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Mrs. Judith Whitney, Clerk
Vermont Public Utilities Commission
112 State Street
Montpelier, Vermont 05620-2601

**Subject**: Standard Offer Program - PUC Case Number 17-5257-INV

The Institute for Policy Integrity[1] submits these comments on the above-captioned proceeding. Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity regularly engages with public utilities commissions from a number of U.S. states on energy policy and regulations.[2]

On August 15, 2018, the Vermont Public Utilities Commission (PUC) issued a request for comments on the standard offer program (17-5257-INV).[3] Policy Integrity offers the following comments:

1. To the extent that the goals of 30 V.S.A. § 8001(a)(1) inform the structure of the standard offer program, the PUC should interpret the term "benefits" under 30 V.S.A. § 8001(a)(1) to include avoiding environmental externalities. The best tool for measuring avoided climate externalities is the social cost of greenhouse gas metric.
2. In the specific context of 30 V.S.A. § 8005a(d), the PUC should interpret "benefits to the operation and management of the electric grid" to include more than relieving transmission and distribution constraints. In particular, resilience is a benefit to the operation and management of the electric grid, and a system-wide review of resilience may reveal that renewable energy resources could be especially valuable to increasing the resilience of Vermont's electric grid.
3. The PUC should also consider how climate impacts may affect the operation and management of the electric grid through, for example, thermal efficiency effects. While the social cost of greenhouse gas tool measures climate externalities and is not specifically designed to identify precise effects on the operation and management of the electric grid, at least one state PUC (California) has cited the

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[1] No part of these comments purports to present the views, if any, of New York University.

[2] *See, e.g.,* Policy Integrity. Environmental Value of Distributed Energy Resources for New York State - Subgroup Report. (Jul. 2019). *Available at*: https://policyintegrity.org/projects/update/environmental-value-of-distributed-energy-resources-for-new-york-state-subg.

[3] Vermont PUC. Memorandum re: Request for Comments to Parties in PUC Case Number 17-5257-INV (August 15, 2018). Specifically, the request asks for comments on "(1) any steps the Commission should take to improve the function of the standard-offer program; and (2) any recommendations the Commission should make to the Vermont General Assembly concerning the standard-offer program."

effects of climate change on grid operations as a reason to favor a higher estimate of the social cost of greenhouse gases.

We explain each of these recommendations in further detail, below.

## 1. The PUC should monetize environmental costs and benefits to implement Section 8001's broad statutory goal of balancing "benefits" against "costs."

The standard offer program under 30 V.S.A. § 8005a is designed to help "achieve the goals of section 8001." The first goal of Section 8001 is: "Balancing the benefits, lifetime costs, and rates of the State's overall energy portfolio to ensure that to the greatest extent possible the economic benefits of renewable energy in the State flow to the Vermont economy in general." To the extent that Section 8001's goals inform the PUC's rules for the standard offer program, the PUC should interpret the term "benefits" under Section 8001(a)(1) to include avoiding environmental externalities.[4] The environment externalities avoided by renewable energy can include, but are not limited to, the public health effects and climate effects of emissions from non-renewable energy sources.

To rationally and transparently balance benefits and costs, the PUC should monetize environmental externalities and other effects to the extent feasible. Monetization ensures that environmental effects will be treated on par with other the costs and benefits of renewable energy, and monetization will facilitate comparison against all other costs and benefits. When impacts are translated into the common metric of money, the tradeoffs inherent in policy decisions become apparent, and decisionmakers can more readily and more transparently compare society's preferences for competing priorities. Monetization therefore minimizes the risk that a decision will lean too heavily on any one factor or succumb to unintended and unknown biases.

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] When compared to global greenhouse gas emissions and atmospheric carbon concentrations, the emissions of any one state, like Vermont, may falsely appear trivial. Well-documented mental heuristic like "probability neglect" can cause the public and decisionmakers to irrationally reduce small-yet-significant probability risks entirely down to zero.[7] Monetization contextualizes the significance of the additional tons of emissions. For example, presenting Vermont's 2012 total greenhouse gas emissions of 8.27

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[4] Policy Integrity. Valuing Pollution Reductions: How to Monetize Greenhouse Gas and Local Air Pollutant Reductions from Distributed Energy Resources (March 2018). Available at: https://policyintegrity.org/publications/detail/valuing-pollution-reductions

[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).

[7] 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).

million metric tons[8] as 0.1% of total U.S. emissions[9] makes them seem trivial; yet, by applying the social cost of carbon to monetize the effects, it becomes apparent that those 8.27 million metric tons still caused $339 million worth of climate damages in the year 2012 alone.[10]

The best tool for measuring the avoided climate externality that emissions reductions provides is the social cost of greenhouse gases. The best available estimates, based on the most recent science and economics, were published by the federal Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) in their 2016 update. The Interagency Working Group relied on a transparent, conservative, and consensus-driven methodology drawing from peer-reviewed models and inputs. Its process and estimates have been endorsed by the National Academies of Sciences,[11] the U.S. Government Accountability Office,[12] federal courts,[13] and countless experts in economics and climate change.[14] The social cost of greenhouse gas estimates try to capture as many climate damage categories as possible, from flooding to agricultural productivity to temperature-related changes in the demand for energy for cooling and heating.[15] Nevertheless, some significant categories of damages, like the risk of catastrophic climate outcomes, cannot currently be accurately modeled, and so the social cost of greenhouse gas metrics are widely recognized as a conservative underestimate of climate damages.[16]

A number of states have begun using the social cost of greenhouse gases to account for climate externalities in their energy and environmental policies. California, Colorado, Illinois, Minnesota, Nevada, New York, and Washington State have all used the metrics in various electricity and climate policies, either using actual IWG estimates or borrowing from the IWG's methodology to derive their own SCC values. Policy Integrity's Cost of Carbon Project website (costofcarbon.org) provides details on each states' use of the social

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[8] State of Vermont. Climate Change in Vermont. https://climatechange.vermont.gov/node/174.

[9] Total U.S. emissions were 6528.8MMTCO2e in 2012. https://www.epa.gov/sites/production/files/2018-01/documents/2018_executive_summary.pdf.

[10] IWG 2016 TSD SC-CO2 central estimate for 2012 is $33 per ton in 2007$. https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf. Converting to 2018$, it is $41.11 per ton. https://data.bls.gov/cgi-bin/cpicalc.pl?cost1=33&year1=200701&year2=201808

[11] 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).

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

[13] Zero Zone, Inc. v. Dep't of Energy, 832 F.3d 654, 679 (7th Cir. 2016); 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.

[14] *See, e.g* Richard L. Revesz et al., Best Cost Estimate of Greenhouse Gases, 357 SCIENCE 6352 (2017); 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.").

[15] See Policy Integrity's website http://costofcarbon.org for more information on the SCC, its development and application.

[16] Revesz et al. 2014.

cost of greenhouse gases. The website also includes a frequently asked questions-style guide for state decisionmakers.[17]

### 2. The PUC should interpret "benefits to the operation and management of the electric grid" to include resilience benefits and other effects besides relieving transmission and distribution constraints.

In the specific context of 30 V.S.A. § 8005a(d), the PUC should interpret "benefits to the operation and management of the electric grid" to include more than just relieving transmission and distribution constraints. For example, a system-wide review of resilience may reveal that renewable energy resources could be especially valuable to increasing the resilience of Vermont's electric grid. Resilience of the grid is a paramount component of its operational abilities. To inform the "outside the cap" portion of the standard offer program under Section 8005a(d), Vermont should make use of available tools to measure the effect of renewable energy on resilience.[18]

In Policy Integrity's July 2018 report, *Toward Resilience*, we use a four-part framework to conceptualize resilience: "A resilient electric system is one that has the ability to (1) avoid or resist shocks, (2) manage disruption, (3) quickly respond to a shock that occurs, and (4) fully recover and adapt to mitigate the effects of future shocks."[19] The report goes onto explain how resilience can be measured either by performance of the system and its component, or by the attributes of the system and its components. While the report strongly recommends a system-wide evaluation based on quantitative performance metrics (such as the percentage of critical-customer energy demand served),[20] it is notable that renewable energy projects may often deliver the attributes of resilient systems, such as providing fuel security by virtue of being fuel-less,[21] using decentralized technologies (for example, the loss of a single or even cluster of wind turbines is less damaging to the grid than the loss of a single 1000MW coal-fired power station),[22] increasing geographic dispersion and diversity,[23] and reducing the power portfolio's dependence on water.[24] Our *Toward Resilience* report outlines tools that can empower decisionmakers to make policies that will advance system-wide resilience. In order to assess "benefits to the operation and management of the electric grid," the PUC should undertake a systematic review of grid resilience.

### 3. The PUC should consider how climate impacts may affect the operation and management of the electric grid.

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[17] *Id.*

[18] http://policyintegrity.org/files/publications/Toward_Resilience.pdf

[19] Towards Resilience at 1.

[20] *Id.* at 5-6 (recommending a performance-based approach over an attribute-based approach, since the performance based approach is more objective and holistic, while an attribute-based approach may subjective focus too much on a single factor).

[21] *Id.* at 6.

[22] Scott Victor Valentine. Emerging Symbiosis: Renewable Energy and Energy Security. (Sept. 2011) *Available at*: http://www.scottvalentine.net/wp-content/uploads/2016/05/valentine-emerging-symbiosis.pdf, at 4576.

[23] Sadie Cox et al. Bridging Climate Change Resilience and Mitigation in the Electricity Sector Through Renewable Energy and Energy Efficiency. U.S. Agency for International Development. (Nov. 2017). Available at: https://www.nrel.gov/docs/fy18osti/67040.pdf at 8.

[24] *Id.*

While the social cost of greenhouse gas metric measures climate externalities and is not specifically designed to measure effects on the operation and management of the electric grid, there is some important overlap. States should take into serious consideration how climate change may affect the grid.

For example, the California Public Utilities Commission has been reviewing how it evaluates the benefits of distributed energy resources. In March 2018, an administrative law judge issued a ruling that, together with a proposed staff report, would require California utilities to calculate the climate benefits of DER by using the social cost of greenhouse gas estimates developed by the Interagency Working Group.[25] Specifically, the staff report recommends using the Interagency Working Group's high-impact estimate of the social cost of carbon ($123 per ton of carbon dioxide) instead of its central estimate ($42 per ton). The Interagency Working Group developed its high-impact estimate as a complement to its central estimate, in order to reflect the catastrophic impacts, risks, damage categories, and uncertainty that are not fully captured by the available data and methodologies. The California PUC staff report observed that among the climate damage categories not fully reflected in the central estimate were "the costs of climate change associated with electricity infrastructure," including:

- Line sag decreases to transmission efficiency
- Thermal efficiency decreases
- Lower efficiency, increased maintenance, and increased replacement costs of system components like transformers that cannot cool down and so overheat
- Significant cooling demand increases during both day and night[26]

Because of the serious adverse consequences climate change can have on electricity infrastructure, the PUC should consider climate impacts when assessing the benefits of renewable energy to the operation and management of the electric grid.

In conclusion, the PUC should take a broader approach to assessing the "benefits" of renewable energy and consider, as appropriate, such effects as resiliency benefits and monetized climate benefits.

Sincerely,

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[25] CPUC. Administrative Law Judge's Ruling Seeking Responses to Questions and Comment on Staff Amended Proposal on Societal Cost Test, Addendum #2, Energy Division Staff Report (March 14, 2018).

[26] *Id.* at 11.