November 11, 2020
Docket No. AD20-14-000

Comments of the Competitive Enterprise Institute

Thank you for the opportunity to comment on the Federal Energy Regulatory Commission's proposed policy statement on carbon pricing in wholesale electricity markets organized by regional trading organizations (RTOs) and independent system operators (ISOs).[1]

Summary

The Commission does not clearly explain the rationale for wholesale carbon pricing. Fortunately, the Institute for Policy Integrity (IPI) provides a clear explanation. The central idea is that electricity markets are "inefficient" due to "market failure." IPI thus recommends that RTO/ISO markets incorporate carbon prices based on the Obama administration's 2016 Interagency Working Group (IWG) report on the social cost of carbon (SCC). IPI argus that SCC-based carbon pricing will make U.S. electricity markets more "efficient."

My comments show that:

- The IWG report was politicized by agencies' reliance on structurally biased integrated assessment models (IAMs), dated climate parameters, accounting gimmickry, and unreasonable depreciation of human adaptive capabilities.
- SCC estimation is a highly speculative enterprise, and SCC estimates vary substantially depending on reasonable alternative assumptions.
- A recent peer-reviewed study finds that when a leading IAM is re-run with updated empirical data on climate sensitivity and carbon dioxide fertilization, the social cost of carbon drops to very small numbers, with a 40 percent probability of being negative, through the mid-21st century. A negative SCC is another way of saying a net benefit.
- Even if the IWG's SCC estimates were objective, wholesale carbon pricing would make electricity markets less—not more—efficient, for three reasons:
    - Carbon pricing would overlay, not replace, other climate policies. Adding costs to excessively costly policies only increases inefficiency.
    - Pricing carbon in regional markets in one segment of one sector is all pain for no gain. The benefit-cost ratio of the Commission's proposal is abysmal. That is not efficient.

[1] Federal Energy Regulatory Commission, Carbon Pricing in Organized Wholesale Electricity Markets, Proposed Policy Statement, 85 FR 66965-66969, October 21, 2020, https://www.regulations.gov/document?D=FERC-2020-1355-0001

- Not only free marketers but also UN-affiliated climate experts believe energy- and resource-intensive development can achieve the highest levels of human flourishing over the 21st century. If energy- and resource-intensive development is the most efficient social policy, how can any coercive decarbonization scheme truly be efficient?

Power Plays

Ratepayers have good reason to be suspicious of this proposal. The proposal is a deliverable arising from the Commission's September 30, 2020 technical conference on carbon pricing in wholesale electricity markets.[2] The keynote speaker was Sen. Sheldon Whitehouse (D-RI), among the most zealous carbon tax advocates in Congress. Of the 33 technical presenters, only one represents industrial energy consumers, and none represents commercial and residential ratepayers. Incorporating "state-determined carbon prices" in RTO/ISO markets would raise the cost of wholesale power and, thus, retail rates in states that choose not to price carbon.

Wholesale carbon pricing is not exactly an idea whose time has come. As the proposal acknowledges, only 11 states have carbon pricing policies—all in form of emission allowances under cap-and-trade programs. No state currently applies a carbon tax, tariff, or fee to electricity production or sales.[3]

The proposal specifies two objectives: (1) "clarify the Commission's jurisdiction over RTO/ISO market rules that incorporate a state-determined carbon price," and (2) "encourage RTO/ISO efforts to incorporate a state-determined carbon price in RTO/ISO markets."[4]

Regarding objective (1), the Competitive Enterprise Institute (CEI) concurs with Chairman James Danly that clarifying the Commission's jurisdiction is "unnecessary."[5] The Commission obviously has jurisdiction to ensure that wholesale power rates are "just and reasonable," including rate adjustments proposed by RTOs and ISOs to reflect state-determined electricity policies.

Regarding objective (2), CEI also concurs with Chairman Danly's criticism that the Commission's encouragement of wholesale carbon pricing is premature and "unwise." He explained:

> Without seeing a proposal, the Commission predetermines that any such proposal will be within the Commission's jurisdiction and "would not in any way diminish state authority." That may well turn out to be true, but I would have waited until we had an actual 205 filing before us rather than pre-judging the issue based on unstated assumptions about how such programs might work. It is easy to imagine any number of RTO/ISO carbon-pricing proposals that would violate the Federal Power Act by impermissibly invading the authorities reserved to the States.[6]

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[2] Federal Energy Regulatory Commission, Technical Conference Regarding Carbon Pricing in Organized Wholesale Electricity Markets, September 30, 2020, https://www.ferc.gov/news-events/events/technical-conference-regarding-carbon-pricing-organized-wholesale-electricity

[3] 85 FR 66966, footnotes 5 and 6

[4] 85 FR 66967

[5] 85 FR 66969

[6] 85 FR 66969

The Commission claims its technical conference "identified numerous potential benefits from incorporating carbon prices set by one or more states into RTO/ISO markets."[7] Purported benefits include developing "technology-neutral, transparent price signals within RTO/ISO markets," "providing market certainty to support investment," and improving the "efficiency and transparency" of wholesale markets.[8] However, that handful of words is the proposal's entire discussion of wholesale carbon pricing benefits.

Thin gruel, and not very convincing. Carbon pricing is "technology neutral." Really? Carbon pricing may be neutral with respect to wind, solar, geothermal, nuclear, and hydro, but it discriminates against all carbon-based technologies. Indeed, that is its core function. Carbon pricing is a market-rigging strategy. By design, it handicaps electricity production from coal, natural gas, and oil—technologies that currently supply about 63 percent of U.S. power.[9]

Providing "market certainty to support investment"? So do the Soviet-style production quotas euphemistically called "renewable portfolio standards."

Explicit carbon prices are, by definition, more "transparent" than the implicit prices embedded in renewable energy quota, "green" energy tax credits, energy efficiency standards, U.S. Energy Department loan guarantees, and the like. However, carbon price "adders" are unlikely to be itemized as separate charges on the power bills utilities send to ratepayers. The consumer impacts of carbon fees would likely be as opaque as any resulting from regulatory mandates or out-of-market subsidies.

What then is the case for wholesale carbon pricing, and how well does it withstand scrutiny? Fortunately, Professor Jim Rossi appended, at the end of his conference paper,[10] an Institute for Policy Integrity report titled *Carbon Pricing in Wholesale Electricity Markets: An Economic and Legal Guide*.[11] The IPI report clearly explains the economic and environmental rationales, legal frameworks, and market mechanics of wholesale carbon pricing. One would be hard-pressed to find a stronger case for the Commission's proposal. Accordingly, much of this comment letter examines IPI's rationale for wholesale carbon pricing.

Climate Ambition

Unlike the Commission's policy statement, which does not articulate the broader policy context of wholesale carbon pricing, the IPI report spells it out:

> An economy-wide tax on all polluters is the first-best way to address this negative externality. However, when that approach is not feasible, sector-specific carbon prices

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[7] 85 FR 66966

[8] 85 FR 66968

[9] Energy Information Administration, What is U.S. electricity generation by fuel source? (accessed 11/15/2020) https://www.eia.gov/tools/faqs/faq.php?id=427&t=3

[10] Professor Jim Rossi, Vanderbilt University Law School, Federal Energy Regulatory Commission, Carbon Pricing in Organized Carbon Markets, Docket No. AD20-14, September 25, 2020, https://www.ferc.gov/media/panel-1-prof-jim-rossi-vanderbilt-university

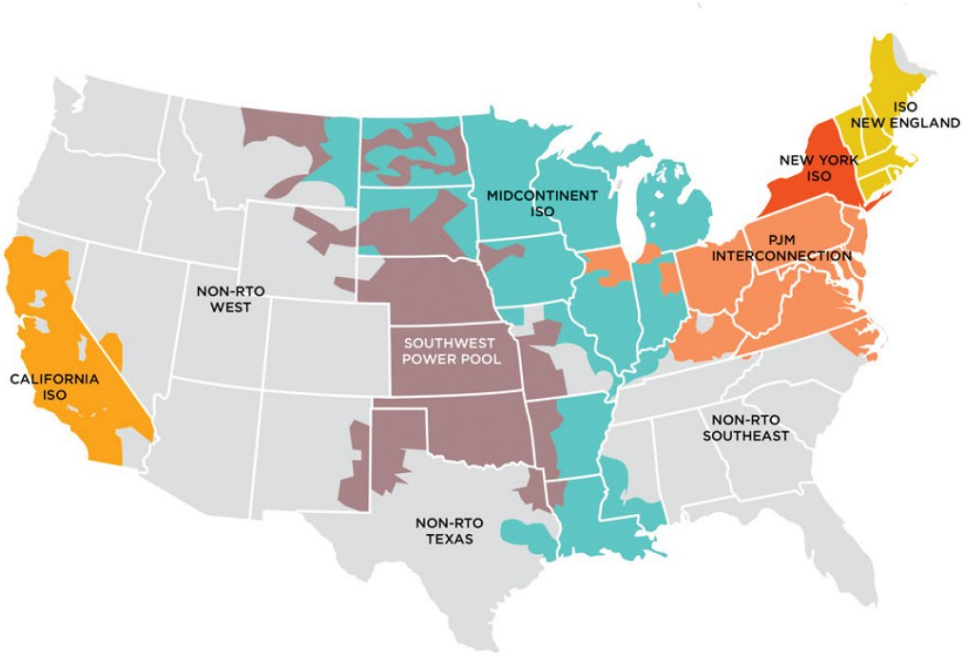
[11] Matt Butner, Bethany Davis Noll, Justin Gundlach, Burcin Unel, and Avi Zevin, *Carbon Pricing in Wholesale Electricity Markets: An Economic and Legal Guide*, Institute for Policy Integrity, New York University School of Law, March 2020 (hereafter IPI), https://policyintegrity.org/publications/detail/carbon-pricing-in-wholesale-electricity-markets

> can serve as an alternative. In areas of the country with organized wholesale electricity markets, a carbon-pricing rule that incorporates the external cost of CO_2 emissions into the RTO's dispatch decisions can align market prices with the marginal social cost of electricity generation without compromising the operational efficiencies of those markets.[12]

So, proponents view wholesale carbon pricing as an incremental step towards an "economywide" carbon tax. Congress has repeatedly rejected economywide carbon pricing (both carbon taxes and cap-and-trade). The Commission thus seeks to bypass Congress by encouraging the formation of regional carbon pricing zones. There was no possibility of legislating an economywide carbon tax during the Trump administration and the 116th Congress. So, proponents urge an independent agency to cheerlead for carbon pricing in six regional wholesale markets with customers in 35 states.

Why the sudden interest in this policy beginning in early 2020? Perhaps it has something to do with widespread expectations of a "blue wave" in the November elections.

Figure 1



A map of FERC-regulated RTOs.
Source: http://sustainableferc.org/iso-rto-operating-regions/

Market Efficiency and the Social Cost of Carbon

The IPI report spotlights the core rationale for wholesale carbon pricing. It is the idea that electricity markets are "inefficient" due to "market failure." In a nutshell, power producers and ratepayers do not pay for the "social cost of carbon" (SCC)—the climate damages caused by carbon dioxide (CO_2) emissions from electric generation. Because climate-related damages are

[12] IPI, p. 1

not reflected in market prices, more carbon-based electricity is produced and consumed than is socially "efficient." By forcing market actors to pay for climate-related damages, an SCC-based carbon tax reduces the demand for CO_2-emitting electricity to the point where the full (private *plus social*) marginal costs of electric generation equal marginal benefits.

IPI explains the basics of SCC estimation in a box insert. Here is the text in pertinent part:

> The Social Cost of Carbon measures and monetizes the damage that results from emission of a ton of CO_2 into the atmosphere. Because CO_2 is a global pollutant, a ton emitted causes the same amount of damage regardless of where the emission occurs. As a result, a single price, applicable regardless of location, is appropriate for monetizing damages. The Interagency Working Group's (IWG) 2016 Social Cost of Carbon estimate is the best currently available estimate for the external cost of CO_2 emissions.[13]

IPI makes no bones about the fact that SCC-based carbon pricing would dramatically decrease the competitiveness of coal-based generation:

> Another type of market failure that is widely recognized by economists and present in electricity markets relates to CO_2 emissions that result from electricity generation. These emissions create a "negative externality," which is a cost of a market transaction that is borne by a third party to that transaction. Climate change damages caused by greenhouse gases—which include increased temperatures, property damage from sea level rise, reduced productivity, and induced mortality—can be quite large in comparison to the value of the electricity generated. For example, using the best available monetary estimate of the damages caused by a ton of CO_2, the Social Cost of Carbon, each megawatt hour (MWh) of electricity from a coal-fired generator leads to a bit less than a ton of CO_2 and causes roughly $50 of damages. In comparison, the average energy price in RTO markets range from $30 to $50 per MWh.[14]

In other words, an SCC-based carbon price would increase the wholesale cost of coal-based power by 60-100 percent. Coal's situation would become worse, year after year, as estimated SCC values increase.

IPI argues that carbon pricing is a more efficient policy than the regulatory mandates and out-of-market payments deployed by many states to expand the market shares of non-emitting electricity resources:

> A carbon-pricing rule in organized wholesale electricity markets would be a more efficient policy tool to reduce CO_2 emissions compared to many other climate policies targeting the electric sector. First, it would cause CO_2-emitting generators to directly internalize this externality. Second, it would provide clear investment signals that, in turn, would lead to the efficient retention or entry of clean generators, and efficient exit of emitting generators. Third, it would be technology neutral, and so allow the market to select the lowest-cost emissions-reduction opportunities. Fourth, it could include features such as border adjustments to limit emissions leakage that might occur if there are trades with entities from regions without similar carbon-pricing policies. Fifth, it would provide

[13] IPI, p. 11
[14] IPI, p. 10

> regulatory certainty and uniformity, lowering the overall cost of achieving various state clean energy and climate commitments.[15]

Note that IPI envisions a system of "border adjustments," which are essentially tariffs on electricity imported from states that choose, for whatever reason, not to impose an SCC-based tax on electric generation. Whatever one thinks of interstate tariffs as a climate change mitigation measure, it represents a sharp break with past practice, and may be the sort of overreach Chairman Danly had in mind when he warned the Commission against "impermissibly invading authorities reserved to the states."

Like the Obama administration's so-called Clean Power Plan, the "regulatory certainty and uniformity" provided by wholesale pricing could undercut states' freedom to pursue low-cost, pro-growth energy policies—hence, undercut the freedom of citizens and businesses to vote with their feet in favor of such policies.[16]

Flaws in the Efficiency Case for Wholesale Carbon Pricing

SCC Basics

To identify the flaws in the "efficiency" case for wholesale carbon pricing, it may be useful first to provide additional information on how SCC estimation works. The following discussion borrows freely from the Environmental Protection Agency's 2016 Social Cost of Carbon Fact Sheet.[17]

The social cost of carbon is an estimate in dollars of the cumulative long-term damage done by a ton of CO_2 emitted in a specific year. That dollar figure also represents an estimate of the benefit of avoiding or reducing one ton of CO_2 emissions.

The IWG used three computer programs abbreviated DICE, FUND, and PAGE to estimate SCC values.[18] The programs are called integrated assessment models (IAMs) because they combine a climate model, which estimates the physical impacts of CO_2 emissions, with an economic model, which estimates the dollar value of climate change effects on agricultural productivity, property values, and other economic variables.

In federal agency analyses, the cumulative damage of an incremental ton of CO_2 emissions is estimated from the year of the emission's release until 2300. SCC estimates are highly sensitive to the discount rates chosen to calculate the present value of future emissions and reductions. The

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[15] IPI, p. 1

[16] Marlo Lewis, Free Market Groups' Comment Letter on EPA's Proposed Rule to Repeal the Clean Power Plan, April 26, 2018, pp. 20-22, https://cei.org/sites/default/files/CEI_Comments_-_Proposed_Rule_-_Clean_Power_Plan_Repeal.pdf

[17] EPA Fact Sheet: Social Cost of Carbon, 2016, https://www.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf

[18] The acronyms stand for **D**ynamic **I**ntegrated **Cl**imate-**E**conomy model, developed by Yale University economist William Nordhaus; the Climate **F**ramework for **U**ncertainty, **N**egotiation and **D**istribution model, developed by University of Sussex economist Richard Tol and University of California economist David Anton; and the **P**olicy **A**nalysis of the **G**reenhouse **E**ffect model developed by Cambridge University economist Chris Hope.

lower the discount rate, the higher the present value of future climate damages and emission reductions, and vice versa.

Federal agencies average the results of the three IAMs to estimate SCC values. For any given year, the Obama administration's Interagency Working Group (IWG) provided four SCC estimates. The first three values presented the SCC at discount rates of 5, 3, and 2.5 percent. The IWG also estimated a fourth value to represent potential damages associated with "lower-probability, higher-impact" events such as ice sheet collapse.

In the Regulatory Impact Analysis for the Final Affordable Clean Energy (ACE) Rule, the Trump administration discontinued certain Obama-era accounting gimmicks that inflate the benefit-cost ratios of climate policy regulations.[19] Specifically, as required for regulatory accounting by OMB Circular A-4, the EPA now uses discount rates of 7 percent and 3 percent to estimate present value.[20]

The rationale for including SCC estimates using a 7 percent discount rate, even for climate change mitigation efforts spanning generations, is that mitigation measures are investments, all potential investments compete for capital, and the long-term rate of return on capital investment in the U.S. economy is roughly 7 percent. The most productive investments are those that leave the largest stock of productive assets to future generations. Thus, one way to assess the efficiency of a climate mitigation investment is to compare it to other potential long-term investments, all discounted at 7 percent.[21]

Also consistent with OMB Circular A-4, the Trump administration compares the domestic compliance costs of climate policies to domestic SCC-estimated benefits rather than the much larger global SCC-estimated benefits. The SCC-estimated value of CO_2 emission reductions is substantially smaller for the United States than for the world at large because the U.S. economy is more resilient to climate-related impacts than most other economies.[22]

That revision is not a change in how the SCC is calculated but in how it is presented. The benefit-cost tables in Obama administration climate regulations gave the impression that Americans would reap the global SCC-estimated benefits of avoided or reduced emissions—an inaccurate and misleading sales pitch. As indicated above, IPI wants wholesale carbon pricing to be based on the IWG's 2016 SCC estimates, i.e., with no corrections for the Obama administration's accounting gimmickry.

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[19] EPA, Regulatory Impact Analysis for Repeal of the Clean Power Plan, and Emission Guidelines for Greenhouse Gas Emissions from Existing Electric Utility Generating Units, EPA-452/R-19-003, June 2019, Chapter 7, https://www.epa.gov/sites/production/files/2019-06/documents/utilities_ria_final_cpp_repeal_and_ace_2019-06.pdf

[20] Office of Management and Budget, Circular A-4, Regulatory Analysis, September 17, 2003, https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/

[21] David Kreutzer, Discounting Climate Costs, Heritage Foundation Issue Brief no. 4575, June 16, 2016, https://www.heritage.org/environment/report/discounting-climate-costs

[22] The Obama administration's IWG guessed that the U.S. domestic SCC was only 7-23 percent as high as the global SCC. See Interagency Working Group, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis, 2010, p. 11, https://www.epa.gov/sites/production/files/2016-12/documents/scc_tsd_2010.pdf

Pretense of Knowledge and Precision

IPI purports to believe SCC estimation is a scientific discipline producing reasonably objective estimates. In fact, SCC estimation is a highly speculative enterprise, and SCC estimates vary substantially depending on reasonable alternative assumptions. For example, when Heritage Foundation analysts re-ran two of the Obama administration's IAMs with a 7 percent discount rate instead of a 3 percent rate, "the SCC dropped by more than 80 percent in one of the models and actually went negative in the other."[23]

IAMs have a role in academic research, allowing analysts to see how different physical and economic assumptions drive estimates of climate-related impacts and regulatory benefits. However, using IAMs to make policy "suggests a level of knowledge and precision that is simply illusory, and can be highly misleading," MIT professor Robert Pindyck cautions.[24] He explains:

> The modeler has a great deal of freedom in choosing functional forms, parameter values, and other inputs, and different choices can give wildly different estimates of the SCC and the optimal amount of abatement. You might think that some input choices are more reasonable or defensible than others, but no, "reasonable" is very much in the eye of the modeler. *Thus these models can be used to obtain almost any result one desires*.[25]

What climate campaigners and their regulatory allies typically desire is to sustain the narrative that climate change is "worse than we thought." Unsurprisingly, the central SCC estimates in the Obama administration's 2013 technical support document (TSD) were about 60 percent higher than the corresponding estimates in the administration's 2010 TSD.[26] As if in four short years, cumulative climate change impacts from 2000 to 2300 got almost 60 percent worse!

Table 1: Central Values for the Social Cost of Carbon Estimates Issued by the Interagency Working Group on Social Cost of Carbon in 2010 and 2013

Dollars are 2007 dollars per metric ton of carbon dioxide		
Year	**2010 central values**	**2013 central values**
2010	$21	$32
2020	26	43
2030	33	52
2040	39	61
2050	$45	$71

Source: Interagency Working Group on Social Cost of Carbon's Technical Support Document and 2013 update. | GAO-14-663

Raise SCC estimates high enough, and modelers can make fossil fuels look unaffordable no matter how cheap and renewable energy look like a bargain at any price. Consider a study co-

[23] Kreutzer, op cit.

[24] Robert Pindyck, Climate Change Policy: What Do Models Tell Us? Working Paper 19244, July 2013 (emphasis added), http://www.nber.org/papers/w19244

[25] Ibid., p. 5

[26] U.S. Government Accountability Office, Regulatory Impact Analysis: Development of Social Cost of Carbon Estimates, July 2014, p. 7, https://www.gao.gov/assets/670/665016.pdf

authored by Chris Hope, creator of the PAGE model, one of the three IAMs used in federal agency SCC estimation.

Selecting a 1 percent discount rate, Hope and his colleagues estimate that in 2010, the SCC was already $266/ton—830 percent larger than the Obama administration's central SCC estimate. They conclude that new renewable generation is more "efficient" than either new gas or existing coal generation.[27]

SCC modelers are free to select below-market discount rates because discounting appears to involve ethical judgments about intergenerational equity.[28] How much material well-being should the poorer present generation be willing to sacrifice to enhance the welfare of wealthier future generations? That is primarily a philosophic rather than a technical or scientific question, which in political practice means it is an ideological or partisan question.

Modelers also have great freedom in selecting other critical IAM inputs because the physical and economic variables affecting carbon's social cost are so uncertain. SCC estimates are intractably conjectural because:

- No one can forecast the baseline emission trajectory of the global economy out to 2300, but it is only in relation to some assumed baseline that the incremental effects of the next ton of CO_2 might be estimated.

- SCC modelers are free to use any "no action" scenario published in the literature, including the increasingly obsolete RCP 8.5,[29] which assumes coal generation scales up to provide nearly half of global energy by 2100—a level not seen since 1940.[30]

- Scientists do not know the relative strength of the positive and negative feedbacks that amplify or constrain the climate's response to rising CO_2 concentrations, which is why the "likely" range of climate sensitivity was 1.5°C—4.5°C in both the IPCC's first (1990) assessment report[31] and fifth (2013) assessment report.[32]

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[27] Laurie Johnson, Starla Yeh, and Chris Hope, "The Social Cost of Carbon: Implications for Modernizing Our Electricity," *Journal of Environmental Studies and Sciences*, December 2013, Volume 3, Issue 4, pp. 369–375, https://link.springer.com/article/10.1007/s13412-013-0149-5

[28] I put "appears" in quotes, because a strong case can be made that discounting at approximately 7 percent is the only objective way to assess the comparative efficiency of climate change investments. See Kreutzer, op cit.

[29] Zeke Hausfather, "Explainer: The high emissions 'RCP8.5' global warming scenario, Carbon Brief, 21 August 2019, https://www.carbonbrief.org/explainer-the-high-emissions-rcp8-5-global-warming-scenario; Kevin Murphy, "Reassessing the RCPs," Climate Etc., January 28, 2019, https://judithcurry.com/2019/01/28/reassessing-the-rcps/

[30] Riahi et al. RCP 8.5—A scenario of comparative high greenhouse gas emissions, Climate Change (2011) 109: 33-57, https://link.springer.com/article/10.1007/s10584-011-0149-y; Hannah Ritchie and Max Roser, "Energy Production & Changing Energy Sources," Our World in Data, https://ourworldindata.org/energy-production-and-changing-energy-sources

[31] IPCC, First Assessment Report (FAR), *Climate Change: The IPCC Scientific Assessment* (1990), Chapter 5, Equilibrium Climate Change, p. 139, https://www.ipcc.ch/ipccreports/far/wg_I/ipcc_far_wg_I_chapter_05.pdf

[32] IPCC, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Summary for Policymakers, p. 16, http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf

- To guesstimate climate damages, IAMs must also make non-validated assumptions about how rising temperatures will affect weather patterns, ice-sheet dynamics, and other natural phenomena, and how such physical changes will affect agriculture, other climate-sensitive industries, and consumption absent adaptive responses.

- Human beings use technology to adapt to environmental conditions. Consequently, the "damage functions" in IAMs—the projected impacts of climate change on consumption, climate-sensitive industries, and human health—depend on assumptions about how technology will develop as the world warms. Nothing is harder to forecast than long-term technological change.

One thing is easy to predict—social cost estimates will incline towards technological pessimism (except maybe the performance of renewables). For example, in the PAGE model, "Beyond 2°C, no adaptation is assumed to be possible to mitigate the impacts of climate change."[33]

That is unreasonable. Consider the following example described by Bjorn Lomborg in his book *False Alarm*. The most fear-inspiring and potentially most destructive impact from high-end global warming is rapid sea-level rise. Lomborg describes a study with a worst-case scenario in which rising sea levels by 2100 flood up to 350 million people every year, with costs reaching $100 trillion or 11 percent of global GDP annually. However, those damages are projected only if people do nothing to adapt. If reasonable adaptations are taken, flood costs will increase from $11 billion in 2000 to $38 billion in 2100. Similarly, dike costs will increase from $13 billion to $48 billion. However, notes Lomborg, "the total cost to the economy will actually decline, from 0.05 percent of GDP to 0.008 percent." Moreover, the number of annual flood victims will drop from 3.4 million in 2000 to 15,000 in 2100—a 99.6 percent reduction in flood victims. In other words, with reasonable adaptation, people are projected to be much safer, and the global economy much less affected in 2100, despite high-end warming.[34]

Although the Trump-era reforms brought SCC estimation into conformity with longstanding OMB regulatory accounting practices, alarmist biases remain. Federal agency SCC estimation still relies on dated (and likely overheated) climate sensitivity assumptions.[35] The PAGE model's techno-pessimism persists.

Worse, agencies still use the DICE and PAGE models, which are structurally biased because they do not estimate CO_2 fertilization benefits. Although the FUND model includes such benefits, it is based on empirical information that has not been updated since the late 1990s. More on that below.

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[33] IWG, Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, August 2016, p. 14, https://www.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf

[34] Bjorn Lomborg, *False Alarm: How Climate Change Panic Costs Us Trillions, Hurts the Poor, and Fails to Fix the Planet* (New York: Basic Books, 2020), pp. 32-33

[35] Marlo Lewis, "Posting Updated List of Studies Finding Low Climate Sensitivity," March 6, 2019, GlobalWarming.Org, http://www.globalwarming.org/2019/03/06/posting-updated-list-of-recent-studies-finding-low-climate-sensitivity/

Finally, the social cost of carbon continues to be calculated from damages projected out to the year 2300, which is far beyond the range of informed speculation about global economic and energy trends.

Sensitivity of SCC Estimation to Reasonable Alternative Assumptions

A recent peer-reviewed study by Heritage Foundation statistician Kevin Dayaratna, Guelph University economics professor Ross McKitrick, and CEI climate scientist Patrick Michaels finds that when the FUND model—the only IAM with a carbon fertilization parameter—is run with updated empirical information on climate sensitivity and CO_2 fertilization, the social cost of carbon drops to very small numbers, with a 40 percent probability of being negative, through the mid-21st century.[36] A negative cost is another way of saying a net benefit.

Over the next three decades, the agricultural benefits of rising CO_2 concentrations and longer growing seasons are projected to exceed the monetary costs of global warming-related economic damages. The results of the study also imply that the possibility of reaching catastrophic "tipping points" during the next 1,000 years is substantially less than in mainstream climate impact assessments. In other words, there is no climate crisis.

Here is the study's abstract:

> We explore the implications of recent empirical findings about CO_2 fertilization and climate sensitivity on the social cost of carbon (SCC) in the FUND model. New compilations of satellite and experimental evidence suggest larger agricultural productivity gains due to CO_2 growth are being experienced than are reflected in FUND parameterization. We also discuss recent studies applying empirical constraints to the probability distribution of equilibrium climate sensitivity and we argue that previous Monte Carlo analyses in integrated assessment models (IAMs) have not adequately reflected the findings of this literature. Updating the distributions of these parameters under varying discount rates is influential on SCC estimates. The lower bound of the social cost of carbon is likely negative and the upper bound is much lower than previously claimed, at least through the mid-twenty-first century. Also the choice of discount rate becomes much less important under the updated parameter distributions.

Importantly, the researchers used the same range of discount rates that most other studies use, namely 2.5 to 7.0 percent; and they show that when the climate sensitivity and carbon fertilization parameters are updated, the choice of discount rate no longer matters very much. For instance, when the FUND model is run with Nicolas Lewis and Judith Curry's climate sensitivity distribution[37] and a 30 percent boost in agricultural productivity (beyond what is already in FUND), the social cost of carbon remains negative "even at a 2.5 percent discount rate"—the lowest rate used by the Obama administration IWG.

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[36] Kevin D. Dayaratna, Ross McKitrick & Patrick J. Michaels, Climate sensitivity, agricultural productivity and the social cost of carbon in FUND, *Environmental Economics and Policy Studies*, January 18, 2020, https://link.springer.com/content/pdf/10.1007/s10018-020-00263-w.pdf

[37] Nicolas Lewis and Judith Curry, Impact of Recent Forcing and Ocean Heat Uptake Data on Estimates of Climate Sensitivity. 2018. *Journal of Climate* 31 (15) 6051-6071, https://journals.ametsoc.org/jcli/article/31/15/6051/92230/The-Impact-of-Recent-Forcing-and-Ocean-Heat-Uptake

To sum up, the central rationale for the Commission's proposal is that, if based on the Obama administration's SCC estimates, wholesale carbon pricing will improve the "social efficiency" of electricity provision. It should now be obvious that such claims are more akin to rhetorical bluster than science. Structurally biased IAMs, reliance on dated climate parameters, skewed discounting, and gloomy depreciation of human adaptive capabilities combined to produce a politicized interagency SCC report.

In any event, the sensitivity of SCC values to reasonable alternative assumptions reveals that policymakers are a long way from possessing an objective, non-partisan method for selecting and imposing "efficiency"-enhancing carbon prices on wholesale power markets or any other part of the U.S. economy.

Other Problems with the Efficiency Case for Carbon Pricing

Even if the Obama IWG's SCC estimates were objective, wholesale carbon pricing would make electricity markets less—not more—efficient, for three reasons.

1. Carbon pricing would overlay, not replace, other climate policies. The IPI report is correct that carbon pricing is, in principle, a more "efficient tool" for reducing emissions than regulatory approaches and targeted subsidies. Among climate policies, only carbon pricing gives all market participants an incentive to reduce consumption of CO2-emitting energy and carbon-intensive products. Carbon pricing also creates the broadest incentive for entrepreneurs and investors to develop, market, and sell low- and zero-emission products in the wider marketplace.

Thus, one could reasonably argue that *replacing* all other electric-sector climate policies with carbon pricing would make electricity markets more efficient. But that is not what IPI is proposing. Nor is it what the Commission is proposing.

Indeed, former Chairman Neil Chatterjee recently reassured state policymakers that wholesale carbon pricing would not interfere with their rapid decarbonization mandates.[38] Note—those policies do not align with IWG social cost of carbon estimates. The IWG estimates assume there is a socially optimal (efficient) level of carbon energy consumption. In contrast, the aggressive renewable energy quota adopted by several states[39] imply that no quantity fossil-fuel generation is acceptable.

The state policies are not efficient, even if one assumes coercive decarbonization is desirable. For example, a recent University of Chicago study finds that RPS programs in 29 states added $125 billion to consumer electricity costs in the first seven years after enactment. Average retail prices in those states increased by 11 percent within seven years of adoption and by 17 percent within 12 years. The study also finds that "the cost per metric ton of CO_2 abated exceeds $115 in

[38] Catherine Morehouse, "Chatterjee says exclusion of state regulators from carbon pricing conference was a 'mistake,'" *Utility Dive*, November 12, 2020, https://www.utilitydive.com/news/chatterjee-says-exclusion-of-state-regulators-from-carbon-pricing-conferenc/588865/

[39] 85 FR 66966, footnotes 3 and 4

all specifications and ranges up to $530, making it at least several times larger than conventional estimates of the social cost of carbon."[40]

Consequently, what the Commission and IPI propose is to overlay the costs of carbon pricing on top of inefficient state regulatory policies. Adding costs to unnecessarily costly policies only increases inefficiency.

2. Pricing carbon in regional markets in one segment of one sector is all pain for no gain. Again, carbon pricing is the most "efficient" policy tool because of its incentive effects on all market actors. But for that very reason, an SCC-based carbon price achieves optimal or efficient CO_2 reductions only if it is both *economywide* and *global*. The narrower the market to which a carbon price is applied, the more the economic pain will outweigh the environmental gain.

Even a carbon tax aggressive enough to decarbonize the United States by 2050 would avert less than 0.2°C of global warming by 2100, according to standard climate modeling.[41] The Commission's carbon pricing proposal would at most achieve a modest reduction of CO_2 emissions from a segment of one economic sector within some regions. The impacts on climate change would be undetectably small, yet ratepayers could be on the hook for tens of billions of dollars in additional electricity costs. The benefit-cost ratio of the Commission's proposal is abysmal. That is not efficient.

3. Freedom to develop and utilize fossil fuels promotes human flourishing. It is not only free marketers who say that. So do experts affiliated with the United Nations Intergovernmental Panel on Climate Change (IPCC).

In addition to developing "representative concentration pathways" (RCPs) to provide radiative forcing trajectories for climate impact assessments,[42] climate researchers also develop "shared socio-economic pathways" (SSPs) to estimate how emissions might increase under different economic development scenarios. Riahi et al. (2017), a study by 16 experts from prestige research institutions in eight countries, finds that, in 2100, global per capita GDP is projected to be greater and income inequality lower in the IPCC's fossil fuel-intensive socioeconomic

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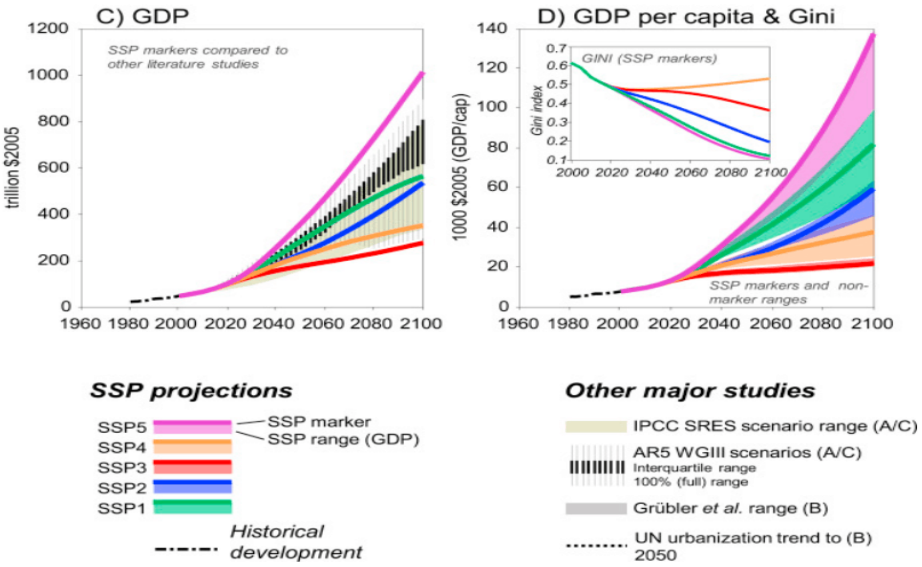
[40] Michael Greenstone and Ishan Nath, "Do Renewable Portfolio Standards Deliver?" Working Paper No. 2019-62, Energy Policy Institute at the University of Chicago, May 2019, https://epic.uchicago.edu/wp-content/uploads/2019/07/Do-Renewable-Portfolio-Standards-Deliver.pdf

[41] Benjamin Zycher, *The Green New Deal: Economics and Policy Analytics*, American Enterprise Institute, March 26, 2019, https://www.aei.org/spotlights/the-green-new-deal-economics-and-policy-analytics/

[42] RCPs are called "pathways" because they plot the trajectory of greenhouse gas emissions, concentrations, and resulting changes in radiative forcing over a period of decades to centuries. "Radiative forcing" may be defined as the difference between the amount of solar energy absorbed by the Earth and the amount radiated back to space. Forcing is measured in watts per square meter. Thus, RCP8.5—the IPCC's high-end emissions scenario—is the emissions trajectory in which radiative forcing increases by 8.5 W/m^2 during 2000-2100. Finally, RCPs are called "representative" because at least some scenarios in the socioeconomic development literature have similar forcing characteristics. SSP5 is one such pathway.

pathway (SSP5) than in all other SSPs, including the "green road/sustainable" pathway (SSP1).[43] Here are the pertinent charts from that study:



SSP5 has a radiative forcing pathway as high as that in RCP8.5—the IPCC's high-end emission scenario.[44] Yet in SSP5, global per capita GDP in 2100 is 10-fold greater than it was in 2000, and the gap between rich and poor countries is smaller than at any time in history.

If an energy and resource-intensive scenario delivers the highest level of human well-being, it is the most "efficient" social policy. How then can any coercive decarbonization policy truly be efficient?

Respectfully submitted,

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[43] Keywan Rhiahi, et al. 2017. The Shared Socioeconomic Pathways and their energy, land use, and greenhouse gas emissions: An overview. *Global Environmental Change* Vol. 42, pages 153-168, https://www.sciencedirect.com/science/article/pii/S0959378016300681

[44] Elmar Kriegler et al. 2017. Fossil-fueled development (SSP5): An energy and resource intensive scenario for the 21st century. *Global Environmental Change* Vol. 42, pages 297-315, https://www.sciencedirect.com/science/article/pii/S0959378016300711