Institute *for* Policy Integrity

new york university school of law

August 21, 2015

Hon. Kathleen H. Burgess, Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350

VIA ELECTRONIC SUBMISSION

Attn: Case No. 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision

Subject: Party Comments on New York State Department of Public Service, Staff White Paper on Benefit-Cost Analysis in the Reforming Energy Vision Proceeding, Docket No. 392 (July 1, 2015)

Dear Secretary Burgess:

The Institute for Policy Integrity at New York University School of Law[1] ("Policy Integrity") respectfully submits the following comments[2] on the New York State Department of Public Service's Staff White Paper on Benefit-Cost Analysis in the Reforming Energy Vision 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 has extensive experience advising stakeholders and government decisionmakers on the rational, balanced use of benefit-cost analysis, both in federal practice and in New York.

We are grateful for the Commission's consideration of these comments.

Sincerely,

Denise A. Grab
Senior Attorney
Institute for Policy Integrity
grabd@exchange.law.nyu.edu

Burcin Unel
Senior Economist
Institute for Policy Integrity
burcin.unel@nyu.edu

[1] No part of this document purports to present New York University School of Law's views, if any.
[2] These comments incorporate by reference into the record all of the documents cited herein.

INTRODUCTION

Recently, New York has continued to strengthen its role as a leading state modernizing its electrical grid in the face of a changing world. As part of these efforts, the Public Service Commission ("Commission") has taken great strides in improving its benefit-cost analysis methodology, to help determine which projects to prioritize in modernizing the grid. Policy Integrity previously submitted comments encouraging the Commission to use benefit-cost analysis best practices to evaluate investments in the resiliency context, in connection with the 2013 Con Edison ratemaking case. Among other recommendations, Policy Integrity noted the importance of conducting comprehensive benefit-cost analyses that monetize all effects, including externalities, to the extent feasible.[3] In its February 21, 2014 order, the Commission adopted an approach consistent with Policy Integrity's recommendations.[4] In the months since, the Commission and Department of Public Service Staff ("Staff") have worked extensively to improve the Commission's approach to benefit-cost analysis on issues at the cutting edge of electricity policy. In connection with the Reforming the Energy Vision ("REV") proceeding, the Commission and Staff have consulted with experts and engaged with stakeholders on the issues involved.[5] In response to the Commission's February 26, 2015 Order,[6] Staff compiled and opened for public comment its extensively researched White Paper on Benefit-Cost Analysis in the Reforming Energy Vision Proceeding ("White Paper")[7] recommending how utilities should conduct benefit-cost analysis in REV and related proceedings. Staff has done an excellent job researching and analyzing important issues regarding benefit-cost analysis for a changing electrical grid, but Staff and the Commission can take certain steps to make the analysis even stronger. In particular, Staff and the Commission should:

- Ensure that the primary benefit-cost analysis used for decisionmaking on REV-related projects employs a societal perspective and a societal discount rate, and differentiates, as appropriate, between resource-allocation decisions and pricing decisions.
- Verify that benefit-cost analysis for REV proceedings accounts for all externalities.
- Instruct that the benefit-cost analysis should use true resource costs and monetize effects using the full marginal damage value of avoided emissions, regardless of other policies that may reduce emissions. In so doing, the analysis should account

[3] Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc., Comments of the Frank J. Guarini Center on Environmental and Land Use Law & Institute for Policy Integrity, PSC Case No. 13-E-0030, Filing No. 476, at 5 (Jan. 10, 2014).
[4] Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc., Order Approving Electric, Gas, and Steam Rate Plans in Accord with Joint Proposal, PSC Case No. 13-E-0030, Filing No. 495, at 67-68 (Feb. 21, 2014).
[5] *See* Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues, PSC Case No. 14-M-0101, Filing No. 109, at 2 n.2, 44-49 (Aug. 22, 2014).
[6] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Adopting Regulatory Policy Framework and Implementation Plan, PSC Case No. 14-M-0101, Filing No. 324, at 124-25 (Feb. 26, 2015).
[7] Proceeding on Motion of the Comm'n in Regard to Reforming the Energy Vision, Staff White Paper on Benefit-Cost Analysis in the Reforming Energy Vision Proceeding, PSC Case No. 14-M-0101, Filing No. 392 (July 1, 2015) [hereinafter White Paper].

for the effects of concurrent policies by calculating the quantity of reduced emissions expected from each proposed project.

I. The primary benefit-cost analysis used for decisionmaking on proposals related to the REV proceeding should use a societal perspective and a societal discount rate, and distinguish, as appropriate, between resource-allocation decisions and pricing decisions

The Commission's goal in the REV proceedings is to establish a benefit-cost analysis framework, which will be used to "guide overall policy decisions and to fairly compare substitutes, accounting for system-wide, aggregated benefits and costs."[8] The Commission would like the framework to be used to "meet overall system cost efficiency, reliability, resiliency, security and societal goals"[9] and to "achieve the best result for the public."[10]

Such statements make it clear that the Commission's goal is to achieve an economically efficient allocation of society's resources among different demand and supply side alternatives by choosing the most socially beneficial investments. Only a societal benefit cost analysis can help the Commission achieve this goal. Thus, the Commission's primary tool for decisionmaking for maximizing the net social welfare, especially in the REV context, should be a benefit-cost analysis that uses a societal perspective. Further, because investments made using this framework will have long lasting societal effects, the analysis should use a societal discount rate.

Finally, the Commission should clarify further how this framework would be applied to qualitatively different economic questions. The Commission's February 26, 2015 Order, and the White Paper, contemplate the use of the framework for "four categories of utility expenditures: (i) utility investments to build [distributed system platform ("DSP")] capabilities; (ii) procurements of [distributed energy resources ("DER")] via selective processes; (iii) procurement of DER via tariffs; and (iv) energy efficiency programs."[11] Three of these categories (utility investment in DSP, procurements of DER through selective processes, and energy efficiency programs) involve resource allocation decisions. These resource allocation decisions require a different economic analysis approach than proposals that involve pricing decisions, such as the remaining category (procurement of DER via tariffs).

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[8] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues, PSC Case No. 14-M-0101, Filing No. 109, at 44 (Aug. 22, 2014).
[9] *Id.*
[10] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, PSC Case No. 14-M-0101, Order Adopting Regulatory Policy Framework and Implementation Plan, Filing No. 324, at 125 (Feb. 26, 2015).
[11] *Id.* at 123 (Feb. 26, 2015); White Paper at 1.

A. The primary benefit-cost analysis used for decisionmaking on REV related projects should focus on a societal perspective

Given that the main focus of the REV proceeding is promoting societal goals, the benefit-cost analysis conducted under the program should use a societal perspective, including applying a comprehensive version of the Societal Cost Test ("SCT"). Focusing instead on the results of narrowly defined tests such as the Utility Cost Test ("UCT") or the Ratepayer Impact Measure ("RIM") would be incomplete and misleading. The UCT focuses on the utility sector, and hence is only an approximation of the net benefits that accrue directly to the supply side of the market, while the RIM focuses on the ratepayer, and thus serves only as an approximation of the net benefits that accrue directly to the demand side.[12] For overall social efficiency, both sides of the market, as well as externalities should be considered at the same time and the benefit-cost analysis should be carried out with the goal of maximizing net social welfare.

In addition to being the most analytically sound way to prioritize policy options in a resource-limited world, a benefit-cost analysis from a societal perspective is the optimal way for the Commission to fulfill its statutory duties of promoting the public interest and preserving environmental values. Several of the Commission's past orders have highlighted the importance of incorporating social externalities into project analysis. The Commission should apply and extend the reasoning of these past orders for the REV proceeding.

The Commission's enabling statutes—as well as statutory interpretations by the courts and by the Commission itself—mandate that the Commission promote the public interest, which includes promoting public health and environmental preservation. New York Public Service Law Section 5 states that the Commission "*shall encourage* all persons and corporations subject to its jurisdiction to formulate and carry out long-range programs . . . for the performance of their public service responsibilities with economy, *efficiency*, and care for the public safety, the preservation of environmental values and the conservation of natural resources."[13] In economics, "efficiency" is defined as maximizing net social welfare—the goal of benefit-cost analysis.[14]

The mandatory term "shall" is also telling, and courts have recognized that these factors have "become an avowed legislative policy"; [15] in particular, this section confers the

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[12] *See* TIM WOOLF ET AL., ADVANCED ENERGY ECONOMY INSTITUTE, BENEFIT-COST ANALYSIS FOR DISTRIBUTED ENERGY RESOURCES: A FRAMEWORK FOR ACCOUNTING FOR ALL RELEVANT COSTS AND BENEFITS 15-17 (2014), *available at* http://www.synapse-energy.com/sites/default/files/Final%20Report (providing a thorough and clear analysis of why the RIM test, as currently used, is inaccurate and misleading).

[13] N.Y. Pub. Serv. Law § 5(2) (McKinney) (emphasis added); *see also id.* § 66 (2) ("The commission *shall* . . . examine or investigate the methods employed . . . in manufacturing, distributing and supplying gas or electricity . . . and [has] *power to order* such reasonable improvements as will *best promote the public interest*, *preserve the public health* and protect those using such gas or electricity.") (emphasis added).

[14] *See*, *e.g.*, N. GREGORY MANKIW, PRINCIPLES OF ECONOMICS 5 (2008) ("[E]fficiency: the property of society getting the most it can from its scarce resources.").

[15] *See* Multiple Intervenors v. Pub. Serv. Comm'n, 166 A.D.2d 140, 143-44 (N.Y. App. Div. 1991) (citations omitted).

Commission with authority to promote energy conservation and public health.[16] Though the Commission has discretion in meeting these goals, its determinations must "bear[ ] a reasonable relationship to the purpose of the enabling legislation."[17] As Section 5(2) demonstrates, the enabling legislation includes goals of promoting the public interest and preserving environmental values. Any project that the Commission approves should therefore be reasonably related to these goals, and the benefit-cost analysis should involve a societal perspective.

The Commission has acknowledged that the environmental and health goals of Section 5(2) are mandatory. In 2007 proceedings to establish long-term electric infrastructure plans, the Commission stated that its decision to begin the planning process was based on its "obligations" under the Public Service Law, which "requires" the Commission to "ensure safe and *adequate service* at just and reasonable rates, *preserve environmental values*, *conserve natural resources*, . . . and *care for the public safety*.[18] The Commission defined "adequate service" as "service that is *reliable*, *environmentally compatible* and *sustainable*."[19] Due to this obligation, the Commission found that "matters such as . . . environmental externalities, energy efficiency, environmental justice, . . . economic development, . . . global warming emissions, . . . and other issues critical to the public interest may be considered."[20] Many of these matters are classic social externalities, and a comprehensive benefit-cost analysis would take them into account. In its February 2014 Order in the Con Ed ratemaking proceeding, the Commission indicated that, in the resiliency context, Con Edison should apply a benefit-cost analysis that assesses "societal cost factors," such as "[t]he risks and probabilities of future climate events, . . . the impact of outages of varying duration on affected customers, and the potential risk to critical facilities," and monetize them "to the extent that reasonable values can be established and will be of practical relevance."[21] In its February 2015 Order in the REV proceeding, the Commission explained, "Accounting for environmental factors in analyzing investment decisions, and internalizing them into market transactions, are priorities of REV and are a logical continuation of past commission policies, as well as being consistent with the State Environmental Quality Review Act and the Draft State Energy Plan."[22] It is important for the Commission to clearly state the goal of this societal benefit-cost analysis as well as the

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[16] N.Y. Pub. Serv. Law § 5(2) (McKinney); *see also* Proceeding on Motion of the Commission to Review Generation Retirement Contingency Plans, Order Accepting IPEC Reliability Contingency Plans, Establishing Cost Allocation And Recovery, And Denying Requests For Rehearing, PSC Case No. 12-E-0503, Filing No. 210, at 15 (Nov. 4, 2013) (also interpreting Section 5(2)).
[17] *Multiple Intervenors*, 166 A.D.2d at 144 (1991).
[18] Proceeding to Establish a Long-Range Electric Resource Plan and Infrastructure Planning Process, Order Initiating Electricity Reliability and Infrastructure Planning, PSC Case No. 07-E-1507, Filing No. 51, at 5 (Dec. 24, 2007) (emphasis added).
[19] *Id*. at 5 n.11. (emphasis added)
[20] *Id*. at 5-6.
[21] Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc., Order Approving Electric, Gas, and Steam Rate Plans in Accord with Joint Proposal, PSC Case No. 13-E-0030, Filing No. 495, at 68 (Feb. 21, 2014).
[22] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Adopting Regulatory Policy Framework and Implementation Plan, PSC Case No. 14-M-0101, Filing No. 324, at 124-25 (Feb. 26, 2015).

associated decisionmaking criteria. In the White Paper, Staff defines one of the goals of REV proceedings as having a distribution platform that provides ratepayers "with the greatest benefits at the lowest cost, while also maximizing consumer options."[23] Even though the core idea of this statement has merit, in the final framework the goal of a societal benefit-cost analysis should be more clearly defined as "maximizing the net social welfare."

To illustrate the difference between a goal of maximizing net social welfare and a goal of providing ratepayers with the greatest benefits at the lowest cost, assume that the decisionmaker has to choose one project from three alternatives: a project that brings $10 million in benefits that costs $6 million, a project that brings $10 million in benefits that costs $5 million, and a project that brings $9 million in benefits that costs $1 million. In this scenario if the goal is to find the project that leads to the greatest benefits ($10 million) at the lowest cost, the second project would be chosen. However, the net benefit of the second project is only $5 million. This is much lower than the net benefit of the third project, $8 million. On the other hand, if the framework clear defines the goal of the benefit-cost analysis as maximizing the net social welfare, the third option, which is the most socially beneficial option, would be chosen.[24]

The framework should clearly explain what the results of the benefit-cost analysis would be compared to. In a resource-constrained world, having benefits greater than costs is a necessary but not a sufficient condition for a project to be undertaken. The alternatives and the counterfactual scenarios must be clearly identified so that the net benefits of the project could be compared against the net benefits of the alternatives. The project should be undertaken only if it leads to higher net benefits than the alternatives or the net benefits that would be attained in the business-as-usual scenario.

Further, Staff should clearly state that the decision rule should be based on a net present value of benefits and costs rather than a benefit-cost ratio. In a resource-constrained context where a choice is required among mutually exclusive alternatives, a ratio-based technique cannot help decisionmakers select the policy option that will deliver the most net benefits to society, especially when the scales of the projects are different. To take a very simplified example, spending $1 to get $10 in benefits has a much higher benefit-to-cost ratio (10:1) than spending $1 million to get $3 million in benefits (3:1); yet from the perspective of net benefits, the $2 million netted by the second project is clearly a much better deal than the $9 total offered by the first alternative. A ratio-based test could mask scale differences, leading to misleading results.

In a benefit-cost analysis, it is crucial that the assumptions are clearly stated and communicated to the stakeholders. However, this alone does not sufficiently inform the decisionmakers and the public. A benefit-cost analysis should include robustness checks of its results by conducting sensitivity analysis. For example, the benefit-cost analysis should

[23] White Paper at 2.
[24] Staff is correct that having more options for the consumers is desirable. However, the welfare benefits of such options, and additional efficiency gains from these options would already be embedded in the consumer surplus calculations and hence will be accounted for in the net social welfare calculations.

be iterated using alternative values of all the relevant parameters and the results of those should be explained in a table. The intensity of the sensitivity analysis should depend on the uncertainty surrounding the specific parameters. For example, the costs of building a solar facility can be estimated with a relative certainty. But the uncertainty surrounding the impacts of DER penetration on the grid is higher. Thus, the sensitivity analysis should include a greater number of scenarios that includes varying degrees of DER penetration. The results of the sensitivity analysis should be clearly summarized and presented, especially if the sensitivity analysis leads to a reversal of the outcome. In that case, the presentation should also include a discussion of possible drivers of this reversal.

Ensuring that the benefit-cost analysis are undertaken from a societal perspective will help to promote the public-interests objectives of the REV proceeding, will satisfy the Commission's statutory requirements and prior precedent, and will help to select the projects that will best help to maximize social welfare.

B. Benefit-cost analysis for REV-related proposals should use the societal discount rate

The White Paper proposes to use a discount rate based on the utility weighted average cost of capital, because the relevant decisions are "being made on alternative utility expenditure plans, costs that are ultimately collected from ratepayers."[25] However, it is precisely because the payments are ultimately coming from ratepayers that a lower, societal discount rate should be used. Instead of the relevant tradeoff being between two different investments that a solely private corporation might make, the tradeoff in these REV decisions will be between alternative grid modernization options funded by ratepayer dollars. As such, the discount rate should reflect societal values, and a discount rate that reflects solely private, capital costs is inappropriate.

Guidance on benefit-cost analysis best practices from the federal Office of Management and Budget indicates, "The effects of regulation do not always fall exclusively or primarily on the allocation of capital. When regulation primarily and directly affects private consumption (e.g., through higher consumer prices for goods and services), a lower discount rate is appropriate."[26] The project proposals in REV will be financed primarily through electricity rates for consumers, meaning that a lower, societal discount rate (the Office of Management and Budget recommends 3%) is appropriate.[27] It is particularly important that the societal discount rate be used for societal benefits, such as the long-term climate benefits.

For example, when the federal government conducts life-cycle cost analyses for prospective energy efficiency investments in federal buildings, it uses a discount rate based upon the interest rate on U.S. Treasury bonds.[28] Currently, the Department of Energy uses a

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[25] White Paper at 10.
[26] OFFICE OF MGMT. & BUDGET. CIRCULAR A-4 at 33 (2004) [hereinafter CIRCULAR A-4].
[27] *See id.* at 33-34.
[28] 10 C.F.R. § 436.14(a); *see also* Federal Energy Management and Planning Programs; Life Cycle Cost Methodology and Procedures, 55 Fed. Reg. 48,217, 48,217 (Nov. 20, 1990) ("[M]easuring the interest rate on

3% discount rate for investments in federal energy efficiency, which is the mandated floor for the discount rate, whereas the actual interest rate on Treasury bonds would result in an even lower discount rate.[29] Just as the federal investments in energy efficiency are borne by—and ultimately benefit—federal taxpayers, the New York investments in modernizing the grid edge will be borne by—and ultimately benefit—New York ratepayers. So the Public Service Commission should follow the guidance of the federal Office of Management and Budget and Department of Energy and use discount rates that are lower than the weighted average cost of capital, currently around 5.5% for New York.[30] Other leading states that employ total resource cost or societal costs tests calculate their discount rates using techniques other than the weighted average cost of capital and have substantially lower discount rates than New York does.[31] The Commission may decide to use a slightly higher discount rate than the return on Treasury bonds, in order to ensure returns for investor-owned utilities. However, the Commission should follow the best practices of its peer states and use a discount rate lower than the weighted average cost of capital, in order to ensure "just and reasonable rates" for its ratepayers and a socially optimal outcome.

The use of a lower, societal discount rate is especially important in the context of project decisions that have projected climate benefits that will accrue over many decades. As the White Paper acknowledges, economists especially support the use of a lower discount rate in the intergenerational context, due to equity concerns.[32] The Interagency Working Group that developed the federal Social Cost of Carbon used a range of lowered discount rates, specifically 2.5 percent, 3 percent, and 5 percent, in calculating the Social Cost of Carbon.[33]

Recent research has shown that the appropriate discount rate for intergenerational analysis may be even lower than that reflected in the Social Cost of Carbon analysis. For example, a recent study found that economics experts believe that the discount rates used

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U.S. Treasury bonds and removing the effects of inflation is the appropriate procedure for setting a market-based discount rate to be used in performing life cycle cost analyses for purposes of estimating and comparing the cost effects of investing in greater energy efficiency in Federal buildings.").

[29] AMY S. RUSHING ET AL., NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, ENERGY PRICE INDICES AND DISCOUNT FACTORS FOR LIFE-CYCLE COST ANALYSIS—2014, NISTIR 85-3273-29, at 1 (2014), *available at* http://www.nist.gov/customcf/get_pdf.cfm?pub_id=917494.

[30] TIM WOOLF ET AL., ADVANCED ENERGY ECONOMY INSTITUTE, BENEFIT-COST ANALYSIS FOR DISTRIBUTED ENERGY RESOURCES: A FRAMEWORK FOR ACCOUNTING FOR ALL RELEVANT COSTS AND BENEFITS 56 tbl.21 (2014), *available at* http://www.synapse-energy.com/sites/default/files/Final%20Report.pdf.

[31] *Id.* (showing discount rates ranging from 0.55% to 3% for states that include more than the utility costs in their analysis).

[32] *See* White Paper at 38-39 and citations therein; *see also* Richard L. Revesz & Matthew R. Shahabian, *Climate Change and Future Generations*, 84 S. CAL. L. REV. 1097, 1099-1101 (2011) (discussing the economic and moral implications of discounting in the intergenerational context); CIRCULAR A-4 at 35-36 (indicating that a discount rate lower than 3%, typically in the range of 1-3%, may be appropriate for intergenerational discounting).

[33] INTERAGENCY WORKING GROUP ON SOCIAL COST OF CARBON, UNITED STATES GOVERNMENT, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 at 23 (2010), *available at* http://www.epa.gov/oms/climate/ regulations/scc-tsd.pdf.

for the federal Social Cost of Carbon should be equal to or lower than that used in the analysis so far. [34]

Because of the many concerns surrounding intergenerational discounting of long-lasting societal effects, if the Commission does decide to use a higher discount rate to reflect infrastructure investment in the near-term, it should use a separate, lower discount rate to reflect long-term climate benefits of REV investments. Further, this lower discount rate used for societal benefits should be equal to the discount rate that is used to calculate the Commission's chosen Social Cost of Carbon. If the Commission uses a SCC calculated at 3% to monetize the avoided emission benefits in a given year, but then discounts it using a different rate while calculating the net present value of the net societal welfare, it would confound the results of the analysis.

C. Benefit-cost analysis for REV proposals should differentiate, as appropriate, between resource-allocation decisions and pricing decisions

In accordance with the Commission's February 26, 2015 Order, the White Paper explains that the benefit-cost analysis framework is designed for use with "four categories of utility expenditures: (i) utility investments to build DSP capabilities; (ii) procurements of DER via selective processes; (iii) procurement of DER via tariffs; and (iv) energy efficiency programs."[35] These four categories can be classified into two types of decisions: resource allocation decisions, and pricing decisions. Three of the four categories (utility investment in DSP, procurements of DER through selective processes, and energy efficiency programs) involve resource allocation decisions. These resource allocation decisions require a different economic analysis approach than proposals that involve pricing decisions, such as the remaining category (procurement of DER via tariffs). Resource allocation decisions refer to choosing the most beneficial alternative in procurement and investment decisions. Pricing decisions refer to valuing alternatives and developing a tariff accordingly.

Application of a benefit cost analysis in the context of resource allocation is relatively straightforward. The net benefits of each alternative resource, whether it is a demand side or a supply source resource, can be represented using a common metric of dollars when a net present value approach is used. Thus, as long as the benefit-cost categories are consistently calculated for each resource, comparing the net benefits of each alternative, or portfolio of alternatives, and choosing the one that yields highest net benefit will ensure

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[34] PETER H. HOWARD & DEREK SYLVAN, THE ECONOMIC CLIMATE: ESTABLISHING CONSENSUS ON THE ECONOMICS OF CLIMATE CHANGE 32 (2015), *available at* http://ageconsearch.umn.edu/bitstream/205761/2/AAEA_HowardSylvan_2015_Update.pdf. Other studies have recommended lower discount rates, as well. *See, e.g.*, Moritz Drupp et al., *Discounting Disentangled: An Expert Survey on the Determinants of the Long-Term Social Discount Rate* 3 (Ctr. for Climate Change Econ. & Policy Working Paper No. 195, 2015), *available at* http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/06/Working-Paper-172-Drupp-et-al.pdf (recommending a long-term social discount rate of 2.25 percent).

[35] White Paper at 1 (quoting Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Adopting Regulatory Policy Framework and Implementation Plan, PSC Case No. 14-M-0101, Filing No. 324, at 123 (Feb. 26, 2015)).

that society's resources are allocated efficiently. Staff already explains this proper way of using a benefit cost analysis in the White Paper.[36]

Using a benefit-cost analysis framework for tariff development, on the other hand, is less straightforward. The purpose of a benefit-cost analysis is to understand whether a specific investment or policy is desirable.[37] The analysis is intended to calculate total benefits and total costs associated with a project. But it is not intended to estimate marginal costs, and hence cannot be used to determine efficient price signals.[38] While the framework can be used to determine the benefit and cost categories that should be valued in a proper DER tariff as Staff notes,[39] clearer guidance on how exactly the benefit-cost analysis would be used in pricing decisions, the distinction between the values that would be used for monetization in a benefit cost analysis and the values that would be used in tariffs, and the necessity of separate marginal cost studies is needed.[40]

II. Benefit-cost analysis for REV-associated proceedings should explicitly consider all externalities, both positive and negative, instead of relying on proxy approaches

The White Paper proposes three potential approaches to considering externalities in a benefit-cost analysis: (1) relying on compliance cost values reflected in Location Based Marginal Price ("LBMP") forecasts; (2) conducting a detailed calculation of net marginal damage costs; and (3) using values derived from renewable energy credit programs for large-scale renewables in the Renewable Portfolio Standard Main Tier solicitation program. Both approaches (1) and (3) are proxy approaches: they attempt to value externalities by looking at metrics in a market. However, the very nature of externalities means that their effects accrue to parties other than those involved in a market transaction. Thus, their true value will not be fully captured by market proxies. Even though it requires more effort, the only conceptually sound approach to evaluating externalities is to directly conduct a detailed calculation of net marginal effects, along the lines proposed in the White Paper's approach (2). As the Staff already notes, approach (2) is the "most complete, rational and defensible approach."[41] These comments detail proposed improvements to the methodology laid out in the White Paper's approach (2) that will make the approach more economically sound and also more manageable in the face of uncertainty.

As it stands now, approach (2) proposes accounting for certain key externalities, such as carbon dioxide emissions, but the White Paper recommends against monetizing the full scope of externalities affected by potential REV decisions.[42] It is essential for a benefit-cost

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[36] White Paper at 5-6.
[37] Application of Nevada Power Company d/b/a NV Energy for Approval of a Cost of Service Study and Net Metering Tariffs, Testimony of Ahmad Faruqui, Nev. PUC Docket No. 15-07041, File ID No. 4399, at 216, 231 (July 31, 2015).
[38] *Id.*
[39] White Paper at 6.
[40] Some of the implications of calculating DER tariffs in the presence of other policies are explored further in Section III.A.2 below.
[41] White Paper at 31.
[42] *Id.* at 41.

analysis to monetize as many significant societal externalities as possible in order to accurately reflect the true costs and benefits of a project. Many other leading states have already expanded their screening tests to consider a fuller range of externalities in their benefit-cost analyses. For example, for energy efficiency projects, Rhode Island monetizes various externalities, including health and safety benefits, improved comfort (thermal and noise reduction), property value benefits, and other societal impacts in its project assessments.[43] Massachusetts, the highest ranking state for energy efficiency according to ACEEE,[44] also applies an expansive cost test for energy efficiency and has considered adopting a similar test for resiliency. The state's test uses a societal discount rate and monetizes various health, safety, and environmental benefits in its analyses[45]—both hallmarks of cost-benefit methodology.[46] These practices of forward-thinking states demonstrate that it is appropriate and possible to monetize many non-energy benefits in a benefit-cost analysis.

In addition to the benefits and costs discussed in the White Paper, DERs may provide other benefits to the society. These benefits include reduced financial and security risks, health benefits, and economic development, among others. Even though some of these benefits may be difficult to quantify, that does not justify counting these values as zero.[47] The Commission has previously indicated the importance of monetizing externality values to the extent feasible.[48] Methodologies exist to estimate many of the non-energy benefits of proposed REV projects,[49] and the benefit-cost analysis should reflect the best-available monetization methodologies.

It should be noted that while most discussions of DERs focus on external social benefits (i.e., positive externalities), DERs may also result in external social costs (i.e., negative externalities). For example, a full rollout of Advanced Metering Infrastructure to enable a more integrated grid raises concerns about health effects of resulting electromagnetic

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[43] *Id.* at 46, 57-58.
[44] *See Executive Summary, 2014 State Energy Efficiency Scorecard*, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON. 4, http://aceee.org/files/pdf/summary/u1408-summary.pdf (last visited Aug. 20, 2015).
[45] TIM WOOLF ET AL., SYNAPSE ENERGY ECONOMICS, INC., ENERGY EFFICIENCY COST-EFFECTIVENESS SCREENING IN THE NORTHEAST AND MID-ATLANTIC 43 (2013); ELIZABETH DAYKIN, ET AL., PICKING A STANDARD: IMPLICATIONS OF DIFFERING TRC REQUIREMENTS, THE CADMUS GROUP 2 (Dec. 15, 2010).
[46] *See generally* CIRCULAR A-4.
[47] *Cf.* Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 538 F.3d 1172, 1200 (9th Cir. 2008) ("NHTSA's reasoning is arbitrary and capricious for several reasons. First, while the record shows that there is a range of values, the value of carbon emissions reduction is certainly not zero.").
[48] Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc., Order Approving Electric, Gas, and Steam Rate Plans in Accord with Joint Proposal, PSC Case No. 13-E-0030, Filing No. 495, at 68 (Feb. 21, 2014) ("The risks and probabilities of future climate events, the expected useful life of assets, the impact of outages of varying duration on affected customers, and the potential risk to critical facilities, among other societal cost factors, should be considered, and should be monetized to the extent that reasonable values can be established and will be of practical relevance.").
[49] For example, a report prepared by Dr. Bruce Tonn at the Oak Ridge National Laboratory, which is expected to be released soon, calculates many non-energy benefits of an energy conservation program, including health and productivity benefits. *See* NATIONAL ASSOCIATION OF REGULATORY UTILITY COMMISSIONERS, NARUC 2015 SUMMER COMMITTEE MEETINGS PROGRAM 17 (2015), *available at* http://summer.narucmeetings.org/2015_Summer_Program-Final.pdf.

fields, privacy, and increased vulnerability to cyber terrorism. While, in reality, some of these negative effects may be minimal compared to the benefits, a benefit-cost analysis should consider them, or should explain why they were excluded from the analysis.

Even if it is difficult to monetize or quantify a particular benefit or cost, the analysis cannot disregard an important category of benefits or costs. In such cases there are alternatives the analysis can use. One alternative is to use a "breakeven analysis" to estimate the point at which the benefits of a particular policy justify the potential costs. A breakeven analysis measures how high the unquantified or unmonetized benefits would have to in order for the benefits to justify the costs (the breakeven point) and then estimates whether the unquantified or unmonetized benefits are likely to be higher or lower than this point.

Another alternative is to use "Multi-Criteria Decision Analysis" (MCDA). When all the benefits and costs can be quantified, the decisionmaker can simply rank alternative policy options according to their net benefit, and choose the alternative with the highest net benefit. However, when one or more of the value components cannot be quantified, ranking policy alternatives is not so straightforward and decisionmakers may attempt to use heuristics to choose among alternatives. Valuable information may be lost in the process.[50] MCDA provides a method that can be applied to reliably rank alternatives using all the information available.

Finally, the Commission should note that the categories of quantified and unquantified benefits are not immutable. Instead, they are highly permeable.[51] Empirical and analytical methods of quantification as well as computational technologies are rapidly advancing, allowing us to quantify and monetize value components that were once thought unquantifiable. Further, given the fast changing pace of the industry, there may be some value components that we cannot yet foresee. For example, if improved energy storage allows solar and wind energy to be more easily dispatchable, the cost and benefit of DER as well as any other infrastructure investment would change significantly. Thus, it is important that the Commission and Staff review these value components and evaluation methods periodically to ensure that all relevant components are included in the benefit-cost analysis and that the quantification methods are state-of-the-art.

III. The benefit-cost analysis should use the true resource benefits of avoided energy use and the full marginal damage value of avoided emissions, but should account for the effects of concurrent policies when calculating the quantity of reduced emissions expected from a proposed project

Best practices for benefit-cost analysis indicate that a decisionmaker should use the true resource benefits of avoided energy use and the full marginal damage value of avoided emissions as the basis for the calculations. Using alternative values for these parameters can cause distortions in the analysis, particularly when exogenous policies affect different

[50] Gregory A. Kiker et al., *Application of Multicriteria Decision Analysis in Environmental Decision Making*, 1 INTEGRATED ENVIORNMENTAL ASSESSMENT AND MANAGEMENT 95, 108 (2005).
[51] Richard L. Revesz, Quantifying Regulatory Benefits, 102 CAL. L. REV. 1423, 1436 (2014).

proposal options differently (such as when generators above a certain size are subject to RGGI while ones below that size are not).

By and large, Staff has done an excellent job reviewing different components and proposing clearly thought out valuation methods for each component. However, the White Paper appears to indicate that the benefit-cost analysis should use modified versions of the value of avoided energy use[52] and the value of avoided emissions,[53] which adds unnecessary complexity and creates a risk of distortions in the analysis. As laid out in the White Paper, Staff proposes to use the Congestion Assessment and Resource Integration Study ("CARIS") model to monetize the value of avoided energy use, and "the CARIS model and database to calculate the change in the tons produced of each gas by the bulk system when system load levels are reduced" and then multiply those quantity estimates "by an estimate of the $/ton value of marginal damage costs, net of the costs already internalized by CARIS"[54] to monetize the value of avoided emissions.

This approach is appealing at first glance, but additional analysis reveals that it is conceptually problematic. Instead of using CARIS forecasts that include compliance costs to estimate avoided energy benefits, and reducing the marginal damage *values* based on other policies reflected in CARIS estimates, an economically sound analysis should use the true resource benefits of energy use to monetize the avoided energy use and the full marginal damage value to monetize each unit of reduced emissions from a proposed REV project. Instead of trying to embed the effect of existing policies in the values for avoided energy use or marginal pollution damage, the analysis should account for the effect of these other policies when calculating the *quantity* of reduced emissions attributable to the proposed project.

A. When monetizing the value of avoided emissions, the benefit-cost analysis should use both the true resource benefits of avoided energy use and the full marginal damage value of avoided emissions

Benefit-cost analyses for proposed REV projects should use LBMP forecasts *exclusive* of any compliance costs to calculate the true resource benefits of avoided energy use and the full value of each unit of avoided emissions as the marginal damage value multiplier. Using other values—as the White Paper proposes—would result in distortions in the analysis. A discussion of the economic theory will help explain why.

Staff has done an excellent job reviewing the basic economic theory behind externalities, so these Comments need to present only a brief refresher.[55] An externality is the uncompensated benefit or cost imposed on third parties by a transaction: in other words, an effect whose cost or benefit is not borne by an acting party. Emissions of greenhouse gases and of other pollutants associated with the production of electricity are textbook

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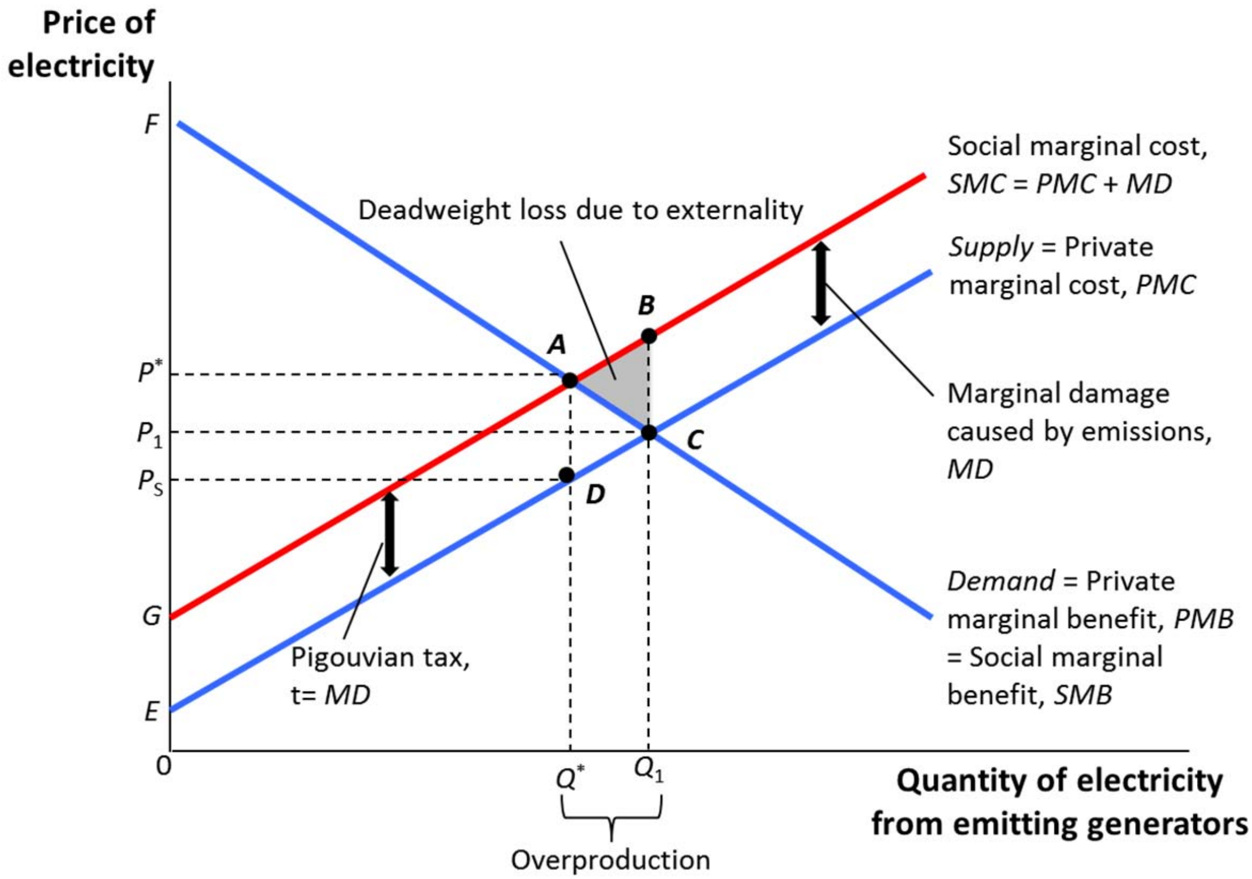
[52] White Paper at 17 (indicating that the estimate of LBMP does and should include compliance costs).
[53] White Paper at 33 (indicating that the analysis should subtract out compliance costs).
[54] White Paper at 33.
[55] White Paper at 29.

examples of negative externalities.[56] The existence of such externalities leads to market failures, producing a market outcome that does not maximize efficiency.[57] For example, in the presence of such negative externalities, the free market will lead to an overproduction of electricity as shown in Figure 1.[58] The free market outcome will be Point C—where the social marginal benefit of electricity consumption equals to the private marginal cost of electricity production—while the socially efficient output level would instead be Point A—where the social marginal benefit of electricity consumption equals the social marginal cost of electricity production including the external marginal damage.

Figure 1. Market Failure Due to Negative Production Externality.



This simple graph can also be used to calculate the net social welfare. The net social welfare at a given level of market output is the difference between the social benefits of consumption at that level—the area below the demand curve—and the social costs of producing at that level—the area below the social marginal cost curve. For example, if the market outcome is point C, the total societal benefit would be given by the area $0FCQ_{11}$. The net social welfare is the difference between these two areas. As can be seen from this

[56] JONATHAN GRUBER, PUBLIC FINANCE AND PUBLIC POLICY 138-142 (4th ed. 2013).
[57] *Id.* at 124-125.
[58] Please note that this graph is not intended to capture all the complexities of the electricity market. It is intended as a simple illustration that can be used to explain these concepts.

graph, the existence of a negative externality leads to an area of deadweight loss—loss of economic efficiency—as the social marginal cost of producing electricity for quantities beyond Q* exceeds the social marginal benefit of consuming them. In other words, since the market participants are not directly paying for any of the costs associated with the pollution, too much of it is produced. In this graph, if the output level could be brought down to Q*, the deadweight loss—the triangle ABC—would be eliminated and the net social welfare would be maximized.

The goal of a benefit-cost analysis is essentially to calculate the net social welfare given alternative policies and choose the one that maximizes the net social welfare, i.e. to choose a policy that would bring the market outcome as close to Point A as possible. Thus, correctly identifying and monetizing the drivers that can change the *net* social welfare is essential to the success of using a benefit-cost analysis to choose a policy alternative. Therefore, it is crucial that the Commission chooses the right approach to value the resource benefits and externalities.

1. Benefit-cost analysis should use the true resource benefits of avoided energy use and the full value of marginal damage estimates, even if a cap-and-trade program exists

Figure 1 can help illustrate the correct parameter for monetizing the benefits associated with avoided emissions. The graph demonstrates two important points. First, the supply curve in the graph, by definition, reflects the marginal private cost of production. That is, this curve reflects only the resource costs of producing electricity, and does not show any of the "internalized" costs associated with compliance with any emission pricing programs. Second, given the market demand and supply, the location of the socially optimal Point A relative to the free market outcome depends on the size of the external damage caused by each additional unit of pollution. The size of this marginal external damage is independent of what policies are already in effect. Therefore, regardless of whether other emissions pricing policies, such as the Regional Greenhouse Gas Initiative ("RGGI"), are already in place, the analysis should use the full value of the marginal damage to estimate the socially optimal outcome, Point A.

Understanding these two insights is crucial to the proper application of a benefit-cost analysis in the REV context. The first point implies that, to understand the resource benefits of a policy alternative, the analysis should use cost estimates that best mimic the true resource costs underlying the electricity production. Regulatory best practices, as reflected in the federal Office of Management & Budget's Circular A-4, explain that "benefit and cost estimates should reflect real resource use."[59] That is, when calculating savings resulting from avoided energy use, the appropriate metric to use should be the LBMP forecasts *exclusive* of any compliance costs.

Staff's proposed approach to valuing avoided energy use applies LBMP forecasts that include compliance costs associated with cap and trade programs for CO_2, SO_2 and NO_X.[60]

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[59] CIRCULAR A-4 at 38.
[60] White Paper at 17.

Staff argues that the contribution of such compliance costs should be included in the LBMP forecasts. However, such an approach would not give an accurate estimate of the real resource use associated with a project, and hence would not be the appropriate metric for estimating the avoided energy use.[61] For, example, an increase in RGGI price, all else equal, would artificially increase the utility's cost of production but it would not change the societal resource utilization associated with the production of electricity. Using the full energy portion of the LBMP forecasts, on the other hand, would give an estimate of the true resource savings that is not confounded by any emissions pricing programs and will avoid any possibility of double counting.

Further, including any compliance costs in the definition of the "LBMP" creates a potential for confusion when interpreting the value components. The New York Independent System Operator defines LBMP as the "cost to supply the next increment of load at that particular location,"[62] and it has a specific methodology to calculate LBMPs.[63] This is how the concept of LBMP is used in every context; even the Commission itself defines LBMP the same way in other documents[64] and proposes that it is the "energy value in New York."[65] Even the CARIS methodology defines LBMP as load payments related to energy, losses, and congestion, and reports emission costs "separately from the production costs."[66] Using different definitions of LBMP in different contexts would unnecessarily complicate the interpretation of the results and make it harder to compare across analyses than if the benefit-cost analysis simply excluded compliance costs from the forecast results when calculating avoided energy benefits.

The second crucial insight that can be learned from Figure 1 is that, to the extent that a proposed project leads to net avoided emissions,[67] those net avoided emissions should be monetized using the full value of the monetized damages. This will lead to an approach that can be used to estimate the social marginal cost curve, which can then be used to estimate the true impact of any policy change on the net social welfare. This social marginal cost curve reflects the external damage associated with a marginal unit of pollution, which is

[61] CIRCULAR A-4 at 38.
[62] Glossary, NYISO, http://www.nyiso.com/public/markets_operations/services/customer_support/glossary/index.jsp (last visited Aug. 21, 2015).
[63] NEW YORK INDEPENDENT SYSTEM OPERATOR, NYISO TARIFFS, LBMP CALCULATION at 1999-2028 (2015), *available at* https://nyisoviewer.etariff.biz/ViewerDocLibrary//MasterTariffs//9FullTariff.pdf.
[64] In the Matter of a Status Report on the Demand/Supply Component of the Department's Electric Price and Reliability Task Force Including Recommendations for Specific Utility Actions on the Demand-Side, Order Adopting Action on a Permanent Basis, and Cancelling Tariff Amendments and Directing the Filing of New Tariff Amendments, PSC Case No. 00-E-2054, Filing No. 10, at 2 (June 18, 2001).
[65] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Staff White Paper on Ratemaking and Utility Business Models, PSC Case No. 14-M-0101, Filing No. 416, at 90 (July 28, 2015).
[66] NEW YORK INDEPENDENT SYSTEM OPERATOR, 2013 CONGESTION ASSESSMENT AND RESOURCE INTEGRATION STUDY 16 (2013), *available at* http://www.nyiso.com/public/webdocs/markets_operations/committees/bic_espwg_iptf/meeting_materials/2013-08-12/2013%20CARIS%20Draft%20Report%20%20rev.pdf.
[67] How to calculate the net avoided emissions and implications of RGGI on net avoided emissions will be discussed below.

independent of other policies that may currently be in effect.[68] Because the effects of each marginal unit of pollution are independent of other policies, using the full value of marginal damages to monetize their effect will lead to a more accurate assessment of external benefits than an approach that adjusts for existing policies.

While this approach may seem equivalent to the White Paper's proposed approach (2), it is economically more accurate as this technique clearly differentiates between the real resource benefits (as measured by the value of avoided energy costs expected from the proposed project) and externality benefits (as measured by the value of the avoided damage due to avoided emissions.) Further, if used consistently for all resources, regardless of resource size, it will alleviate the concerns of the Staff regarding perverse incentives that may arise when different-scale emission-free generators receive different compensation.[69]

The inclusion of compliance costs in the LBMP and, hence, in calculating savings related to avoided energy costs unnecessarily complicates the calculations. The White Paper's current approach requires different "instructions" for different DERs—emission-free, emitting, small, large—and, worse, muddles the drivers of net welfare impacts when other emission programs are in effect. Instead, using the LBMP forecasts exclusive of any emission price estimates will lead to an estimate of savings purely related to the system use, and will be a better assessment of resource cost savings associated with reducing the bulk system load due to new resources. Similarly, because the external damage associated with a marginal unit of pollution is independent of existing policies, using the full marginal damage to monetize the effect of net avoided emissions will lead to a better assessment of external benefits.[70] This approach would not only simplify the framework, but would also lead to the Staff's desire to avoid the risk of perverse incentives and ensure that the analysis is "balanced."[71]

2. A cap-and-trade program does not alter the monetary value of the marginal damage estimates that should be used in a benefit-cost analysis

The existence of other policies aimed at reducing emissions does not change the above analysis. To understand the effect of other environmental policies, such as RGGI prices, on net social welfare, it is helpful to review a much simpler setting first. First, imagine a scenario in which there are no policies aimed at internalizing any of the external damages associated with carbon pollution, namely, Point C on Figure 1. In this scenario, one simple emission pricing policy that could achieve economic efficiency would be instituting a "carbon tax" on the producers that is equal to the amount of external damage per unit of

[68] The Department of Environmental Conservation makes similar points. Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Comments of the N.Y. Dep't of Envtl. Conservation, PSC Case No. 14-M-0101, Filing No. 365 (May 1, 2015).
[69] White Paper at 39.
[70] *See* Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Comments of the N.Y. Dep't of Envtl. Conservation, PSC Case No. 14-M-0101, Filing No. 365 (May 1, 2015).
[71] White Paper at 30.

electricity produced.[72] This tax would cause the market to internalize all the costs associated with externality, and move the market equilibrium to Point A. The net social welfare calculated at Point A, however, does not depend on the existence or the nature of the tax. It depends on the real resources that are being used to produce Q*, the externalities associated this level of production, and the benefit that customers get from consuming it. In a societal benefit-cost analysis[73], the tax revenue associated with this carbon tax is a transfer—a monetary payment from one group to another that does not affect total resources available to society.[74] While one party pays the tax, the revenue—the rectangle P^*ADP_s—is collected by the government, and redistributed back to society.[75] Thus, the tax revenue, while having distributional consequences, does "not affect total resources available to society", and hence should not be included in the benefit-cost analysis.[76] If, for example, a DER leads to a small decrease in the quantity produced in this market, the associated benefits would be the resource savings associated with this decrease—the avoided production costs—and the full value of the reduced emissions; the tax revenue would not factor into the analysis. While the firms pay less tax when they reduce production, this also means that government collects less revenue and the amount redistributed back to the society goes down by the same amount, making the impact of taxes on net social welfare zero.

The rest of this section will analyze the case study of the value of carbon dioxide reductions, in the face of a cap-and-trade program like RGGI. Though the focus here is on carbon dioxide reductions, the same logic would apply to programs like the Cross-State Air Pollution Rule, aimed at reducing other pollutants like SO_2 and NO_x.

The impact of RGGI can similarly be illustrated in a simple graph, Figure 2. Even though RGGI program itself is not a direct tax on emissions, RGGI prices for carbon allowances are functionally similar to carbon taxes; they are intended to induce producers to internalize the external cost of carbon emissions and the revenue collected by this pricing program is redistributed to the society.[77] However, as the RGGI prices[78] are lower than the marginal damage,[79] the RGGI program by itself is not sufficient to help the market fully internalize the external damage. Thus, the market outcome will be at Point I, an intermediary point between Point A and Point C. At this point, some—but not all—of the external damage is internalized. The deadweight loss—the triangle HIA—is smaller, but the market still overproduces electricity from emitting generators.

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72 This is called a Pigouvian tax.

73 This is not the case if perspectives other than a societal perspective are used. For example, avoided carbon tax would be included as a benefit if the utility perspective is used.

74 Stephanie Riegg Cellini & James Edwin Kee, *Cost-Effectiveness and Cost-Benefit Analysis*, *in* HANDBOOK OF PRACTICAL PROGRAM EVALUATION 493, 513 (Joseph S. Wholey et al eds., 3rd ed. 2013); J. PRICE GITTINGER, ECONOMIC ANALYSIS OF AGRICULTURAL PROJECTS 42 (2nd ed., 1984).

75 Of course, there could be leaks from the system due to administrative costs and, if they exist, those costs should be considered in the BCA.

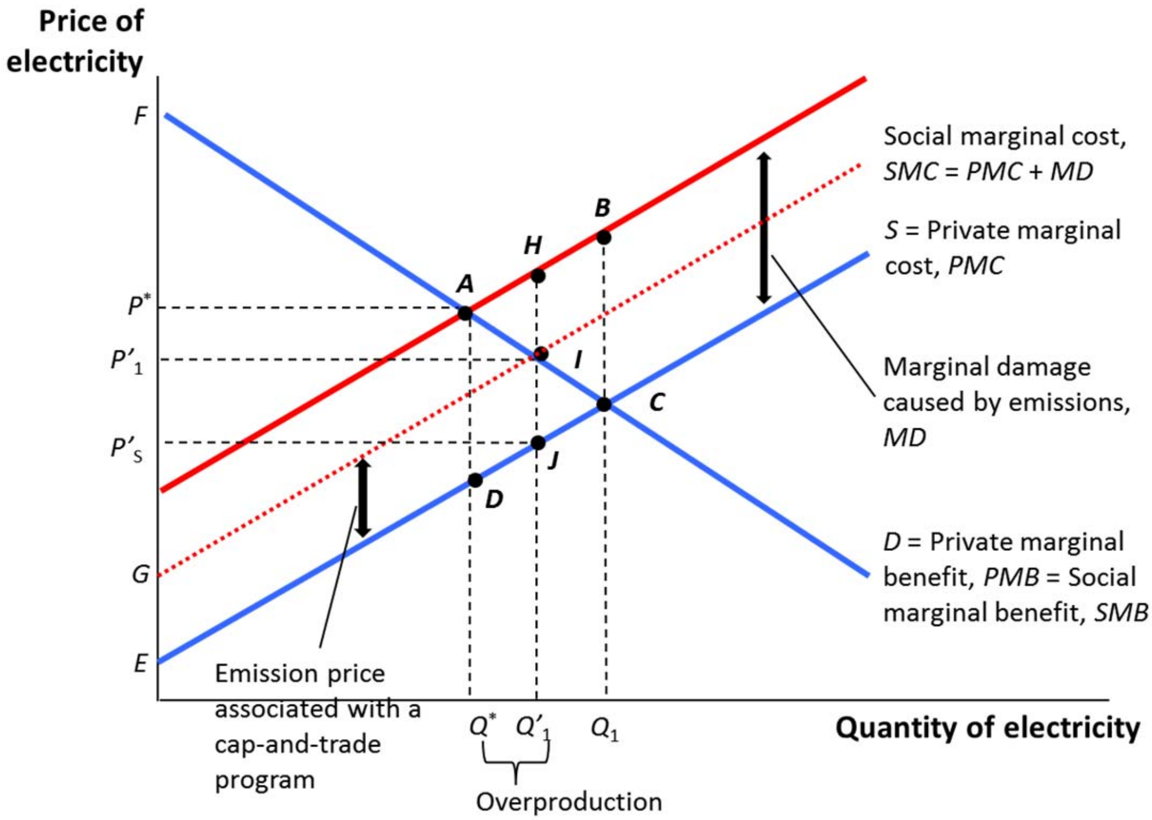
76 CIRCULAR A-4 at 38.

77 JONATHAN GRUBER, PUBLIC FINANCE AND PUBLIC POLICY 142 (4th ed. 2013).

78 POTOMAC ECONOMICS, MARKET MONITOR REPORT FOR AUCTION 28, at 8 (June 5, 2015), http://www.rggi.org/docs/Auctions/28/Auction_28_Market_Monitor_Report.pdf.

79 White Paper at 32.

Figure 2. Impact of Emission Pricing Programs as a Solution to Negative Production Externalities.



RGGI revenue (the area of the rectangle $P'_1IJP'_S$), like any other transfer,[80] should not be counted in a societal benefit-cost analysis. When a societal perspective is used, this transfer revenue should not be treated either as an avoided compliance cost, or as an indirect metric for calculating the benefit of avoided emissions.[81]

However, as currently structured, the White Paper's proposed approach (2), in the case where RGGI has a "binding" cap, would count the RGGI revenue in the benefit-cost analysis.[82] RGGI prices do not affect the actual resource cost related to the production of electricity of Q'_1 units. If RGGI prices were to increase overnight because of a new policy announcement, this does not mean that the marginal damage caused by emissions is

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80 Nearly all of the revenue is distributed back in forms of several different programs. PAUL J. HIBBARD ET AL, ANALYSIS GROUP, THE ECONOMIC IMPACTS OF THE REGIONAL GREENHOUSE GAS INITIATIVE ON NINE NORTHEAST AND MID-ATLANTIC STATES 4 (2015), *available at* http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf.

81 Of course, it is important to understand how RGGI revenues are distributed. To the extent that all the revenue collected from firms serving the NYS area is distributed in NYS, the net transfer is zero. However, net outflow of transfers to other states through RGGI mechanism should count as costs, and net inflow of transfers from other states should count as benefits. *Cf.* CIRCULAR A-4 at 38 (making this point with respect to international transfers from the domestic perspective).

82 The White Paper's proposed approaches (1) and (3) also would inappropriately use prices associated with other trading programs as a metric for valuing the benefits of the avoided externalities.

suddenly higher; it just means that the price reflects the changes in the demand and supply conditions of the allowance market. If RGGI revenues were to change, the total amount that could be transferred to energy efficiency programs, for example, would also change. Hence, RGGI revenue, just like tax revenue, does not change the net social welfare, but instead redistributes it. As such, RGGI revenue should not factor directly into the benefit-cost analysis, where the focus is on societal welfare.

As explained in Section I.C above, the goal of a benefit-cost analysis is not to determine the efficient price signals. Thus, subtracting compliance costs associated with emission pricing programs from the Social Cost of Carbon ("SCC") in order to determine the net marginal damage cost for monetization is not appropriate in a societal benefit-cost analysis. Adjusting for existing pricing programs would be appropriate as part of an analysis designed to answer the question of what the optimal emissions tax for emitting resources (or the optimal subsidy for avoided emissions) would be in the presence of RGGI. Although the value of the marginal external damage from pollution is independent of RGGI and other policies, these other policies would affect the optimal pollution control policy going forward. Thus if, the goal is to calculate the optimal tax or subsidy—or to decide what the value of avoided emissions should be in a DER tariff—then it would make sense to calculate the portion of the external damage that has not yet been internalized (the distance between Point H and Point I in Figure 2). Subtracting the RGGI price from the SCC would be a good start for deriving the value of external damage that has not yet been internalized.[83] But, to be accurate, this calculation would need to reflect *all* existing policies affecting the market, not just RGGI. In addition to policies like RGGI and the Clean Power Plan, which might reduce the magnitude of an optimal tax, the analysis would also need to include policies that might increase the magnitude of an optimal tax, such as federal subsidies for fossil fuels.[84]

However, the goal for project-based REV analysis is not to calculate what the exact value of avoided emissions should be in an optimal tariff, but is instead to determine what the monetized benefit of one less ton of emissions in a societal benefit-cost analysis should be. In order to answer that question, the monetization for the benefit-cost analysis should use the full value of the estimates of the monetized external damages, even if other policies are also leading to net avoided emissions. To further emphasize this point, consider a world where a magical policy led to the socially optimal outcome, Point A. If we wanted to impose a new tax on the carbon emissions (or subsidize DER further with the sole purpose of reducing emissions), we would hurt the net social welfare. If we were already at Point A, the socially optimal level of this new carbon tax would be zero. However, the monetary value of the external damages associated with one more ton of carbon emissions at Point A would still be the same. Therefore, Staff should recommend the use of the full value of the

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[83] *See* Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Comments of the N.Y. Dep't of Envtl. Conservation, PSC Case No. 14-M-0101, Filing No. 365 (May 1, 2015); *see generally* RICK HORNBY ET AL, SYNAPSE ENERGY ECONOMICS, INC., AVOIDED ENERGY SUPPLY COSTS IN NEW ENGLAND: 2013 REPORT 4-1 to 4-60 (2013), *available at* publicservice.vermont.gov/sites/psd/files/Topics/Energy_Efficiency/AESC%20Report%20-%20With%20Appendices%20Attached.pdf.
[84] *See* U.S. ENERGY INFO. ADMIN., DIRECT FEDERAL FINANCIAL INTERVENTIONS AND SUBSIDIES IN ENERGY IN FISCAL YEAR 2013 at 11-14 (2015), *available at* http://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf.

monetized damages associated with CO_2 emissions to estimate the monetary value of the benefits associated with avoided CO_2 emissions.

3. The Commission should use the Social Cost of Carbon as an estimate of the marginal damages associated with carbon dioxide emissions

Now that it is clear that the benefit-cost analysis should monetize emission reductions using the full marginal value of monetary damages, the question becomes precisely what values to use. For many pollutants, perhaps most notably with the SCC, the federal government has spent extensive time and resources developing robust models of the monetary damages for each marginal unit of pollution, and it makes sense for the Commission to take advantage of the federal government's efforts and adopt the use of the federal metric. The SCC is "an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year."[85] The SCC was developed by an Interagency Working Group comprised of economic and scientific experts from the White House and multiple federal agencies that regularly met to review technical literature, consider public comments, and discuss relevant inputs and assumptions.[86] The SCC is regularly updated over time to account for changing information and evolving climate effects.[87]

In February 2010, the IWG released estimated SCC values, developed using three widely cited climate economic impact models (known as integrated assessment models). These models were each developed by outside experts, and published and extensively discussed in peer-reviewed literature.[88] The IWG's Technical Support Document discussed the models, their inputs, and the assumptions, including discount rates, used in generating the SCC estimates.[89] In May 2013, after all three underlying models had been updated and used in peer-reviewed literature, the IWG released revised SCC values, with an accompanying Technical Support Document.[90]

Both the 2010 and 2013 Technical Support Documents are comprehensive and rigorous in explaining the IWG's sources of data, assumptions, and analytic methods. The Government Accountability Office recently examined the IWG's process, and found that it was consensus-based, relied on academic literature and modeling, disclosed relevant

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[85] INTERAGENCY WORKING GROUP ON SOCIAL COST OF CARBON, UNITED STATES GOVERNMENT, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 (2013), available at https:// www.whitehouse.gov/sites/default/files/omb/inforeg/ social_cost_of_carbon_for_ria_2013_update.pdf.

[86] INTERAGENCY WORKING GROUP ON SOCIAL COST OF CARBON, UNITED STATES GOVERNMENT, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 at 2-3 (2010).

[87] INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, U.S. GOV'T, RESPONSE TO COMMENTS: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 at 2 (2015).

[88] INTERAGENCY WORKING GROUP ON SOCIAL COST OF CARBON, UNITED STATES GOVERNMENT, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 at 5 (2010).

[89] *Id.* at 5-23.

[90] INTERAGENCY WORKING GROUP ON SOCIAL COST OF CARBON, UNITED STATES GOVERNMENT, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 (2013).

limitations, and was designed to incorporate new information via public comments and updated research.[91] Additional research has found that the SCC is likely too low because it currently omits a number of types of damages from the analysis, but it is the best available estimate of climate effects,[92] and it is regularly updated over time to reflect new information.

The SCC is a standardized number used across multiple regulatory agencies in the federal government, ensuring that all agencies account for climate benefits in a rational and consistent manner.[93] Leading states and municipalities, including Minnesota,[94] and Maine,[95] have also begun using the SCC in their energy-related benefit-cost analysis, recognizing that the SCC is the best available estimate of the marginal economic impact of carbon emission reductions. These states realize that—especially given the extensive effort the federal government has expended developing the SCC and the fact that carbon emissions have the same effect regardless of where they are emitted—it would be a waste of resources for the state to develop its own carbon-damages metric. Like in these other leading states, the Commission should follow the White Paper's proposed approach (2)[96] and use the SCC to monetize the carbon emission effects of energy projects in New York State.

The same argument applies for the marginal damage estimates for SO_2 and NO_x. EPA has already spent considerable effort calculating these values. While it is commendable that NYSERDA plans to conduct a study to estimate regional values for these externalities,[97] such study would only be valuable if the results are likely to be significantly different than EPA's estimates. Additionally, the Staff's concern about the robustness of using EPA's damage estimates[98] is not a strong enough reason by itself to immediately dismiss their use. Such concerns should be resolved by using sensitivity analysis, rather than not including the full additional damages like the Staff suggested.[99]

B. Quantifying net avoided emissions

After determining that the benefit cost-analysis should use the well-grounded, standardized federal values to calculate the monetary impact of each avoided unit of emissions, the question still remains of how to quantify the actual amount of avoided

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[91] GOV'T ACCOUNTABILITY OFFICE, REGULATORY IMPACT ANALYSIS: DEVELOPMENT OF SOCIAL COST OF CARBON ESTIMATES (2014).
[92] PETER HOWARD, INSTITUTE FOR POLICY INTEGRITY, OMITTED DAMAGES: WHAT'S MISSING FROM THE SOCIAL COST OF CARBON 1 (2014), *available at* http://policyintegrity.org/publications/detail/omitted-damages-whats-missing-from-the-social-cost-of-carbon.
[93] *See* Richard L. Revesz, *Quantifying Regulatory Benefits*, 102 CAL. L. REV. 1423, 1439-41, 1454-55 (2014).
[94] THOMAS E. HOFF & BEN NORRIS, CLEAN POWER RESEARCH, MINNESOTA VALUE OF SOLAR: METHODOLOGY (2014), *available at* https://mn.gov/commerce/energy/businesses/energy-leg-initiatives/value-of-solar-tariff-methodology%20.jsp.
[95] MAINE PUB. UTIL. COMM'N., MAINE DISTRIBUTED SOLAR VALUATION STUDY 35 n.26 (2015), *available at* http://www.nrcm.org/wp-content/uploads/2015/03/MPUCValueofSolarReport.pdf.
[96] *See* White Paper at C-1 to C-2.
[97] *Id.* at 35 n.27.
[98] *Id.* at 34
[99] *Id.*

emissions. As the White Paper notes, this requires a more nuanced approach, especially in cases where multiple policies may concurrently affect emission rates.[100] Two aspects warrant further attention in such a calculation: the amount of net avoided emissions in the presence of a cap and trade program, and the level of granularity with which these avoided emissions should be calculated.

1. Calculating the Quantity of Avoided Emissions

Two complications arise in calculating the quantity of avoided emissions. First, as Staff has noted, not all DER is emission-free.[101] For example, distributed solar generation may avoid emissions on a customer site while combined heat and power will have some emissions.[102] The benefit-cost analysis should reflect the differences in emission levels between different types of DERs. If all DERs receive the same compensation regardless of whether they emit or not, this will create perverse incentives, especially if the emitting DERs are cheaper. Thus, the analysis should calculate the amount of avoided emissions based upon reduced energy load from the grid, net of the amount a DER emits, regardless of the size of the DER.

Second, as Staff has explained,[103] the existence of a cap and trade program complicates the calculation of the quantity of avoided emissions. As shown in Figure 1 of the White Paper,[104] the RGGI cap is mostly a vertical supply curve for allowances, with two flat portions: the price floor that would be in effect if the cap is not binding, and the cost containment reserve which would be added to the supply of allowances if prices rise above a trigger price. If the demand for allowances corresponds to any of these flat portions of the supply curve, the cap-and-trade program will essentially function as a carbon tax with reductions in demand for bulk electricity immediately leading to reductions in the number of allowances traded. However, complications arise when the supply of allowances is binding, i.e., when the demand for allowances correspond to the vertical portion of the supply curve.

In the White Paper, Staff argues that if this cap is binding, net emissions would not be reduced if the bulk load level decreases.[105] Staff's reasoning is that if the cap is binding, that means that all of the emissions allowances would already be sold, and hence the quantity of emissions could not change. Staff further asserts that the externality value of DER in this case would depend on either RGGI lowering the level of the cap, or the appearance of other indirect benefits, such as clean energy market development or fuel hedging options.[106] While Staff makes an important observation about how a binding RGGI cap could be problematic, Staff's assessment that there would be no emission reduction benefits if the bulk system load is decreased when the cap is binding is incorrect given the current dynamic nature of the RGGI program.

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[100] *Id.* at 39.
[101] *Id.* at 33.
[102] N.Y. INDEP. SYS. OPERATOR, A REVIEW OF DISTRIBUTED ENERGY RESOURCES 25 (2014).
[103] White Paper at 36.
[104] *Id.* at 38.
[105] *Id.* at 36.
[106] *Id.* at 39.

To be able to quantify avoided emissions that result from a DER given a binding RGGI cap, it is helpful to analyze the impact of several rules of the RGGI program. It is important to keep in mind that RGGI is a program in which *allowances* for carbon dioxide emissions are traded. Thus, the supply curve corresponds to allowances, and not the emissions. While this may seem like an insignificant distinction, it has a significant impact on how to value the environmental and health benefits of DERs. If a DER is reducing the amount of electricity the bulk system needs to generate, then it is stopping a dirtier generator from emitting more carbon dioxide at that instant, and hence, creating an "unused" allowance at that moment, regardless of whether the cap is binding or not. Thus, the relevant questions to ask for the purposes of the benefit-cost analysis framework are what happens to the allowances that are unused as a result of more DER integration and how these unused allowances affect the cap.[107]

For this purpose, it is helpful to look at the history of RGGI. Until 2013, not all of the RGGI allowances offered were sold, so the RGGI cap was not binding.[108] Following a 2012 Program Review, the RGGI states announced changes to the model rule, and the cap was adjusted downward with further annual reductions of 2.5 % until 2020.[109] Since the new rule went into effect in 2013, all of the allowances that were offered have been sold, and the allowance cap has been binding. However, even this did not directly translate to a binding *emissions* cap given that the RGGI rules have allowed for banking of allowances with no time restrictions.

A large bank of unused allowances has accumulated since the inception of RGGI.[110] The number of all allowances in circulation at the end of 2014 was 403 million, 139 million of which were unused. To deal with the unused allowances, RGGI states made further adjustments to the cap in the updated rule to deplete this accumulated surplus by the end of this decade. Between 2014 and 2020, the number of total allowances sold will be reduced by the total number of "banked" allowances during the first and the second control periods (2009-2012, and 2012-2013, respectively.) The updated rule includes further provisions that would make it easier for participating states to retire unused allowances at the end of each control period.

This has important implications for quantifying the amount of avoided emissions. If, for example, a compliance entity ends up with "unused" allowances as a result of distributed solar generation and expects the reduction in demand to be permanent, this would not only reduce the entity's demand for allowances in future years, but it would also induce further adjustments to the allowance cap at the end of each control period. So, the RGGI cap in practice is a dynamically decreasing allowance cap rather than a static emissions cap. Hence, there are indeed externality benefits beyond those that Staff described in the White Paper, even when RGGI allowance cap is used as the metric to quantify avoided emissions.

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[107] RICK HORNBY ET AL, SYNAPSE ENERGY ECONOMICS, INC., AVOIDED ENERGY SUPPLY COSTS IN NEW ENGLAND: 2013 REPORT 4-11 (2013).
[108] POTOMAC ECONOMICS, ANNUAL REPORT ON THE MARKET FOR RGGI CO2 ALLOWANCES: 2014, at 25 (2015), *available at* http://www.rggi.org/docs/PressReleases/PR050515_2014-Annual-Market-Monitor-Report.pdf.
[109] *Id.* at 11.
[110] *Id.* at 7.

These unused allowances may delay when the pollution is emitted, if they are eventually used, or they may lead to a reduction in the cap in the future, as the RGGI program dynamically adjusts allowances. Unused allowances will translate to a reduced allowance cap within a maximum of three years if RGGI continues to retire unused allowances after each control period.

This raises the question whether there is a possibility of a very tight allowances market with no or minimal unused allowances, which could lower or eliminate the quantity of additional emission reductions available under the program. However, this does not seem to be the case. At the end of 2014, entities which had compliance obligations held 76 million surplus allowances, which accounted for 56% of the total surplus allowances. The remaining 44% of the surplus allowances were held by investors, who have no compliance obligations. This accounts for 15% of all allowances. These investors participate both in the primary market for allowances by purchasing them directly in auctions, and in the secondary market by selling the allowances directly or other financial derivatives such as futures and options.[111] Given the current surplus of allowances, a high level of investor participation is expected to continue over the remainder of the decade.[112] Further, given the significant rise of trading volume in the secondary market, both for physical delivery of allowances and futures, [113] and the steady rise in open interest in futures,[114] there is no reason to believe that investors will stop participating in the carbon allowances market in the near future even as the cap tightens, ensuring a continued balance of unused allowances.

Even though the availability of unused allowances in a given year is expected to decrease as the number of allowances offered for sale decreases by 2.5% each year until 2020, this does not necessarily guarantee an eventual full depletion of unused allowances. While the cap decreases, it is also expected that more of the cleaner resources will be integrated into the system as a result of both more DERs on the demand side and more technological innovation from the supply side, freeing up more allowances. Thus, to the extent that the percentage of cleaner resources rises faster than 2.5%, there will continue to be sold-but-unused allowances, leading to an eventual cap reduction.

Finally, as the demand for dirty generation and hence the demand for carbon allowances decrease over the next decades, the prices of allowances may decrease enough to make the market more attractive for another type of investor: environmental groups who buy allowances—either through initial auctions or in the secondary market—to retire coal plants. These types of transactions have already been happening on smaller scales.[115] Given the increasing efforts to battle climate change, it is plausible that these transactions would occur at a much larger scale if the allowance prices decrease enough. In such

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[111] *Id.* at 15.
[112] *Id.* at 24.
[113] *Id.* at 26.
[114] *Id.* at 28.
[115] *See, e.g.*, *Green Group Buys CO2 Emissions Permits to Retire Them*, ENVTL. NEWS SERV., http://www.ens-newswire.com/ens/mar2009/2009-03-20-092.html (Mar. 20, 2009).

circumstances, those allowances will not only remain unused, but they will be retired immediately.

Overall, there are demonstrable benefits due to avoided emissions even in conjunction with a cap-and-trade program. DERs will displace generators from the bulk system, which will lead to unused allowances, and eventually, lower caps. If the Staff would like to recommend using the RGGI cap as a metric to quantify avoided emissions, Staff should study how DERs affect the number of unused allowances and how those unused allowances impact the cap in detail, taking the values created in the secondary market and the timing of control periods into account. However, it is likely that the results of such a study would not differ significantly from an approximation of avoided emissions based upon the quantity of carbon dioxide emissions that the generator displaced by a DER would have emitted.

The main difference between the two approaches to estimating the quantity of avoided emissions—studying the effect of unused allowances on the RGGI cap in detail versus using the quantity of avoided emissions from the displaced generator as a proxy—would stem from the time delay between the "creation" of the unused allowance and the eventual reduction of the RGGI cap. Including the avoided emissions in the benefit-cost analysis using a delayed reduction in the RGGI cap as a metric, however, would undervalue the benefits, as the avoided emissions technically occur at the moment when a DER displaces a bulk generator. A simple use of displaced emissions due to displaced bulk generators as a metric, on the other hand, may potentially overestimate the quantity of avoided emissions if the cap is binding and the unused allowances are simply being shuffled and used by another source. But that overvaluing is likely to occur when the allowances market is tight enough to not have any significant surplus of unused allowances and the cap is expected to be static for the remainder of the time, and hence the cap on *emissions* is binding. Given the current dynamics of the RGGI program, the probability of undervaluing the benefits with the former approach is likely greater than the probability of overvaluing the benefits with the latter approach. Further, the latter approach is much simpler. And, finally, given the importance of cleaner energy resources for mitigating climate change and securing a better future for the next generation, it would be prudent to err on the side of overvaluing cleaner energy rather than undervaluing it. Thus, regardless of whether the RGGI cap is binding, the metric Staff should prescribe to quantify the external benefits of DERs is: the amount of avoided emissions from the marginal generator that the DER will displace at the time when the energy is produced (or when energy is not used in the case of demand response).

2. Determining the granularity of the analysis

In the White Paper, Staff suggests calculating the quantity of avoided emissions by looking at "the change in the tons produced of each gas by the bulk system when system load levels are reduced."[116] While this approach is fairly simple to implement, it is not very accurate given the variation in the types of DERs that would be considered using the framework. Not

[116] White Paper at 33.

all types of REV projects will have the same impact on the bulk system, and the benefit-cost analysis framework should recognize such differences, when they exist.

For example, an energy efficiency program is likely to reduce the bulk demand on average. Thus, calculating the quantity of avoided emissions as the Staff proposes would likely to lead to accurate estimates. However, the same is not true when other DERs are considered. If, for example, the project is installation of more distributed solar generation, this will lead to displacing generators during the day, with the peak displacement happening in the early afternoon hours. Thus, the quantity of avoided emissions will depend on the generator that is on the margin during that time. If solar generation is displacing an emissions-free generator, this will not have any carbon emissions benefits. However, if the generator the solar DER is replacing is dirtier than average, the avoided emissions will be higher than the Staff's suggested formula would provide. Thus, it is important that the framework involves more temporal granularity.

As Staff explains in the Track 2 White Paper, [117] not only do the resource savings associated with DERs depend on the time and location of their deployment, but the amount of external benefits also depend on the marginal generation that is being displaced at a particular time.[118] Such granularity is especially important given the Commission's intention to use this benefit-cost analysis framework as a basis for DER tariffs. Thus, Staff should incorporate its analysis of granularity from the Track 2 White Paper into the benefit-cost analysis framework, explaining that the analysis of both forecasted resource savings and the quantity of avoided emissions should consider the effects of time granularity.

Accurately valuing emission benefits is vital to ensure efficient allocation of resources among different investment alternatives, throughout the REV process, whether for DERs, Distributed System Implementation Plans, or tariff development. If the temporal dimensions are not taken into account, and all DERs are rewarded based on the same average quantity of avoided emissions, then the market incentives will lead to more investment in cheaper DERs, regardless of whether they are the most beneficial for the society when externalities are taken into account.

CONCLUSION

Through REV, the Commission is taking the necessary steps to ensure that New York's electricity system is ready for the changes and challenges of the future. An effective benefit-cost analysis framework will help to ensure that REV actions help to maximize net benefits for the people of New York, both today and into the future. Staff's White Paper moves a great deal toward reaching these goals, but Staff and the Commission should apply certain

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[117] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Staff White Paper on Ratemaking and Utility Business Models, PSC Case No. 14-M-0101, Filing No. 416, at 85-88 (July 28, 2015).
[118] Meredith Fowlie, *Subsidizing Renewables for the Damage not Done*, ENERGY INST. AT HAAS, https://energyathaas.wordpress.com/2015/05/11/subsidizing-renewables-for-the-damage-not-done/ (May 11, 2015). One exception is New York (NYISO), where the marginal emissions rates are significantly lower on average during high-demand hours. Solar PV resources and commercial lighting retrofits, which generate electricity/savings disproportionately during daylight hours, displace fewer emissions per MWh than wind energy or residential lighting improvements.

best practices to ensure that the benefit-cost analysis is accurate, robust, and manageable. In particular, Staff and the Commission should ensure that the primary benefit-cost analysis on REV-related projects employs a societal perspective and a societal discount rate, and differentiates, as appropriate, between resource-allocation decisions and pricing decisions. The analysis should account for all externalities. And the benefit-cost analysis should use true resource costs and monetize effects using the full marginal damage value of avoided emissions.