STATE OF MINNESOTA
PUBLIC UTILITIES COMMISSION

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January 24, 2020

In the Matter of Establishing an Updated Estimate of the Costs of Future Carbon Dioxide Regulation on Electricity Generation Under Minn. Stat. § 216H.06 **Docket No. 07-1199**

CLEAN ENERGY ORGANIZATIONS' COMMENTS

Clean Grid Alliance, Fresh Energy, Minnesota Center for Environmental Advocacy, Sierra Club, and Union of Concerned Scientists (together, the "Clean Energy Organizations") submit these initial comments in response to the Minnesota Public Utilities Commission's December 20, 2019 Notice of Comment Period.

Utilities' CO_2 emissions are a major liability for Minnesota's electricity customers, and there is considerable evidence that the regulatory cost values recommended by the Department of Commerce and Pollution Control Agency (together, "the Agencies") underestimate the range of future regulatory costs. Fortunately, two simple modifications to the Agencies' methodology produce regulatory cost values that are more consistent with statute and more reflective of carbon pricing programs and legislation around the U.S. and across the world. In addition, given the potential for a dramatically different political landscape and the timeframe within which carbon regulation can be implemented, the Agencies' recommended threshold year of 2025 is overly conservative. We recommend applying regulatory CO_2 costs beginning in 2023.

1) Carbon emissions are a major liability for Minnesota's electricity customers

In its 2009 Order in this docket, the Commission explained the importance of considering CO_2 regulatory costs in resource planning and acquisitions:

> Minnesota Statutes §216H.06 reflects the Legislature's conclusion that it is likely that eventually laws will govern the emission of CO_2 and that utilities and their ratepayers will need to bear these costs. The statute's chief requirement is to compel utilities to plan accordingly. A utility's failure to correctly forecast the magnitude of CO_2 regulation costs may result in the utility's making choices that prove to be costly in retrospect.[1]

As the Commission noted, CO_2 emissions are an economic liability, and many of the state's utilities have exposed their customers to substantial expenses if a carbon pricing program is enacted at the state or federal level. Figure 1, below shows the potential costs Minnesota's electricity customers would be required to pay if a CO_2 tax were implemented at the Mid level of Synapse Energy Economics' Spring 2016 National Carbon Dioxide Price Forecast[2] (the "Synapse forecast"), and Figure 2 shows the average per-kWh rate impact of this tax over the period.[3]

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[1] Minnesota Public Utilities Commission, "Order Establishing 2009 and 2010 Estimate of Future Carbon Dioxide Regulation Costs," filed October 8, 2009 in Docket 07-1199, at page 2 (eDocket No. 200910-42619-01).

[2] Luckow et al., "Spring 2016 National Carbon Dioxide Price Forecast," *Synapse Energy Economics, Inc.*, March 16, 2016. Note: this forecast was the basis for the Agencies' recommended High CO_2 regulatory cost value.

[3] For Xcel, OTP, and GRE, Figures 1 and 2 were calculated using utilities' responses to CEO IRs 1 and 2 (included as Attachment A). Minnesota Power's responses to CEO IRs 1 and 2 contained internal inconsistencies that have not been explained as of the comment

Figure 1, CO_2 tax liability at Synapse Mid case

	Xcel	OTP	MP	GRE
2022	$353,778,550	$77,265,213	$200,783,861	$226,676,001
2023	$392,016,148	$83,442,791	$211,733,587	$243,969,631
2024	$333,600,715	$90,133,189	$209,611,639	$264,525,956
2025	$294,900,736	$94,910,297	$212,157,883	$285,858,867
2026	$296,728,441	$102,807,246	$223,528,086	$301,770,699
2027	$251,587,316	$107,335,566	$234,041,204	$332,334,280
2028	$163,344,358	$109,010,209	$246,006,955	$358,797,503
2029	$153,355,625	$118,221,742	$257,937,071	$369,998,637
2030	$155,878,629	$123,265,251	$275,751,646	$403,041,830
2031	$169,162,702	$137,256,381	-	$433,557,628
Total	**$3,217,980,498**	**$1,043,647,884**	**$2,071,551,931**	**$3,220,531,033**

Though these utilities have made significant progress in reducing their CO_2 emissions, all except Xcel Energy (Xcel) have CO_2 emissions rates that are dramatically higher than the national average of 988 lbs/MWh.[4] As Figure 1 shows, these CO_2 emissions are a massive liability; if utilities are allowed to pass these costs directly through to customers—which has typically been the case for utility investments to meet previous federal emissions standards—Minnesota's electricity customers would be on the hook for *billions* of dollars over the next decade. And, as Figure 2 shows, a CO_2 tax at this level would dramatically increase electricity rates, especially for Great River Energy (GRE), Minnesota Power (MP), and Otter Tail Power (OTP) customers.

Figure 2, CO_2 tax rate impact at Synapse Mid case

	Xcel	OTP	MP	GRE
2022	0.8 ¢/kWh	1.4 ¢/kWh	1.6 ¢/kWh	1.8 ¢/kWh
2023	0.9 ¢/kWh	1.5 ¢/kWh	1.7 ¢/kWh	1.9 ¢/kWh
2024	0.8 ¢/kWh	1.6 ¢/kWh	1.7 ¢/kWh	2.0 ¢/kWh
2025	0.7 ¢/kWh	1.7 ¢/kWh	1.7 ¢/kWh	2.1 ¢/kWh
2026	0.7 ¢/kWh	1.8 ¢/kWh	1.8 ¢/kWh	2.2 ¢/kWh
2027	0.6 ¢/kWh	1.9 ¢/kWh	1.9 ¢/kWh	2.4 ¢/kWh
2028	0.4 ¢/kWh	2.0 ¢/kWh	1.9 ¢/kWh	2.6 ¢/kWh
2029	0.4 ¢/kWh	2.1 ¢/kWh	2.0 ¢/kWh	2.7 ¢/kWh
2030	0.4 ¢/kWh	2.3 ¢/kWh	2.2 ¢/kWh	2.8 ¢/kWh
2031	0.4 ¢/kWh	2.5 ¢/kWh	-	2.9 ¢/kWh
Average	**0.6 ¢/kWh**	**1.9 ¢/kWh**	**1.8 ¢/kWh**	**2.4 ¢/kWh**

These figures illustrate the concern raised by the Commission in its 2009 Order: failing to correctly forecast the magnitude of CO_2 regulation costs may result in utilities making choices that prove to be very costly for their customers. It is imperative that the Commission set appropriate values for potential CO_2 regulatory costs to protect customers from excessive risk.

deadline; accordingly, Figures 1 and 2 use the data provided by MP in its February 20, 2018 Comments in this docket (eDocket No. 20182-140313-01). Both figures include emissions from both company-owned generation sources and market purchases.

[4] U.S. Energy Information Administration, "United States Electricity Profile 2018: Table 1. 2018 Summary statistics," December 31, 2019.

2) There is growing urgency to reduce greenhouse gas emissions

Since the Commission last updated the CO_2 regulatory cost range, there has been increasing momentum to reduce greenhouse gas emissions. In November 2018, the federal government published its fourth National Climate Assessment, a report produced and endorsed by 13 federal departments and agencies—including the U.S. Department of Energy, Environmental Protection Agency, Department of Health and Human Services, and Department of Defense—with contributions from more than 300 scientists and experts.[5] Its findings are clear: the impacts of climate change are already beginning to materialize, and continuing on our current emissions trajectory would wreak havoc on our economy. By the end of the century, climate change could reduce gross domestic product by ten percent, which would be *more than double* the economic harm of the Great Recession.[6]

The most recent Intergovernmental Panel on Climate Change report underscores these conclusions.[7] The IPCC report—which surveyed over 6,000 scientific publications, with contributions from 133 authors and reviewed by more than 1,000 scientists—found limiting the increase in global average temperature to 1.5°C—to help limit some of the worst impacts of climate change—would require reducing global CO_2 emissions 45 percent below 2010 levels by 2030 and reaching net zero CO_2 emissions by 2050.

As the IPCC report indicates, achieving these appropriately ambitious climate goals will require significant technological and socioeconomic shifts to transition to a low-carbon economy. Policies and measures to cut emissions in every sector of the economy are vital, and the power sector will play a pivotal role in this transformation. We must make this low-carbon transition swiftly, and on an economywide basis, if we are to meet our climate goals.

There is also growing political and public support for federal action to limit greenhouse gas emissions. Efforts are underway in Congress to begin to respond to these demands, including anticipated proposals from the House Energy and Commerce Committee and the House Select Committee on the Climate Crisis. Each of the top Democratic presidential contenders has promised bold action to reduce greenhouse gas emissions: Joe Biden contends "there is no greater challenge facing our country and our world today than climate change" and pledges to "take immediate action on day one of my Administration to meet this challenge and ensure the US achieves a 100 percent clean energy economy and net-zero emissions no later than 2050"; Bernie Sanders calls climate change "the single greatest threat facing us today" and argues "we must act immediately to dramatically cut our greenhouse gas emissions"; and Elizabeth Warren says "a comprehensive, bold approach to addressing climate change would be a top priority in [her] Administration."[8] Public demand for ambitious climate action is growing as people in America increasingly grapple with devastating climate impacts.[9] An estimated 6 million people participated in climate change protests in September 2019, and 72 percent of registered voters in the United States support taxing

[5] U.S. Global Change Research Program, "Fourth National Climate Assessment: Volume II Impacts, Risks, and Adaptation in the United States," November 23, 2018.
[6] Coral Davenport and Kendra Pierre-Louis, "U.S. Climate Report Warns of Damaged Environment and Shrinking Economy," *New York Times*, November 23, 2018.
[7] Intergovernmental Panel on Climate Change, "Global Warming of 1.5°C," October 8, 2018
[8] Umair Irfan and David Roberts, "How Climate Change Ranks as a Priority for 2020 Democratic Presidential Contenders," *Vox Media*, October 15, 2019.
[9] Dennis et al., "Americans increasingly see climate change as a crisis, poll shows," *Washington Post*, September 13, 2019.

pollution.[10,11] In 2019, a group of 3,558 PhD economists—including 27 Nobel Laureates and all four former chairs of the Federal Reserve—called for a carbon tax of $40/ton, escalating at 5 percent above inflation.[12]

3) The Commission should make two simple changes to the Agencies' methodology to produce a more reasonable CO_2 regulatory cost range

In making their 2018 recommendation to the Commission, the Agencies employed a "blended approach to setting the cost range," basing the Low value on prices in U.S. carbon markets at the time and the High value on the upper end of the most recent Synapse forecast for the year 2022.[13]

In past comments, we have argued that basing the High and Low values on a blend of the existing U.S. carbon markets' price ranges would be a more objective, easily accessible estimate of true regulatory costs.[14] However, if the Commission prefers to continue using the Agencies' blended approach, two simple revisions to their methodology would produce a regulatory cost range that is more consistent with the governing statute and more reasonable throughout utility planning horizons. Specifically, the Low CO_2 regulatory cost value should be based on *future* market prices, not historical, and the High value should be based on the Synapse forecast for the given year, not remain frozen at the 2022 level throughout the planning period.

3.1 The Low CO_2 regulatory cost value should be based on future market prices, not historical

To develop their recommendation for the low value of their CO_2 regulatory cost range, the Agencies looked to the two extant carbon markets in the U.S., the Regional Greenhouse Gas Initiative (RGGI) and the Western Climate Initiative (WCI). At the time they developed the recommended values, the Agencies raised concerns that these markets had "recently seen declines in their auction prices," and that "the RGGI price is the lowest it has been over the past four years."[15] In light of these market conditions, the Agencies recommended the Low value be set at $5/ton. Moreover, the Agencies' recommended value does not escalate over time, meaning it effectively decreases over time as other planning values increase with inflation.

We agree with the Agencies that basing regulatory cost values on existing carbon markets has many advantages. However, as the Agencies note, basing values on *historical* auction results "do not reflect likely future values."[16] This is a fatal flaw, in light of Minn. Stat. §216H.06's requirement for "an estimate of the likely range of costs of ***future*** carbon dioxide regulation" (emphasis added).

The drawback of the Agencies' approach can already be seen: in the years following the Agencies' recommendation, auction clearing prices have increased in both markets, as displayed in Figure 3 below.[17] The average clearing price in 2019 RGGI auctions ($5.43/ton) was more than double the price cited by the Agencies in making their recommendation ($2.53 in June 2017). Moreover, the clearing price in each 2019

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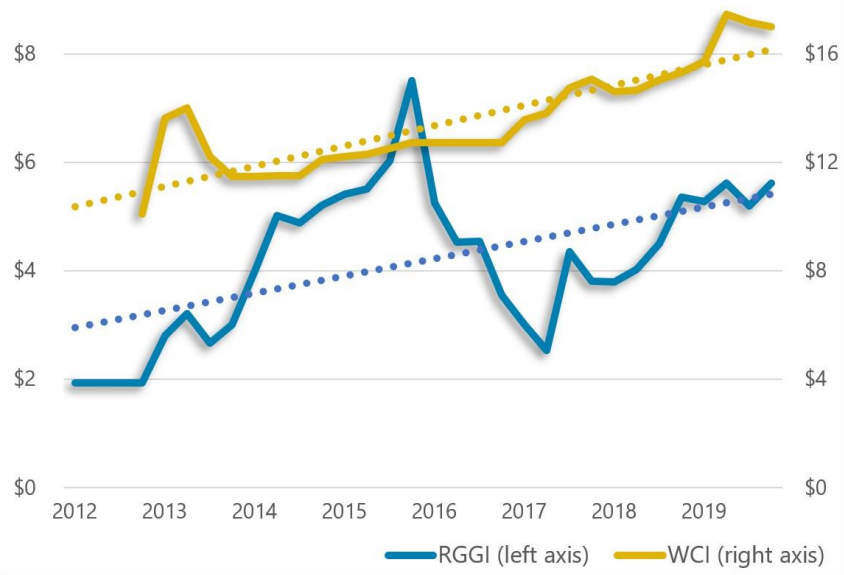
[10] Taylor et al., "Climate crisis: 6 million people join latest wave of global protests," *The Guardian*, September 27, 2019.
[11] Lieserowitz et al., "Politics & Global Warming, April 2019," *Yale Program on Climate Change Communication*, May 16, 2019.
[12] Climate Leadership Council, "Economists' Statement on Carbon Dividends," January 17, 2019.
[13] Minnesota Department of Commerce and Minnesota Pollution Control Agency, "Corrected Analysis and Recommendations," filed February 28, 2018 in Docket 07-1199, at pages 3-4 (eDocket No. 20182-140586-01).
[14] *See*: Clean Energy Organizations, "Comments," filed February 15, 2018 in Docket 07-1199 (eDocket No. 20182-140140-02); Clean Energy Organizations, "Comments," filed September 6, 2019 in Docket 07-1199 (eDocket No. 20199-155708-02).
[15] Minnesota Department of Commerce and Minnesota Pollution Control Agency, "Corrected Analysis and Recommendations," filed February 28, 2018 in Docket 07-1199, at pages 3-4 (eDocket No. 20182-140586-01).
[16] *Ibid.*
[17] Data sources: Regional Greenhouse Gas Initiative, "Allowance Prices and Volumes," accessed January 9, 2020, from https://www.rggi.org/Auctions/Auction-Results/Prices-Volumes; California Air Resources Board, "WCI Carbon Allowance Prices," December 20, 2019, accessed January 9, 2020 from https://ww3.arb.ca.gov/cc/capandtrade/wcicarbonallowanceprices.pdf

RGGI auction was higher than Minnesota's Low CO_2 regulatory values *for 2025 and beyond*. WCI allowance prices have also increased steadily over time, and in the most recent WCI auction the clearing price was $17/ton, well above the program's current price floor of $15.62.

Figure 3, Historical WCI and RGGI auction clearing prices



The underlying program design in these markets will produce further increases in clearing prices moving forward. RGGI and WCI are "cap and trade" programs rather than carbon taxes, meaning the price per ton of CO_2 will vary depending on the supply of and demand for credits. Notably, each program requires the rate of CO_2 reductions to accelerate over time, meaning utilities will need to make larger reductions in the 2020s than were required in the 2010s. Further, the design of RGGI and the WCI cap and trade programs include provisions that aim to limit the range of CO_2 prices within a given year. Specifically, RGGI has established "Emissions Containment Reserve" and "Cost Containment Reserve" trigger prices through 2030. While these are not technically a hard price floor or ceiling, the provisions serve as rough low and high bounds for auction clearing prices, and they signal RGGI's expectation (and intention) that auction prices will remain within that range, thus increasing considerably over time.

As displayed in Figure 4 below, RGGI's "Emissions Containment Reserve" in 2030 will be roughly double current auction prices.[18] It is also imperative to note that the both RGGI's and WCI's price containment provisions escalate annually, each at roughly seven percent per year; conversely, the Agencies' Low (and High) CO_2 values remain flat over the entire planning period.

Figure 4, RGGI's Emissions Containment Reserve trigger price

2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
$6.00	$6.42	$6.87	$7.35	$7.86	$8.41	$9.00	$9.63	$10.30	$11.02

Fortunately, the problem with the Agencies' Low value is easily rectified. Rather than basing *future* CO_2 regulatory cost values on *historical* RGGI prices, the Low CO_2 regulatory cost should be set as the RGGI Emissions Containment Reserve trigger price for the relevant year.[19] This would maintain the objectivity, accessibility, and authenticity of the Agencies' approach, while being more theoretically sound and consistent with statute.

3.2 The High CO_2 regulatory cost value should not be frozen at 2022 levels

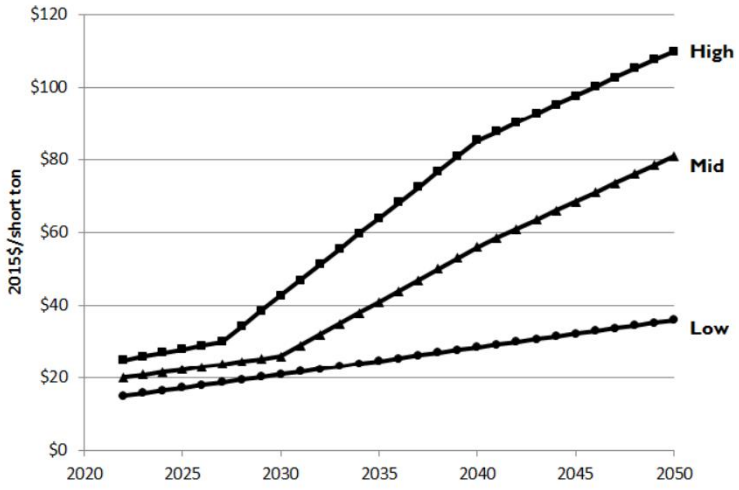
For the High CO_2 regulatory cost value, the Agencies used the high value for the year 2022 of the most recent Synapse national CO_2 price forecast, arguing that "basing the regulatory cost range on carbon price

[18] RGGI prices come from its Revised 2017 Model Rule, pages 6 and 7.
[19] For years beyond 2030, the value could continue to be escalated at the ECR's rate of seven percent per year.

forecasts has the advantage of projecting regulatory costs into the future, which corresponds to electric utility planning horizons."[20]

However, the Agencies did not recommend using the high end of the Synapse forecast *throughout the planning period*, but simply the high value from the year 2022 (even though they also recommended the values begin to be applied in 2025). As shown in the chart Figure 5 to the right, Synapse's forecasted high CO_2 price does not freeze at $25 from 2022 and beyond.[21] Rather, it increases considerably throughout the forecast period.

Figure 5, Synapse 2016 CO_2 national price forecasts



Source: Synapse Energy Economics, Inc. 2016.

As with the Agencies' recommended Low value, it is inappropriate to maintain a single value throughout a 15-year (or longer) planning period. Holding the values constant not only effectively reduces their value over time due to inflation, it is also inconsistent with the evidence in CO_2 markets, forecasts, and potential legislation. As shown in Figure 3 above, RGGI and WCI auction clearing prices have increased considerably over time, and the price control provisions in each program increase at rates well above inflation. Indeed, WCI's price *floor* will be higher than the Agencies' recommended High value beginning in roughly 2026 and will then continue to escalate at five percent above inflation.[22] Similarly, each of Synapse's price forecasts escalate over time. Further, of the five carbon pricing bills with bipartisan sponsorship in the 116th Congress, the *lowest* price would be roughly $40/ton in 2025, or *60 percent higher* than Minnesota's current high value.[23]

Figure 6, CEO Recommendation

	Low	Mid	High
2023	$6.87	$18.47	$30.08
2024	$7.35	$19.56	$31.77
2025	$7.86	$20.69	$33.51
2026	$8.41	$21.85	$35.29
2027	$9.00	$23.05	$37.10
2028	$9.63	$26.34	$43.05
2029	$10.30	$29.73	$49.16
2030	$11.02	$33.23	$55.44

Fortunately, this issue is easily addressed by using the high price in the Synapse forecast (adjusted for inflation) for each year of the planning period. This would better fulfill the Agencies' objective of aligning forecasts with electric utility planning horizons and would be more reflective of the historical prices and market rules of the existing North American pricing programs and the potential federal legislation proposed in recent years.

When combined, the CEOs' recommended modifications would produce the CO_2 regulatory cost values shown in Figure 6.

[20] Minnesota Department of Commerce and Minnesota Pollution Control Agency, "Corrected Analysis and Recommendations," filed February 28, 2018 in Docket 07-1199, at pages 3-4 (eDocket No. 20182-140586-01).
[21] Luckow et al., "Spring 2016 National Carbon Dioxide Price Forecast," *Synapse Energy Economics, Inc.*, March 16, 2016, at page 7.
[22] The WCI Auction Reserve Price escalates annually at a rate of 5% above the rate of inflation. Escalating the 2020 Auction Reserve Price of $16.68 at a rate of 7% (5% plus the Federal Reserve's unofficial inflation target of 2%) would give a value of $25.03 in 2026 and $32.81 in 2030.
[23] Energy Innovation and Carbon Dividend Act, H.R. 763, 116th Congress 2019; the Raise Wages, Cut Carbon Act, H.R. 3966, 116th Congress 2019; the Climate Action Rebate Act H.R. 4051/S.2284, 116th Congress 2019; Stemming Warming and Augmenting Pay (SWAP) Act H.R. 4058, 116th Congress 2019; and the Modernizing America with Rebuilding to Kickstart the Economy of the Twenty-first Century with a Historic Infrastructure-Centered Expansion Act H.R.4520, 116th Congress 2019.

3.3 These values are more consistent with existing and proposed carbon pricing programs

Our recommended values fall well within the range of current prices for existing international carbon pricing programs. According to the World Bank, worldwide there are 57 carbon pricing initiatives implemented or scheduled for implementation in 2019, ranging in price from <$1/ton (Poland) to $127/ton (Sweden).[24] The average of the 10 lowest-value international carbon pricing programs is $2.78/ton, while the average of the 10 highest-value programs is $56.15/ton. This produces a midpoint of $29.47, which is considerably higher than the midpoint of our recommended 2023 values.

Comparing the CEO recommendation to recently introduced federal legislation also confirms its reasonableness. Notably, the High value that was used from 2009-2018 was originally set based on modeled costs of proposed federal legislation.[25] As explained above, in the current Congress, there are at least five active bills with bipartisan sponsorship that would place a price on CO_2; of those bills, the *lowest* value in 2025 would be approximately $40/ton. Thus, if anything, the CEO's recommended range is conservative when compared to other indicators of the likely regulatory costs of CO_2 emissions.

4) The threshold year for the application of the value range should be 2023

Though there is considerable uncertainty regarding the timing of future CO_2 regulations, the Agencies' recommended effective date of 2025 is overly conservative. Policy changes could require electricity generators to begin incurring regulatory costs for CO_2 emissions as early as 2021. Based on the potential for federal or state action regulating greenhouse gas emissions, CEOs recommend an effective date of 2023.

Pursuant to the 2007 *Mass v. EPA* Supreme Court ruling and the subsequent U.S. Environmental Protection Agency "Endangerment Finding" that greenhouse gas emissions threaten human health and welfare, the Clean Air Act *requires* the federal government to regulate carbon dioxide and other heat-trapping pollutants.[26] While the Trump administration's Clean Power Plan replacement, the Affordable Clean Energy Rule, does not require meaningful emissions reductions from fossil fuel-fired energy generators, a coalition of states and cities are suing to ensure stricter protections that would fulfil the government's obligation.[27] The 2020 presidential election could also dramatically impact the status of this federal rule.

In addition to federal regulatory action, there is also the potential for federal legislation to regulate greenhouse gas emissions. As mentioned above, there are at least five active bills in Congress with bipartisan sponsorship that would establish a federal carbon tax, each of which would take effect *within two years* of passage.[28] Other recent proposals for federal carbon pricing measures have similar timelines.[29]

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[24] World Bank Group, "State and Trends of Carbon Pricing 2019," June 2019.
[25] Minnesota Pollution Control Agency and Office of Energy Security, "Other-Letter," filed March 27, 2009 in Docket 07-1199, at pages 3-4 (eDocket No. 5848995).
[26] Massachusetts v. EPA, 549 U.S. 497 (2007). Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule, 74 Fed. Reg. 66,496 (December 15, 2009).
[27] Lisa Friedman, "States Sue Trump Administration Over Rollback of Obama-Era Climate Rule," *New York Times*, August 13, 2019.
[28] Energy Innovation and Carbon Dividend Act, H.R. 763, 116th Congress 2019; the Raise Wages, Cut Carbon Act, H.R. 3966, 116th Congress 2019; the Climate Action Rebate Act H.R. 4051/S.2284, 116th Congress 2019; Stemming Warming and Augmenting Pay (SWAP) Act H.R. 4058, 116th Congress 2019; and the Modernizing America with Rebuilding to Kickstart the Economy of the Twenty-first Century with a Historic Infrastructure-Centered Expansion Act H.R.4520, 116th Congress 2019.
[29] *See:* American Opportunity Carbon Free Act of 2019, S.1128, 116th Congress 2019; America Wins Act, H.R.4142, 116th Congress 2019; and Healthy Climate and Family Security Act of 2019, S.940, 116th Congress, 2019

The political landscape has the potential to change dramatically over the next several years, with two Presidential elections and three Congressional elections between now and 2025. Depending on the outcome of these elections, the likelihood of implementing a federal carbon pricing program could increase dramatically. This is particularly true given the increasing support for greenhouse gas regulation in the United States, with 82 percent of registered voters expressing support for regulating pollution and 72 percent supporting requiring companies to pay a carbon tax.[30] In addition, over 3,500 leaders from across the country have signed on to the We Are Still In declaration to uphold the Paris Agreement, including governors, mayors, county executives, tribal leaders, college and university leaders, businesses, faith groups, and investors.[31] The state of Minnesota; the cities of Duluth, Eden Prairie, Minneapolis, and Saint Paul; and businesses such as Aveda and Target have signed on to the declaration.[32]

Further, even without federal action, the state of Minnesota could impose regulations on CO_2 emissions well before 2025. The Minnesota Pollution Control Agency has the obligation to limit CO_2 emissions using its broad statutory authority to "adopt, amend and rescind rules and standards . . . relat[ing] to sources or emissions of air contamination or air pollution" under Minn. Stat. §116.07. Both Governor Walz and Pollution Control Agency Commissioner Bishop have publicly stated that the Agency has the power to regulate carbon directly under this statutory authority. Even without enabling legislation, Minnesota could, for instance, adopt rules joining RGGI or WCI. In recent years, several states have taken steps to join these markets through administrative actions taken under broad statutory authorities similar to our state's.[33] For example, New Jersey, which left RGGI in 2012, began the process of rejoining the market following a January 29, 2018 executive order from Governor Phil Murphy.[34] The state re-entered the market January 1, 2020, meaning there was *less than two years* between the executive order and the application of a carbon price.[35]

Given the potential for a dramatically different political landscape and the timeframe within which carbon regulation can be implemented, the current threshold year of 2025 is overly conservative. Utilities may be required to comply with greenhouse gas regulations through federal or state legislation or administrative action within a few years. For these reasons, we recommend an effective date of 2023.

5) Response to Staff discussion topics

5.1 Should the basis for likely CO_2 costs contemplate a specific type of CO_2 regulation (e.g. a direct tax or cap and trade)?

As Staff notes, there are a variety of different types of CO_2 cost programs in place within and outside of the U.S., and future CO_2 regulations could take several forms—e.g. the Minnesota legislature could pass a state-specific CO_2 tax, the Walz administration could join an existing cap and trade program, or a new President or Congress could institute a nation-wide carbon tax or cap and trade program. In this context, the Commission

[30] Lieserowitz et al., "Politics & Global Warming, April 2019," *Yale Program on Climate Change Communication*, May 16, 2019.
[31] "We Are Still In" Declaration.
[32] "We Are Still In" Signatories.
[33] *See generally,* Janet E. Milne, *Carbon Pricing in the Northeast: Looking Through a Legal Lens*, 70 NAT'L TAX JOURNAL 855, 861 (2017). The Virginia Attorney General, for instance, has concluded that the authority to "abate, control, and prohibit air pollution" includes the authority to regulate carbon, a well-recognized air pollutant. Attorney General Mark R. Herring Advisory Opinion, 17-010 (May 12, 2017), https://www.oag.state.va.us/files/Opinions/2017/17-010-Toscano-carbon-pollution-%20for-issuance.pdf (quoting VA. CODE. § 10.1-1300 (defining air pollution)).
[34] State of New Jersey, Governor Phil Murphy, "Executive Order No. 7," filed January 29, 2018.
[35] Regional Greenhouse Gas Initiative, "RGGI States Welcome New Jersey as Its CO_2 Regulation Is Finalized," June 17, 2019.

would be wise to review the full range of evidence in developing CO_2 regulation cost range, rather than focusing exclusively on any one program.

The legislature provided the Commission a challenging assignment in this statute. But, while it may be abstract, it is still a necessary customer protection. The Commission acknowledged this reality in its 2007 Order in this docket:

> The future is uncertain. The need to plan for the future is not. The degree of uncertainty regarding future CO_2 regulation and future technology makes the task of estimating regulatory costs more difficult; it does not make the task any less necessary.[36]

Reviewing a wide range of evidence—including the existing RGGI and WCI cap and trade programs, market forecasts like Synapse's, international carbon pricing programs, and proposed state and federal carbon pricing legislation—will aid this difficult task.

As detailed above, a full review of the evidence shows the Agencies' recommended CO_2 regulatory cost range is far too low. Eight countries and one Canadian province *currently* have higher carbon taxes than the Agencies' recommended High value *in 2025 and beyond*.[37] Each of the five active federal carbon pricing bills with bipartisan sponsorship would have a much higher price than the Agencies' High value. And the WCI "Auction Reserve Price"—which is effectively a price floor for the cap and trade program—will be higher than the Agencies' recommended High value from approximately 2026 on.[38]

5.2 Why is it reasonable to base the range of likely CO_2 costs on programs in which Minnesota does not participate?

While Minnesota does not currently participate in RGGI or WCI, it could join either program through executive action, as described in Section 4, above. The Minnesota Pollution Control Agency has the obligation to limit CO_2 emissions using its broad statutory authority to "adopt, amend and rescind rules and standards . . . relat[ing] to sources or emissions of air contamination or air pollution" under Minn. Stat. §116.07. Notably, the Walz Administration could take this action without new legislation. As described above, it took less than two years for New Jersey to rejoin the RGGI market following a 2018 executive order from new Governor Phil Murphy.

That said, the extant U.S. carbon pricing programs should not be the sole consideration in developing the CO_2 regulatory cost range. They provide concrete examples possible future carbon pricing programs, but they are not the only possible futures. The Commission would be wise to consider the WCI and RGGI markets within the broader carbon pricing context described above.

5.3 Minn. Stat. §216H.06 requires the Commission to estimate the costs "of future carbon dioxide regulation." Is the correct interpretation of the statute that the CO_2 values should reflect a net cost of complying with a particular regulation or the price of an incremental unit of CO_2? Why should an allowance price correspond to the net cost of CO_2 regulation?

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[36] Minnesota Public Utilities Commission, "Order Establishing Estimate of Future Carbon Dioxide Regulation Costs," filed December 21, 2007 in Docket 07-1199, at page 5 (eDocekt No. 4877738).
[37] World Bank Group, "State and Trends of Carbon Pricing 2019," June 2019.
[38] The WCI Auction Reserve Price escalates annually at a rate of 5% above the rate of inflation. Escalating the 2020 Auction Reserve Price of $16.68 at a rate of 7% (5% plus the Federal Reserve's unofficial inflation target of 2%) would give a value of $25.03 in 2026 and $32.81 in 2030.

The most reasonable interpretation of the statute is that the values should reflect the cost of an incremental unit of CO_2 emissions. The statute requires the Commission to "establish an estimate of the likely range of costs of future carbon dioxide regulation on electricity generation." The phrasing "costs … on" suggests a volumetric (e.g. $/ton) value that is *imposed on* electricity generation, like a carbon tax. Had the legislature intended to reflect the cost of compliance, it could have simply required utilities to impose emissions constraints in their resource plans, or to compare scenarios with emissions constraints to those without.

This approach is also logistically simpler than estimating a cost of compliance. Estimating a cost of compliance would be highly dependent on the emissions reductions required over time and would vary from utility to utility based on their existing and potential generation mixes. A simple price per ton can be applied consistently across all utilities and is much more practicable.

6) Conclusion and recommendations

We appreciate the opportunity to provide input on these important topics. We urge the Commission to modify the Agencies' proposals to better reflect the governing statute, the design and pricing of active carbon pricing programs, and potential future regulatory or legislative actions. Specifically, we recommend the Commission:

- Set the Low regulatory CO_2 cost value as RGGI's Emissions Containment Reserve trigger price for years 2023-2030, and escalate the 2030 value at seven percent annually for years after 2030;
- Set the High regulatory CO_2 cost value as the inflation-adjusted High case forecast from Synapse Energy Economics' Spring 2016 National Carbon Dioxide Price Forecast for the relevant planning year; and
- Find that 2023 is the appropriate threshold year for the application of CO_2 regulatory costs.

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Attachment A

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greatriverenergy.com

GREAT RIVER ENERGY™

Date of Request: December 19, 2019

Requested By: Andrew Twite
Fresh Energy

Requested From: Great River Energy

Request Due: January 3, 2019

In the Matter of Establishing an Updated 2020 Estimate of the Costs of Future Carbon Dioxide Regulation on Electricity Generation under Minn. Stat. § 216H.06.

PUC Docket Number: E999/CI-07-1199
E999/DI-19-40

If you believe your responses are proprietary, please indicate.

Request Number	
#1	Please provide GRE's total CO_2 emissions and average CO_2 emissions rate (lbs/MWh), both with and without market purchases, for each year from 2016 to 2018.
#2	Please provide GRE's projected total CO_2 emissions and CO_2 emissions rate (lbs/MWh), both with and without market purchases, for each year of GRE's most recently accepted integrated resource plan.

Request

1. Please provide GRE's total CO_2 emissions and average CO_2 emissions rate (lbs/MWh), both with and without market purchases, for each year from 2016 to 2018.

Response

1.

	2016			2017			2018		
	CO2 (tons)	MWh	CI (lb/MWhn)	CO2 (tons)	MWh	CI (lb/MWhn)	CO2 (tons)	MWh	CI (lb/MWhn)
GRE w/o Market	10,467,413	12,606,417	1,661	9,107,559	11,645,962	1,564	10,545,714	11,760,000	1,793
GRE w/ Market Purch	11,473,598	14,231,917	1,612	10,615,094	14,137,754	1,502	11,950,204	14,049,306	1,701
GRE w/ Market Purch & Sales	10,009,077	12,286,673	1,629	9,418,764	12,455,368	1,512	10,876,746	12,716,499	1,711

Request

2. Please provide GRE's projected total CO_2 emissions and CO_2 emissions rate (lbs/MWh), both with and without market purchases, for each year of GRE's most recently accepted integrated resource plan.

Response

2. GRE previously responded to the portion of this request that includes the markets in MCEA IR 11 and 12 in Docket No. ET2/RP-17-286. The response figures provided in that submission are illustrated below (note that Table numbers are incorrect as they correspond with the original response of MCEA IR 5-20):

11. Please provide GRE's system-wide annual projected CO_2 emissions by year from 2017 – 2032, including anticipated bilateral contracts and market transactions.

11. MCEA IR 11 Table 2 below illustrates GRE's system-wide annual projected CO_2 emissions by year over the planning period under the Expected Values Case. The year 2017 is not included, as 2017 was not modeled in our 2018-2032 IRP. Please note that modeled CO_2 projections are only indicative. The actual values are likely to be different due to market transactions and more flexible operations at Coal Creek Station. We also cannot predict future bilateral transactions. The data below include our current bilateral contracts.

MCEA IR 11 Table 2 - Annual Projected CO_2 Emissions

Year	CO2 Emissions (tons)
2018	11,706,146
2019	11,379,389
2020	9,882,498
2021	9,953,698
2022	9,969,847
2023	10,163,808
2024	10,455,006
2025	10,734,881
2026	10,782,693
2027	11,313,821
2028	11,652,375
2029	11,476,599
2030	11,953,667
2031	11,353,413
2032	10,653,785

12. Please provide the historic and projected annual emissions from Information Requests 10 and 11 on a per MWh basis for each year.

12. MCEA IR 12 Table 4 below indicates GRE's annual projected system-wide CO_2 emissions intensity in our Expected Values Case from 2018-2032. 2017 is not included since it was not modeled in our IRP. Again, we caution these data are indicative and actual data are likely to be different, as noted in the response to MCEA IR 11

MCEA IR 12 Table 4 – GRE 2018-2032 Projected CO_2 Emissions Intensity

Year	CO2 Emissions (tons)	CO2 Emissions (lbs)	Generation (MWh	CO2 Emissions Rate (lbs/MWh)
2018	11,706,146	23,412,292,532	12,621,082	**1,855**
2019	11,379,389	22,758,778,888	12,461,975	**1,826**
2020	9,882,498	19,764,995,944	12,425,339	**1,591**
2021	9,953,698	19,907,396,668	12,496,610	**1,593**
2022	9,969,847	19,939,694,684	12,605,442	**1,582**
2023	10,163,808	20,327,616,520	12,798,386	**1,588**
2024	10,455,006	20,910,011,448	12,934,658	**1,617**
2025	10,734,881	21,469,761,002	13,324,347	**1,611**
2026	10,782,693	21,565,385,656	13,455,545	**1,603**
2027	11,313,821	22,627,642,606	13,648,424	**1,658**
2028	11,652,375	23,304,750,338	13,640,410	**1,709**
2029	11,476,599	22,953,197,316	13,904,851	**1,651**
2030	11,953,667	23,907,334,984	14,529,303	**1,645**
2031	11,353,413	22,706,825,580	14,764,027	**1,538**
2032	10,653,785	21,307,570,166	14,921,011	**1,428**

Additionally, for this specific request, GRE identified the station performance characteristics from the preferred plan run of its 2017 Integrated Resource Plan. GRE has since transitioned from the use of System Optimizer as its capacity expansion modeling tool to Encompass. As such, the model datafiles are unavailable in the model itself, however, outputs and emissions rates from the modeling were utilized to verify the tons of CO_2 emissions and the megawatt-hours (MWh) associated with the market portions of the expansion plan. Using this data, it was possible to separate out the Market energy from the expansion plan and provide a future CO_2 emissions stream in both tons and intensity that excludes the market, per the request in IR 2.

Table 1 - Emissions Data and Intensity without Market Purchases

Date	Base CO2 Emissions (tons) w/o Market	Portfolio MWh w/o Market	Emissions Intensity w/o Market
2018	11,000,489	11,639,950	2,011
2019	10,492,853	11,227,630	2,027
2020	8,710,159	10,833,430	1,820
2021	8,635,903	10,739,640	1,844
2022	8,498,099	10,614,410	1,871
2023	8,669,198	10,794,910	1,873
2024	9,155,301	11,176,570	1,865
2025	9,318,928	11,378,470	1,884
2026	9,280,908	11,394,270	1,889
2027	9,940,891	11,751,090	1,924
2028	10,150,399	11,555,330	2,017
2029	10,030,457	11,895,300	1,929
2030	10,744,874	12,850,410	1,860
2031	10,307,699	13,311,640	1,706
2032	9,759,882	13,687,670	1,556
Grand Total (Tons, MWh) / Average (Intensity)	**144,696,039**	**174,850,720**	**1,872**

OTTER TAIL POWER COMPANY
Docket No: E999-DI-19-406, E999-CI-07-1199

Response to: Clean Energy Organization
Analyst: Andrew Twite
Date Received: 12/19/2019
Date Due: 01/03/2020
Date of Response: 01/03/2020
Responding Witness: Brian Draxten, Manager Resource Planning - (218) 739-8417

Information Request:

Please provide OTP's total CO2 emissions and average CO2 emissions rate (lbs/MWh), both with and without market purchases, for each year from 2019 to 2018.

Attachments: 0

Response:

The following table contains OTP's total CO2 emissions and average CO2 emissions rate (lbs/MWh) from 2016 through 2018.

	CO2 Mass - Owned (short tons)	CO2 Mass - Owned + Purchases (short tons)	CO2 Rate - Owned (lbs/MWh)	CO2 Rate - Owned + Purchases (lbs/MWh)
2016	2,744,584	3,809,910	1,945	1,547
2017	2,930,880	3,968,813	1,999	1,587
2018	3,667,565	4,510,320	2,074	1,715

OTTER TAIL POWER COMPANY
Docket No: E999-DI-19-406, E999-CI-07-1199

Response to: Clean Energy Organization
Analyst: Andrew Twite
Date Received: 12/19/2019
Date Due: 01/03/2020
Date of Response: 01/03/2020
Responding Witness: Brian Draxten, Manager Resource Planning - (218) 739-8417

Information Request:

Please provide OTP's projected total CO2 emissions and CO2 emissions rate (lbs/MWh), both with and without market purchases, for each year of OTP's most recently approved integrated resource plan.

Attachments: 0

Response:

The table below contains our projected CO2 emissions and CO2 emissions rate (lbs/MWh) from our 2016 IRP (RP 16-386).

	CO2 Mass - Owned (short tons)	CO2 Mass - Owned + Purchases (short tons)	CO2 Rate - Owned (lbs/MWh)	CO2 Rate - Owned + Purchases (lbs/MWh)
2017	3,516,533	4,354,471	1,832	1,615
2018	3,302,339	4,063,121	1,654	1,497
2019	3,274,705	3,992,442	1,648	1,494
2020	3,250,815	3,744,884	1,502	1,408
2021	3,376,263	3,821,921	1,456	1,420
2022	2,071,361	3,398,341	1,183	1,248
2023	2,118,397	3,476,238	1,211	1,263
2024	2,240,260	3,562,384	1,240	1,281
2025	2,158,147	3,564,174	1,215	1,267
2026	2,340,020	3,673,448	1,291	1,313
2027	2,338,930	3,654,078	1,291	1,312
2028	2,144,644	3,540,236	1,238	1,278
2029	2,430,554	3,666,996	1,326	1,331
2030	2,489,984	3,655,878	1,336	1,335
2031	2,427,113	3,594,282	1,317	1,320

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Xcel Energy Information Request No. 1
Docket No.: E999/CI-07-1199
Response To: Clean Energy Organizations
Requestor: Andrew Twite, Fresh Energy
Date Received: December 19, 2019

Question:
Please provide Xcel's total CO_2 emissions and CO_2 emissions rate (lbs/MWh), both with and without market purchases, for each year from 2016 to 2018.

Response:
Xcel Energy has publicly reported third-party verified CO_2 emissions from electricity since 2005, following The Climate Registry's *Electric Power Sector Protocol.*[1] Our reported totals include CO_2 emissions from owned power plants, power purchase agreements (PPAs), and power purchases and sales in the MISO market.

In Table 1 below, "without MISO purchases and sales" provides the CO_2 data based only on our owned power plants and PPAs. "With MISO purchases and sales" includes CO_2 from owned power plants, PPAs, and MISO market purchases, but excludes CO_2 attributable to short-term sales into the MISO market. Since MISO market sales represent energy sold to others for resale to their end-use customers, including it in our reporting would result in double-counting if the purchasers account for it in their reporting, and would overstate the total CO_2 our customers are responsible for. The data is for Xcel Energy's Upper Midwest (i.e. Northern States Power Company) system.

[1] *See* https://www.theclimateregistry.org.

Table 1: CO_2 Emissions Data – 2016 to 2018
Xcel Energy Upper Midwest NSP System

Year	2016	2017	2018
Total CO_2 (million short tons)			
Without MISO purchases and sales	17.4	17.5	17.0
With MISO purchases and sales	19.0	18.9	18.5
CO_2 emissions rate (lbs/MWh)			
Without MISO purchases and sales	856	865	824
With MISO purchases and sales	889	893	856

Values determined in accordance with The Climate Registry's *Electric Power Sector Protocol*

Preparer: Nicholas Martin
Title: Manager
Department: Energy & Environmental Policy
Telephone: (612) 330-6255
Date: January 3, 2020

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☒ **Public Document**

Xcel Energy		Information Request No.	2
Docket No.:	E999/CI-07-1199		
Response To:	Clean Energy Organizations		
Requestor:	Andrew Twite, Fresh Energy		
Date Received:	December 19, 2019		

Question:
Please provide Xcel's projected total CO_2 emissions and CO_2 emissions rate (lbs/MWh), both with and without market purchases, for each year of Xcel's most recently approved integrated resource plan.

Response:
We provide the requested data in Attachment A in Excel sheet, *07-1199 CEO-002 Attachment A*. Consistent with the response to CEO-1, "without MISO purchases and sales" provides the CO_2 data based only on our owned power plants and PPAs. "With MISO purchases and sales" includes CO_2 from owned power plants, PPAs, and MISO market purchases, but excludes CO_2 attributable to short-term sales into the MISO market. Since MISO market sales represent energy sold to others for resale to their end-use customers, including it in our reporting would result in double-counting if the purchasers account for it in their reporting, and would overstate the total CO_2 our customers are responsible for.

The data is for Xcel Energy's Upper Midwest (i.e. Northern States Power Company) system. Please note that this data is for our most recently filed integrated resource plan, i.e. the plan for 2020-2034 filed on July 1, 2019, rather than our latest approved plan (filed in 2015). We are providing the data for our latest filed plan for two reasons: 1) the data in our 2015 plan is significantly outdated and does not reflect the CO_2 emissions we now expect, and 2) for our 2015 plan the Company ran Strategist in "markets off" mode, so would not be able to provide CO_2 data with MISO market purchases and sales. For our latest filed IRP, we can provide CO_2 data both with and without MISO market purchases and sales.

Preparer:	Eryn Coleman
Title:	Analyst