

FREQUENTLY ASKED QUESTIONS

ECONOMIC ANALYSIS OF MINNESOTA/REGIONAL ENERGY POLICIES

- **What was the primary policy analyzed in this study?**

The primary policy (called the Midwest regional climate policy or the alternative model) was based on elements of the Next Generation Energy Act of 2007, adopted by the Minnesota Legislature. An *economy-wide* carbon emissions cap was formulated based on achievement of the greenhouse gas reduction schedule on regional CO₂ emitting sources as outlined in the Act: reduction goals of 15% below 2005 emissions by 2015, 30% below by 2025 and 80% below by 2050. The cap was modeled to cover CO₂ emissions from five states that are signatories to the Midwest Regional Greenhouse Gas Accord (Minnesota, Wisconsin, Illinois, Iowa and Kansas). Lacking available data for the entire region, non-CO₂ gases were not included. The CO₂ emissions associated with imported electricity into the five covered states also count towards the cap.

In developing the analysis, CRA assumed achievement of the CO₂ reduction goals of the Next Generation Energy Act of 2007. It is estimated that these CO₂ emissions in Minnesota account for approximately 78% of greenhouse gas emissions.

To arrive at the cost impacts of this regional policy, the regional climate policy model was compared to a baseline model that included other current Minnesota rules and regulations, including the Renewable Energy Standard and the Mercury Reduction Act.

- **Is the regional climate policy modeled in this study based on an existing or proposed regional cap-and-trade policy?**

There are no specific proposals or an existing policy for the Midwest from which to create an analysis. Consequently, the regional climate policy model uses Minnesota law as its guide – the carbon dioxide emissions reduction required under the law is extended across five states that are signatories to the Regional Greenhouse Gas Accord (Minnesota, Wisconsin, Illinois, Iowa and Kansas). Significant changes in the model would require legislative action in Minnesota to remove or alter specific provisions within the Next Generation Energy Act of 2007.

- **What is the “carbon cost”?**

The analysis includes two models – a baseline model (current Minnesota rules and regulations) and the regional climate policy model. Once the baseline was established, the regional climate policy model was run, and that analysis shows the economic responses (e.g., increased investments in energy efficiency and reduced use of coal in electricity generation) to the Midwest regional climate policy within the covered region. From these responses, a cost of compliance (i.e., what it costs to reduce carbon dioxide emissions) is determined. The cost of compliance is the “carbon cost.”

- **Why do energy prices rise?**

The cost of carbon will impact energy prices. This carbon cost will filter throughout the economy and impact everything from electricity rates to gasoline prices. And as the carbon cost directly impacts various energy sources, it inevitably impacts the cost of manufacturing, producing and transporting goods. These cost increases are felt directly by consumers in their household energy prices and increased costs for consumer goods and services.

- **How does this study compare to work done by the Minnesota Climate Change Advisory Group or anticipated work by the Midwestern Governors Association?**

This study is entirely independent of the MCCAG or pending analysis by the Midwestern Governors Association. While the CRA study and the MCCAG arrived at some of the same conclusions – for example, the baseline model assumes electricity demand growth of 0.8% – CRA used its own modeling and a set of assumptions developed by CRA with PAE.

While the MCCAG evaluated all greenhouse gas emissions in Minnesota, in order to create a regional policy model, the CRA study measures only CO₂ emissions. There is data for non-CO₂ emissions in Minnesota, but there are no reliable estimates on these emissions on a regional level. This study, therefore, reflects a conservative estimate of the cost impacts on Minnesota.

This analysis assumes a sector-wide carbon dioxide emissions cap for a regional cap-and-trade system. Indications from those involved in the MGA process suggest that they may look at exemptions and/or allowances in creating their regional climate policy model. However, those steps would require new legislative action and approval by each of the states participating in a Midwest cap-and-trade program – consequently, CRA did not consider them.

- **The carbon costs in this study are higher than others that have been cited, such as those mentioned in PUC deliberations. Why is that?**

This analysis is the first comprehensive analysis of a regional cap-and-trade based on Minnesota's Next Generation Energy Act of 2007, so the costs arrived at in this model are the only numbers that apply specifically to this law. The model used in this analysis imposed a sector-wide carbon emissions cap for the entire region. It assumes complete adherence to CO₂ emission reduction within the greenhouse gas reduction schedule outlined in the Next Generation Energy Act of 2007. Therefore, the carbon price rises until the emissions are reduced to the required level called for in the law.

- **How is the carbon cost applied in this study?**

The cost is applied to every ton of carbon dioxide emitted in Minnesota (and the other covered states), regardless of the source. The cost filters throughout the economy to impact everything from electricity rates to gasoline prices and state industrial output. Any business using electricity, natural gas and commercial transportation (i.e., motor fuel) will be affected. The study did not apply safety valves or other cost containment measures on the cost of carbon, as they are not included in current Minnesota law.

- **Why does this study show that Minnesota emissions will only be reduced by 38% when the goal is 80% reduction by 2050?**

There are a number of barriers to extending Minnesota's law to a regional level. One of those challenges is measuring non-CO₂ emissions. There is no reliable data on these emissions at a regional level. Therefore, this analysis respects the spirit of the law but makes accommodations for the limited information in order to model some of the economic implications of the policy. Lacking the regional data, the study focused only on CO₂ emissions, which are estimated to account for about 78% of Minnesota's greenhouse gas emissions.

The CO₂ emission declines in Minnesota are achieved through three policy approaches that, while common to regional policies, have the effect of loosening the stringency of the overall greenhouse gas emission goals. The first is "banking" in the model, which means that the

covered states are making larger reductions in earlier years to ease the pain of meeting the more stringent caps in the future. The result is that if you were to add up the cap across all of the years and add up the emissions across all of the years they would be the same number. The second approach is that the model allowed emission offsets (i.e., reductions from non-covered sectors or increases in sinks that absorb CO₂). These offsets were not allocated to any particular state. Lastly, emissions in some of the other covered states may have fallen by more than in Minnesota because of the availability of new nuclear generators in those regions. These regions would have the incentive to over-comply and sell their excess allowances to states like Minnesota.

- **What are offsets and sinks and how are they applied in this study?**

Offsets are reductions in the emissions of uncovered greenhouse gases or increases in carbon sinks. Carbon sinks are typically natural sources that absorb CO₂ emissions in the atmosphere (e.g., trees, soil and oceans). Therefore, increasing forestry can reduce the concentration of carbon in the atmosphere and is equivalent to a reduction in CO₂.

In this study, offsets are used to help achieve the overall CO₂ reductions throughout the five-state region being analyzed. While the use of offsets and sinks are commonly-used approaches in climate policies, they do have the effect of loosening the stringency of implementation of Minnesota's reduction goals. However, total emissions over the full 40-year period are completely compliant with the sum of the annual targets.

- **Why didn't this study include allowance allocations for certain industries? Does it make any assumptions about how allowance values could be used?**

The Next Generation Energy Act of 2007 does not specify how allowances might be allocated; therefore, CRA did not allocate allowances to specific industries. Instead, the regional climate policy model followed the intent of the Next Generation Energy Act of 2007 and created an Upper Midwest carbon policy that would reduce CO₂ emissions through sector-wide implementation of a carbon cap. This means that the carbon cost was applied to every ton of carbon dioxide emitted, without allocation of sector allowances.

However, because the policy is a regional cap policy, this automatically means that there will be active trading of allowances among the states such that there is a single CO₂ allowance price. That is how a cap-and-trade program works. The typical options are to allocate allowances to different groups based on historical emissions, to auction the allowances or some combination of these two options.

In the CRA analysis, the value of all allowance allocations is distributed back to the covered states. It is then up to those states to determine how that revenue will be used to mitigate the costs of the carbon policy.

- **Could the value of the allowances or funds from an auctioning of allowances be used to mitigate the impacts of the policy?**

It is up to each state to determine how the revenue will be used. This report simply demonstrates the net cost to the state's economy. However, how a state chooses to distribute allowances can produce extremely different sets of financial "winners" and "losers" within the state. Thus, pockets of severe financial harm could be created within the state's economy even while the net cost to the state's economy may appear to be *relatively* moderate. The CRA study made no attempt to assess the mix of "winners and "losers" because there is no information available on what allowance distribution decisions Minnesota will make.

- **What does this study assume in regard to the 1.5% conservation goal?**
 The 1.5% energy conservation goal is not explicitly modeled in the baseline model. The conservation goals are achieved in the regional climate policy scenario as a response to higher energy prices and the carbon cap.
- **It appears that this study assumes more than 1.5% conservation – what is the rationale that leads to that assumption?**
 The higher level of conservation is a direct result of higher costs. As costs increase, consumer demand decreases and businesses move away because they are priced out of Minnesota. Consumers using less because they can't afford it and businesses opting for locations with lower costs or simply closing their doors mean less energy use.
- **What are the characteristics of “demand reduction” as they are modeled in this study?**
 Demand reduction can be thought of in two ways. One is the loss of demand from industry leaving the state and the other is behavioral changes to reduce consumption. Demand reduction in the first form essentially means Minnesota will lose businesses (and jobs) to other states, so there are fewer residents paying taxes and fewer businesses creating jobs.
- **How did the study account for the fluid nature of commodity fuel prices?**
 As with any economic study, the commodity fuel inputs in this study were based on the best numbers available at the time the study was initiated (based on NYMEX futures prices). These prices are subject to changes in supply and demand but because this model was based on a regional policy (vs. national), the demand changes for both natural gas and crude oil are relatively small and have little impact on national and international commodity prices.
- **What happens to coal in Minnesota’s energy portfolio?**
 Due to the emissions reduction goals outlined in Minnesota law, most of Minnesota’s existing coal plants will be retired. Those that are most efficient could stay on-line for a while but may not produce at an economical capacity. This will result in the loss of about 11,000 MW of coal-generated electricity in the Midwest. In 2020, the model assumes new technology will be available on a widespread basis that allows for the burning of coal and the capture and storage of 90% of the carbon emissions from the coal. This new technology is adopted in the model, but in Minnesota, it only accounts for about 2,700 MW of the lost generation.
- **Does the study assume the introduction of carbon capture/storage technology that would allow for new coal plants?**
 Yes. In order to meet energy demands through low-emitting sources, the study assumes that by 2020 technology will be developed to capture and store carbon. However, some existing coal plants are expected to be retired in the years prior to 2020, in order to meet earlier goals established under the law.
- **Is carbon sequestration technology available now?**
 The technology needed for the level of carbon capture and sequestration to meet emission requirements is not yet available. Making the necessary advancements in technology will require a significant level of investment in research and development and new infrastructure to ensure that Minnesota doesn’t waste the billions of dollars of investment it has already made in existing baseload generation plants.

- **Where does the model assume new generation will come from to replace retired coal plants?**

The model assumes that new electric generation will come from a variety of sources, all of which must be low or zero-emitting sources. While all of these sources have not yet been identified or developed for commercial use, the model determines the sources based on adherence to emissions requirements and costs. These sources include a large amount of renewable energy, hydroelectric power and nuclear power (with all new nuclear power generated in states other than Minnesota).

- **The study mentions a 20% limit for the amount of wind that can be generated. How does that fit into the 25% by 2025 Renewable Energy Standard?**

CRA allowed for a best-case scenario with wind generation. The limit of approximately 20% is an optimistic upper limit for the amount of wind energy that can be generated while maintaining reliability within the transmission system because of the intermittent nature of wind. The model assumes that new renewable sources – beyond those we can name in 2008 – will be identified over the next several decades and will be able to be imported into and/or developed in Minnesota.

- **Does the model assume additional transmission will be made available for renewable sources? Or nuclear?**

CRA worked from a best-case scenario assumption in regard to transmission, assuming that Minnesota will have an open and accessible system to import non-emitting sources of power. The model does not include any additional costs for upgrades to the transmission system, assuming the existing transmission system can handle the increases in renewables generation likely to flow into Minnesota. However, this is an optimistic assumption; importing the level of low and/or zero-emitting sources that will be necessary to meet demand may require additional transmission upgrades, which would mean even higher costs.

For nuclear power, the issue is connecting a plant to the grid. This model groups Minnesota and Iowa into the same region, in which there are no transmission constraints between the two states so the new nuclear production coming from Iowa would be transmitted on the existing grid.

- **Does the study account for job increases expected through new "green" investments?**

Yes, the study accounts for new jobs associated with increased investments in renewables generation and energy efficiency. However, even with those additional jobs, increased energy prices for industries will drive the net loss of 21,000 jobs by 2015.

- **How did CRA determine job impacts?**

The model estimates jobs aggregated across all sectors, using a "sticky wage" model that assesses how changes in the economy-wide real wage rate alters the supply-demand balance for total labor. The net job loss estimate implies that across the entire economy more jobs are lost due to the higher cost of energy than are created in new activities such as renewables generation.

- **Is \$575 in additional costs per year too much to ask of Minnesota families?**

That's ultimately up to Minnesotans to answer but families are already struggling with home energy costs. As an example, in one part of Minnesota the average amount of fuel assistance for home heating was \$600 in 2007. For people on fixed incomes, such as seniors with a monthly income of \$1,200 to \$2,000, any increase will be hard to manage.

- **Why did the analysis include the Mercury Reduction Act – how is that related to emissions reduction?**

The Mercury Reduction Act was included because it is current law in Minnesota and because it impacts coal plants. Because the Act is included in the baseline, the costs associated with complying with the Act are not included in the regional climate policy cost estimates from this study.

- **Does the study assume that Minnesota will lift its moratorium on nuclear plants?**

No. While it does assume that Minnesota will get more of its power from nuclear sources, Minnesota's current law has been maintained throughout the analysis, so it is assumed that any new nuclear generation will be from plants located outside of Minnesota.

- **Does this study assume a high level of "government intervention" to reach Minnesota's greenhouse gas reduction goals?**

This study assumes government will follow the law as it is written. This means that Minnesota (along with other states) would need to significantly change its energy landscape over the next 40 years: double its electric generation sourced from nuclear power; have the transmission infrastructure necessary to import large quantities of renewable energy sources; rely on large-scale investments in carbon capture and storage technology; and, ultimately, experience significant demand reduction (lost industry and jobs) and behavioral changes by the entire population to produce the required level of energy conservation.

- **How was the grouping of states determined in this study? For example, why aren't North Dakota and South Dakota included in the model? Why are Minnesota and Iowa grouped together in some of the findings? Why was Michigan excluded?**

There were two factors that contributed to the grouping. First is a political reality and the other is a modeling factor. North Dakota and South Dakota have declined participation in the Midwestern Governors Association cap-and-trade discussions and so they were not included in the model. The other Midwest states (Wisconsin, Illinois, Iowa and Kansas) are signatories to the Midwest Regional Greenhouse Gas Accord. Minnesota and Iowa are grouped in the results as a single region for electricity market modeling purposes within the model because the model creates regional groupings based on similar market characteristics. Michigan was not included because of the difficulty of counting electricity imports into the state toward the regional cap.

- **How are Minnesota's energy laws different from other states?**

When Minnesota passed the Next Generation Energy Act and Renewable Energy Standard in 2007, it surged ahead of most of the rest of the nation in establishing aggressive greenhouse gas reductions and a planning timeline for implementation of a regional cap-and-trade system.

The greenhouse gas emissions reductions agreed to by six states (including Minnesota) and the Canadian Province of Manitoba under the Midwestern Greenhouse Gas Reduction Accord is the most aggressive regional climate change policy in the nation. Only the state of Florida's policy is slightly more ambitious. The other two regional climate change policy initiatives in the nation – the Western Climate Change Initiative and the regional greenhouse gas initiative (RGGI) including ten Northeastern states – are taking more gradual steps than the 60 to 80 percent below 2005 greenhouse gas emissions levels that the Midwestern states have set as goals by 2050.

- **Why was this study based on a regional cap-and-trade policy rather than a national cap-and-trade system?**

This analysis was based on Minnesota's Next Generation Energy Act, which calls for the implementation of a regional approach to reducing greenhouse gases (216H.02 subd. 6). For purposes of analysis, the study needed to make certain assumptions and those assumptions were based on following the direction of Minnesota, as outlined in its law.

- **How do the assumptions used affect the likelihood that the economic costs will actually be more severe than reflected in this report?**

CRA made a number of assumptions in developing the economic model that have the effect of creating a conservative estimate of the cost impacts to Minnesota:

- An open and accessible transmission system that will support the transport/import of any new non-emitting energy sources.
- No new transmission costs.
- The availability of non-emitting resources that can be imported into Minnesota from other states.
- The exclusion of non-CO₂ emissions (because reliable data on these emissions is not available for the region analyzed) from the cap, loosening the cap and the cost of compliance.
- The inclusion of offsets that also has the impact of loosening the cap and the cost of compliance
- An optimistic expectation on the quantity of wind generation that will be available in the region.
- A higher than 1.5% level of conservation in response to higher energy prices.

- **Do the backers of this study support a federal cap-and-trade policy?**

The participants in this study believe that this economic analysis highlights the commonly understood risks of regional climate policies – they place a higher burden on the covered region while simply shifting the emissions problem to bordering states and regions. We prefer that Minnesota be on an even economic playing field with the rest of the nation. However, support for any specific federal legislation will depend on the details of each proposal.

- **Who funded the CRA study?**

The study was commissioned by Partners for Affordable Energy, along with several other Minnesota trade associations that are interested in policies that support affordable and reliable energy. Funding came from a variety of organizations, including Partners for Affordable Energy, the lignite mining industry, Minnesota utility companies, Minnesota Chamber of Commerce, Iron Mining Association of Minnesota, Minnesota Forest Industries, Printing Industry of Minnesota, Central Minnesota Municipal Power Agency, Minnesota Rural Electric Association, Minnesota Utility Investors and the Southern Minnesota Beet Sugar Cooperative.