STATE OF VIRGINIA
STATE CORPORATION COMMISSION

COMMONWEALTH OF VIRGINIA, *ex rel.* STATE CORPORATION COMMISSION	:	CASE NO. PUR-2020-00120
Ex Parte: In the matter of establishing rules and regulations pursuant to § 56-585.5 E 5 of the Code of Virginia related to the deployment of energy storage	:	JULY 29, 2020

COMMENTS OF THE INSTITUTE FOR
POLICY INTEGRITY AT NYU SCHOOL OF LAW

The Institute for Policy Integrity at New York University School of Law (Policy Integrity) appreciates the opportunity to submit the following comments in response to the Virginia's State Corporation Commission (Commission)'s June 29, 2020 Order Establishing Proceeding, which seeks comments on questions raised by Virginia Code § 56-585.5 E 5. 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.[1]

Our comments make the following two related points. The first is that energy storage deployments can increase emissions from the electricity sector, even if those deployments also facilitate the integration of variable renewable resources. The second is that the Virginia Clean Economy Act (the Act) gives the Commission authority to craft rules and regulations that address and mitigate this potentially adverse outcome. These points are responsive to Question 9, "Should the regulations mandate or limit the deployment of any particular type of energy storage resource or facility? If so, please explain," and Question 14, "What additional provisions should be included in the required regulations?"

1. Energy Storage Deployments Can Increase Systemwide Emissions

Energy storage resources are necessary to decarbonize the electric grid, but the emissions impacts of operating those resources depend on the regional generation mix and marginal emission rates. Marginal emission rates can vary widely across times and locations, and depend on the marginal generator's fuel type and efficiency. The electric grid's marginal emission rate can be zero when a renewable resource is the marginal generator, but it jumps when a coal-fired

[1] This document does not purport to present New York University School of Law's views.

generator is on the margin. Marginal emission rates are also affected by location-specific transmission constraints and other operational features of the grid.

The net effect of energy storage on emissions depends on the difference between the marginal emission rates of charging and discharging periods.[2] If an energy storage resource charges when marginal emission rates are high, and discharges when marginal emission rates are low, it will increase emissions compared to a scenario involving no use of energy storage.[3] Numerous academic publications have demonstrated that the emissions reduction potential of various resources—and especially energy storage—depends on the grid's hourly and sub-hourly marginal emission rates, such that operating energy storage can increase emissions.[4]

Another factor that must feature in any analysis of the emissions impacts of energy storage is the energy losses associated with charging, discharging, and maintaining charge.[5] These "round-trip efficiency" losses vary by technology and can be quite high.[6] As a result, even if there is no difference in the marginal emission rates between charging and discharging periods, energy storage can increase emissions by simply increasing the amount of energy generation needed to serve the same amount of load.[7]

Practically speaking, these features of energy storage could help *delay* the exit of emitting resources in Virginia. That is, storage can perform an economic arbitrage function, charging when it is cheap to do so, and discharging when it is expensive. In Virginia, this could mean using coal-fired generation to charge and thereby providing coal-fired generators with a way to increase their capacity factors—and revenues. And this, in turn, could slow those generators' exit from the marketplace.

2. The Commission Should Adopt a Rule that Mitigates this Risk

Virginia should follow the example of states that have not only encouraged energy storage resource deployments but also recognized and sought to mitigate the risk of those resources

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[2] *See* Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Energy Storage and Greenhouse Gas Emi*ssions, 42 HARV. ENVTL. L. REV. 139, 163–68 (2018); MADISON CONDON, RICHARD REVESZ & BURCIN UNEL, INST. FOR POL'Y INTEGRITY, MANAGING THE FUTURE OF ENERGY STORAGE (2018), http://policyintegrity.org/publications/detail/managing-the-future-of-energy-storage.

[3] Revesz & Unel, *supra* note 2, at 143.

[4] Laura M. Arciniegas & Eric Hittinger, *Tradeoffs Between Revenue and Emissions in Energy Storage Operation*, 143 ENERGY 1 (2018); Eric S. Hittinger & Ines M. L. Azevedo, *Estimating the Quantity of Wind and Solar Required to Displace Storage-Induced Emissions*, 51 ENVTL. SCI. & TECH. 12988 (2017); Duncan S. Callaway, Meredith Fowlie, & Gavin McCormick, *Location, Location, Location: The Variable Value of Renewable Energy and Demand-Side Efficiency Resources*, 5 J. ASS'N ENVTL. & RESOURCE ECONOMISTS 39 (2017); Eric S. Hittinger & Ines M. L. Azevedo, *Bulk Energy Storage Increases United States Electricity System Emissions*, 49 ENVTL. SCI. & TECH. 3202 (2015); Joshua Graff Zivin, Matthew J. Kotchen & Erin T. Mansur, Spatial and Temporal Heterogeneity of Marginal Emissions: Implications for Electric Cars and Other Electricity-Shifting Policies, 107A J. ECON. BEHAVIOR & ORGANIZATION 248 (2014).

[5] Revesz & Unel, *supra* note 2, at 166.

[6] *Id.*

[7] *Id.*

increasing electricity sector emissions for the reasons described above. California, for instance, amended its Self-Generation Incentive Program after determining that the initial version had led to net increases in emissions.[8] New York adopted rules and incentives for energy storage only after examining the expected impacts of those deployments on marginal emissions rates and net emissions overall.[9] And Massachusetts has adopted a Clean Peak Standard that uses incentives to encourage storage and other distributed energy resources to reduce systemwide emissions.[10]

Virginia's Clean Economy Act contains several elements that, taken together, provide a foundation for a Commission rule that encourages energy storage resources to be deployed and operated in ways that reduce net emissions—or at least do not increase them. To begin, the Act puts the electricity sector on a path toward eliminating greenhouse gas emissions,[11] and recognizes that energy storage resources will help to achieve that overarching goal.[12] In addition, the Act directs the Commission, when evaluating proposals for new generation, to make use of the Social Cost of Carbon, a metric that reflects the damage resulting from emitting a unit of greenhouse gas.[13] Although the Act does not *instruct* the Commission to apply the Social Cost of Carbon to other analyses, it certainly does not place restrictions on when and how to apply that metric—which is useful for valuing marginal emissions (or their avoidance) in resource-specific and system-wide analyses.[14] Finally, the Act directs utilities to submit annual plans for renewables deployments to the Commission from 2020 to 2035 and directs the Commission to determine whether those plans "give due consideration" to several factors, including emissions

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[8] Cal. Pub. Utils. Comm'n Staff, Revised Self-Generation Incentive Program Greenhouse Gas Staff Proposal 5 (Dec. 31, 2018), https://perma.cc/SW79-9MPS ("Subsequent SGIP storage impact evaluations have found that SGIP storage has led to a net increase in greenhouse gases . . . ."); *see also* Proposed Decision Approving Greenhouse Gas Emission Reduction Requirements for the Self Generation Incentive Program Storage Budget, Cal. Pub. Utils. Comm'n, Rulemaking 12-11-005 (May 31, 2019), https://perma.cc/FM62-6VQX.

[9] *See* Order Establishing Energy Storage Goal and Deployment Policy, N.Y. Pub. Serv. Comm'n, Case 18-E-0130, In the Matter of Energy Storage Deployment Program 10–11, 29 (Dec. 13, 2018), https://perma.cc/2XJD-KJJ2; *see also* New York State Energy Storage Roadmap and Department of Public Service/New York State Energy Research and Development Authority Staff Recommendations, App'x A 56 (June 2018), https://perma.cc/GQR2-SRJJ ("The analysis . . . presented in the Roadmap considers the carbon offset from energy storage as the delta between the marginal emissions rate (MER) when storage charges and discharges.").

[10] Mass. Code Regs. 225-21.00; *but see also* Comments of Policy Integrity and WattTime on Proposed Clean Peak Energy Standard (Oct. 30, 2019), https://policyintegrity.org/documents/Policy_Integrity_WattTime_Comments_on_Clean_Peak_Standard.pdf (raising concerns about disparity between regulation's objectives and likely outcomes with respect to emissions).

[11] Va. Code § 10.1-1308(E); *see also id.* at Preamble ("An Act . . . relating to . . . ending carbon dioxide emissions . . . .").

[12] *See id.* § 56-585.1(A)(5)(c) (requiring Commission to determine that demand-side and energy storage resource deployments would be less cost-effective than new emitting generation before authorizing development or acquisition of such generation).

[13] For a description of the Social Cost of Carbon and its various potential applications by state governments, see DENISE A. GRAB, ILIANA PAUL & KATE FRITZ, INST. FOR POL'Y INTEGRITY, OPPORTUNITIES FOR VALUING CLIMATE IMPACTS IN U.S. STATE ELECTRICITY POLICY (2019), https://policyintegrity.org/files/publications/Pricing_Climate_Impacts.pdf.

[14] *See* Jeffrey Shrader et al., *Valuing Pollution Reductions: How to Monetize Greenhouse Gas and Local Air Pollutant Reductions from Distributed Energy Resources* (Mar. 2018), https://policyintegrity.org/files/publications/Valuing_Pollution_Reductions.pdf ().

reductions and the deployment of energy storage.[15] And so, although the Act does not expressly direct the Commission to examine and mitigate the effect of energy storage on marginal emissions rates, adopting a rule that resulted in demonstrable emissions increases would cut against the basic purpose of the Act, and would forego an opportunity to pursue that purpose more efficiently and effectively.

3. Conclusion: What the Commission Should Do

The Commission's June 29 Order asks, "Should the regulations mandate or limit the deployment of any particular type of energy storage resource or facility? If so, please explain," and also, "What additional provisions should be included in the required regulations?" In response, Policy Integrity encourages the Commission to consider including in its rule a combination of incentives and restrictions to prevent energy storage resources from increasing emissions and lengthening the lives of emitting generators that might otherwise retire sooner. First and foremost, this would mean directing utilities (or a third party) to analyze and report on the marginal emissions impacts of storage deployments, either when they are proposed, after they have been implemented, or both. It would also mean at least exploring—and, ideally, designing and implementing—approaches to address any net emissions increases identified by the net marginal emissions analysis. As noted above, models for such approaches are available from the several states have done so.[16]

Respectfully submitted,

/s/ Justin Gundlach

Justin Gundlach, Attorney
Institute for Policy Integrity at NYU School of Law
139 MacDougal Street, 3rd floor
New York, NY 10012
Email: justin.gundlach@nyu.edu
Phone: (212) 992-8932

[15] Va. Code § 56-585.5(D)(4).
[16] *See* notes 8 through 10, *supra.*