STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

CASE 20-E-0197 **Proceeding on Motion of the Commission to Implement Transmission Planning Pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act**

COMMENTS OF POTOMAC ECONOMICS, LTD. ON UTILITY TRANSMISSION AND DISTRIBUTION INVESTMENT WORKING GROUP REPORT

Potomac Economics, Ltd. ("Potomac Economics") respectfully submits these comments on the Utility Transmission and Distribution Investment Working Group Report (the "Working Group Report") submitted in this proceeding by the Utilities on November 2, 2020.[1] Potomac Economics Ltd. serves as the Market Monitoring Unit for the New York Independent System Operator, Inc. ("NYISO").

The Commission issued its Order on Transmission Planning Pursuant to the Accelerated Renewable Energy Growth and Community Benefit Act on May 14, 2020. The Order required the Utilities to develop proposals for a process to guide their future investments needed to achieve objectives of the Climate Leadership and Community Protection Act ("CLCPA"), including a benefit/cost analysis to apply in assessing potential investments in CLCPA upgrades to the distribution and local transmission systems. In the Working Group Report, the Utilities proposed a benefit cost analysis approach for local transmission projects (the "BCA Methodology").

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1 The Utilities include: Central Hudson Gas & Electric Corp. (Central Hudson); Consolidated Edison Company of New York, Inc. (CECONY); Long Island Power Authority (LIPA); Niagara Mohawk Power Corporation d/b/a National Grid (National Grid); New York State Electric & Gas Corporation (NYSEG); Orange & Rockland Utilities, Inc. (O&R); and Rochester Gas and Electric Corporation (RG&E).

Our limited comments address the proposed use of assumptions derived from NYISO planning studies in the BCA Methodology as well as other proposed inputs to the BCA Methodology. As the market monitoring unit for the NYISO, we have detailed knowledge of the NYISO planning studies and their applicability to other purposes that may be helpful to the Commission as it evaluates the proposed BCA Methodology.

I. Introduction and Summary

It is crucial to use a principled approach when setting forecast assumptions for benefit-cost analyses of proposed long-term investments. The proposed BCA Methodology relies on long-term forecasts of the quantity of renewable energy that can be unbottled by local transmission projects and the market value of that energy. There are many possible ways that New York's power sector could evolve under the CLCPA, so the future benefits of any proposed project are highly uncertain. There is serious risk that any single forecast will over- or under-state the benefits of individual projects. Additionally, because other investments such as energy storage could provide similar benefits in delivering renewable energy to load, approval of local transmission based on an unreliable forecast could risk crowding out lower-cost, market-driven solutions. This is discussed further in Section II of this filing.

The BCA Methodology relies heavily on inputs and results from the NYISO's Congestion Adequacy and Resource Integration Study ("CARIS"), particularly its scenario designed to model NYISO's transmission system if CLCPA goals are met (the "70x30 Case"). The 70x30 Case provides valuable insights as a starting point for identifying possible future congestion patterns. However, it represents just one hypothetical set of resources that could satisfy CLCPA goals and was not designed to consider the economic viability of its resource buildout compared to alternatives. As a result, projections of curtailment and prices derived from the 70x30 Case are unrealistic for some locations and technologies. This can cause the analysis to understate or fail to identify valuable projects in some locations, or estimate large benefits for projects in areas where not renewables will likely cite. Hence, it is not a reliable basis for evaluating specific local transmission projects. Instead of relying on a single CARIS case, we recommend that the PSC: a) develop a resource forecast based on economic principles (such as a capacity expansion modeling approach or project screening criteria), and to b) consider multiple alternative scenarios to capture the range of realistic project benefits. We discuss these concerns and recommendations in Section III.

The Utilities also propose a set of simple assumptions that will determine the value of unbottled energy and other parameters to be used in the BCA Methodology. These proposed values should be refined so that they accurately calculate the NYISO market value of unbottled energy, reflect the riskiness of benefits that are based on forecasted market revenues, and do not create biased results that favor local transmission over competing solutions.

To satisfy these objectives, we recommend a number of specific changes in the assumptions and calculations. Our recommendations include the following:

- Calculating LBMP value using generation-weighted, location-specific prices,
- Calculating capacity market value using a technology-specific capacity credit that is consistent with expected saturation levels,
- Discounting the REC value component to reflect when a local transmission project does not reduce the cost of REC procurement,
- Using a cost of capital consistent with the risk of uncertain NYISO market prices, and
- Using a 20-year period of analysis to evaluate project benefits.

Section IV provides our discussion of these recommendations. Finally, Section V summarizes our conclusions and recommendations.

II. Importance of a Principled Approach to Cost Benefit Analyses

Recent studies of New York's power system suggest that investment in new transmission will be necessary to achieve the targets of the CLCPA.[2] The primary driver of the need for new transmission is the expected deployment of large quantities of renewable generation resources. When evaluating the cost-effectiveness of projects that would allow renewables to serve load under the BCA Methodology, it is advisable to adopt a principled approach to modeling assumptions for several reasons.

First, the benefits of a given transmission project are highly uncertain. There are many possible combinations of generation and transmission investments that could support the CLCPA, and the combination of technologies and locations of future resources is not known to planners today. There is a risk that transmission projects will be funded based on expected benefits that will not materialize if faulty assumptions are used. Such an outcome would increase costs to ratepayers without helping to achieve CLCPA goals.

Second, local transmission projects classified as 'Phase II' under the Utilities' proposal will effectively compete with other solutions. Competing solutions that can facilitate integration of renewable energy can include energy storage, alternative siting of generation, competitive transmission investment (including merchant facilities or facilities funded by market participants), demand-side solutions, and other NYISO transmission planning processes. Although local transmission traditionally serves a specific local need, the benefits contemplated by the BCA Methodology – namely, cost-effective delivery of renewable energy to load on a statewide basis – can potentially be achieved in multiple ways. If benefit-cost analysis used for

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[2] See NYISO 2019 CARIS Report at p. 10. The 2019 CARIS Report can be found here: https://www.nyiso.com/documents/20142/2226108/2019-CARIS-Phase1-Report-Final.pdf/bcf0ab1a-eac2-0cc3-a2d6-6f374309e961

local transmission planning relies on biased assumptions, there is a risk that viable alternative solutions that are more cost-effective or do not rely on ratepayer guarantees will be crowded out. Hence, it is important to use realistic assumptions that are aligned with the assumptions and incentives embedded in other planned and competitive processes.

III. Comments on the Use of the CARIS 70x30 Case in the BCA Methodology

The BCA Methodology is heavily reliant on assumptions and outputs developed as part of the CARIS 70x30 Case. Based on our detailed review of the CARIS report and modeling results as the market monitoring unit for NYISO, we highlight limitations in the scope of the CARIS that should be considered when formulating modeling assumptions to evaluate local transmission projects. The CARIS 70x30 Case was never designed to be an accurate forecast of the power system in 2030. Hence, it does not provide an reasonable basis for assessing the benefits of individual proposed transmission investments.

A. Significance of the 70x30 Case in BCA Methodology

The Utilities have proposed for the CARIS 70x30 Case to play a key role in assessments of specific projects under the proposed BCA Methodology. NYISO conducts the CARIS every two years as part of its economic planning process. The CARIS projects congestion on the bulk transmission system and identifies transmission investments that would be economic compared to alternatives. While the CARIS Base Case includes only changes in generation that are considered firm, the NYISO's recent 2019 CARIS Phase I included a 70x30 Case which modeled high-renewable penetration scenarios that would achieve New York State goals for 2030. The study provides a wealth of information that is useful for: evaluating the transmission needs of the system with large-scale entry of renewable resources, providing prospective investors insight regarding potential future market conditions, and helping policymakers craft renewable development goals and conduct REC solicitations.

The Working Group Report relies on the 70x30 Case for key inputs affecting the evaluation of local transmission projects. The quantity of renewable energy that can be unbottled by a transmission project (e.g. the amount of renewable curtailment that can be avoided if the project is built) is the key metric for the proposed BCA Methodology and the proposed 'Renewable Utilization' investment criteria. The Utilities cited the CARIS 70x30 Case (or 2020 RNA 70x30 Case which uses the same assumptions) as the basis for resources included in their CLCPA Scenario congestion studies.[3] Additionally, the Utilities propose to use projected energy prices "based on a NYISO CARIS forecast that includes a buildout of renewables consistent with CLCPA mandates" as an input in the BCA Methodology.[4]

B. Scope and Limitations of Renewable Resource Mix in the 70x30 Case

The 70x30 Case is not intended to serve as an accurate forecast of specific renewable additions under the CLCPA. To conduct the 70x30 Case, the NYISO developed a set of new renewable resources to include in the model that would produce sufficient energy to meet the CLCPA's 2030 targets. Thus, the NYISO included many new additions beyond those that are currently contracted or at an advanced planning stage. The CARIS Phase I Report clarifies that its 70x30 scenarios represent just one distribution pattern of resources, although there are many possible alternatives.[5] The NYISO used simplifying assumptions to develop the resource mix:

- The relative quantities of solar and land-based wind were determined by simply assuming that one half of the total energy needed from these sources to satisfy CLCPA requirements will be from solar and one half will be from wind.[6]

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3 Con Edison, Central Hudson, Orange & Rockland, LIPA, National Grid and Avangrid (NYSEG and RG&E) all indicate using the 2019 CARIS or 2020 RNA with varying degrees of modification. See individual utility assessments in Part 2 of the Working Group report.

4 Working Group report at p. 32 and 38.

5 2019 CARIS Report at p. 65-66.

6 2019 CARIS Report at p. 76.

- The zonal distribution of future solar and land-based wind resources was based on recently awarded contracts resulting from NYSERDA Tier 1 solicitations, not an assessment of locations that will attract investment through future solicitations.[7]
- Zonal solar and land-based wind quantities were assigned to buses by distributing them on a *pro rata* basis to the buses of resources in the NYISO Interconnection Queue in the same zone, based on the relative capacity of those projects.[8] This method did not use economic or viability criteria to evaluate the assigned quantities at those locations.

These are reasonable approaches for the 70x30 Case's intended purpose of constructing a "first look" at congestion patterns. However, they are unlikely to accurately predict the specific mix of technologies and locations of renewable resources that will be developed, as they do not take economic or viability criteria into account. NYISO emphasizes that the 70x30 Case is intended to serve as a starting point to identify broad transmission needs, rather than to define specific steps to meet CLCPA goals.

C. Results of the 70x30 Case are Unlikely to be Accurate

Since the 70x30 Case includes many renewable projects that would not be economically viable, transmission investments that are designed to "unbottle" such hypothetical projects may be of little or no value. However, the proposed BCA Methodology would assign the largest value to proposed transmission projects that reduce curtailment of such hypothetical projects that would not actually be built. In our memorandum assessing the results of the 2019 CARIS Phase I,[9] we identified several results that would tend to be moderated by market forces:

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[7] 2019 CARIS Report at p. 78.

[8] 2019 CARIS Report at p. 79.

[9] See Potomac Economics, "NYISO MMU Review of the 2019 CARIS Phase I Study", June 2020 ("MMU 2019 CARIS Review"), available here: https://www.nyiso.com/documents/20142/13246341/MMU_Review_of_2019_CARIS_Phase_1%20-%2020200622.pdf/cff019b7-5b4f-0b90-6ae1-32469db03f2c

- Congestion and curtailment affecting renewable projects vary widely by location, with some areas relatively unconstrained and others experiencing curtailment exceeding 50 percent. Because resource siting in the 70x30 Case was not subject to economic screening, it is likely that some portion of curtailment could have been avoided by locating resources at different buses or zones. This result is particularly troubling because the BCA Methodology would forecast large benefits by unbottling renewable projects that would likely never be built. In reality, NYISO markets and the state's Index REC structure will incentivize project developers to make use of locations with transmission headroom and avoid the most constrained locations.

- Some resource types are 'overbuilt' relative to others in the 70x30 Case, resulting in unrealistic patterns of hourly pricing and curtailment. In particular, solar projects generally experience extreme nodal discounts, high curtailment and lower profitability relative to wind projects. It is likely that before reaching this state, developers would begin to favor other renewable technologies over solar in order to earn higher revenues and reduce their required Index REC offers in NYSERDA solicitations. An alternative resource mix resulting from developers' economic decision-making would drive different patterns of prices and curtailment.

- The 70x30 Case does not model incremental energy storage deployment based on economics. Some of the modeled 70x30 Case scenarios included 3,000 MW of battery storage in accordance with state mandates, which the NYISO concluded can help in reducing curtailment (without obviating the need for transmission solutions). Our analysis showed that larger quantities of energy storage would be economically viable at many locations in the 70x30 Case. Market-based, adaptive solutions such as additional storage in generation or load pockets could reduce the levels of curtailment and affect the price patterns derived from the CARIS.

The above points are illustrated by Figure 1, which shows estimated average and generation-weighted LBMPs at a variety of nodes and zones in the CARIS 70x30 Case.[10] Steep nodal discounts generally correspond to locations where curtailment is frequent and the value of energy produced is low. Some locations have severe discounts, while others are priced at or

[10] Prices for land-based wind, solar PV and offshore wind are weighted by the resource's generation in each hour of the year, in order to show the average realized price in the hours in which it operates. Prices are shown for a hypothetical resource at various nodal locations, but they are not intended to represent specific suppliers. The horizontal axis indicates the node or zone location being modeled. (For example, under "A", "1" refers to a particular node in Zone A, while "Z" refers to our analysis of the Zone A price itself). All-hours average prices at each node and zonal average prices are calculated as a simple average across all hours of the year. See MMU 2019 CARIS Review at p. 7.

above the zonal average. Generation-weighted prices for solar PV are deeply discounted at most locations, reflecting system-wide over-saturation and curtailment. These results suggest that some of the resources included in the CARIS reflect sub-optimal choices of location and technology, and that the competitive investment process would tend to produce a different result.

Figure 2 – Generation-Weighted and Simple Average LBMPs for Intermittent Renewables

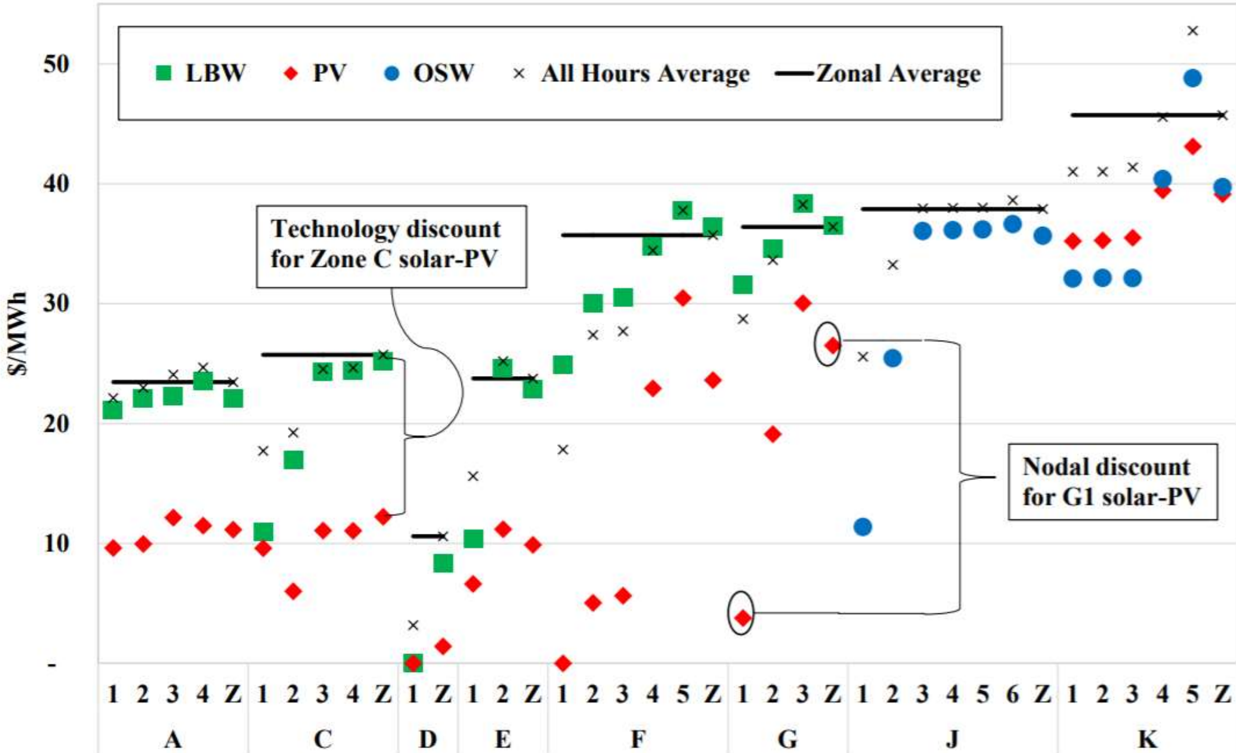

Figure 2 shows that some projects in the 70x30 Case are extremely unlikely to be built because they would receive very low LBMPs and experience frequent curtailment. Yet, the BCA Methodology would ascribe large benefits to transmission projects for unbottling such unlikely renewable generation projects. Hence, the 70x30 Case should not be used without modification to estimate the value of proposed transmission projects.

D. Use of the 70x30 Case Risks Unreliable Benefit Calculation

Reliance on the new resource assumptions and projected LBMPs from the 70x30 Case, with little or no modification, may result in an unreliable forecast of the benefits of potential local transmission projects for the following reasons:

- Since the 70x30 Case represents just one possible set of resources out of many, there is a risk that curtailment will be over- or under-estimated at individual locations if the actual resource buildout differs from its assumptions. This would cause the results of the BCA Methodology and Renewable Utilization criteria to be unreliable. While all forecasts are subject to error, there is an especially high risk of this outcome when modeling of future resources is not subject to economic or viability screening, since competitive drivers would tend to produce different outcomes.

- The proposed BCA Methodology will calculate larger benefits for local transmission projects that relieve a larger quantity of projected curtailment. Hence, if the forecast model unnecessarily includes some resources at especially constrained locations, the BCA Methodology would assign a high value to transmission projects that relieve their curtailment. To the extent that this process then causes generation to be developed at those sites, this could result in total costs of renewable energy (including both generation and transmission) that are higher than for other possible configurations of projects.

The reliability of the BCA Methodology could be improved by adopting a set of principled criteria for determining or modifying resources included in the model that is used to forecast curtailment and LBMPs. Multiple approaches should be considered.

First, a long-term capacity expansion modeling approach could be developed. Models of this type may be used to estimate the most cost-effective set of resources taking into account their costs and market revenues. While such an approach is still subject to forecast error, it can help to avoid relying on projected outcomes that deviate significantly from what a competitive process would plausibly produce.

Second, a set of screening criteria and an iterative process could be developed to refine the set of resources taken from the 70x30 Case. Non-firm resource additions that fail to pass criteria related to economic viability (or underperform significantly relative to other resources) can be removed from the model and replaced with technologies and locations that score more highly. Since development of local transmission will affect generation project economics, this process could ultimately be used to compare packages of generation and local transmission, instead of assuming a single, fixed set of generating resources when evaluating local transmission.

Finally, it should be noted that any single long-term forecast of curtailment and prices, no matter how detailed its methodology, risks significantly over- or under-estimating projected benefits. To avoid reliance on a single scenario, the Commission should require the development of multiple alternative cases with varying assumptions. This will help to ensure that a range of realistic benefits for each local transmission project is explored before it is approved.

IV. Comments on Proposed Values for Assumptions in the BCA Methodology

The proposed BCA Methodology calculates a present value of unbottled renewable energy based on various market prices. This metric is intended to capture the avoided costs of purchasing renewable energy elsewhere when resources are curtailed. Because local transmission projects that provide these benefits effectively compete with other solutions (such as generation, storage, alternative transmission or demand-side solutions), it is important to quantify their benefits in a consistent manner. The framework proposed by the Utilities is a useful starting point which can be refined to achieve such a metric. We provide the following feedback on proposed calculation of inputs to the BCA Methodology:

1. Energy Prices

The BCA Methodology proposes to include the energy market value of MWhs of unbottled renewable energy, based on the CARIS forecast of statewide average LBMP (or the load-weighted average J and K zonal LBMPs for offshore wind).[11] We recommend using an LBMP value that is (a) specific to the pricing node(s) where renewable curtailment is relieved

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[11] Working Group Report at p. 39.

and (b) weighted on an hourly basis by the incremental renewable generation that is enabled.

As Figure 1 indicates, deployment of renewables could drive large differences in the realized energy prices of different locations and resource types. Transmission projects that unbottle renewable resources that can realize higher energy market value provide greater benefits in achieving CLCPA goals cost-effectively. Hence, the LBMP component of the BCA methodology should value projects proportionately to the potential value of the renewable resources that they will help to unbottle.

2. ICAP Value

The BCA Methodology proposes to calculate capacity market value of incremental renewable investment avoided by the transmission project. The calculation of capacity market revenue requires an Unforced Capacity (UCAP) Percentage, which the Utilities cite as being derived from the NYISO's ICAP Manual.[12] We recommend using a UCAP percentage consistent with resources' expected capacity value at levels of penetration consistent with CLCPA targets, rather than the most recent default values published in the ICAP Manual.

Multiple recent studies commissioned by the state, including analysis by Siemens presented at the November 23, 2020 Technical Conference under this proceeding, have demonstrated that the capacity value of intermittent resources is likely to change significantly as penetration grows. Using only current default UCAP ratings for a long-term analysis risks overstating this portion of the BCA calculation.

Figure 2 – Capacity Credit Estimated by Siemens[13]

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[12] Working Group Report at p. 38.

[13] See Siemens, "Zero-Emission Electric Grid in New York by 2040", presented at November 23, 2020 Technical Conference in this proceeding, at p. 12. Available on NYSDPS website in "20-E-0197 Cover Letter and Slides 11242020 REVISED.pdf".

ELCC BY RENEWABLE TECHNOLOGY (PEAK CAPACITY CREDIT)				
NYISO	Solar	Wind	Offshore Wind	Energy Storage
2020	21%	16%		78%
2025	6%	15%	19%	75%
2030	9%	15%	12%	57%
2035	8%	16%	14%	64%
2040	6%	15%	14%	76%

3. Period of Analysis

The BCA Methodology proposes to calculate net present value over a 40-year period of analysis. We recommend using a 20-year period of analysis instead.

While transmission assets may have a useful life of 40 years or longer as indicated by the Utilities, the BCA Methodology effectively captures the value of incremental output made possible from generation assets assumed to be located behind transmission constraints. Generation assets are typically assumed to have a shorter economic life than transmission assets. It is therefore appropriate to use a period of analysis consistent with the typical economic life of projects that supply the energy to be unbottled. Such an approach would also avoid biasing the evaluation of local transmission projects in a way that creates an advantage over competitive solutions which could provide a similar service.

4. Cost of Capital

The BCA Methodology proposes to use the Utilities' average after-tax Weighted Average Cost of Capital to discount benefits and costs.[14] We recommend using a cost of capital aligned with estimates for generation projects in New York that rely on NYISO market revenues.

The benefits in the BCA Methodology are based on forecasts of wholesale electricity markets, including energy and capacity price forecasts, and carry a degree of uncertainty akin to

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14 See Working Group Report at p. 37.

participation in the wholesale market. As such, a cost of capital should be used that reflects the real risk that future benefits will be less than projections. Regulated firms are able to finance their investments with a cost of capital favorable to that of unregulated market participants due to the guaranteed nature of their revenues. Projected benefits based on future congestion patterns and market prices are much less certain and should be discounted accordingly, so that the BCA calculation adequately reflects the risk borne by ratepayers. Additionally, use of a 'merchant' cost of capital will avoid biasing the BCA calculation in favor of local transmission over competing market-driven solutions.

The use of the Utilities' average cost of capital in the BCA Methodology would not allow ratepayers to secure CLCPA benefits at lower cost. This is because the inputs to the BCA Methodology would only be used to estimate the benefits from the project, not how it is accounted for in the utility's rate base for purposes of cost recovery. Hence, the use of a cost of capital that accurately reflects the risk associated with those benefits would not have an impact on costs once a project is approved.

5. REC Value

The BCA Methodology proposes to include REC or OREC value as proxies for the societal value of reduced renewable curtailment. The Utilities propose to calculate this component by multiplying: (a) the most recent REC or OREC prices posted or estimated by NYSERDA by (b) the quantity of estimated unbottled renewable energy.[15]

The Utilities propose to treat the full value of RECs from unbottled renewable generation as a benefit of the local transmission project, but this will overstate the benefits for some projects. This is because it may be possible to obtain RECs from other renewable projects that

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[15] See Working Group Report at p. 38-39.

do not require the same degree of local transmission investment. For example, if a proposed transmission project would 'unbottle' 100 RECs per year, but alternatively it is possible to procure 100 additional RECs from a new renewable project at a less constrained site without the transmission project, then the environmental value of the 100 RECs is obtained at the going REC price in either scenario. Treating this value as a benefit of the transmission project would effectively double-count benefits that are already purchased from generators.

A more accurate representation of the environmental value of local transmission projects is the degree to which they reduce the cost of meeting state targets by lowering REC prices required by new renewable generators. Renewable resources that anticipate curtailment will offer higher Index REC strike prices in NYSERDA solicitations to offset the loss of energy and REC revenues on curtailed MWhs.[16] If curtailment is widespread and there are not sufficient unconstrained sites, local transmission projects could lower the cost of procuring RECs by reducing the premium that generators at otherwise bottled sites would add to their Index REC offers. But if a local transmission project would not unbottle renewable generation at lower cost sites, then it would be inappropriate to include the Index REC value in the evaluation of the transmission project. Hence, the use of the full REC price as proposed in the BCA Methodology likely represents an overestimate of a transmission project's environmental value.

Developing a metric for how local transmission projects will reduce the long-term cost of REC procurements may not be viable due to uncertainty surrounding the amount of capacity that is feasible at each location, future technology costs, market conditions, and other factors. The

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16 Our analysis of the 2019 CARIS Report indicates substantial variation in Index RECs required by renewable resources in a scenario with widely varying congestion and curtailment by location. See MMU 2019 CARIS Review at p. iv-vi and p. 8-12.

BCA Methodology can better account for the uncertainty (and likely upward bias) of the proposed REC value by discounting the REC value component.

V. Conclusions

A principled approach to forecasting assumptions in the BCA analysis for CLCPA benefits of local transmission projects is needed to mitigate the risk of relying on inaccurate forecasts and crowding out more effective competing solutions. In these comments we respectfully recommend improvements to the proposed BCA Methodology.

First, we recommend developing economic criteria for future resource inclusion in the forecast model and using multiple realistic scenarios when assessing projected curtailment. Second, we recommend changes to the LBMP, capacity value, cost of capital and period of analysis assumptions that will more accurately quantify projects' benefits and risks.

Respectfully submitted,

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