February 26, 2024

Chris Corcoran
Energy Research and Development Agency
appliancestandards@nyserda.ny.gov

Subject: Cost-Effectiveness of Energy Code Updates

In response to New York State Energy Research and Development Authority (NYSERDA)'s December 27, 2023 notice in the New York State Register, regarding the proposed Addition of Part 510 to Title 21 NYCRR (the Proposed Rule), which would govern the consideration of new Energy Codes or Energy Code amendments by the New York State Fire Prevention and Building Code Council (the Code Council) (the Code Council and NYSERDA collectively, the Agencies), the Institute for Policy Integrity at New York University School of Law[1] (Policy Integrity) respectfully submits the following initial comments. 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.

In summary, these comments recommend as follows.

- The Agencies should anticipate that DEC's social cost of greenhouse gases methodology will likely change and improve over time.
- The Agencies should amend the evaluation criteria for determining "cost-effectiveness" to include societal benefits beyond GHG emissions reductions that may be readily monetizable, particularly societal benefits from emissions of non-GHG emissions.
- The Agencies should explain the proposed rule's omission of certain parameters that are relevant to privately owned buildings.
- The Agencies should confirm that the terms used in the proposed rule, particularly "life-cycle costs," are defined and used accurately and consistently.

[1] This document does not purport to present the views, if any, of New York University School of Law.

I. The treatment of the social cost of greenhouse gases should more flexibly anticipate that DEC's methodology will likely change and improve over time.

The Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022 (the Act) amended New York's Energy Law to state that New York policy is, in addition to encouraging conservation of energy, "to promote the clean energy and climate agenda, including but not limited to greenhouse gas reduction, set forth within… the climate leadership and community protection act" (CLCPA).[2] Accordingly, it modifies Section 11-103 of the Energy Law, which describes the conditions under which the Code Council may amend or replace the state energy conservation construction code, to specify that the consideration of the cost-effectiveness of any proposed modification or replacement shall consider, among other important factors, "secondary or societal effects, such as reductions in greenhouse gas emissions."[3] The Proposed Rule would calculate avoided greenhouse gas emissions by using existing NYSERDA methodologies, assigning a monetary value by naming and incorporating by reference DEC Guidance (*Establishing a Value of Carbon, Guidelines for Use by State Agencies*), and specifying central values and the 2% discount rate.

The Agencies are correct to look to DEC for the monetary value to assign to greenhouse gas emissions. The CLCPA, with which the Act is intended to align, gives the DEC—in consultation with NYSERDA—responsibility for promulgating such a value. The Proposed Rule is fully aligned with the DEC's current approach to valuing greenhouse gas emissions, including identification of 2% as the preferred discount rate at the present time. However, as drafted, the Proposed Rule creates a risk that the cost-effectiveness methodology will not *remain* aligned with the DEC's methodology, because that methodology has changed and will likely continue to change over time. To avoid this risk, the Proposed Rule should state clearly that what it is incorporating by reference is the DEC's most current guidance, including any updates prior to the date at which the cost-effectiveness analysis is performed, and should not specify a discount rate numerically but, rather, should state that discounting from future emissions year is to be based on a discount rate that is the central value for the discount rate in the then most current guidance.

It is essential to keep the methodology up to date because estimating the social cost of greenhouse gases is a rapidly evolving area of inquiry. DEC's methodology was most recently updated in August 2023,[4] and at the time it was adopted, New York's methodology represented the best finalized estimates for the value of carbon adopted by any U.S. jurisdiction. Specifically, it represented an improvement over prior methodologies promulgated by the federal government's Interagency Working Group on the Social Cost of Carbon precisely insofar as the New York methodology updated the central discount rate from 3% to 2%.[5] Subsequently, however, EPA finalized its own climate-damage values in December 2023, following public

---

[2] Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022, Section 2, amending N.Y. Energy Law Section 3-101(2).

[3] Advanced Building Codes, Appliance and Equipment Efficiency Standards Act of 2022, Section 4, amending N.Y. Energy Law Section 11-103.

[4] N.Y. Department of Environmental Conservation, Establishing a Value of Carbon: Guidelines for Use by State Agencies (August 2023), https://extapps.dec.ny.gov/docs/administration_pdf/vocguide23final.pdf.

[5] Max Sarinsky, Inst. for Pol'y Integrity, *The Social Cost of Carbon: Options for Applying a Metric in Flux* (2023), https://policyintegrity.org/files/publications/SCC_Options_for_Applying_a_Metric_in_Flux_Policy_Brief_v2.pdf.

comment and expert peer review.[6] EPA's updated values are the most robust and comprehensive federal climate-damage estimates currently available, and importantly, they update the discount rate as well as other inputs, producing estimates at discount rates of 1.5%, 2%, and 2.5%. EPA's update implements the 2017 roadmap from the National Academies of Sciences for improving the existing Interagency Working Group estimates.[7] EPA's methodology also incorporates newer scientific and economic evidence.[8] Expert peer reviewers praised EPA's numbers as a "huge advance,"[9] a "significant step,"[10] and a "much-needed improvement"[11] that "advanc[es] our state of knowledge"[12] and "represents well the emerging consensus in the literature."[13]

Ideally, DEC will follow suit in incorporating the newest scientific and economic evidence in its own methodology. Moreover, as the science and economics in this area continue to improve in the coming years, leading environmental agencies such as the federal EPA and the DEC could update their figures, including by using any new damage estimates and discount rates.[14] The final version of Part 510 should be drafted in a manner that keep the cost-effectiveness analysis provided for aligned with the most state-of-the-art science and economics in this area as recognized by the State of New York.

Drafting the final rule in a way that will automatically adjust to future updates adopted by DEC is preferable to needing to spend NYSERDA's resources revisiting this rule again every time the DEC may update its central discount rate, or risking that cost-effectiveness determinations could be based on outdated values. The following redline would accomplish this goal:

> The monetary value associated with avoided GHG emissions will be calculated ~~using central values at the 2% discount rate~~ following the current iteration of the New York State Department of Environmental Conservation (DEC) published guidance, Establishing a Value of Carbon, Guidelines for Use by State Agencies, as incorporated by reference in section 510.7 of this Part, or the current successor guidance on establishing a monetary value for greenhouse gas emissions adopted by the DEC. If the DEC guidance provides central values, it is appropriate to use such central values for both damage costs and discount rates. Central values are discounted to the emissions year. Discounting from the emissions year to present

---

[6] ENV'T PROT. AGENCY, EPA REPORT ON THE SOCIAL COST OF GREENHOUSE GASES: ESTIMATES INCORPORATING RECENT SCIENTIFIC ADVANCES (2023).
[7] NAT'L ACAD. SCI., ENGINEERING & MED., VALUING CLIMATE DAMAGES: UPDATING ESTIMATION OF THE SOCIAL COST OF CARBON DIOXIDE (2017).
[8] *See* ENV'T PROT. AGENCY, *supra* note 6, at 46 fig.2.3.1 (comparing publication year of studies underlying EPA's estimates to those underlying Interagency Working Group estimates).
[9] FINAL COMMENTS SUMMARY REPORT, EXTERNAL LETTER PEER REVIEW OF TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF GREENHOUSE GAS 7 (2023) (comments of Dr. Maureen Cropper).
[10] *Id.* at 9 (comments of Dr. Chris E. Forest).
[11] *Id.* at 10 (comments of Dr. Catherine Louise Kling).
[12] *Id.* at 14 (comments of Dr. Wolfram Schlenker).
[13] *Id.* at 15 (comments of Dr. Gernot Wagner).
[14] For example, Circular A-4, which provides the Office of Management and Budget's (OMB's) guidance to Federal agencies on benefit-cost analysis for certain significant rules, has announced that it will publish updated discount rates every three years. OFF. OF MGMT. & BUDGET, CIRCULAR A-4: REGULATORY ANALYSIS 77 (2023), https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf. EPA uses a somewhat different method to derive discount rates for its climate-damage estimates, though its short-term central rate exactly matches Circular A-4's currently recommended 2.0%. *See* ENV'T PROT. AGENCY, *supra* note 6, ch. 2.4. But DEC may consider whether updated data should inspire similar updates in discount rates for climate-damage estimates.

will use ~~a 2%~~ the central discount rate if provided, or otherwise follow the DEC guidance on discounting.

II. The definition of cost-effective should be amended to include societal benefits beyond GHG emissions reductions that may be readily monetizable.

The Regulatory Impact Statement states that the proposed rule "includes broader societal effects of energy use in a *comprehensive* view of costs, benefits, and impacts across New York State."[15] However, the proposed rule's definition of "societal effects" requires inclusion of only "the value of avoided GHG emissions"; the proposed definition does not mention—and, by omission, could even be interpreted not to allow—the consideration of any other costs or benefits. While the consideration of GHG emissions reductions is specifically required by statute, those reductions do not represent the full range of societal benefits. A definition that omits any mention of quantitatively or qualitatively considering other emissions reductions cannot be called "comprehensive." To go beyond the bare minimum specified in the statute, and to move in the direction of a more comprehensive framework, the rule should include consideration of other important societal effects: at a minimum, the analysis should, ideally, be required, and at a minimum, be permitted to consider public health harms caused by non-GHG pollutants that are significant and quantifiable. Including consideration of these harms is feasible and should be part of the framework adopted by the Agencies at this juncture.

A. Non-GHG emissions cause significant harm and are an essential consideration when evaluating the societal benefits of emissions reductions.

Air pollutants cause damage to human health, impair ecosystems, and harm crops and other production activities. Each pollutant has its own relationship between exposure and impact, called the *dose-response function* or *damage function* in epidemiological and economic research. Reductions in fuel and electricity consumption in foreseeable locations and times yield commensurate reductions in a wide range of emissions, including GHG emission as well as non-GHG emissions. The proposed rule incorporates consideration of harm caused by GHG emissions, but omits any consideration of the harm caused by non-GHG emissions, effectively assigning such harms a value of zero. Some examples of non-GHG pollutants that are avoidable through more efficient use of electricity and on-site energy combustion include the following:

1. **Toxic Heavy Metals.** Toxic heavy metals like mercury or lead cause rapid health deterioration even for low concentrations. Heavy metals like mercury and lead can also decrease brain function from childhood or prenatal exposure, leading to marked reduction in IQ.[16] Harms can also occur over long periods of time because heavy metals do not break down once they are released, leading to long-run harms as the public is exposed the pollutant over longs periods of time and permanent, negative health effects for individuals whose bodies cannot get rid of the toxins.

---

[15] Regulatory Impact Statement for Proposed Rule (Title 21 of the Official Compilation of Codes, Rules and Regulations of the State of New York, Part 510) at 2.

[16] Daniel A Axelrad et al., *Dose-Response Relationship of Prenatal Mercury Exposure and IQ: An Integrative Analysis of Epidemiologic Data*, 115 ENVIRON. HEALTH PERSPECT. 609 (2007).

2. **Sulfur Dioxide (SO_2).** Sulfur dioxide (SO_2) is a gas released during combustion of oil and coal that negatively affects the environment and human health. SO_2 irritates mucous membranes in the lungs, eyes, nose, and throat, exacerbating conditions like asthma.[17] SO_2 also breaks down into particulate matter. Fine particulates, especially those smaller than 2.5 micrometers, called $PM_{2.5}$, penetrate into the lungs, causing or exacerbating cardiovascular problems like asthma and heart disease. Fine particulate matter is also a primary contributor to haze and visibility reduction in much of the United States.[18] SO_2 is also a major contributor to acid rain.[19]
3. **Nitrogen Oxides (NO_x).** Nitrogen oxides are gases including nitrogen dioxide, nitrous acid, and nitric acid, which are emitted during the combustion of a range of fossil fuels, including natural gas. Collectively, these gases are referred to as NO_x.[20] Like SO_2, NO_x breaks down into particulate matter, causing cardiovascular health effects and contributing to haze.[21] NO_x, along with other pollutants like VOCs, react with sunlight to create ozone pollution, which is a respiratory irritant that aggravates conditions like asthma.[22]

Given the large magnitude of the public health impacts that non-GHG pollution can cause, especially in densely populated areas, a cost-effectiveness tests that treats these values as if they were of zero value cannot be considered "comprehensive."

B. A reasonable methodology for incorporating assigning monetary values to avoided non-GHG pollution is possible.

Though there are challenges to quantifying and monetizing social harms caused by non-GHG pollutants, they can be overcome.

1. Challenges exist for monetizing non-GHG pollutants, but such challenges can be overcome.

Assigning monetary values to the health harms caused by pollution is more complicated for non-GHG pollutants than for GHG pollution, for several reasons. While GHG pollutants have a global impact that is uniform regardless of where they are emitted, the location of non-GHG pollution – both where it is emitted, and where it is transported – matters. The total harm that non-GHG pollution can cause depends on ambient concentrations of pollution, interaction among pollutants, and the formation of secondary pollutants. And the health effects depend directly on the number of people who are exposed to the pollution, and their underlying health.

---

[17] Richard L. Revesz & Jack Lienke, Struggling for Air: Power Plants and the "War on Coal" 10 (2016).
[18] *Particulate Matter (PM) Basics*, U.S. ENVTL. PROT. AGENCY (last visited March 11, 2018), https://www.epa.gov/pm-pollution/particulate-matter-pm-basics#PM; For a more detailed description of the health effects of $PM_{2.5}$ and ozone, *see* U.S. ENVTL. PROT. AGENCY, Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants at 4-16 to 4-24 (2014), https://www3.epa.gov/ttn/ecas/docs/ria/utilities_ria_proposed-carbon-poll-existing-egus_2014-06.pdf.
[19] REVESZ & LIENKE, *supra* note 17, *at* 11.
[20] *Id*.
[21] *Id.*
[22] Matthew MJ Neidell, *Information, Avoidance Behavior, and Health: The Effect of Ozone on Asthma Hospitalizations*, 44 J. HUM. RESOURCES 450 (2009).

Additionally, pollutants can interact, exacerbating effects. For instance, ozone creation is more likely in the presence of both VOCs and NO_x.[23] Pollutant interaction makes it potentially important to account for ambient concentration of other pollutants when calculating damages per unit of emissions. Such interaction effects might be challenging to quantify in a way that is also easy to administer, so a reasonable alternative would be to incorporate damages that vary by location depending on the average or usual concentration of important ambient pollutants.

Further, pollution can be carried away from the area where it is created through a process called pollution transport. Wind and water carry pollutants away from the point of emission, potentially exposing populations far from the emission source.[24] Rain washes particulate matter out of the air and into bodies of water.[25] Pollution transport models are useful for understanding this movement of pollutants from source to final location. For instance, lighter pollutants like fine particulates can be carried farther than heavier pollutants like PM_{10}, making modelling of transport for fine particulates relatively more important for damage estimation.[26]

Related to pollution transport, pollutants break down and potentially create other, secondary pollutants as they travel through the atmosphere. As discussed above, SO_2 and NO_x break down to create particulate matter. Ozone forms when sunlight reacts with oxides and organic compounds in the air.[27] Thus, ozone is less likely to form at night and is also less likely to form in the winter, making time of day and year important for damage from this pollutant.[28]

Finally, pollution causes damage when individuals are exposed to that pollution, so the size of the exposed population is one of the most important drivers of changes in damage from pollution. Densely populated areas experience more damage from a given amount of pollution simply because more people are exposed to that pollution.

The healthiness of the exposed population also affects damage. Ozone created in an area with high asthma rates will cause more health damage than ozone released in an area with very few asthma sufferers. Overall health affects the vulnerability of individuals to mortality from pollutants.

2. Tools exist to quantify and monetize social harms from non-GHG pollutants, and these tools can be incorporated into the assessment of cost effectiveness.

---

[23] Claire E. Reeves et al., *Potential for Photochemical Ozone Formation in the Troposphere Over the North Atlantic as Derived from Aircraft Observations During ACSOE*, 107 J. GEOPHYS. RES. ATMOS., no. D23, 2002, at ACH 14-1. Paola Michelozzi et al., *High Temperature and Hospitalizations for Cardiovascular and Respiratory Causes in 12 European Cities*, 179 AM. J. RESPIRATORY CRITICAL CARE MED. 383 (2009).
[24] *See*, *e.g.* JERALD L. SCHNOOR, ENVIRONMENTAL MODELING: FATE AND TRANSPORT OF POLLUTANTS IN WATER, AIR, AND SOIL (1996).
[25] *Id.*
[26] Alex A. Karner, Douglas S. Eisinger & Deb A. Niemeier, *Near-Roadway Air Quality: Synthesizing the Findings from Real-World Data*, 44 ENVTL. SCI. TECH. 5334 (2010).
[27] Reeves *et. al.*, *supra* note 23.
[28] REVESZ & LIENKE, supra note 17, at 108.

In order to calculate the value of avoided GHG emissions reductions available from an energy code change, regulators must necessarily have a hypothesis as to the amount, locations, and approximate (at least annually) of electricity and fuel-use reductions. Regulators can use those same estimates to calculate damages as a function of other avoidable pollutants. The most accurate calculation of damages would incorporate granular information about location, timing, and ambient environmental conditions such as weather and background pollution concentrations. However, there is a tension between granularity versus ease of administration.

Options for monetizing the benefits of non-GHG pollution reductions would include:

- Estimating Air Pollution Social Impact Using Regression (EASIUR), a model of the damages from emission of primary $PM_{2.5}$, SO_2, NO_x, and NH_3;
- BenMAP, a tool created by the EPA to calculate and map damages from ozone and PM2.5 in the United States;
- Air Pollution Emission Experiments and Policy Analysis, which maps county-by-county marginal damages estimates for SO2, NOx, PM2.5, PM10, NH3, and VOCs;
- EPA's Co-Benefits Risk Assessment (COBRA) tool, which uses a simple pollution source-receptor matrix and a subset of BenMAP health damage functions to estimate county-level damages from the creation of secondary PM2.5 from emissions of NOx, SO2, NH3, PM2.5, and VOCs;
- InMAP (Intervention Model for Air Pollution), an open source, emissions-to-health impact model that estimates the human health impacts caused by annual total air pollutant emissions (NOx, SOx, NH3, PM2.5, and VOCs). It is able to translate emissions into pollutant concentrations, into human exposure and economic damages with high spatial resolution; and
- Custom solutions.

Accounting for all of the factors that affect damages using custom models would lead to the most accurate calculations of damage per unit of emissions. However, data constraints and ease of use might make alternative, less granular methods more desirable. The most granular methods use high-resolution population data with time-varying pollution transport models. Less granular methods make stronger assumptions or use more aggregated data to reduce the complexity of calculation. [29]

III. The Agencies should explain the proposed rule's omission of parameters relevant to privately owned buildings.

In the proposed rule, the life-cycle cost savings for commercial buildings would be "analyzed in accordance with the DOE Commercial Methodology for privately owned buildings" (proposed Section 510.3(d)(1). Accommodating various economic criteria among commercial building owners, the DOE Methodology considers multiple ownership scenarios for its cost-effectiveness analysis, including (1) government or public ownership (without borrowing or taxes) and (2)

[29] For more information about the various options listed above, including information about their relative merits and drawbacks, *see* Jeffrey Shrader et al., Inst. for Pol'y Integrity, *Valuing Pollution Reductions* (2018), https://policyintegrity.org/files/publications/valuing_pollution_reductions2.pdf, and K. Baker et al, *A database for evaluating the InMAP, APEEP, and EASIUR reduced complexity air-quality modeling tools*, 28 DATA IN BRIEF (2020).

private or business ownership (includes loan and tax impacts). While the fundamental methodology is identical across these scenarios, the private ownership perspective incorporates additional factors such as income and property taxes, financing, and a private sector real discount rate adjusted for inflation.[30]

Despite calling for cost-effectiveness analysis to be aligned with the DOE Methodology for the private ownership scenario, the proposed rule expressly excludes property tax from consideration (Section 510.3(c)(4)) while including income tax (Section 510.3(d)(4)). This inconsistent treatment of taxes raises questions about the intended perspective of the analysis. The Agencies should be clear about the perspective of the analysis. If it is a societal perspective, taxes are transfer and have no relevance to the analysis. The consideration of avoided greenhouse gas emissions suggests that the proper perspective is a societal perspective.

IV. The Agencies should confirm that the terms used in the proposed rule, particularly "life-cycle costs," are defined and used accurately and consistently.

Although the rule's purpose under the Act to enable the adoption of cost-effective code changes and to require that cost-effectiveness be calculated in a manner that includes societal impacts, there are instances where the intended arithmetic set forth in the proposed rule lacks clarity. Specifically, the proposed rule introduces confusion by using "life-cycle costs" to denote the net present value of *savings*, i.e., the metric for the cost-effectiveness analysis, which differs from the terminology used in the DOE Methodology documents. The DOE documents typically use more precise terms such as "life-cycle cost net savings", "LCC net savings", "NPV of savings", and synonyms, instead of equating "costs" with benefits net of costs as seen in the proposed rule.

To ensure that Part 510 achieves its intended effect of facilitating the approval of cost-effective code changes, NYSERDA should scrutinize the defined terms and their use in the proposed rule, ensuring clarity and alignment with the intended methodology. In particular, NYSERDA should examine whether the reference to "the sum of the life-cycle costs" in draft Section 510.5 corresponds to the net present value of savings. If so, consideration should be given to whether the cross-reference to Section 510.3(f) is appropriate, or whether Section 510.3(f) itself requires modification.

Sincerely,

/s/ Vasundhara Gaur
Vasundhara Gaur, Ph.D
Economic Fellow
vasundhara.gaur@nyu.edu

/s/ Elizabeth B. Stein
Elizabeth B. Stein
State Policy Director
elizabeth.stein@nyu.edu

/s/ Minhong Xu
Minhong Xu, Ph.D.
Economist
minhong.xu@nyu.edu

[30] U.S. DEPARTMENT OF ENERGY, METHODOLOGY FOR EVALUATING COST-EFFECTIVENESS OF COMMERCIAL ENERGY CODE CHANGES at 4.8 tbl.4.2 (2015), https://www.energycodes.gov/sites/default/files/2021-07/commercial_methodology.pdf ("the tax assessment of the building increases by exactly the same amount as the code-related cost increase, and the tax increases in step with inflation." Meanwhile, "DOE intends to account for corporate income tax deductions in the cost/benefit analyses." Additionally, the inflation rate "is used to determine a real discount rate").