

Chapter 8

Cap-and-Trade

Overview of Cap-and-Trade

The Cap-and-Trade Technical Work Group (TWG) was formed about midway through the Minnesota Climate Change Advisory Group (MCCAG) process when the Energy Supply TWG observed that the complexity of the issue demanded the full-time attention of a special committee. The first meeting of the Cap-and-Trade TWG was held on October 10, 2007; in total, 11 meetings were held between then and January 18, 2008, including a 6-hour in-person meeting on December 14, 2007. Several policy options were referred to and considered by the Cap-and-Trade TWG, but most of the committee's effort was devoted to the cap-and-trade option itself, C&T-1.

Unlike most of the policies studied by the other TWGs, cap-and-trade is not tied to a specific sector or emissions reduction measure. It is a system by which the sources within covered sectors find and achieve the lowest-cost emissions reduction investments. Cap-and-trade also provides a means of ensuring that total emissions from all covered sources will not exceed the government-set limit, or cap.

Cap-and-trade programs limit emissions by first placing a "cap," or limit, on the total number of tons of pollutants that will be permitted to be released from regulated, or "covered," sources of greenhouse gas (GHG) emissions within a specified geographic area and interval of time. The cap is enforced by the issuance of permits, or "allowances," which must be surrendered by each covered source in an amount equal to its emissions. By setting the total number of allowances equal to the overall cap, total emissions are limited. Moreover, the number of allowances issued over time can be decreased, thereby further reducing total emissions.

Since the government regulates only the total emissions, the means by which the reductions are achieved is left to the individual covered sources (although many reduction activities may be covered by other policies). Sources would individually identify their least-cost options, but creating a market gives these allowances a financial value, which encourages the covered sources to collectively implement the least-cost measures at different levels of mitigation to achieve the capped emission reductions. Through trading, participants with lower costs of compliance can choose to over comply and sell their additional reductions to participants for whom compliance costs are higher. In this fashion, the overall costs of compliance are lower than would otherwise be the case.

The Cap-and-Trade TWG also studied the use of a carbon tax as a substitute for, or in addition to, the cap-and-trade policy, as well as several policies related to regional (interstate) actions. In addition, the TWG considered the creation of a carbon credit system to encourage and enable carbon mitigation and sequestration projects in Minnesota to qualify for offset or other credits from state, regional, national, or international cap-and-trade programs. Unfortunately, the time demands of the cap-and-trade policy analysis prevented the committee from fully examining this option. The MCCAG encourages further study of this policy, especially in the context of the governor's announced intention to pursue a similar program.

Key Challenges and Opportunities

The State of Minnesota, has joined the Midwestern Greenhouse Gas Reduction Accord (MGA), which calls for a number of interstate actions, including the design and implementation of a regional cap-and-trade program covering Minnesota, Michigan, Wisconsin, Iowa, Illinois, Kansas, and the Canadian Province of Manitoba. Three additional states are participating in the project as observers. Two other regions are pursuing cap-and-trade programs to limit GHG emissions: the 10-state northeast Regional Greenhouse Gas Initiative (RGGI) and the 7-state, 2-province Western Climate Initiative (WCI). In addition, there are numerous bills before Congress to create a national cap-and-trade program for this purpose. Minnesota will almost certainly become a participant in a regional, super-regional or national cap-and-trade program to limit and then reduce GHG emissions. The MCCAG's investigation of this issue should offer valuable early guidance to state and regional policy makers who will need to confront the complex policy choices demanded of these programs.

The benefits of the approach, especially when applied on a regional basis, are tangible. First of all, the very basis of a cap-and-trade program is the cap—a specific, numerical limit on the number of tons of GHGs that may legally be released to the atmosphere over a specified period of time. The environmental integrity of a well-designed and operated cap-and-trade program is therefore compelling. The second tangible benefit is the ability to achieve those emission reductions at a reduced cost, even after considering the cost of the program itself. For the recommended configuration of region, sectors, and program design, modeling of the program indicates that in 2025 Minnesota can achieve a 32% reduction in GHG emissions versus a business-as-usual projection at a net cost of \$5 million below that which would be possible without the cap-and-trade program.

While many key cap-and-trade program design questions have been addressed through this process, the MCCAG did not have sufficient time to develop policy recommendations regarding all of the major program design alternatives. The MCCAG recommends that a panel of experts be convened by the partners in the Midwestern Greenhouse Gas Reduction Accord (hereafter, Midwestern Accord Partners) to study in greater depth and make recommendations on the multitude of program design features that must be addressed.

Overview of Policy Recommendations

The MCCAG recommends three policy options relating to the use of market-based programs to help achieve emission reductions goals. The creation of a Market Advisory Group (C&T-5) to help the Midwestern Accord Partners sort out the hundreds of complex program design issues addresses the challenge that lies ahead and draws from California's experience with their Market Advisory Committee. This option was not quantified because, in and of itself, it does not reduce emissions. Likewise, the recommendation to seek additional cooperative emission reductions through regional initiatives and agreements (C&T-6) was not quantified, but concern for private sector competitive issues and a desire to maximize emissions reductions through joint action achieved the unanimous endorsement of the MCCAG.

The cap-and-trade policy (C&T-1) was examined with several assumptions regarding design alternatives. Many of these were geographic (e.g., Minnesota-only, MGA Partners, MGA Partners and Observers, MGA Partners and WCI Partners), some were programmatic (e.g., free

distribution of allowances to sources, 100% auction of allowances), and some examined the effect of changing assumptions for analysis (whether the Renewable/Environmental Portfolio Standard is an active policy option or assumed to be in the baseline). The result was hundreds of numbers and dozens of graphs, all of which helped guide the C&T TWG to their recommendations. What are presented here are the results as they describe the final recommended configuration for the cap-and-trade program. All of the details of each scenario are presented in full in Appendix K.

The MCCAG recommends that Minnesota join with its regional Midwestern Accord Partners to create a multi-sector cap-and-trade program as soon as possible. MCCAG recommends that sector coverage include power generation, industrial boilers and processes, transportation fuels, fossil fuels used in residential and commercial buildings, municipal waste incinerators, landfills, large confined animal feeding operations, and other large agricultural operations where it is possible to measure emissions with a reasonable degree of precision.

The policies and measures that achieve the required emission reductions under the cap-and-trade program are essentially those recommended by the MCCAG within the covered sectors, plus any measures that the regulated entities choose to undertake at a cost less than that of an allowance.

“The permit price of the MGA partner trading in 2025 is in the range of \$45–\$48 per metric ton of CO₂ equivalent (\$/tCO₂e) across the three baseline scenarios. In all three of the baseline scenarios, the total cost of achieving the carbon emissions reductions is negative for many states. Minnesota’s total cost is negative in two of the three scenarios, but positive in the recommended policy scenario (in which a renewable electricity standard [RES] and Conservation Improvement Program [CIP] are assumed to be in the baseline). This is because in the recommended baseline scenario, the substantial cost savings associated with CIP have been incorporated into the baseline condition of Minnesota. States with negative total costs will realize an overall cost savings, due to the extensive range of cost-saving options to reduce emissions (such as improvements in energy efficiency). Notwithstanding the positive total cost result for Minnesota, the cap-and-trade program allows Minnesota to achieve its cap at a lower cost than would be the case without the program.”

Modeling of the recommended program design indicates that in 2025, Minnesota will achieve nearly 53 million metric tons of carbon dioxide (MMtCO₂) mitigation at a net cost of \$245 million. This is \$5 million less than the cost of achieving the same reductions without the cap-and-trade program. To realize those savings, in-state regulated entities would purchase a projected 2.27 million allowances from outside Minnesota at a price of \$45.95 per allowance.

It is important to distinguish the difference between the expected cap-and-trade allowance price and the expected cost of mitigating one ton of CO₂e. The allowance price will be equal to the cost associated with mitigating the *last* ton of CO₂ necessary to achieve the cap. This is the marginal, or most expensive, ton mitigated. The expected unit cost would be the total expended to mitigate all the CO₂ to meet the cap divided by the number of tons mitigated. This is the average cost per ton mitigated, and for many scenarios, it turned out to be a negative cost (savings), even while the allowance price was expected to exceed \$40 per ton.

The actual cost of the program to emitters will depend on the allowance allocation mechanism, because under an auction, all tons will be priced at the market price (marginal cost). This cost is simply the price—marginal cost per ton—times the quantity—the total tons auctioned. In any market system, it is the market price, not the production cost, that is the main determinant of initial cash flows. In the auction case, it determines the permit expenditures and government revenues, while cost or cost savings to emitters will be realized during implementation of mitigation and through the application of auction revenues (reduced taxes, rebates, grants or other financial incentives to encourage innovation). For the case where permits are freely granted, the market price will determine the expenditures by permit buyers and revenues by permit sellers, while cost savings will again be realized during implementation. The net costs after auction revenue is expended have not been analyzed for the MCCAG.

Across the MGA region, total emission reductions in 2025 are projected to reach 459 million tons at a total cost savings of \$5.7 billion. The region-wide net savings resulting directly from the cap-and-trade program is \$520 million.

The MCCAG also studied the implications of a Minnesota-only program, as well as variations of the Midwestern program merged with the WCI region. In every modeling run, the Minnesota-only scenarios proved to be more costly and less effective than the regional configurations. And while results varied, depending on the particular configuration chosen, there is evidence that Minnesota's costs would be further reduced if the WCI region were merged into the MGA program. Cost-effectiveness across the various geographical configurations ranged from \$4.71 to -\$2.19 per ton of CO₂ that Minnesota mitigated in 2025.

Table 8-1 summarizes the modeling results from the various configurations and assumptions. The first row (MGA Partners C&T—*with both RES/CIP in the baseline*) gives the results from the geographic configuration that reflects the programmatic assumptions preferred by the MCCAG.

The MCCAG also recommends that the cap-and-trade program include, or give credit to, emission reductions achieved by non-cap-and-trade policies and measures within the capped sectors. In addition to keeping the cost of the program low, this approach allows the cap-and-trade program to serve as a backstop to the expected reductions from these other policies and measures. For example, if the non-cap-and-trade policies and measures do not achieve the expected reductions, the cap-and-trade program emissions limit would guarantee that the goals are achieved through additional reductions either in Minnesota or elsewhere in the region.

Table 8-1. Summary list of cap-and-trade policy recommendations

Policy No.	Policy Recommendation	GHG Reductions (MMtCO ₂ e)			Net Present Value (Million \$)	Cost-Effective-ness* (\$/tCO ₂ e) 2025	Permit Price [†] (\$/tCO ₂ e) 2025	Level of Support
		2015	2025	Total (2008–2025)				
C&T-1	Cap-and-Trade Program							Majority (9 objections)
	MGA Partners C&T —with both RES/CIP in the baseline		52.94			\$2.65	\$45.95	
	MGA Partners C&T —no RES/CIP in the baseline		79.82			–\$12.17	\$48.45	
	MGA Partners C&T —with only RES in the baseline		67.35			–\$15.42	\$46.64	
	MGA Partners+Observers C&T —no RES/CIP in the baseline		81.97			–\$10.52	\$52.44	
	MGA Partners+Observers C&T —with both RES/CIP in the baseline		55.45			\$4.71	\$50.72	
	MGA Partners+Observers C&T —with only RES in the baseline		69.45			–\$13.48	\$51.27	
	MGA plus WCI Partners C&T —no RES/CIP in the baseline		72.64			–\$17.52	\$35.69	
	MGA plus WCI Partners C&T —with both RES/CIP in the baseline		46.93			–\$2.19	\$34.95	
	MGA plus WCI Partners C&T —with only RES in the baseline		61.92			–\$20.36	\$35.07	
	MGA and WCI Partners+Observers C&T —no RES/CIP in the baseline		76.17			–\$14.92	\$41.87	
	MGA and WCI Partners+Observers C&T —with both RES/CIP in the baseline		50.41			\$0.59	\$41.25	
	MGA and WCI Partners+Observers C&T —with only RES in the baseline		64.92			–\$17.65	\$41.39	
C&T-2	Minnesota-only C&T —no RES/CIP in the baseline		89.18			–\$2.39	\$65.48	Merged into C&T-1
C&T-3	National C&T	<i>Not quantified</i>						Merged into C&T-1
C&T-5	Market Advisory Group (Formerly CC-11)	<i>Not quantified</i>						Unanimous
C&T-6	Regional and Multistate GHG Reduction Efforts (Formerly CC-7)	<i>Not quantified</i>						Unanimous

GHG = greenhouse gas; MMtCO₂e = million metric tons of carbon dioxide equivalent; \$/tCO₂e = dollars per metric ton of carbon dioxide equivalent; MGA = Midwestern Governors Association; C&T = cap-and-trade; RES = renewable electricity standard; CIP = Conservation Improvement Program; WCI = Western Climate Initiative; CC = Cost-Cutting Issues.

Negative numbers represent cost savings.

MGA C&T partners include Illinois, Iowa, Kansas, Michigan, Minnesota, Wisconsin, and Manitoba; MGA C&T observers include Indiana, Ohio, and South Dakota; WCI partners include Arizona, California, New Mexico, Oregon, Utah, Washington, British Columbia, and Manitoba; WCI observers include Colorado, Idaho, Montana, Nevada, and Wyoming. To run simulations including both MGA and WCI states in 2025, the C&T Technical Work Group (TWG) used 2020 marginal cost curves for WCI states for 2025. The emission cap for both MGA and WCI states (or provinces) is assumed to be 30% below the 2005 level in 2025.

* This represents the average \$/tCO₂e mitigated/sequestered for Minnesota.

† This represents the marginal cost of the last tCO₂e mitigated/sequestered and applies to all states involved in a trading arrangement.

Note: A number of MCCAG members raised concerns about the cost assumptions associated with wind power and believe the costs are too high. A lower wind cost assumption would lower the cost estimates for the Renewable Energy Standard (see Energy Supply) and for this Cap-and-Trade analysis. Future analyses should reexamine the wind cost estimates.

Cap-and-Trade Policy Descriptions

The Cap-and-Trade policy measures look at opportunities to use market-based mechanisms and regional actions to limit and reduce GHG emissions through the collective independent actions of covered sources seeking lowest-cost emissions reduction measures.

C&T-1 Cap-and-Trade Program

The MCCAG recommends by majority vote (with 9 objections) of those present and voting that the state of Minnesota work with its MGA Partners to design and implement a multi-sector, regional cap-and-trade GHG emission trading program. The MCCAG recommends that the MGA investigate linking or combining the midwestern program with the WCI, the Northeastern RGGI or other proposed regional programs that may arise in the future.

The MCCAG does not recommend the creation of a Minnesota-only cap-and-trade program. Modeling has confirmed that, as a general rule, larger programs broaden access to lower-cost emission reduction opportunities, thereby reducing the overall cost of achieving the targeted reductions.

The cap-and-trade program should set an initial cap at 2007 emission levels, with gradual annual reductions to achieve the statutory goals of at least 15% below 2005 levels by 2015, 30% below 2005 levels by 2025, and 80% below 2005 levels by 2050. The cap-and-trade program should be implemented as soon as possible to prevent significant increases above current emissions in the meantime and to maximize the time available to meet the 2015 target.

The MCCAG recommends that the electric power sector, large industrial boilers and processes, transportation fuels, and landfills be included in the cap-and-trade program. The MCCAG also recommends that the program include municipal waste incinerators, large confined animal feeding operations, and other large agricultural operations where it is practical to measure emissions beyond some de minimis level. The MCCAG favors the inclusion of fossil fuel for residential and commercial use.

The cap-and-trade program should include emissions from all six GHGs listed in the statute (Minn. Stat. 216H.02)—CO₂, methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆)—from the covered sectors.

The cap-and-trade program should include incentives to encourage “early actions,” or GHG-reduction investments within capped sectors prior to the start of the program. Qualifying early-action projects should be subject to stringent standards to ensure their environmental integrity.

The cap-and-trade program should allow unlimited banking of allowances. Banking permits enables holders to withhold their allowances from the market or from surrender for emissions

compliance without expiration and to use an allowance issued in any compliance period beyond that period without penalty. Banking is seen as a means of mitigating market volatility.

The cap-and-trade program should vary the point of regulation with the sector covered. The point of regulation is the entity responsible for acquiring and surrendering allowances for emissions. In some sectors, such as major industrial emissions, this is simply the entity operating the facility from which the emissions are released. But for other sectors, it is either impractical or undesirable to use this approach. The MCCAG recommends the following point of regulation for each covered sector:

- **Electric Power Sector:** A load-based system that aligns with current energy planning regulatory requirements is recommended in order to capture the substantial emissions resulting from in-state consumption of imported electricity and to maximize cost-effective emission reductions.
- **Large Industrial Boilers and Processes, Waste Incinerators, Large Agricultural Operations, and Landfills:** A production-based system regulating direct emissions from each source is recommended.
- **Transportation Fuels and Fossil Fuels for Residential and Commercial Buildings:** An indirect or “upstream” system is recommended, requiring allowances from the entities importing or distributing the fuel into the Minnesota market. If a fuel used by a facility that is regulated on a production basis has been covered upstream, the program should be designed to eliminate double counting.

There are several methods through which the program may distribute allowances for use by covered entities, including free distribution to covered sources on some basis (such as historical emissions [grandfathering]) and auction at the market, thus requiring covered sources to purchase the allowances. The MCCAG makes no recommendation on the issue of allowance distribution but recommends further study of five distribution alternatives:

- Partial auction–partial free distribution,
- Shift from free distribution to auction over time,
- Auction for unregulated entities and free distribution for regulated entities,
- Sector-specific distribution systems, and
- Performance-based market systems.

The MCCAG strongly recommends that emission reductions resulting from complementary policies and measures (non–cap-and-trade) within capped sectors be credited toward the achievement of the cap and that the cap be set accordingly.

CC-5 Market Advisory Group (Formerly CC-11)

The MCCAG recommends by unanimous consent of those present and voting that MGA partners create a Market Advisory Group consisting of experts to provide guidance to the region on the design of market-based compliance programs to manage GHG emissions. California has formed a Market Advisory Committee (MAC) to help formulate a GHG cap-and-trade system in the

state. The California MAC has proposed a set of guiding principles and has developed an initial set of recommendations for a California cap-and-trade program. The MCCAG recommends that the MGA convene a similar Market Advisory Group to receive the policy recommendations of the MCCAG and provide expert guidance to the partners on the design of a midwestern regional cap-and-trade program to manage GHG emissions.

The Market Advisory Group could be created by agreement among the MGA partners and should serve for a limited time. The product of the Market Advisory Group's deliberations should be a report or reports recommending in some detail the scope, design, and plan for implementation of the MGA regional cap-and-trade program.

CC-6 Regional and Multistate GHG Reduction Efforts (Formerly CC-7)

The MCCAG recommends by unanimous consent of those present and voting exploration of opportunities for regional market-based approaches to reduce GHG emissions. The MCCAG believes that this recommendation is met through the implementation of a regional multi-sector cap-and-trade program as proposed in C&T-1. However, there may be additional opportunities for enhanced GHG reductions through coordinated regional action. The MCCAG through its C&T TWG has not had sufficient time to fully explore regional opportunities beyond the proposal under C&T-1.

Regional approaches undertaken in collaboration with partner states or other organizations can offer broader and more economically efficient opportunities to reduce GHG emissions across Minnesota's economy. An additional example might be to include cost sharing on multistate initiatives.

Minnesota's participation in a regional GHG emission reduction initiative that meets the state's goals will result in additional environmental and economic co-benefits, including the opportunity to reduce GHG emissions in an economically efficient manner, the identification of additional areas for cooperation within specific sectors, the reduction of interstate competitive challenges, and the reduction of other non-GHG pollutants associated with the production and use of energy.