

## ECONOMIC IMPACT ANALYSIS (Initial Analysis)

**Item Title:** Request for Rulemaking on Amendments to Regulation 22 to Add Colorado Greenhouse Gas Program

**Meeting Date:** February 18-19, 2021

---

### INTRODUCTION

The petitioners are proposing a new Part C and corresponding amendments to Part A of Regulation 22 to the Air Quality Control Commission (Commission) to satisfy the requirements the General Assembly set forth in the Colorado Air Pollution Prevention and Control Act (the Act), Sections 25-7-102(2), 25-7-105(1)(e), and 25-7-140, C.R.S., which establish greenhouse gas (GHG) emission reduction targets and direct the Commission to timely promulgate implementing rules to meet the emission reduction targets. The proposed rule amendments will help ensure that Colorado meets the State's statutory requirements to reduce GHG emissions by requiring quantifiable, verifiable, and enforceable emission reductions.

The Commission has a duty under state statute to meet science-based climate pollution reduction requirements by delineated deadlines and to address adverse pollution impacts on disproportionately impacted communities. Colorado has failed to carry out its mandatory legal duty to propose implementing regulations by July 1, 2020. EDF urges Colorado to immediately carry out these crucial and overdue responsibilities as required by law to protect the health, environment, economy and well-being of all Coloradans.

### Part A, Greenhouse Gas Reporting

The proposed amendments to Part A will establish GHG reporting requirements for fuel importers and suppliers based upon the emissions resulting from the combustion or oxidation of the fuel distributed or sold in Colorado. These changes are required to implement Part C for this important source category.

### Part C, Colorado Greenhouse Gas Program

This proposed part establishes a binding, declining emission limit across most of Colorado's major sources of GHG emissions, while enabling the use of a cost-effective emissions trading system for compliance with that limit. The limit is set to meet Colorado's GHG reduction targets, assuming conservative estimates about projected emissions from sources not subject to the limit over the course of the upcoming decade. Entities that are subject to this regulation will be required to meet a compliance obligation for each compliance period. On an annual basis, each covered entity must report its emissions and the emissions for which it is responsible, and surrender the appropriate number of compliance instruments to account for these emissions. Compliance instruments may be either allowances or offset credits, subject to limitations.

The proposed Part C establishes state-wide annual allowance budgets beginning in calendar year 2022, which have been calculated to put the state on a path to achieving the cumulative reductions consistent with a linear trajectory to the state targets. Specific allowance budgets are established through 2030, and the regulation provides for setting targets for the period starting in 2031 at future dates that would enable the state to meet the statutory requirements. The proposed Part C provides for allowance allocation to certain types of entities and for certain types of projects, with a strong emphasis on empowering and providing benefits to disproportionately impacted communities through pollution-monitoring and pollution-mitigation projects, with input from community members. The proposed Part C also establishes an allowance consignment auction through which regulated sources may acquire allowances. Allowances may be transferred or banked under certain conditions and with certain restrictions.

#### **Part D**

Current Regulation 22, Part C is redesignated Part D.

#### **Part E**

Current Regulation 22, Part D is redesignated Part E. In addition, Part E is amended to reflect the basis, specific statutory authority, and purpose of proposed amendments to Part A and the newly proposed Part C.

### **REQUIREMENTS FOR ECONOMIC IMPACT ANALYSIS (EIA)**

Section 25-7-110.5(4)(a), C.R.S., sets forth the requirements for the initial and final Economic Impact Analyses, as stated below:

Before any permanent rule is proposed pursuant to this section, an initial economic impact analysis shall be conducted in compliance with this subsection (4) of the proposed rule or alternative proposed rules. Such economic impact analysis shall be in writing, developed by the proponent, or the Division in cooperation with the proponent and made available to the public at the time any request for hearing on a proposed rule is heard by the commission. A final economic impact analysis shall be in writing and delivered to the technical secretary and to all parties of record five working days prior to the prehearing conference. If no prehearing conference is scheduled, the economic impact analysis shall be submitted at least ten working days before the date of the rule-making hearing. The proponent of an alternative proposal will provide, in conjunction with the Division, a final economic impact analysis five working days prior to the prehearing conference. The economic impact analyses shall be based upon reasonably available data. Except where data is not reasonably available, or as otherwise provided in this section, the failure to provide an economic impact analysis of any noticed proposed rule or any alternative proposed rule will preclude such proposed rule or alternative proposed rule from being considered by the Commission. Nothing in this section shall be construed to restrict the Commission's authority to consider alternative proposals and alternative economic impact analyses that have not been submitted prior to the prehearing conference for good cause and so long as parties have adequate time to review them.

#### **INITIAL ECONOMIC IMPACT ANALYSIS PURSUANT TO § 25-7-110.5(4)(c), C.R.S.**

The initial Economic Impact Analysis must be based upon reasonably available data and must consist of one or more of the methods set forth in § 25-7-110.5(4)(c), C.R.S. Based upon reasonably available data, December 21, 2020 Economic Impact Analysis (Initial Analysis) for Amendments to Regulation 22 to Add Colorado Greenhouse Gas Program (revised February 4, 2021)

the Petitioners conducted this initial Economic Impact Analysis of the proposed rule amendments pursuant to § 25-7-110.5(4)(c)(I) and (III) to determine the following:

#### **Part A, Greenhouse Gas Reporting**

##### *Initial Economic Impact Analysis Pursuant to § 25-7-110.5(4)(c)(III)*

*An economic impact analysis that:*

*(A) Identifies the industrial and business sectors that will be impacted by the proposal*

The proposed amendments will require fuel suppliers who own or store fuel and fuel importers who import fuel into Colorado from another state and fuel exporters to report GHG emissions to Colorado if the full combustion or oxidation of the fuel imported or supplied would create 25,000 metric tons (mt) or more carbon dioxide equivalent (CO<sub>2</sub>e) annually. Presently, Regulation 22 requires GHG reporting from fuel suppliers and importers who are required to report GHG emissions to the United States Environmental Protection Agency (EPA) pursuant to 40 CFR Part 98. Importers of fuel into Colorado from another state and suppliers and importers of certain types of fuel such as biomass-derived fuels are not required to report GHGs to EPA pursuant to 40 CFR Part 98. The proposed amendments will fill that gap and require state reporting from those importers and suppliers if the emissions resulting from fuel imported or supplied equal or exceed 25,000 metric tons CO<sub>2</sub>e annually.

Thus the proposal will impact fuel importers who import fuel into Colorado from another state and fuel importers and suppliers of biomass-derived fuels (such as ethanol, biodiesel, renewable diesel, rendered animal fat, and vegetable oil) if emissions from the combustion of fuel imported or supplied equals or exceeds 25,000 metric tons CO<sub>2</sub>e annually. The proposal will also impact businesses engaged in direct natural gas sales that are not otherwise required to report pursuant to 40 CFR Part 98, if emissions from the combustion of fuel supplied equal or exceed 25,000 metric tons CO<sub>2</sub>e annually.

*(B) Quantifies the direct cost to the primary affected business or industrial sector*

The petitioners estimate that the direct cost to fuel suppliers and importers likely to be impacted by the proposal will be nominal. As set forth above, the businesses likely to be impacted by the proposal can be divided into three categories: (1) importers of fuels into Colorado from another state; (2) suppliers and importers of biomass-derived fuel; and (3) businesses engaged in direct natural gas sales.

First, the petitioners believe the direct cost to importers of fuels into Colorado or exporters from Colorado will be nominal. These fuel importers and exporters are likely already reporting information to the state regarding the quantity of fuel acquired or sold for state taxation purposes, and may be reporting to the U.S. Energy Information Administration as Prime Suppliers for Colorado. The cost to these entities to report GHG emissions to the state will be nominal because converting fuel sales to GHG emissions will be based on reasonably available information and is a simple multiplication exercise. The Division acknowledged as much in the Economic Impact Analysis presented with its prehearing statement in the spring 2020 rulemaking to adopt Regulation 22, noting that entities would experience only small reporting costs because “GHG emissions for these companies are based on volume of product supplied, which the businesses currently track for accounting and billing purposes. Therefore, there are no additional data gathering requirements.”<sup>1</sup>

---

<sup>1</sup> Final Economic Impact Analysis for Proposed AQCC Regulation No. 22 at 10 (Apr. 10, 2020) (Regulation 22 Final EIA).

December 21, 2020 Economic Impact Analysis (Initial Analysis) for Amendments to Regulation 22 to Add Colorado Greenhouse Gas Program (revised February 4, 2021)

Second, the petitioners believe the direct costs to suppliers and importers of biomass-derived fuel will also be nominal. These entities similarly track volume of fuel supplied or imported for accounting and billing purposes, and it will be a simple multiplication exercise to convert those volumes to anticipated GHG emissions. Suppliers and importers of biomass-derived fuel may also be reporting fuel quantity information to the state for taxation purposes. The petitioners were not able to obtain an estimate of the number of these entities that will be affected by the proposal. However, data from Oregon, California, and Washington, which have GHG reporting requirements similar to those included in the proposal, did not reveal any biofuel suppliers that are not also producing non-biogenic fuel emissions at levels that would require reporting.<sup>2</sup> This suggests that essentially all affected biomass-derived fuel importers and suppliers are likely already familiar with GHG reporting requirements and methodologies, and will incur only nominal costs to comply with the proposal.

Third, the proposal may affect natural gas suppliers; however, the petitioners believe that natural gas suppliers are likely already tracking and reporting information to the state government, or may even be covered under Regulation 22's reporting requirements that pertain to the natural gas sector. Suppliers of natural gas liquids (compressed natural gas and liquified natural gas) pay fuel tax in Colorado, so they are already tracking the information needed to report. The petitioners therefore believe that any impact of the proposal on natural gas suppliers will be nominal.

Despite the petitioners' best efforts, including inquiries made to the Colorado Department of Revenue and the Division during the spring 2020 Regulation 22 rulemaking process, the petitioners lack Colorado-specific information necessary to estimate the number of entities that will be required to report information to the state based on the proposal. However, the petitioners used data from other states with similar GHG reporting programs to develop an estimate.

In Oregon, for example, data shows that in 2018, 40 entities reporting GHGs as fuel importers had emissions greater than the 25,000mt CO<sub>2</sub>e threshold proposed by petitioners. In California, 37 transportation fuel suppliers reported GHG emissions above the 25,000mt CO<sub>2</sub>e threshold in 2018. In Washington, 24 transportation fuel suppliers reported GHG emissions above the 25,000mt CO<sub>2</sub>e threshold in 2018. Given the dramatic variance in population between California and Oregon and Washington, and the fact that the number of fuel suppliers in each state is nevertheless comparable, the petitioners make the assumption that with a similar definition of "fuel supplier," Colorado is likely to capture a similar number of reporting entities. The petitioners estimate there are at least 34 entities that would be classified as fuel importers or

---

<sup>2</sup> The petitioners relied on the following data sources for purposes of this analysis of Oregon, California, and Washington fuel suppliers: Environmental Protection Agency, Facility Level Information of GHGs Tool (FLIGHT), Supplier GHG Emissions for 2018 (last visited Apr. 2020), [https://ghgdata.epa.gov/ghgp/main.do?site\\_preference=normal#](https://ghgdata.epa.gov/ghgp/main.do?site_preference=normal#); State of Oregon Department of Environmental Quality, Greenhouse Gas Reporting Program: Fossil Fuel Importers Greenhouse Gas Emissions from Fuel Combustion 2010-2018 (last updated Jan. 2020), <https://www.oregon.gov/deq/aq/programs/Pages/GHG-Emissions.aspx>; State of Oregon Department of Environmental Quality, Greenhouse Gas Reporting Program: Greenhouse Gas Emissions from Natural Gas Suppliers 2010-2018 (last updated Mar. 2020), <https://www.oregon.gov/deq/aq/programs/Pages/GHG-Emissions.aspx>; California Air Resources Board, Annual Summary of GHG Mandatory Reporting Non-Confidential Data for Calendar Year 2018 (last updated Nov. 2019), <https://ww2.arb.ca.gov/mrr-data>; State of Washington, GHG Reporting Program Publication (last updated Dec. 5, 2019), <https://data.wa.gov/Natural-Resources-Environment/GHG-Reporting-Program-Publication/idhm-59de/data>.

suppliers in Colorado, which is a rounded-up average of the number of reporters in Oregon, California, and Washington.

The data for Oregon, California, and Washington also shows an additional 6 natural gas suppliers with emissions greater than 25,000mt CO<sub>2</sub>e in Oregon, 20 in California, and 8 in Washington. Taking the rounded-up average of these numbers, the petitioners estimate there are at least 12 natural gas suppliers in Colorado required to report GHG emissions due to the proposed amendments.

Thus, the petitioners estimate there may be approximately 46 suppliers and importers required to report GHG emissions to the state based on the proposal. For a number of reasons, this is a conservative estimate. First, this number will likely include a number of entities already reporting to EPA (and therefore already reporting to the state based on Regulation 22 as adopted in May 2020). Second, in addition to those entities already directly reporting to EPA, many entities appear to be subsidiaries or affiliates of entities that report federally, meaning there will be only the most minimal burden to report for these additional entities as well. Third, even if not reporting to EPA, many of these entities are likely reporting to the U.S. Energy Information Administration as Prime Suppliers. Finally, this estimate also does not cover fuel suppliers or importers that may be reporting their GHG emissions pursuant to a different section of the federal reporting rule. Thus, while the petitioners estimate that 46 entities may be affected by the proposed amendments, the actual number of affected entities number is likely to be much smaller.

In summary, the data available indicates that the majority of entities that would be affected by the proposal are likely already reporting fuel purchase and sale information to the state government and/or federal government for other purposes and will face only nominal costs to comply with the reporting obligations under Regulation 22. In the Final EIA for the spring 2020 rulemaking to adopt Regulation 22, the Division estimated that most suppliers will incur small costs of \$3,747 per business in the first year of compliance with Regulation 22, and \$749 in each subsequent year.<sup>3</sup> These estimates were for entities with emissions below the federal reporting threshold of 25,000 metric tons CO<sub>2</sub>e annually. Because the proposal will only affect entities with emissions at or above the threshold, the costs per entity are likely to be even smaller, because the affected entities are likely to be larger and more sophisticated with additional resources, and likely already have staff with emissions reporting experience to comply with the GHG reporting requirements. Petitioners estimate that as many as 46 entities may be affected by the proposal, but this is a conservative estimate that likely overstates the number of affected entities.

*(C) Incorporates an estimate of the economic impact of the proposal on the supporting business and industrial sectors associated with the primary affected business or industry sectors.*

During the spring 2020 rulemaking to adopt Regulation 22, Part A, the Division determined that “suppliers may face minor cost increases which should not increase costs noticeably to gas stations and other customers.”<sup>4</sup> The petitioners believe this conclusion also applies for fuel suppliers and fuel importers who will be affected by the proposal. The proposal is designed to require reporting from large companies that distribute fuel from terminals and import fuel from out of state. As described above, these large companies are likely to face only small cost increases due to compliance with the proposal, which should not create a noticeable cost increase for their customers.

---

<sup>3</sup> Regulation 22 Final EIA at 11 tbl.3.

<sup>4</sup> Division Initial EIA at 9.

December 21, 2020 Economic Impact Analysis (Initial Analysis) for Amendments to Regulation 22 to Add Colorado Greenhouse Gas Program (revised February 4, 2021)

(D) *Impacts to the Division*

The Division may have to develop additional guidance materials to facilitate reporting from entities affected by the proposal. However, the petitioners believe the Division has the appropriate expertise to prepare such a guidance document, and can model the guidance document off of similar work done in other states, such as Oregon. This guidance document will be similar to other materials prepared by the Division for the implementation of Regulation 22.

**Part C, Colorado Greenhouse Gas Program**

*Initial Economic Impact Analysis Pursuant to § 25-7-110.5(4)(c)(I)*

*Cost-effectiveness analyses for air pollution control that identifies:*

- (A) *The cumulative cost including but not limited to the total capital, operation, and maintenance costs of any proposed controls for affected business entity or industry to comply with the provisions of the proposal*

The overall annual abatement cost for the Colorado Greenhouse Gas Program is about \$770 million in 2030 (\$2020)<sup>5</sup> and the cumulative cost of the program through 2030 is \$4.9 billion present value, if the Commission chooses not to link the program with the Western Climate Initiative (WCI).<sup>6</sup> For a Greenhouse Gas Program that accepts compliance instruments from WCI jurisdictions, the overall annual abatement cost in 2030 is about \$180 million (in \$2020 dollars)<sup>7</sup> and the cumulative present value cost of the program is \$1.1 billion through 2030.<sup>8</sup> The difference in costs between the two programs reflects the additional costs of achieving all reductions from covered sectors within the state of Colorado compared to achieving some of those reductions outside the state and the benefits of providing flexibility to allow for the most cost-effective reductions across participating jurisdictions. The proposed Regulation 22, Part C has the potential to be linked to the WCI program, which would be a process that the Division and Commission would have to undergo with regulators in the participating WCI jurisdictions. This could be done concurrently with a rulemaking proceeding, or following adoption. In either case, the carbon pollution benefits, as explained in detail below, are estimated to be \$1.28 billion (\$2020) in 2030 and \$9 billion present value through 2030. Accounting for other public health benefits from the program will increase these benefits even more. The present values in this paragraph reflect a 4 percent discount rate, consistent with Resources for the Future's model's interest rate used in their report. Using a different discount rate or no discount rate would affect how these values are reflected, but in all instances the benefits outweigh the costs.

- (B) *Any direct costs to be incurred by the general public to comply with the provisions of the proposal*

---

<sup>5</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 17, Table 3. The analysis estimates total abatement costs by multiplying the allowance price (which represents the cost of achieving the last, most expensive ton of reduced emissions) by the emissions reductions in the covered sectors and dividing by two (essentially calculating the triangular area under the cost curve). Since marginal abatement cost curves are non-linear, these estimates overstate the overall abatement costs.

<sup>6</sup> See Table 1 below.

<sup>7</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 17, Table 3.

<sup>8</sup> See Table 2 below.

No direct costs will be incurred by the general public to comply with the provisions of the proposal.

*(C) Air pollution reductions caused by the proposal*

The Colorado-only Greenhouse Gas Program will reduce at a minimum approximately 215 million mt CO<sub>2</sub>e cumulatively between 2022 and 2030. Net GHG emissions are about 85 million metric tons of CO<sub>2</sub>e in 2025 and 80 million metric tons of CO<sub>2</sub>e in 2030 - a reduction of roughly 24 million metric tons of CO<sub>2</sub>e in 2030 compared to business-as-usual projections and 22 mmt CO<sub>2</sub>e in 2025.<sup>9</sup> While modeling estimates annual net GHG emissions under the program to be lower than the state's target in 2025 and higher in 2030, cumulative emissions reductions through 2030 are consistent with a linear reduction trajectory towards the state's targets - reflecting the ability to bank allowances and the cost-effectiveness of abating more in the early years of the program. When the Commission sets the budgets for post-2030, modeling past 2030 will show a similar dynamic will occur if banking between 2030 and 2050 is allowed, thereby driving additional annual abatement in 2030. The statute requires the state to achieve its targets "by"—not "in"—the specified years,<sup>10</sup> and it directs the Commission to consider "whether greater or more cost-effective emission reductions are available through program design."<sup>11</sup> Importantly, a program that establishes a glide path toward the targets and accounts for accelerated early reductions is consistent with the characteristics of climate pollution—it is less critical the precise level of pollution in any given year, but essential that emissions decline consistently over time to minimize the cumulative emissions burden. Reduction trajectories should be consistent with the carbon dioxide budget from which these targets were derived.<sup>12</sup> A hypothetical program that required emission reductions rigidly—but only—in the specified years would not achieve the mandated reductions by those years, and it would fail to realize the potential for greater emission reductions through near-term, cost-effective measures. It cannot be the case that the General Assembly required strict adherence to the targets in the three specified years regardless of emission reductions in the intervening years—an absurd result that would allow emissions to exceed business-as-usual levels for most of the next three decades and impose severe compliance costs in the three specified years.

A WCI-linked program will reduce the same cumulative GHG emissions over the first phase of the program, though net GHG emissions in Colorado are 92 million metric tons of CO<sub>2</sub>e in 2025 and 87 million metric tons of CO<sub>2</sub>e in 2030, a reduction of roughly 17 million metric tons of CO<sub>2</sub>e in 2030 compared to business-as-usual.<sup>13</sup> However, the program would still reduce emissions roughly 24 million metric tons in 2030 across the WCI jurisdictions. Given that GHG emissions are a global pollutant, the climate benefit from such reductions would be identical—as recognized under statute.<sup>14</sup> The difference in emissions from the Colorado-only program represent less costly reductions secured from other WCI jurisdictions.

---

<sup>9</sup> Compare [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 16, Table 2, *with id.* at 9, Table 1.

<sup>10</sup> C.R.S. § 25-7-102(2)(g).

<sup>11</sup> *Id.* § 25-7-105(1)(e)(VI).

<sup>12</sup> See section C.1.3 of the See Summary for Policymakers of IPCC Special Report on Global Warming of 1.5° C. Available at: <https://www.ipcc.ch/sr15/chapter/spm/>.

<sup>13</sup> Compare [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 16, Table 2, *with id.* at 9, Table 1.

<sup>14</sup> C.R.S. § 25-7-105(1)(e)(V) ("The commission may account for reductions in net greenhouse gas emissions that occur under coordinated jurisdictions' programs if the commission finds that the implementing regulations of each coordinated jurisdiction are of sufficient rigor to ensure the integrity of the reductions in greenhouse gas emissions to the atmosphere.").

The estimated annual climate benefits under both programs are \$1.28 billion in 2030 (in \$2020)<sup>15</sup> with cumulative climate benefits through 2030 of \$9.0 billion present value.<sup>16</sup>

By comparison, the overall annual abatement cost for the Colorado-only Greenhouse Gas Program is about \$770 million in 2030 (\$2020)<sup>17</sup> and the cumulative abatement cost of the program through 2030 is approximately \$4.9 billion present value.<sup>18</sup> For a WCI-linked Greenhouse Gas Program, the overall annual abatement cost in 2030 is about \$180 million (\$2020);<sup>19</sup> the cumulative abatement cost of the program through 2030 is \$1.1 billion present value.<sup>20</sup>

In addition to the reductions in GHG emissions, these programs deliver reductions in local criteria air pollutants (so named for the criteria that EPA establishes for them under the federal Clean Air Act) that yield significant public health benefits. Under the Colorado Greenhouse Gas Program as proposed, sulfur dioxide emissions are reduced by about 5,000 metric tons annually in 2030 (representing about 60 percent reduction compared to business-as-usual projections).<sup>21</sup> Nitrogen oxide emissions are reduced by about 23,000 metric tons annually in 2025 and 2030 (representing about 18-19 percent reduction) and fine particulate matter (PM<sub>2.5</sub>) emissions by about 800-900 metric tons annually in 2025 and 2030, respectively (about 6-7 percent reduction) relative to business-as-usual projections.<sup>22</sup> The estimated combined local health benefits of reduced PM<sub>2.5</sub> (through direct PM<sub>2.5</sub> emissions and indirect sulfur dioxide and nitrogen oxide emissions, which form PM<sub>2.5</sub> in the atmosphere) are over \$1.9 billion annually by 2030<sup>23</sup> with cumulative benefits through 2030 time period at about \$16 billion (present value).<sup>24</sup>

---

<sup>15</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 39, Table B.2. The analysis used a Social Cost of Carbon of \$51.93 in 2020 (\$2020) growing to \$61.83 in 2030 (\$2020), reflecting the average Social Cost of Carbon, using a 3 percent discount rate, from the Obama administration's Interagency Working Group's 2016 update. These estimates are likely to be an underestimate of the true benefits of reducing an additional ton of carbon emissions, as these models generally do not account for tipping points and impacts such as loss of biological diversity, ocean acidification, and the bleaching of coral reefs are not included due to the difficulty of quantifying the monetary value of these damages. See, e.g., Richard L. Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, 508 NATURE 173 (2014) (explaining that current estimates omit key damage categories and, therefore, are very likely underestimates); Peter Howard, *Omitted Damages: What's Missing from the Social Cost of Carbon* (Cost of Carbon Project Report, 2014); Frances C. Moore & Delavane B. Diaz, *Temperature Impacts on Economic Growth Warrant Stringent Mitigation Policy*, 5 NATURE CLIMATE CHANGE 127 (2015) (demonstrating SCC may be biased downward by more than a factor of six by failing to include the climate's effect on economic growth).

<sup>16</sup> See Tables 1 & 2 below.

<sup>17</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 17, Table 3.

<sup>18</sup> See Table 1 below.

<sup>19</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 17, Table 3.

<sup>20</sup> See Table 2 below.

<sup>21</sup> See [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 40, Table B.3; *id.* at 21, Table 5.

<sup>22</sup> See *id.* Other criteria air pollutant reductions include carbon monoxide, particulate matter PM<sub>10</sub>, and volatile organic compounds.

<sup>23</sup> *Id.* at 39, Table B.2. (using the higher benefit per ton estimates). The analysis only quantified the health benefits related to PM<sub>2.5</sub> pollution (direct and indirect). The lower estimate represents the Krewski et al. (2009) mortality estimates and the upper bound represents the Lepeule et al. (2012) mortality estimates (both using a 3 percent discount rate). These total estimates apply the 2020 estimates for all years (i.e., they do not account for annual increases in benefit estimates for avoided pollution).

<sup>24</sup> See Table 1 above.



Under a WCI-linked program, sulfur dioxide emissions are reduced by about 4,000 metric tons annually in 2030, representing more than 50 percent reduction relative to business-as-usual.<sup>25</sup> Nitrogen oxide emissions are reduced by about 13,000 metric tons annually in 2025 and 2030 (representing about 10-11 percent reduction) and PM<sub>2.5</sub> emissions by about 300-400 metric tons annually in 2025 and 2030, respectively (about 3 percent reduction) relative to business-as-usual.<sup>26</sup> The estimated combined local health benefits of reduced PM<sub>2.5</sub> are over \$1.1 billion annually by 2030<sup>27</sup> with cumulative benefits through 2030 at about \$9.4 billion (present value).<sup>28</sup>

Because these estimates do not include the health benefits of reductions of other criteria pollutant emissions or the non-PM<sub>2.5</sub> benefits of reduced nitrogen oxide (a precursor to tropospheric ozone pollution) or sulfur dioxide (a contributor to acid rain), the local air benefit estimates clearly understate the overall benefits of criteria air pollutant reductions from these programs.

The Colorado Greenhouse Gas Program as proposed starts in 2022, instead of an optimal 2021 start date. The difference in the modeled allowable energy CO<sub>2</sub> budget between 2021 and 2022 is only 2.9 MMT CO<sub>2</sub>e, which represents less than 5% of the energy CO<sub>2</sub> budget in 2022. As such the overall costs and benefits of the program are unexpected to have any appreciable change.

Tables 1 and 2, below summarize the present value of the costs and benefits (climate benefits reflected from the social cost of carbon and health co-benefits) of the Colorado only and WCI linked programs, respectively, for the period through 2030.

---

<sup>25</sup> See [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 40, Table B.3; *id.* at 21, Table 5.

<sup>26</sup> See *id.*

<sup>27</sup> *Id.* at 39, Table B.2. (using the higher benefit per ton estimates).

<sup>28</sup> See Table 2 above.

December 21, 2020 Economic Impact Analysis (Initial Analysis) for Amendments to Regulation 22 to Add Colorado Greenhouse Gas Program (revised February 4, 2021)

**Table 1. Costs and Benefits for a Colorado Only Program (present value at 4% annual discount rate, million dollars)**

Year	Costs	SCC Benefits	SCC Benefits + Health Benefits (per Krewski)	SCC Benefits + Health Benefits (per Lepeule)	Net Benefits (SCC benefits minus costs)	Net Benefits (SCC+ Health Benefits per Krewski minus costs)	Net Benefits (SCC+ Health Benefits per Lepeule minus costs)
2021	\$493	\$980	\$1,892	\$3,059	\$487	\$1,399	\$2,565
2022	\$491	\$959	\$1,813	\$2,904	\$468	\$1,322	\$2,413
2023	\$488	\$ 938	\$1,736	\$2,757	\$450	\$1,248	\$2,269
2024	\$480	\$908	\$1,649	\$2,597	\$427	\$1,169	\$2,116
2025	\$473	\$879	\$1,566	\$2,444	\$406	\$1,093	\$1,972
2026	\$481	\$879	\$1,539	\$2,382	\$398	\$1,057	\$1,901
2027	\$489	\$878	\$1,512	\$2,322	\$389	\$1,023	\$1,832
2028	500	\$872	\$1,484	\$2,266	\$372	\$984	\$1,766
2029	\$510	\$864	\$1,456	\$2,212	\$354	\$946	\$1,702
2030	\$522	\$867	\$1,440	\$2,172	\$345	\$919	\$1,650
<b>Total</b>	<b>\$4,927</b>	<b>\$9,023</b>	<b>\$16,087</b>	<b>\$25,114</b>	<b>\$4,095</b>	<b>\$11,160</b>	<b>\$20,187</b>

Source: Resources for the Future (July 2020).

**Table 2. Costs and Benefits for a WCI-Linked Program (present value at 4% annual discount rate, million dollars)**

Year	Costs	SCC Benefits	SCC Benefits + Health Benefits (per Krewski)	SCC Benefits + Health Benefits (per Lepeule)	Net Benefits (SCC benefits minus costs)	Net Benefits (SCC+ Health Benefits per Krewski minus costs)	Net Benefits (SCC+ Health Benefits per Lepeule minus costs)
2021	\$104	\$980	\$1,516	\$2,204	\$876	\$1,413	\$2,100
2022	\$105	\$959	\$1,462	\$2,105	\$853	\$1,356	\$2,000
2023	\$106	\$938	\$1,409	\$2,012	\$832	\$1,303	\$1,906
2024	\$106	\$908	\$1,341	\$1,896	\$802	\$1,235	\$1,790
2025	\$128	\$879	\$1,276	\$1,785	\$750	\$1,148	\$1,657
2026	\$107	\$879	\$1,261	\$1,751	\$771	\$1,154	\$1,643
2027	\$109	\$878	\$1,246	\$1,716	\$769	\$1,137	\$1,606
2028	\$115	\$872	\$1,228	\$1,684	\$757	\$1,114	\$1,570
2029	\$118	\$864	\$1,210	\$1,652	\$746	\$1,092	\$1,534
2030	\$124	\$867	\$1,204	\$1,636	\$742	\$1,080	\$1,511
<b>Total</b>	<b>\$1,123</b>	<b>\$9,023</b>	<b>\$13,154</b>	<b>\$18,441</b>	<b>\$7,900</b>	<b>\$12,031</b>	<b>\$17,318</b>

Source: Resources for the Future (July 2020)

*(D) The cost per unit of air pollution reductions caused by the proposal*

Under the Colorado Greenhouse Gas Program, the estimated allowance price is \$61 per ton of carbon reduction in 2025 and about \$75 per ton in 2030 (in \$2020),<sup>29</sup> without linking to other jurisdictions. This reflects the marginal cost of reducing an additional ton of carbon emissions. Under the WCI-linked program, the allowance price is lower at \$21 per ton of carbon reduction in 2025 and \$27 per ton in 2030 (in \$2020), reflecting the flexibility of importing allowances from other WCI jurisdictions.<sup>30</sup>

Some simplifying modeling assumptions were used in the policy cases, but none are expected to result in any appreciable deviation from the overall modeling results.<sup>31</sup> Additionally, the

<sup>29</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado’s Emissions Targets](#), Resources for the Future (July 2020), at 18, Table 4.

<sup>30</sup> *Id.*

<sup>31</sup> Colorado GHG Program coverage includes non-energy related CO2 emissions, which are 2 MMT CO2e under BAU in 2030 - only 1.9% of total net GHG emissions under BAU in 2030. Coverage of those emissions are not expected to materially impact overall modeling results. Emissions from imported power are also included—in 2015, approximately 10% of Colorado’s electricity was generated in other states. Slightly

Colorado Greenhouse Gas Program as proposed starts in 2022, instead of an optimal 2021 start date. The difference in the modeled allowable energy CO<sub>2</sub> budget between 2021 and 2022 is only 2.9 MMT CO<sub>2</sub>e, which represents less than 5% of the energy CO<sub>2</sub> budget in 2022. As such the cost of the program is unexpected to have any appreciable change. However, the longer the program is delayed, the less time and flexibility the state will have to meet its 2025 and 2030 targets, and the more costly the program would become.

*(E) The cost for the division to implement the provisions of the proposal*

The Division's implementation costs are estimated at roughly \$5.5 to 7 million annually. Under the fiscal appropriation from HB19-1261, 1 full-time equivalent employee (FTE) at the Division is \$128,613. (3 FTE were allocated for *development* of regulations under HB19-1261 for \$385,839.) Under the fiscal appropriation for SB19-96, 1 FTE at the Division is \$103,571. (3.4 FTE were allocated for the *development* of regulations.) Assuming an average FTE cost of \$116,092, \$5 million annually would support roughly 43 additional FTE for the climate division, bringing total FTE to 49 (inclusive of those Climate Division FTE already supported by general fund appropriations).

The Division may also decide to allocate the resources to a combination of FTE and other supporting expenditures (such as consulting contracts and other third party costs). When legislation to establish a comparable economy-wide program was considered in Oregon (a state of comparable size) during the 2019 legislative session, Oregon analysts estimated<sup>32</sup> a need for 29 FTE in the newly created Carbon Policy Office to implement the program. Oregon also outlined the following, ongoing additional costs that are likely to be comparable for a Colorado program: contractor costs to provide technical services for auctions is estimated at \$900,000 per year, legal costs estimated at \$900,000 annually, and additional ongoing contractor costs of \$200,000 to assist with non-emitter allocation projects (for a total of \$2 million annually). One-time contractor costs to facilitate work with other agencies for the development of offset protocols was estimated at \$200,000, and a one-time expenditure of \$900/year over two years was estimated for initial IT investments, for an additional \$1.1m in the first two years. As such, \$5.5-7 million/annually is roughly consistent with these estimates. (\$3.36m for 29 FTE using the average CDPHE FTE estimate above, \$2m for ongoing contractor costs, plus start-up costs.)

In the 2020 legislative session, a refined proposal in Oregon detailed the costs in the 2021-2023 biennium, including 38 FTE as the program got up and running for a total cost of approximately \$8 million per year.<sup>33</sup> This total budget includes costs associated with functions that are out of scope for implementation of the Colorado Greenhouse Gas Program, however, and as such likely represents an upper bound.

## SUMMARY AND CONCLUSION

The proposed amendments to Regulation 22, Part A are expected to have only a nominal impact on affected entities and the Division. Affected entities are believed to already report quantities of fuel acquired and sold to the state for taxation purposes, and it will be a simple mathematical exercise to convert these quantities into GHG emissions. The nominal costs from this amendment

---

higher electricity prices and modest reductions in emissions associated with imported electricity are anticipated, with a negligible change in modeling results.

<sup>32</sup> <https://olis.leg.state.or.us/liz/2019R1/Downloads/MeasureAnalysisDocument/50549>

<sup>33</sup> <https://olis.oregonlegislature.gov/liz/2020R1/Downloads/MeasureAnalysisDocument/53340>

are not expected to be passed on to consumers. Similarly, while the Division may have to create an additional guidance document, the Division has the capacity to develop such a document.

The proposed amendments to Regulation 22, Part C, the Colorado Greenhouse Gas Program, will achieve the state's cumulative emissions targets while delivering significant climate and local air pollution benefits to the residents of Colorado with estimated cumulative abatement costs of \$4.9 billion present value<sup>34</sup> through 2030.<sup>35</sup> The WCI-linked program provides additional flexibility and delivers the same climate benefits at a lower cost than the Colorado-only approach, with estimated cumulative abatement costs of \$1.1 billion present value<sup>36</sup> --reflecting lower allowance prices and the benefits of providing flexibility to allow for the most cost-effective reductions across participating jurisdictions.<sup>37</sup>

Through 2030, both programs deliver the same cumulative climate benefits of \$9.0 billion present value but the Colorado-only approach delivers more reductions in local criteria air pollution - cumulative benefits of reduced PM<sub>2.5</sub> pollution range from \$7 to \$16 billion under the Colorado-only program and \$4 to \$9 billion under the WCI-linked program (all reflected as a present value).<sup>38</sup>

The total climate and public health benefits of both programs significantly outweigh their costs and not implementing this regulation would cost Colorado billions of dollars, even considering solely the public health benefits that would accrue in Colorado. The Colorado-only and WCI-linked programs deliver cumulative net benefits (reduced climate pollution benefits plus public health benefits minus program cost) of \$11 to \$20 billion and \$12 to \$17 billion, respectively, through 2030.<sup>39</sup> Using a higher Social Cost of Carbon,<sup>40</sup> which is likely appropriate because of the narrow scope of the current Social Cost of Carbon's damage estimates and the need to avoid low-probability, catastrophic climate impacts that would be much costlier than the Social Cost of Carbon, and quantifying other environmental benefits would further increase these net benefit estimates.

---

<sup>34</sup> See Table 1 above.

<sup>35</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 17, Table 3.

<sup>36</sup> See Table 2 above.

<sup>37</sup> [Decarbonizing Colorado: Evaluating Cap and Trade Programs to Meet Colorado's Emissions Targets](#), Resources for the Future (July 2020), at 17.

<sup>38</sup> See Tables 1 & 2 above.

<sup>39</sup> See *id.* The range reflects two methods of estimating health co-benefits.

<sup>40</sup> See note 15 above.

December 21, 2020 Economic Impact Analysis (Initial Analysis) for Amendments to Regulation 22 to Add Colorado Greenhouse Gas Program (revised February 4, 2021)