortcoming of MCMAP’s analysis. Nowhere do they make any attempt to quantitatively deal with uncertainty. They simply pick one set of assumptions and forecast \$577 million in savings. Given the uncertainty a more

responsible cost benefit study would have constructed multiple scenarios and attached a probability to each to estimate an expected value.

To illustrate: assume a project has a net present value if MCMAP's assumptions are correct of \$3 million and that there is a 60 percent chance the assumptions are correct. Further assume that there is a 40 percent chance that the payout will be negative \$8 million dollars because the assumptions didn't hold. MCMAP only uses their most likely forecast (\$3 million) but the correct approach would be to calculate the expected value which in this case would be negative \$1.4 million.

MCMAP makes no effort to construct scenarios that take account of the likelihood of differing outcomes. In fact, even when MCMAP had multiple sources with conflicting estimates in hand, such as the California Clean Car program, they only made use of their one favored estimate – essentially attaching a zero probability to forecasts from all other sources.

The failure to adjust for risk is not unique to this proposal. MCMAP fails to forecast multiple scenarios and then adjust for their probability when looking at numerous speculative policies. All of the proposals are speculative in nature, but the uncertainty never makes it into the MCMAP's estimates. A more realistic approach to uncertainty would likely increase the net cost associated with the recommended mitigation options.

Conclusion

The MCMAP report provides zero guidance to policy makers regarding the desirability of policies aimed at reducing greenhouse gas emissions. It fails to perform the most basic task of any cost-benefit analysis – quantifying both the costs and benefits in monetary terms so that they can be directly compared. It also finds net economic savings from many policies intended to reduce greenhouse gasses, even *without* counting the value of those reduced emissions.

In this peer review we have briefly examined the cost-benefit assumptions for one policy in each of the four main mitigation areas. In each case we have found the analysis to be seriously flawed. Despite the MCMAP claim that these four programs have a net benefit of more than \$2.8 billion, we can find no sound scientific basis for their claim. MCMAP's cost savings estimates are not just wildly optimistic; they are the product of a purely fictitious analysis. MCMAP's cost (savings) estimates of other mitigation options suffer from similar problems causing their estimate of a \$726 million cost to their overall package to grossly understate the true costs.

For policy makers, there is no worthwhile guidance in the MCMAP report. Its cost savings estimates cannot be believed, and it fails to quantify the monetary benefits of reduced carbon emissions. Thus policy makers are left with no basis on which to judge the merits of the MCMAP report's recommendations for action on the mitigation of emissions of greenhouse gases.

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