

March 29, 2019

Before the Public Utilities Commission of the State of Colorado

Proceeding No. 19R-009E

In the Matter of the Proposed Amendments to Rules Regulating Electric Utilities, 4 Code of Colorado Regulations 723-3, relating to Electric Resource Planning, the Renewable Energy Standard, Net Metering, Community Solar Gardens, Qualifying Facilities, and Interconnection Procedures and Standards

**Comments from the Institute for Policy Integrity
on the Social Cost of Greenhouse Gases**

The Institute for Policy Integrity at New York University School of Law¹ submits these initial comments on the Commission's proposed rulemaking to the Electric Rules, specifically on the issue of using the social cost of greenhouse gases to assess the climate externalities of various energy policy decisions. These comments respond both to the Commission's general call for public input and to Commissioner Frances Koncila's concurring statement specifically asking for proposed "language or analytical approaches that could be used to place a 'value' on the cost of carbon." (During the response comment period and hearing, Policy Integrity may also comment on other aspects of the proposed rules.)

These comments detail:

- **Justifications for why the Commission should use the social cost of greenhouse gases to monetize the externalities of carbon pollution.**
 - Specifically, using the social cost of greenhouse gases will inform rational decisionmaking by the Commission; will transparently convey useful information to ratepayers and the general public; and will encourage other jurisdictions to reciprocally make their decisions after internalizing the social cost of greenhouse gases, which will directly benefit Colorado as foreign carbon emissions are reduced.
 - Neither quantifying regulatory compliance costs, nor only qualitatively considering climate impacts, is sufficient to accomplish these goals.
- **Recommendations and redlines for proposed language to incorporate the social cost of greenhouse gases into the Electric Rules.**
 - We both offer proposed changes to Rule 3610(b) as Commissioner Koncila specifically requests, as well as other alternatives that will more efficiently help internalize climate externalities in all relevant decision-makings.
 - We also overview the Commission's legal authority for these changes, as well as the language that other states, like Nevada, have adopted.
- **Explanations on why the 2016 estimates published by the federal Interagency Working Group on the Social Cost of Greenhouse Gases are currently the best available estimates.**
 - In particular, the Commission should focus on the Interagency Working Group's central estimates of the social cost of carbon, methane, and nitrous oxide, and should use the high-impact estimates for sensitivity analysis. That said, the 2016 estimates are very likely conservative underestimates. The categories of damages not yet included in the estimate and the uncertainty around these estimates all suggest that the estimates should be treated as a lower bound, and uncertainty is not a reason to abandon use of the metrics.
 - It is appropriate and necessary for Colorado to use the federal Interagency Working Group's estimates of the global costs of carbon. No Colorado-only estimate can be accurately calculated using any of the existing methodologies, and even if it could, failing to count any climate impacts beyond Colorado's geographic borders both would ignore climate impacts that directly affect the interests of Colorado's ratepayers, citizens, governments, and

¹ No part of these comments purports to present the views, if any, of New York University. Note that while Policy Integrity is based at New York University, our legal director, Jason Schwartz, lives and works in Denver, Colorado.

utilities, and also would hurt Colorado as foreign jurisdictions might then take negatively reciprocal actions to Colorado's detriment.

I. Monetizing the Externalities of Greenhouse Gas Emissions Will Advance the Interests of Colorado's Citizens and Ratepayers

In Decision No. C17-0316, the Colorado Public Utilities Commission rationally concluded that it had authority to include externalities in resource planning considerations;² that the social cost of carbon estimates published by the federal Interagency Working Group were "a reasonable quantification of the potential cost of externalities" from greenhouse gas emissions;³ and that using the social cost of carbon in portfolio modeling will allow the Commission to "test the robustness of the portfolios and assess the impact to customers of a broader range of costs from carbon emissions."⁴

While testing the robustness of portfolio analysis to different cost assumptions is certainly a key and sufficient reason to require use of the social cost of greenhouse gases, it is not the only justification. In addition to informing the Commission's decisionmaking and helping it select the portfolio that maximizes welfare for Colorado ratepayers, use of quantitative metrics will help the public better understand the benefits of the decisions made by the Commission. Finally, the social cost of greenhouse gases presents a special case of reciprocity: by using the metric in decisions made in Colorado, the Commission can set a precedent for other states and signal to foreign countries that the United States remains committed to tackling global climate change. As Colorado helps encourage other jurisdictions to likewise base their decision on the social cost of greenhouse gases, Colorado will benefit as foreign emissions are reduced.

Informing Rational Decisionmaking and Public Understanding

Monetizing the impacts of emissions facilitates comparison against other costs and benefits. Without such values, decisionmakers are faced with imperfect information; by contrast, when impacts are translated into the common metric of money, decisionmakers can more readily compare society's preferences for competing priorities.

If an analysis only qualitatively discusses the externalities of emissions, decisionmakers and the public will both tend to overly discount the significance of the effects. In general, non-monetized effects are often irrationally treated as worthless.⁵ This may be especially true with respect to climate change. As the Environmental Protection Agency's website explains, "abstract measurements" of so many tons of greenhouse gases can be rather inscrutable for the public, unless "translat[ed] . . . into concrete terms you can understand."⁶ After all, Colorado's 36.6 million metric tons of carbon dioxide emitted per year

² Colo. PUC, Decision No. C17-0316, *Phase I Decision Granting, with Modifications, Applications for Approval of 2016 Electric Resource Plan*, in Proceeding No. 16A-0396E ¶86 (adopted Mar. 23, 2017).

³ *Id.* ¶87; see also *id.* n.33 (citing to the Interagency Working Group's 2015 Technical Support Update on the Social Cost of Carbon).

⁴ *Id.* ¶87.

⁵ Richard Revesz, *Quantifying Regulatory Benefits*, 102 Cal. L. Rev. 1424, 1434-35, 1442 (2014).

⁶ EPA, Greenhouse Gas Equivalencies Calculator, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (last updated Sept. 2017).

from electric power production⁷ may seem like a trivial 0.1% of global emissions.⁸ A well-documented mental heuristic called “probability neglect” causes people to irrationally reduce small probability risks entirely down to zero.⁹ In this case, for example, many decisionmakers and interested citizens would wrongly reduce down to zero the climate risks associated with 0.1% of global emissions, simply due to the leading zero before the decimal. Yet the monetized expected cost of the climate risks associated with those same emissions from Colorado’s electricity sector—\$1.87 billion per year in climate damages¹⁰—is less likely overlooked. Monetization contextualizes the significance of the additional tons of emissions.

That \$1.87 billion in annual climate damages from Colorado’s electricity sector represents real-world impacts:¹¹

- property lost or damaged by inland and coastal flooding, storms, other extreme weather events, as well as the cost of protecting vulnerable property and the cost of resettlement following property losses;
- changes in energy demand, from temperature-related changes to the demand for cooling and heating;
- lost productivity and other impacts to agriculture, forestry, and fisheries, due to alterations in temperature, precipitation, CO₂ fertilization, and other climate effects;
- human health impacts, including cardiovascular and respiratory mortality from heat-related illnesses, changing disease vectors like malaria and dengue fever, increased diarrhea, and changes in associated pollution;
- changes in fresh water availability;
- ecosystem service impacts;

⁷ U.S. Energy Info. Admin., State Carbon Dioxide Emissions Data: Electricity, <https://www.eia.gov/environment/emissions/state/analysis/> (last modified Oct. 31, 2018); see also Colorado Dept. of Public Health & Enviro., *Colorado Greenhouse Gas Inventory—2014 Update* (2014) at ES-3 <https://www.colorado.gov/pacific/sites/default/files/AP-COGHGInventory2014Update.pdf> (projecting carbon dioxide emissions from electric power generation at 37.05 million metric tons in 2020).

⁸ Ctr. for Climate Change and Energy Solutions, *Global Emissions*, <https://www.c2es.org/content/international-emissions/> (last visited Jan. 31, 2018) (estimating global carbon dioxide emissions as approaching 35 billion metric tons per year by 2020).

⁹ Cass R. Sunstein, *Probability Neglect: Emotions, Worst Cases, and Law*, 112 Yale L61, 63, 72 (2002) (drawing from the work of recent Nobel laureate economist Richard Thaler).

¹⁰ The Interagency Working Group’s central estimate of the social cost of carbon for year 2019 emissions is \$41 in 2007\$. See IWG, *2016 Technical Update*, https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf. Using the CPI Inflation Calculator, that equals \$51.20 in current 2019\$. 36.6 million metric tons * \$51.2/ton = \$1.87 billion.

¹¹ These impacts are all included to some degree in the three integrated assessment models (IAMs) used by the IWG (namely, the DICE, FUND, and PAGE models), though some impacts are modeled incompletely, and many other important damage categories are currently omitted from these IAMs. Compare Interagency Working Group on the Social Cost of Carbon, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis* at 6-8, 29-33 (2010), <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf> [hereinafter 2010 TSD]; with Peter Howard, *Omitted Damages: What’s Missing from the Social Cost of Carbon* (Cost of Carbon Project Report, 2014), http://costofcarbon.org/files/Omitted_Damages_Whats_Missing_From_the_Social_Cost_of_Carbon.pdf. For other lists of actual climate effects, including air quality mortality, extreme temperature mortality, lost labor productivity, harmful algal blooms, spread of west Nile virus, damage to roads and other infrastructure, effects on urban drainage, damage to coastal property, electricity demand and supply effects, water supply and quality effects, inland flooding, lost winter recreation, effects on agriculture and fish, lost ecosystem services from coral reefs, and wildfires, see EPA, *Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (2017); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment* (2017); EPA, *Climate Change in the United States: Benefits of Global Action* (2015); Union of Concerned Scientists, *Underwater: Rising Seas, Chronic Floods, and the Implications for U.S. Coastal Real Estate* (2018).

- impacts to outdoor recreation and other non-market amenities; and
- catastrophic impacts, including potentially rapid sea-level rise, damages at very high temperatures, or unknown events.

But even combined with a quantitative estimate of the volume of emissions, a qualitative description of such general climate impacts fails to contextualize the contributions to climate change of any particular energy planning decisions. By monetizing the contributions to climate damages of each individual energy planning decision, the social cost of greenhouse gases will help the Commission weigh each alternative's environmental externalities along with its other costs and benefits.

Such context is helpful to the Commission not only in making energy planning decisions, but also in explaining the chosen decision to Colorado ratepayers and citizens. For example, the social cost of greenhouse gases will allow the Commission to highlight the monetized benefits of a less carbon-intensive resource mix, helping the public understand the climate consequences of the decision.

Supporting Beneficial Reciprocal Actions by Other Jurisdictions

Because greenhouse gases are global pollutants, there is another strong justification for the Commission to incorporate the monetized social cost of greenhouse gases in energy decisions: to encourage reciprocal actions by other states and countries, which will benefit Colorado.

Greenhouse gases do not stay within geographic borders, but rather mix in the earth's atmosphere and affect climate worldwide. Greenhouse gases emitted in Colorado therefore contribute to climate damages around the world, just as, conversely, greenhouse gases emitted outside Colorado contribute to climate damages in Colorado.

Colorado is undeniably already experiencing the effects of climate change. The most recent National Climate Assessment grimly reported that "as a harbinger, the unusually low western U.S. snowpack of 2015 may become the norm"¹²—an outcome with devastating consequences to any economic sector dependent on snow or water.¹³ Colorado will also experience damages from temperature increases and spikes, more frequent and more dangerous wildfires,¹⁴ more extreme weather events like the 2013 Boulder floods,¹⁵ and myriad other impacts.

At the same time, Colorado is also undeniably already benefiting from the efforts of other jurisdictions to curb their greenhouse gas emissions. From Europe's Emissions Trading System to California's newly launched cap-and-trade program, every ton of emissions reduced abroad delivers some direct benefit to Colorado. Global actions on climate change have already helped the United States as a whole avoid more than \$200 billion in direct economic damages, with potentially hundreds of billions more at stake

¹² U.S. Global Change Research Program, *Climate Science Special Report 236* (2017), https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf.

¹³ See R. Steiger et al., *A critical review of climate change risk for ski tourism*. *Current Issues in Tourism*, 1-37 (2017); C. Wobus et al., *Projected climate change impacts on skiing and snowmobiling: A case study of the United States*, *Global environmental change*, 45, 1-14 (2017).

¹⁴ Z. Liu et al., *Climate change and wildfire risk in an expanding wildland-urban interface: A case study from the Colorado Front Range Corridor*, *Landscape ecology*, 30(10), 1943-1957 (2015).

¹⁵ See U.S. GCRP, *supra* note 12, at 413.

if other countries continue to take efficient actions on climate change.¹⁶ As the 19th biggest economy in the United States,¹⁷ Colorado earns a significant portion of those benefits.

Colorado stands to benefit greatly as other U.S. states and other countries apply a global social cost of greenhouse gas value to their regulatory decisions and so weigh the externalities of their emissions that will fall on Colorado. It is therefore rational for Colorado to use the social cost of greenhouse gases in its own decisionmaking, because it will encourage other states and countries to follow suit. Indeed, several significant players—including the United Kingdom, Sweden, Germany, and Norway—have already developed their own estimates of the global social cost of greenhouse gases.¹⁸ Canada and Mexico have explicitly borrowed the U.S. Interagency Working Group’s estimates to set their own carbon emission standards.¹⁹ Similarly, several U.S. states have begun to apply the federal Interagency Working Group’s estimates to their electricity policy and regulatory decisions:

- Nevada requires using the social cost of greenhouse gases in resource planning, and recommends the IWG values as the best estimates;
- Minnesota requires using the social cost of carbon in resource planning, and has adopted the IWG’s methodology with some adjustments;
- Washington will begin this year requiring utilities to use of the social cost of greenhouse gases in resource planning, and has recommended the IWG values as the best estimates;²⁰
- New York has adopted the IWG values (adjusted for RGGI credit prices) for decisions about prioritizing and compensating distributed energy resources (DER) and zero emission credits (ZECs) for nuclear energy;
- California has proposed using the IWG values, including the high-impact estimates, for decisions about DER;
- Maine has adopted IWG values as appropriate for valuing and compensating distributed solar resources;
- Maryland is considering using IWG values in its cost-benefit analysis of DER;
- Illinois uses adjusted values from the IWG for its ZECs programs;
- And New Jersey has recognized in its ZECs program that the IWG estimates are “an accepted measure of the cost of carbon.”²¹

Colorado should join those states as a leader in climate policy by applying the social cost of greenhouse gases in its energy decision-making. Not only will it help continue to set a precedent for other states to follow suit, but it will be a strong signal to foreign countries that the United States remains committed to reducing the global externalities of our emissions. Such a signal is consistent with the pledge Colorado

¹⁶ Peter Howard & Jason Schwartz, *Foreign Action, Domestic Windfall: The U.S. Economy Stands to Gain Trillions from Foreign Climate Action* (Policy Integrity Report, 2015, <http://policyintegrity.org/publications/detail/foreign-action-domestic-windfall>).

¹⁷ U.S. Bureau of Economic Analysis, *Colorado*, at 3, <https://www.bea.gov/regional/bearfacts/pdf.cfm?fips=08000&areatype=STATE&geotype=3> (last published Nov. 14, 2018) (listing Colorado as 19th by GDP). Note that, as Policy Integrity has explained more thoroughly elsewhere (see, e.g., https://policyintegrity.org/documents/Oil_Gas_NSPS_Joint_SCC_Comments.pdf), portioning out climate impact by GDP is misleading. The figure is only used here to make a point that Colorado has a lot at stake when it comes to foreign actions on climate change. Note also that Colorado ranks 21st in the nation by population. BEA, *supra*, at 1.

¹⁸ Peter Howard & Jason Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon*, 42 *Columb. J. Envtl. L.* 203 (2017).

¹⁹ *Id.*

²⁰ Separately, Washington’s Energy Office uses the Interagency Working Group’s estimate calculated at a 2.5% discount rate.

²¹ See generally costofcarbon.org; see also Denise A. Grab et al., *Opportunities for Pricing Climate Impacts in U.S. State Electricity Policy* (2019), https://policyintegrity.org/files/publications/Pricing_Climate_Impacts.pdf.

made when it joined the U.S. Climate Alliance.²² As other states and other countries respond by likewise applying the social cost of greenhouse gases and continuing to reduce their externalities as well, Colorado will benefit.

Considering Only Regulatory Costs or Qualitative Factors Is Insufficient

Compliance costs are not a useful or appropriate proxy here for measuring climate externalities. Whereas compliance costs are a factor of existing or expected regulatory stringency, the point of measuring climate externalities is to put both dirtier and cleaner energy resources on equal analytical footing for comparison and to transparently disclose the total costs that are being externalized onto the public.

If regulations existed that were calibrated to the optimal level of stringency from the perspective of finding the economically efficient equilibrium, marginal costs would then equal marginal social benefits.²³ But no existing or even prospective regulations at the state or federal level—not a revival of the Clean Power Plan and not even implementation of some state-level targets now proposed in the legislature or by the governor—would necessarily achieve optimal emissions reductions on the optimal timeline. Anticipated compliance costs are not a useful proxy for climate externalities and are not a substitute for using the social cost of greenhouse gas estimates to internalize the actual costs of climate change and make efficient, informed decisions.

A purely qualitative assessment of carbon emissions, as some Colorado utilities have favored in the past, is also insufficient. Such an approach would fail to achieve any of the goals of applying the social cost of carbon: namely, giving the Commission the kind of informational context necessary to make decisions that enhance the social welfare of Colorado's ratepayers, giving Colorado's citizens the kind of informational context necessary to understand the climate consequences of electric resource plans, and encouraging reciprocal use by other states and nations of the social cost of carbon in ways that will directly benefit Colorado's citizens.

II. Proposed Language on the Social Cost of Greenhouse Gases

The previous section explained the social cost of greenhouse gas metric is a useful and appropriate tool to incorporate into an array of analytical reviews and decisions before the Commission. Two questions must be answered in proposing language to implement that finding: First, in which proceedings and decisions should the social cost of greenhouse gases apply? Second, which estimates of the social cost of greenhouses gases or methodological criteria should be required? This section offers several alternative options for proposed language in response to each of those questions. Each of the various options for proposed language as to the scope of application can then be combined with any of the proposed language as to selecting the proper estimate.

On scope of application, there are various places throughout the Electric Rules where incorporating the social cost of greenhouse gases would be appropriate, and these comments begin with options for incorporating use of the metric into every appropriate proceeding and decision under the Electric Rules. However, given the specific request of Commissioner Koncila, we also identify appropriate places in Rule 3610(b) to add relevant language.

²² Colorado Public Radio, *Colorado Joins States Upholding Paris Climate Accord*, July 11, 2017, <http://www.cpr.org/news/story/colorado-climate-alliance>.

²³ Even at the point of economically efficient regulation, additional environmental externalities would exist; it just would not necessarily be strictly economically efficient to regulate them.

On selecting the estimates of the social cost of greenhouse gases to use, there are several options. Minimally, all estimates should be consistent with the best science and economics. Right now, the available estimates most consistent with the best existing science and economics are the 2016 estimates by the federal Interagency Working Group on the Social Cost of Greenhouse Gases. The “central” estimates reported by that group (and calculated at a 3% discount rate) would be an appropriate single set of estimates to use as a minimum default value. Alternatively, the other estimates reported by the Interagency Working Group, including the “high-impact” estimate, can also be used for sensitivity analysis. The Electric Rules could directly incorporate by reference the Interagency Working Group’s tables published in 2016 on the social cost of carbon, social cost of methane, and social cost of nitrous oxide (adjusted for inflation); or could specify certain minimum default values and allow for future revisions consistent with the best science and economics.

This section also reviews the Commission’s legal authority for such proposed language, and offers language on the social cost of greenhouse gases recently adopted by the Nevada PUC as a useful comparative example.

Options for Scope of Application

We first propose the preferred and simplest option for incorporating the social cost of greenhouse gases into all relevant proceedings and decisions that already involve the assessment of costs and benefits: namely, a definitional change in Rule 3001. As alternatives, we also explore specific changes to Rule 3610, as suggested by Commissioner Koncila, and also revisit some redline proposals made to the Commission in the previous proceedings that led to this notice of proposed rulemaking.

Scope Option #1—Rule 3001: General Definition of Costs and Benefits

Throughout the Electric Rules, numerous provisions already refer to the consideration of costs, benefits, and/or emissions. In many, though not all,²⁴ of those references, it would be appropriate to specify that such considerations should include weighing the social cost of greenhouse gases:

- Rule 3102(b)(IV) requires the disclosure of the “estimated cost of the proposed facilities” in an application for a certificate of public convenience and necessity; Rule 3102(b)(VIII) requires disclosure of costs of alternatives.
- Rule 3205(b)(III) requires the Commission to consider the cost of pollution control projects, as compared to the alternative of plant retirement or fuel switching.
- Rule 3604(g) requires electric resource plans to include “a description of the projected emissions, in terms of pounds per MWH and short-tons per year, of . . . carbon dioxide.” Rule 3607(a)(VIII) requires a similar assessment of emissions from existing resources.
- The proposed amended Rule 3604(k) requires electric resource plans to include an assessment of cost-effective early retirements.
- Rule 3604(l) requires electric resource plans to include an assessment of costs and benefits of integrating intermittent renewable energy resources.
- The proposed amended Rule 3610(b) requires a utility to address the benefits of emissions reductions in its assessment of need for resources. Rule 3610(c) allows the Commission to consider the future costs of greenhouse gas emissions during the resource acquisition period. (See also below for additional proposed revisions to Rule 3610.)
- The proposed amended Rule 3614(b)(iv) requires the utility to propose “criteria for evaluating the costs and benefits of resources such as the valuation of emissions” during the competitive

²⁴ For example, it would most likely not be appropriate to incorporate the social cost of greenhouse gases into rules that reference specific administrative costs or financing costs

bidding process. Proposed Rules 3614(c)(II)(A)-(B) and (c)(III) allow a utility to develop resources outside of competitive bidding based on an assessment of costs and benefits.

- The proposed amended Rule 3615(e) requires the Commission to “weigh the public interest benefits” during Phase II decisions, including environmental protection.
- Rule 3616(b)(VI) requires that in annual reports, cooperative electric generation associations detail the beneficial contributions of future acquisitions to environmental protection.

A straightforward way to incorporate the social cost of greenhouse gases into all relevant decisionmakings, therefore, would be to specify in Rule 3001:

The term “cost”—as it appears in Rules 3102(b), 3205(b), 3604, 3610, 3614(b)(IV), 3614(c), 3615(e), and 3616(b)(VI), as well as in other rules that the Commission may specify—shall include the social damage costs of greenhouse gas emissions. Likewise, the term “benefit”—as it appears in Rules 3604, 3610, 3614, 3615, and 3615, as well as in other rules that the Commission may specify—shall include the social benefits of reducing greenhouse gas emissions. Required assessments of “emissions”—including in Rule 3604(g), Rule 3607(a)(VIII), and other rules that the Commission may specify—shall include an assessment of the costs of carbon dioxide, methane, and other greenhouse gases. [Insert additional language on required estimates of the social cost of greenhouse gases, as proposed below.]

The bracketed language at the end is a placeholder for whatever language option on estimates of the social cost of greenhouse gases is chosen from below.

This single addition to the general definitions in Rule 3001 could easily incorporate the social cost of greenhouse gases into relevant proceedings under the Electric Rules, while leaving the Commission flexibility to extend application of the monetization framework to additional proceedings as appropriate. Alternatively, similar language could be added to the definitions in Rule 3602, though such an amendment would be specific to only the rules on resource planning, and therefore would leave out other proceedings where the social cost of greenhouse gas metric would also be appropriate and useful.

Scope Option #2—Individual Amendments

As a more cumbersome alternative to the above proposed definitional approach, each of the relevant rules identified above as referring to “costs,” “benefits,” or “emissions” could be directly amended to incorporate relevant considerations of the social cost of greenhouse gases. Any existing references to “carbon dioxide” should be amended to refer more broadly to all greenhouse gases, or minimally to include at least methane in addition to carbon dioxide.

Additional amendments to Rule 3610 are discussed in the next section.

We also incorporate herein our previous comments from Proceeding No. 17M-0694E on various options for amending the rules to require the monetization of externalities more broadly. In our original comments, we had proposed amending the pre-proposal versions of Rules 3604 and 3611 as follows: *At the end of Rule 3604(k), and also at the end of Rule 3611(g), add: The full costs and benefits of emissions changes shall be quantified, to the extent possible, based on the best available data, best economic practices, peer-reviewed methodologies, and consensus-driven inputs.* In our response comments, we had also endorsed other options proposed by Western Resource Advocates and the Colorado Energy Office and others for various possible amendments to Rule 3604.

Many of these options for individual amendments would be superfluous if the above proposal for a new definition under Rule 3001 were adopted instead.

Scope Option #3—Rule 3610, as Recommended by Commissioner Koncila

Commissioner Koncila recommends adding language on the social cost of greenhouse gases to Rule 3610(b). The proposed rule would amend Rule 3610(b) so that a utility must “address the benefits of potential emission reductions” in “assessing its need to acquire resources.” After that language, the following could be added:

(III) address the benefits of potential emission reductions. **The benefits of reducing emissions of greenhouse gases, or the costs of increasing emissions of greenhouse gases, shall be measured using estimates of the social cost of greenhouse gases. [Insert additional language on required estimates of the social cost of greenhouse gases, as proposed below.]**

That proposed language to Rule 3610(b) would be superfluous if the above proposal for a new definition of “costs” and “benefits” under Rule 3001 were adopted instead.

Note that Rule 3610(c) already provides that the Commission “may” consider “the risk of higher future costs associated with the emission of greenhouse gases.” That language is distinct but related to the language in Rule 3610(b), which requires (as opposed to merely allows) utilities (as opposed to the Commission) to consider the benefits of reducing emissions. But given the proposed changes to Rule 3610(b) (as well as broader changes that make Rule 3610 about the general need for resources instead of only the acquisition of “additional” resources), it would also make sense to modify Rule 3610(c):

(c) The Commission ~~may~~ **shall** give consideration of the likelihood of new environmental regulations and **also** the risk of higher future costs **to social welfare** associated with the emission of greenhouse gases such as carbon dioxide **and methane** when it considers utility proposals to acquire ~~additional~~ resources during the resource acquisition period. **The benefits of reducing emissions of greenhouse gases, or the costs of increasing emissions of greenhouse gases, shall be measured using estimates of the social cost of greenhouse gases. [Insert additional language on required estimates of the social cost of greenhouse gases, as proposed below.]**

While the first part of those recommended changes, such as changing “may” to “shall,” is a standalone recommendation, the additional language at the end would be superfluous if the above proposal for a new definition of “costs” and “benefits” under Rule 3001 were adopted instead.

As noted above, the bracketed language at the end of the redline is a placeholder for whatever language option on estimates of the social cost of greenhouse gases is chosen from below.

Options for Specifying the Estimates

As explained more below, the 2016 estimates of the social cost of carbon, social cost of methane, and social cost of nitrous oxide published by the federal Interagency Working Group are the best available estimates.

Whether, as explored above, the Commission chooses to incorporate the social cost of greenhouse gases broadly into all relevant proceedings through a definitional change to Rule 3001 or only into specific reviews such as under Rule 3610, the following language on specifying the best estimates to use should be added to guide utilities, Commission staff, and the public. This language on the best estimates of the social cost of greenhouse gases can be inserted into any of the bracketed sections marked in the redlines proposed above.

Estimates of the social cost of greenhouse gases shall be based upon the best available science and economics. All base case analyses shall use as minimum values for the social cost of greenhouse gases the central “3% average” estimates for the applicable year of emissions as listed in either Appendix A, Table A1, of the *Technical Update on the Social Cost of Carbon*, or

Appendix Add-A, Table A1 of the *Addendum on Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide*, as published in August 2016 by the Interagency Working Group on the Social Cost of Greenhouse Gases, except that the values shall be updated to be expressed in dollars current to the year of analysis. Sensitivity analyses should also consider other estimates provided by the Interagency Working Group, including the high-impact estimates. Any discount rate applied to calculate the present value of the total costs or benefits of future changes in emissions of greenhouse gases shall be the same as the discount rate used to calculate the underlying estimate of the social cost of greenhouse gases.

Referring to these tables, which contain the best estimates currently available of the social cost of greenhouse gases, is the most straightforward way to ensure that the effects on climate change of various alternatives under consideration are not undercounted. As explained more below, the Interagency Working Group's "central" estimates, calculated at a 3% discount rate, is widely considered to be a conservative estimate, since many key categories of climate damages have not yet been fully valued. This proposed language would still leave the Commission the flexibility to require use of revised estimates in the future, so long as they are consistent with best science and economics.

Alternatively, a single minimum default value—such as \$50 per ton of carbon dioxide for 2019 emissions in year 2019 dollars—can be given, along with instructions on an appropriate growth factor to apply to calculate damages from pollution emitted in subsequent years. A growth factor is necessary to account for the fact that the social cost of greenhouse gases grows over time, since a ton emitted in the future will be more damaging than a ton emitted today, as underlying climate and economic systems become increasingly stressed.

While a definition of the social cost of greenhouse gases could also more generally rely on a reference to best science and economics without specifying the 2016 Interagency Working Group estimates as minimum default values, in no case should the so-called "interim" estimates developed under the Trump administration be used, as they are methodologically deficient and irrationally ignore key factors. Any future updates that are consistent with best practices (unlike the "interim" estimates) will almost certainly revise the estimates upwards, as significant categories of damages have yet to be fully monetized. Therefore, specifying the 2016 Interagency Working Group estimates as default minimum values is a reasonable approach that will still allow for the Commission to endorse future revisions.

It may be useful for the Commission to compare language recently adopted into Nevada regulations by order of the Nevada PUC:²⁵

Nevada Administrative Code 704.937(5): For the purposes of subsection 4 and NAC 704.9215 and 704.9359, the social cost of carbon must be determined by subtracting the costs associated with emissions of carbon internalized as private costs to the utility pursuant to subsection 3 from the net present value of the future global economic costs resulting from the emission of each additional metric ton of carbon dioxide. The net present value of the future global economic cost resulting from the emission of an additional ton of carbon dioxide must be calculated using the best available science and economics such as the analysis set forth in the "Technical Support Document: Technical Update of the Social cost of Carbon for Regulatory Impact Analysis" released by the Interagency Working Group on Social Cost of Greenhouse Gases in August 2016. This publication may be obtained, free of charge, at the Internet website

²⁵ See http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2017-7/34959.pdf; http://pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2017-7/32153.pdf

https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf.

All other states that have incorporated or are considering incorporating the social cost of greenhouse gases into their electricity decisionmaking have likewise relied at least in part on the Interagency Working Group numbers or methodologies.²⁶ California is considering using the 2016 IWG estimates, including a possible focus on the high-impact estimate. Illinois adjusted the 2016 IWG estimates into per megawatt-hour figures to calculate ZECs. Maine recommended in 2014 that previous IWG estimates should be used to value solar DER. Maryland is considering using the 2016 IWG estimates. Minnesota used the basic IWG methodology, but made a few adjustments, such changing the timeline. New Jersey felt that, given the specific nature of ZECs, the 2016 IWG estimates would have to be a ceiling, but recognized the 2016 estimates as “an accepted measure of the cost of carbon.” New York has applied or is considering using the IWG estimates in various contexts. Washington recommended that utilities start using the 2016 IWG central estimates in their forthcoming resource plans; previously, in other contexts, other Washington state agencies have recommended using the IWG’s slightly higher estimate, calculated at a 2.5% discount rate.

The Commission Has the Necessary Statutory Authority

As the Commission found in its 2017 decision requiring use of the social cost of carbon,²⁷ the Commission has “broad authority” under the state constitution²⁸ and is charged by statute both with giving the “‘fullest possible’ consideration to cost-effective implementation of new clean energy and energy-efficient technologies ‘bearing in mind the beneficial contributions such technologies make to Colorado’s energy security, economic prosperity, insulation from fuel price increases, and environmental protection,’”²⁹ and with giving “consideration to the likelihood of new environmental regulation and the risk of higher future costs associated with the emission of greenhouse gases such as carbon dioxide when it considers utility proposals to acquire resources.”³⁰ The Commission has interpreted that language to allow consideration of two distinct categories: (1) the likelihood of new environmental regulation and associated regulatory costs, and, separately, (2) the risk of other costs, including externalized climate damages, “regardless of whether the associated costs flow directly to customers.”³¹

The Commission’s 2017 decision also made note of the statutory requirement for every public utility to furnish and maintain its services, equipment, and facilities to “promote the safety, health, comfort, and convenience of its patrons, employees, and the public.”³² However, the Commission cut off the quotation before a key phrase: the utility’s provision of services, equipment, and facilities “shall in all respects be adequate, *efficient, just, and reasonable*.”³³ As energy policy experts Bethany Davis Noll and Burcin Unel explain in a recent article, determining whether a utility’s services are efficient, just, and

²⁶ See generally costofcarbon.org; see also Denise A. Grab et al., *Opportunities for Pricing Climate Impacts in U.S. State Electricity Policy* (2019), https://policyintegrity.org/files/publications/Pricing_Climate_Impacts.pdf.

²⁷ Colo. PUC, Decision No. C17-0316, *Phase I Decision Granting, with Modifications, Applications for Approval of 2016 Electric Resource Plan*, in Proceeding No. 16A-0396E (adopted Mar. 23, 2017).

²⁸ *City of Montrose v. Pub. Utils. Comm’n*, 629 P.2d 619, 622 (Colo. 1981) (citing Colo. Const. Art. XXV).

²⁹ Decision No. C17-0316 at ¶ 83.

³⁰ § 40-2-123(1)(b) C.R.S.

³¹ Decision No. C17-0316 at ¶¶ 85-86.

³² Decision No. C17-0316 at ¶ 82 (citing § 40-3-101(2) C.R.S.).

³³ § 40-3-101(2) C.R.S. (emphasis added).

reasonable requires assessing externalities, because failing to account for climate externalities places cleaner generation sources at an undue and potentially unjust disadvantage relative to dirtier sources.³⁴

Thus, in addition to the legal authorities already cited by the Commission in support of its 2017 decision on the social cost of carbon, the requirement for *efficient, just, and reasonable* services provides additional and powerful authority for the Commission to incorporate the social cost of greenhouse gas metrics into an array of relevant proceedings with significant impacts on emissions of carbon dioxide, methane, or other greenhouse gases.

Existing PUC Rules Already Both Incorporate by Reference Other Analytical Methodologies and Specify Default Values

Incorporating by reference the central estimates of the social cost of greenhouse gases published by the federal Interagency Working Group in 2016 is appropriate, because the PUC Rules Regulating Electric Utilities already incorporate by reference other best analytical practices as developed by the federal government. Specifically, Rule 3005(d) requires cooperative electric associations to maintain their accounting books and records in accordance with the best practices enshrined in federal regulations at 7 C.F.R. part 1767. Rule 3008(b) clarifies that only those federal standards as published on May 27, 2008 are incorporated by reference, and subsequent amendments or editions are not automatically incorporated without further action by the Commission. That approach to incorporation by reference is analogous to the approach recommended by these comments: the central estimates published in 2016 by the Interagency Working Group should be incorporated by reference as minimum values, but the Commission can approve the use of higher values based on subsequent updates consistent with best scientific evidence and economic practices.

Specifying minimum values for the social cost of greenhouse gases is also appropriate, because the PUC Rules Regulating Electric Utilities already specify default values for other key terms. For example, in Rule 3412 on electric service low-income programs, “administrative costs” is defined as having a maximum of either ten percent of the total cost of program credits or \$10,000. §3412(b)(1). Similarly, the maximum impact on residential rates of program cost recovery is set at 31 cents per month. §3412(g)(II)(B). See also §3658 (setting the standard rebate offer for on-site solar systems at \$2 per watt, or lower if supported by a finding of changing market conditions).

III. The 2016 Estimates from the Interagency Working Group Reflect the Best Available Science and Economics

All estimates of the social cost of greenhouse gases should be based on the best science and economics. The analysis should start with peer-reviewed methodologies that are widely accepted in the economic and scientific literature. More than one model should be used, with results averaged across the models, to balance out the limitations of any single tool. Assumptions like the discount rate should follow the general consensus in the economic and scientific communities. All assumptions and calculations should be transparent, with results reproducible and tested for sensitivity to assumptions. The valuations should be regularly updated to incorporate the latest peer-reviewed data. As detailed below, these practices were all embodied by the Interagency Working Group on the Social Cost of Greenhouse Gases.

³⁴ Bethany A. Davis Noll & Burcin Unel, *Markets, Externalities, and the Federal Power Act: The Federal Energy Regulatory Commission’s Authority to Price Carbon Dioxide Emissions*, 27 N.Y.U. ENVTL. L.J. 1, 38-44 (2019). Note that the article focuses on FERC’s authority to correct failures in the wholesale markets, but much of their reasoning would apply to any statutory language on “just and reasonable.”

The 2016 Interagency Working Group Estimates Are Based on Best Available Data and Methods

In 2009, an Interagency Working Group assembled experts from a dozen federal agencies and White House offices to “estimate the monetized damages associated with an incremental increase in [greenhouse gas] emissions in a given year” based on “a defensible set of input assumptions that are grounded in the existing scientific and economic literature.”³⁵ The estimates are based on the three most cited, most peer-reviewed models built to link physical impacts to the economic damages of each additional ton of greenhouse gas emissions. (The models are DICE (the Dynamic Integrated Model of Climate and the Economy), FUND (the Climate Framework for Uncertainty, Negotiation, and Distribution), and PAGE (Policy Analysis of the Greenhouse Effect)). The Working Group ran these models using inputs and assumptions drawn from the peer-reviewed literature, and its estimates were updated every few years—most recently in 2016—to reflect the latest and best scientific and economic data.³⁶

As an important example of a consensus-driven input, the Working Group chose a 3% discount rate for its central estimate. While it also considered a 2.5% rate and a 5% rate as sensitivity analyses, it specifically declined to use any rate as high as 7%, as such a rate is far outside the consensus in the economic community about the appropriate discount rate for intergenerational effects.³⁷ Recent efforts by certain³⁸—though not all³⁹—federal agencies under the Trump administration to apply a 7% discount rate to intergenerational climate effects are misguided. A “7% rate based on private capital returns is considered inappropriate because the risk profiles of climate effects differ from private investments.”⁴⁰ There is a strong consensus in the economic literature that a 3% or lower discount rate is appropriate for the social cost of greenhouse gases, and there is an emerging consensus that a declining discount rate is the best approach.⁴¹

The Working Group’s estimates have been repeatedly endorsed by reviewers. In 2014, the U.S. Government Accountability Office reviewed the Working Group’s methodology and concluded that it had followed a “consensus-based” approach, relied on peer-reviewed academic literature, disclosed relevant limitations, and adequately planned to incorporate new information via public comments and updated research.⁴² In 2016, the U.S. Court of Appeals for the Seventh Circuit held that estimates of the social cost of carbon used to date by agencies were reasonable.⁴³ The U.S. District Courts for the Districts of Colorado and Montana have also chided agencies for their failure to use the Interagency

³⁵ Interagency Working Group on Social Cost of Carbon, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (Feb. 2010), available at <https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/foragencies/Social-Cost-of-Carbon-for-RIA.pdf>.

³⁶ Interagency Working Group on Social Cost of Greenhouse Gases, Technical Update (Aug. 2016)

³⁷ Interagency Working Group on the Social Cost of Carbon, Response to Comments: Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12,866 at 36 (July 2015) (“The use of 7 percent is not considered appropriate for intergenerational discounting. There is wide support for this view in the academic literature...”).

³⁸ For example, by EPA. See Joint Comments to EPA on Manipulation of the SCC in Emission Standards for Oil and Gas Sources, Dec. 8, 2017, http://policyintegrity.org/documents/12.8.17_Joint_Comment_on_EPA_Oil_and_Gas_NODA-final.pdf.

³⁹ For example, the Bureau of Ocean Energy Management has continued to use the 2016 IWG estimates, as recently as August 2017. Draft Evtl. Impact Statement: Liberty Development Project at 3-129, 4-246 (Aug. 2017).

⁴⁰ Richard L. Revesz et al., Best Cost Estimate of Greenhouse Gases, 357 SCIENCE 6352 (2017); see also Joint Comments to EPA, *supra* note 38.

⁴¹ See Joint Comments to EPA, *supra* note 38, at 25-26 & Technical Appendix: Discounting.

⁴² Gov’t Accountability Office, *Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates* 12-19 (2014).

⁴³ *Zero Zone, Inc. v. Dep’t of Energy*, 832 F.3d 654, 679 (7th Cir. 2016).

Working Group's estimates of the social cost of carbon.⁴⁴ In 2016 and 2017, the National Academies of Sciences issued two reports that, while recommending future improvements to the methodology, supported the continued use of the existing Working Group estimates.⁴⁵ It is, therefore, unsurprising that scores of economists and climate policy experts have endorsed the Working Group's values as the best available estimates.⁴⁶ The Interagency Working Group's estimates have been used in nearly 100 regulatory proceedings, and counting, each subject to a thorough public comment period.⁴⁷

In March 2017, President Trump's Executive Order 13,783 disbanded the Working Group.⁴⁸ But the Executive Order does not alter the fundamental legal and economic principles that support full and accurate monetization of externalities. In fact, the Executive Order presumes that agencies may continue "monetizing the value of changes in greenhouse gas emissions,"⁴⁹ and some agencies under the current administration have continued to use the Working Group's estimates. For example, in August 2017, the Bureau of Ocean Energy Management called the Interagency Working Group's social cost of carbon "a useful measure" and applied it to analyze the consequences of offshore oil and gas drilling,⁵⁰ and in July 2017, the Department of Energy used the Interagency Working Group's 2016 estimates for carbon and methane emissions to analyze energy efficiency regulation, describing the social cost of methane as having "undergone multiple stages of peer review."⁵¹ Thus, the unfortunate disbandment of the Interagency Working Group in no way puts into question the analytical rigor of its methodology. The Interagency Working Group's estimates continue to reflect the most thorough effort of the federal government to date to use the best science and the best economic models to estimate the costs of carbon and, notwithstanding Executive Order 13,783, the Commission and other Colorado agencies should continue to rely on those estimates—just as other states have done.

As already mentioned, all states that have to date incorporated or are considering incorporating the social cost of greenhouse gases into their electricity decisionmaking have relied at least in part on the Interagency Working Group numbers or methodologies. Nevada has explicitly incorporated by reference the IWG's technical support documents, as archived online, into their regulation as a recommended set of estimates based on the best science and economics. California is considering using the 2016 IWG estimates, including a possible focus on the high-impact estimate. Illinois adjusted the 2016 IWG estimates into per megawatt-hour figures to calculate ZECs. Maine recommended in 2014 that previous IWG estimates should be used to value solar DER. Maryland is considering using the 2016 IWG

⁴⁴ *High Country Conservation Advocates v. Forest Service*, 52 F. Supp. 3d 1174, 1191 (D. Colo. 2014); *Montana Environmental Information Center v. Office of Surface Mining*, 15-106-M-DWM, at 40-46, Aug. 14, 2017.

⁴⁵ Nat'l Acad. Sci., Eng. & Medicine, *Valuing Climate Damages: Updating Estimates of the Social Cost of Carbon Dioxide 3* (2017); Nat'l Acad. Sci., Eng. & Medicine, *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update 1* (2016).

⁴⁶ See, e.g., Revesz et al., *supra* note 40; Michael Greenstone et al., *Developing a Social Cost of Carbon for U.S. Regulatory Analysis: A Methodology and Interpretation*, 7 Rev. Envtl. Econ. & Pol'y 23, 42 (2013); Richard L. Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, 508 Nature 173 (2014) (co-authored with Nobel Laureate Kenneth Arrow, among others); Decl. of Michael Hanemann ¶ 17, *Wyoming v. Interior*, No. 16-00285 (D. Wyo. Dec. 14, 2016), available at <https://www.edf.org/sites/default/files/content/69.1-2016.12.15-Dec-of-M-Hanemann.pdf> (The estimates that the Working Group prepared for the costs of methane are "the best available estimate of the environmental cost of an additional unit of methane emissions.").

⁴⁷ See Howard & Schwartz, *Think Global*, *supra* note 18, App. A (cataloguing uses of the social cost of greenhouse gases by federal agencies).

⁴⁸ Exec. Order No. 13,783 § 5(b), 82 Fed. Reg. 16,093 (Mar. 28, 2017).

⁴⁹ *Id.* § 5(c).

⁵⁰ Draft Envtl. Impact Statement: Liberty Development Project at 3-129, 4-246 (Aug. 2017).

⁵¹ Energy Conservation Program: Energy Conservation Standards for Walk-In Cooler and Freezer Refrigeration Systems, 82 Fed. Reg. 31,808, 31,811, 31,857 (July 10, 2017).

estimates. Minnesota used the basic IWG methodology, but made a few adjustments, such changing the timeline. New Jersey felt that, given the specific nature of ZECs, the 2016 IWG estimates would have to be a ceiling, but recognized the 2016 estimates as “an accepted measure of the cost of carbon.” New York has applied or is considering using the IWG estimates in various contexts. Washington recommended that utilities start using the 2016 IWG central estimates in their forthcoming resource plans; previously, in other contexts, other Washington state agencies have recommended using the IWG’s slightly higher estimate, calculated at a 2.5% discount rate.⁵²

The 2016 Estimates Are a Useful Lower Bound; Uncertainty Points Toward Higher Values

In past proceedings, the Public Service Company of Colorado has suggested that the range of estimates for the social cost of greenhouse gases is too wide to be useful, noting that the Interagency Working Group produced four different estimates. In fact, the Interagency Working Group identifies a single set of “central” estimates—namely, the same set of estimates the Commission previously selected in 2017, with values starting at \$43 per ton in 2022 (in 2007\$; the value is \$52 in current dollars).⁵³ The other three estimates—which range from \$16 to \$157 (in current dollars)⁵⁴—serve to explore the sensitivity of the central estimate to the choice of discount rate and to uncertainty over catastrophic outcomes and other omitted factors.⁵⁵ A growing number of states has had no trouble either selecting the “central” estimate as its preferred metric, choosing to focus instead—as some Washington state agencies have done—on the estimate calculated at a 2.5% discount rate, or giving some attention to the full range of estimates.⁵⁶ The assertion that the range is too wide to be useful is factually false.

More than that, though, the assertion is pernicious: some degree of uncertainty does not excuse complete inaction. As the U.S. Court of Appeals for the Ninth Circuit explained, “while the record shows that there is a range of values, the value of carbon emissions reduction is certainly not zero.”⁵⁷ Uncertainty is *not* a reason to abandon the social cost of greenhouse gas methodologies; quite the contrary, uncertainty supports higher estimates of the social cost of greenhouse gases, because most uncertainties regarding climate change entail tipping points, catastrophic risks, and unknown unknowns about the damages of climate change. Because the key uncertainties of climate change include the risk of irreversible catastrophes, applying an options value framework to the regulatory context strengthens the case for ambitious regulatory action to reduce greenhouse gas emissions. There are numerous well-established, rigorous analytical tools available to characterize and quantitatively assess uncertainty, such as Monte Carlo simulations, and the Interagency Working Group’s social cost of greenhouse gas protocol incorporates those tools. Because future updates (if based on best science and economics, consistent with the recommendations from the National Academies of Sciences) will almost certainly increase the valuation—as currently omitted categories of damages become quantifiable and as consensus emerges around switching to a declining discount rate—the 2016 estimates can in the meantime continue to be applied as a conservative lower bound.⁵⁸

⁵² See generally costofcarbon.org; see also Denise A. Grab et al., *Opportunities for Pricing Climate Impacts in U.S. State Electricity Policy* (2019), https://policyintegrity.org/files/publications/Pricing_Climate_Impacts.pdf.

⁵³ 2016 TSD, *supra* note 36.

⁵⁴ *Id.* (adjusted using the CPI Inflation Calculator).

⁵⁵ 2010 TSD, *supra* note 35.

⁵⁶ Iliana Paul et al., *The Social Cost of Greenhouse Gases and State Policy: A Frequently Asked Questions Guide* (2017), https://policyintegrity.org/files/publications/SCC_State_Guidance.pdf.

⁵⁷ *Center for Biological Diversity v. NHTSA*, 538 F.3d 1172, 1200 (9th Cir. 2008).

⁵⁸ See Revesz et al., *Global Warming: Improve Economic Models of Climate Change*, 508 *Nature* 173, *supra* note 46 (making the case that the IWG estimates are almost certainly underestimates).

Nor would it burden utilities or the Commission with any great expense to simply run all four of the Interagency Working Group's estimates—as the Commission already noted, according to Public Service's own testimony, "sensitivities typically aren't that difficult to run" and "[t]hey can be run fairly fast."⁵⁹ Similarly, it is also notable that Public Service's parent company Xcel Energy made contradictory pronouncements in the proceedings over Minnesota's use of the social cost of carbon. Specifically, on February 2, 2018, Xcel Energy filed before the Minnesota Public Utility Commission a response to a petition for reconsideration of a decision on environmental and social costs.⁶⁰ The Minnesota Commission has adapted the Interagency Working Group's methodology to generate its own estimates of the social cost of carbon to use in electricity planning. An industrial group filed a petition objecting to that determination. In response, Xcel Energy supported use of the social cost of carbon in Minnesota. Xcel argued that the Interagency Working Group's values are "a reasonable and best available starting point for developing a new range of carbon dioxide environmental costs" for use in Minnesota energy policy. Xcel acknowledged that some uncertainty around the estimates is "inevitable," but observed that the goal should "not [be] perfection but a reasonable and best available estimate to take these damages into account in resource selection."

Using the Global Social Cost of Greenhouse Gas Estimates Advances Colorado's Interests

For greenhouse gases, fully valuing the costs and benefits necessitates a global perspective on climate damages. Several reasons explain why a full accounting of climate costs requires a global estimate of the social cost of greenhouse gases. First, the principles of reciprocity discussed above in Section I dictate the need for a global perspective. Colorado cannot solve climate change on its own, and Colorado benefits tremendously when other states and other countries reduce their greenhouse gas emissions. To encourage other jurisdictions to continue to take account of the externalities of their emissions imposed on Colorado, Colorado must likewise take account of the externalities of its emissions that fall outside state borders. The fragile tit-for-tat dynamic could fall apart in the face of too many jurisdictions turning a blind eye to their global externalities and considering only domestic effects. For example, soon after the Trump administration reversed course and developed its own, flawed, domestic-only "interim" values of the social cost of greenhouse gases, Mexico also moved toward considering only domestic climate impacts in its regulatory analyses. In the long term, such a move could mean more emissions from Mexico, which will hurt Colorado. To secure the reciprocal level of efficient action of greenhouse gas emissions, Colorado should follow the lead of Nevada, Minnesota, and other states, and use a global number.

Second, climate damages do not respect political borders. Coloradans have financial and personal interests in businesses and property located outside Colorado that may be affected by climate change. Colorado businesses depend on non-local economies to buy their exports, sell imports, and fill their supply chains. If rising temperatures and rising seas cause climate refugees or infectious disease vectors to migrate toward the United States, Colorado will feel the impacts along with the rest of the country. Colorado's economy, public health, and security are all linked to globally interconnected systems. Because climate damages occurring outside Colorado borders can spill over and affect Coloradans, a global perspective on the social cost of greenhouse gases is required.⁶¹

⁵⁹ Decision No. C17-0316 ¶189.

⁶⁰ Xcel Energy, Response to Petition for Reconsideration Investigation into Environmental and Socioeconomic Costs, Docket No. E999/CI-14-643, Feb. 2, 2018, *available at* <https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={B0595861-0000-CA11-8965-2EB04B3FB6C7}&documentTitle=20182-139736-01>.

⁶¹ See *Think Global*, *supra* note 18.

Finally, no existing methodology can calculate accurately a domestic-only estimate. The models simply were not designed to produce such estimates: for example, the models do not account for any inter-regional spillover effects. Any approximate and speculative estimate based on factors like percentage of global GDP, or share of global coastline or landmass, will be inherently misleading, as they ignore inter-regional spillover effects and extraterritorial interests of citizens. Put quite simply, there is no Colorado-only estimate of the social cost of greenhouse gases; only global estimates.⁶²

Every state that has begun to incorporate the social cost of greenhouse gases is using a global damage estimate. Attempting to revert to a Colorado-specific estimate would be akin to a homeowner throwing trash in her neighbor's yard without considering the odors and pests that will spill back to her own property, or how the neighbor might retaliate in kind.

The So-Called "Interim" Values Are Fatally Flawed

The so-called "interim" values of the social cost of greenhouse gases developed recently by the Bureau of Land Management and the Environmental Protection Agency under the Trump administration are not appropriate for Colorado to use. Those "interim" values wrongly attempt to calculate a domestic-only estimate, and also ignore the weight of consensus in the economic literature by adding a calculation at a 7% discount rate—a rate wholly inappropriate to the kind of intergenerational effects at stake with climate change. For more discussion on why the "interim" social cost of greenhouse gas figures would be entirely inappropriate for Colorado, please see various other materials from the Institute for Policy Integrity.⁶³

Sincerely,

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Attached: Policy Integrity's Initial Comments, Response Comments, and Supplemental Comments in Proceeding No. 17M-0694E

⁶² See Joint Comments to U.S. Forest Service on Use of Social Cost of Carbon in Colorado Roadless Rule, at 11-14 (Jan. 15, 2016), available at http://policyintegrity.org/documents/Forest_Service_SDEIS_comments.pdf (explaining there is no national-, Colorado-, or forest-only estimate of the social cost of carbon).

⁶³ <https://policyintegrity.org/publications/detail/how-the-trump-administration-is-obscur-ing-the-costs-of-climate-change;>
https://policyintegrity.org/documents/Oil_Gas_NSPS_Joint_SCC_Comments.pdf.