UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

New York Independent System Operator, Inc	**)**	**Docket No. ER25-596-000**

MOTION TO INTERVENE AND COMMENTS OF
THE NEW YORK ISO MARKET MONITORING UNIT

Potomac Economics moves to intervene and file comments concerning the New York Independent System Operator's ("NYISO's") filing on November 29, 2024 in the above captioned proceeding. The NYISO's filing proposed ICAP demand curves for the 2025/2026 Capability Year and a methodology and required inputs for annual updates to the ICAP demand curves for the Capability Years 2026/2027, 2027/2028 and 2028/2029.

Potomac Economics is the Market Monitoring Unit ("MMU") for NYISO and is responsible for monitoring its electricity markets. As the MMU, we are expected to provide comments on the ICAP Demand Curve Reset ("DCR") study.[1] Potomac Economics has a unique perspective and responsibility that cannot be represented by any other party. It should therefore be permitted to intervene herein.

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[1] NYISO MST Section 30.4.6.3.1 states: "The ICAP Demand Curve periodic review schedule and procedures shall provide an opportunity for the Market Monitoring Unit to review and comment on the draft request for proposals, the independent consultant's report, and the ISO's proposed ICAP Demand Curves."

I. NOTICE AND COMMUNICATIONS

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II. BACKGROUND AND SUMMARY OF COMMENTS

In accordance with MST 5.14.1.2, NYISO periodically conducts the DCR process to ensure that the capacity demand curves are set at levels that provide efficient incentives for market-based entry that satisfies NYISO's capacity requirements. The demand curves produce stable spot prices and lead to price discovery, facilitating forward contracting for both capacity and energy that is needed to support investment in new and existing generation.

NYISO contracted with Analysis Group ("AG") to perform a study recommending levels for the capacity demand curves in each of the four capacity localities. After a lengthy process with numerous stakeholder meetings and written comments, AG finalized the DCR Report. Throughout this process, we provided verbal and written comments on a range of issues, including the technology selection in the DCR.[2] Ultimately, NYISO considered AG's report and stakeholder feedback before filing the proposed demand curves on November 29.

Section III of these comments discusses our concerns with NYISO's selection of a 2-hour battery as the reference technology for the ICAP Demand Curves in all four localities. NYISO

[2] See August 23, 2024 MMU DCR comments, available here.

and AG did not perform a complete evaluation because they did not adequately consider that large-scale storage deployment mandated by New York State law will drive large reductions in the 2-hour battery's Capacity Accreditation Factor ("CAF"). CAF reductions are critical because a reduction in a resource's CAF will directly reduce its future capacity revenues by reducing the amount of capacity it may sell. An adequate assessment of the likely future CAF reductions would, therefore, have produced a dramatically higher Net CONE estimate because the investor would have to recover more revenue in the initial years of the investment.

In addition, NYISO and AG did not consider the limited contribution that a 2-hour battery makes towards transmission security requirements that are satisfied using the ICAP Demand Curves. This is particularly important because transmission security needs are setting the local capacity requirements in each of the three downstate zones currently. If these shortcomings were addressed, the estimated cost of addressing reliability needs modeled in the capacity market using a 2-hour battery would be much higher than the Net CONE estimated by AG, which would have led NYISO to reject the 2-hour battery as the reference technology.

Section IV explains why a combustion turbine ("CT") amortized over 20 years is a viable technology choice that should be considered as a candidate for the reference unit. NYISO and AG evaluated a CT with a 13-year amortization period, but the shortened amortization period led to a much higher levelized cost. We argue that the assumed 13-year amortization is unreasonable because it ignores the overwhelming likelihood that a relatively new CT will have opportunities to operate beyond New York's 2040 "zero emissions" requirement by retrofitting to use a compliant clean fuel. While the costs of fleetwide clean fuel retrofits are not currently known, these will be reflected in future DCRs at the time they become mandatory. Since future DCRs will consider the cost of clean fuel and the resulting offsetting revenue impacts, it is appropriate to exclude them when estimating the CT CONE in the present DCR.

We find that proper consideration of the CAF of the 2-hour battery storage unit and its ability to address transmission security requirements would show that it is not a reasonable choice to be the demand curve reference technology. Accordingly, NYISO's filing is deficient, and we respectfully recommend the Commission require NYISO to address these two deficiencies rather than accept its current proposal.

III. NYISO DID NOT PROPERLY EVALUATE THE NET CONE OF A TWO-HOUR BATTERY

NYISO and AG did not properly estimate the net cost of 2-hour battery storage capacity for addressing the system needs that are satisfied through the capacity market. First, NYISO did not properly account for the overwhelming likelihood that the CAF of a 2-hour battery will fall during the life of the project. Second, NYISO did not consider the 2-hour battery's reduced contribution to transmission security criteria, which determine the capacity requirements satisfied by the ICAP Demand Curves in major portions of NYISO's system. This will tend to increase the net cost of the 2-hour battery as a solution to these requirements. While the DCR always involves debate around various assumptions, these are major issues that render NYISO's evaluation of the 2-hour battery deficient.

A. NYISO and Analysis Group Did Not Adequately Consider the Capacity Value of the 2-Hour Battery

NYISO and AG assume a 2-hour battery storage project would be amortized using a 20-year levelized schedule. However, this assumption is flawed because the Capacity Accreditation Factor (CAF) of a 2-hour battery is very likely to decline in the coming years, which would lead a battery investor to under-recover the revenue needed to support its investment over the 20-year life of the investment. Such an investor would need to earn more revenue in the initial years of the investment to make up for falling revenue in the later years. Failing to account for the expected CAF decline leads to a significant underestimate of the battery's Net CONE.

Anticipating these objections, NYISO's Filing Letter responds by claiming: (1) that the direction of future CAFs is uncertain, and (2) that future CAF changes are adequately addressed by annual updates to the ICAP Demand Curves, future demand curve resets, and NYISO's proposed 50 basis point cost of capital adder.[3] We address both of these arguments below, while the third part of this section address specific arguments raised in NYISO's Filing Letter.

1. The Capacity Value of the 2-Hour Battery is Extremely Likely to Decline

The CAF represents the marginal value of a Capacity Accreditation Resource Class (CARC) for addressing resource adequacy needs. The CAF, expressed as a percentage, is calculated by measuring how much an incremental amount of a given resource type improves the system's Loss of Load Expectation (LOLE) relative to a unit of 'perfect' capacity. A resource's CAF helps determine the amount of UCAP MWs it can sell in the capacity market. As such, it plays a major role in the capacity revenues a resource can expect to earn and the economics of satisfying resource adequacy requirements via investment in that resource.

That CAFs of short-duration batteries are widely expected to decline as battery storage penetration increases and New York's reliability risks shift from occurring only in the summer to increasingly occurring also in the winter. Resources that can only generate for a limited duration provide less reliability benefit than resources that can run indefinitely because reliability risks can occur over extended periods. Further, as battery storage penetration grows, longer duration batteries will be needed to achieve the same marginal capacity value. This is because the periods in which they will need to operate will tend to lengthen as their penetration increases.[4]

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[3] NYISO Filing Letter at p. 19-25.

[4] Positive synergies with solar PV tend to raise the marginal capacity value of storage by reducing the need for capacity in afternoon peaks. However, this effect is limited as net peak periods will eventually shift to periods with limited solar output, such as evening hours and winter peaks, when a large amount of solar is added.

While recent CAF values are based on having only 20 MW of battery storage facilities selling capacity in New York, the Public Service Commission (PSC) has officially adopted a target of 6,000 MW of battery storage operating by 2030 with 1,500 MW deployed by 2025. The State announced it will initiate annual storage procurements of 1 GW per year beginning in 2025.[5] While the State has struggled to meet renewable energy deployment targets on time in the past, batteries generally have shorter construction timelines and 1.8 GW of battery projects have already completed a NYISO Class Year interconnection study and accepted transmission upgrade cost allocations. Hence, it is likely that large amounts of battery storage will come online both during and after the four-year DCR period, with potentially major effects on CAFs.

Estimates of battery CAFs in New York that account for the State's policy targets consistently predict falling CAFs. Recent studies by NYISO and the MMU predict large declines from current values to generally below 30 percent in New York City by 2030, even though *none of these studies assume the State achieves its 2030 goal of 6 GW of battery storage installations*. Analysis performed by New York State in support of its storage deployment program also found that the marginal value of shorter-duration storage resources is likely to decline rapidly over time. The Energy Storage Roadmap recently developed by New York's Department of Public Service and the New York State Energy Research and Development Authority finds the following:

> "As more short-duration storage is added to New York's power grid, longer durations of storage will be required to discharge across all peak hours…In other words, to sustain a high capacity value, storage with progressively increasing duration is needed. The analysis estimates that by 2035, over 4 GW of 8-hour storage will be deployed as part of a cost-effective scenario that optimizes ITC use before expiration."[6]

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[5] See "Order Establishing Updated Energy Storage Goal and Deployment Policy", June 20, 2024, NYPSC Case 18-E-0130.

[6] See December 28, 2022 Energy Storage Roadmap (NYPSC Case 18-E-0130), page 31.

This expectation led state agencies to propose procurement carve-outs for longer duration storage and a contract mechanism to protect developers from future CAF reductions.

The following list of studies predicted much lower CAFs for the 2-hour battery than levels incorporated in the proposed demand curves (estimates below are for New York City):

1) NYISO (2022): 25 percent – This study estimated CAFs assuming 3 GW of 4-hour storage from the Capacity Accreditation consumer impact study of 70 percent renewables by 2030.[7]

2) NYISO (2024): 40 percent – This study estimated CAFs assuming 200 MW of 4-hour storage from this DCR study with 5.2 GW of additional intermittent renewables viewed as potentially likely in the 2027-2028 and 2028-2029 Capability Years.[8]

3) Potomac Economics (2021): 28 percent – In this study, we estimated CAFs assuming 3 GW of 4-hour storage and 70 percent renewables by 2030.[9]

4) Potomac Economics (2024): 2 percent – In this study, we estimated CAFs in 2033 assuming delayed completion of State targets for renewables, storage, and electrification and detailed modeling of winter reliability risk drivers (e.g., firm versus non-firm fuel resources and oil inventory limits).[10]

5) NYSERDA's Energy Storage Roadmap (2022) found that the marginal value of shorter-duration storage resources is likely to decline rapidly over time and proposed a contract mechanism to protect developers from future CAF reductions.[11]

6) NYISO (2024): 12.5 to 25 percent – These are implied by the NYISO's recent proposals to require generators with stored oil inventories to be capable of operating for 8 to 16 hours per day to qualify for full capacity credit, taking into account the need for energy adequacy in winter. NYISO's 2024 RNA anticipates that reliability risk will be concentrated in winter by about 2034.

These studies indicate that the 2-hour battery's CAF is expected to decline dramatically over the coming decade and that a higher penetration of battery storage units will tend to reduce future CAF levels. Figure 1 shows the results of these studies for NYC (displaying the two

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7 See NYISO Staff Draft DCR Report, pages 59-60, "2022 RNA Policy Case Model Year 2030" Case.

8 See NYISO Staff Draft DCR Report, pages 59-60, "2024 IRM Sensitivity" Case.

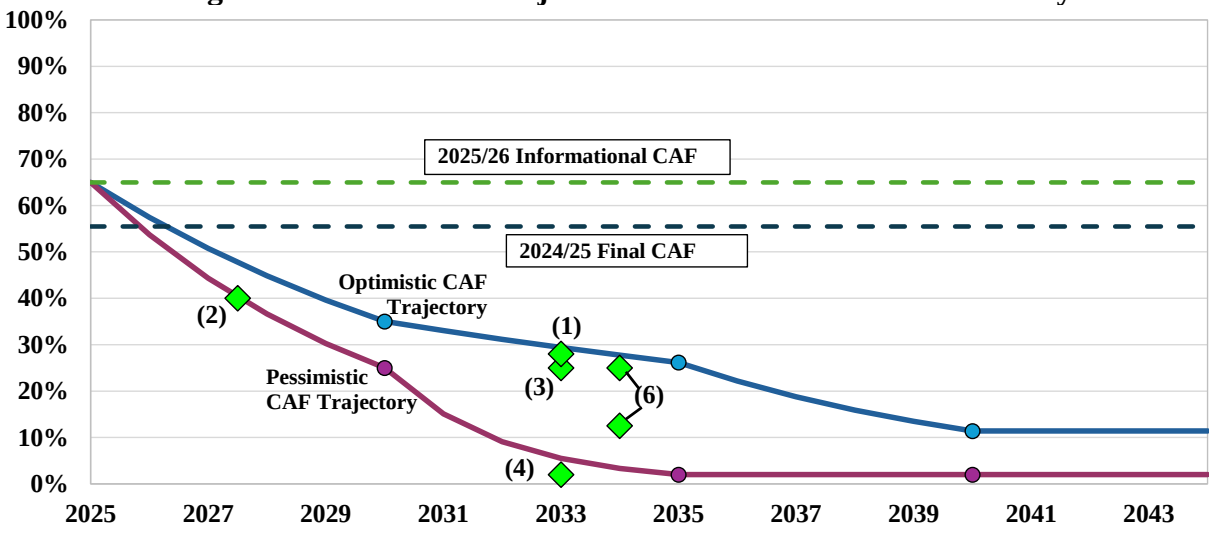
9 See MMU's November 2, 2021 ICAPWG presentation here, slide 43.

10 See MMU's 2023 State of the NYISO Markets Report here, page 100.

11 See December 28, 2022 Energy Storage Roadmap (NYPSC Case 18-E-0130), pages 31 and 37.

studies of 70 percent renewables shifted to 2033 given current progress towards the State's 2030 goals). In addition, Figure 1 shows two realistic CAF trajectories that we developed to analyze 2-hour battery investments: one optimistic (i.e., high CAF) and one pessimistic (i.e., low CAF).[12] We use these two CAF trajectories to analyze 2-hour battery investments later in this section. Lastly, Figure 1 compares these future CAF projections to the 56 percent level that is used for the 2024/25 Capability Year and the 65 percent Informational CAF projection for 2025/26.

Figure 1: Future CAF Projections in NYC for the 2-Hour Battery



[12] The 'Optimistic CAF Trajectory' and 'Pessimistic CAF Trajectory' lines were generated using Potomac Economics' proprietary resource adequacy model, PE-RAM. PE-RAM is a resource adequacy model that performs an hourly chronological simulation of supply margins and load shedding. It models multiple simulation years and considers different combinations of generator forced outages and load forecasts, in addition to transmission limits between zones, intermittent resource profiles and energy storage charging and dispatch. We performed model runs for the years 2030, 2035 and 2040 and interpolated values in between. The modeled scenarios are based on the resource additions from the preliminary State Scenario of NYISO's 2023 Outlook study, with a delay applied to achievement of clean energy targets by 2030 in line with recent projections by New York state. Total modeled battery storage additions by 2030, 2035 and 2040 are 4.5 GW, 8.2 GW and 14.3 GW, respectively, alongside large amounts of renewables including 17 GW (2030), 28 GW (2035) and 49 GW (2040) of solar PV (including utility scale and behind-the-meter). In the 'pessimistic' scenario, we model inventories of energy limited resources (including dual fuel and oil units with stored on-site fuel) during severe winter cold snap events, resulting in lower storage CAFs due to inability to recharge during prolonged cold events that stress the system. While PE-RAM will not produce results identical to NYISO's GE-MARS model used in calculation if market CAFs, it demonstrates the directional impact of rising battery penetration and rising winter load even in the presence of very high solar PV penetration.

Figure 1 highlights the large disparity between the CAF levels reflected in NYISO's proposal and the range of estimates produced by recent studies. In our optimistic CAF trajectory case, CAF levels drop from NYISO's informational 2025/26 value of 65 percent to slightly over 11 percent by 2040, although they do not consider distinctions between firm and non-firm fuel resources during peak winter demand conditions. The pessimistic CAF trajectory shows the CAF for a 2-hour battery dropping from 65 percent in 2025 to 2.0 percent by 2035 when oil-inventory constraints may become a key driver of winter reliability risk. Recently published estimates by NYISO fall between these two CAF trajectories.[13]

NYISO argues that the direction of future CAF changes is uncertain and that CAFs may not fall significantly in the future.[14] NYISO's Staff Recommendations present one case showing a 2-hour battery CAF consistent with current levels by 2030 (called the '2024 RNA Base Case Year 2030' case).[15] This case assumed multiple GWs of new solar PV but virtually no new battery storage, despite the State's intention to rapidly accelerate storage deployment to achieve a goal of 6,000 MW by 2030. Likewise, the preliminary CAF results for the 2025/2026 capability year, which show an increase in the battery CAF compared to the current year, are based on the assumption of only 20 MW of battery storage penetration. Hence, while the direction of CAFs in the next few years is unclear, NYISO has not presented any reason to doubt the widespread expectation that State-driven battery storage deployment will drive major CAF reductions during the proposed 20-year amortization period of the resource.

The anticipated CAF reductions will be a key consideration for battery storage developers. Indeed, the battery storage advocacy group, New York Battery and Energy Storage Technology

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[13] Each trajectory was set by interpolation using a constant multiplier between 2025, 2030, 2035, and 2040.

[14] NYISO Filing Letter at p. 20.

[15] See NYISO Final Staff DCR Report at p. 62-63.

Consortium ("NY BEST"), recently stated: "the lower Net CONE currently enjoyed by the 2-hour battery compared to the 4-hour battery is temporary. While AG's recent DCRP analysis may indicate that a 2-hour battery is the cheapest proxy unit today, it does not account for the future reduction in UCAP associated with the imminent drop in the CAF."[16] Since the demand curves are intended to reflect that CONE for new peaking resources as perceived by resource developers, the CONE must reasonably reflect the effects of expected CAF reductions.

2. Declining Future Capacity Value Makes the CONE of 2-Hour Battery Much Higher Than NYISO's Evaluation

NYISO and Analysis Group have dismissed concerns about falling CAFs by arguing that the CAF will not necessarily fall over the 20-year amortization period and that the Net CONE per kW-year of UCAP will tend to adjust in future years to offset the CAF degradation. This implies that if the CAF drops by 50 percent, future Net CONEs and capacity demand curves could be expected to double. However, this would only happen if 2-hour batteries remain the demand curve technology over the 20-year period, which is not a credible expectation given the magnitude of the Net CONE increase that would be implied by the 20-year levelized amortization schedule. This section evaluates how a falling CAF would affect the revenues of a 2-hour battery over 20 years and how the expectation of declining revenues would affect the revenues needed by an investor over the first four years.

To illustrate how the CAF affects the incentives to invest in a 2-hour battery resource, Figure 2 shows the Net CONE of a battery in New York City over 20 years (assuming a levelized amortization) as the CAF falls in the optimistic CAF trajectory case (depicted in Figure 1). It compares this to the Net CONE of the resource if the CAF were to remain fixed at the

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[16] New York Battery and Energy Storage Technology Consortium ("NY BEST") DCR comments, June 28, 2024, at page 2.

current level and to a CT amortized over 20 years.[17] In Section IV, we discuss reasons why it would be more reasonable to select a CT amortized over 20 years as the demand curve unit technology.

Figure 2: Battery Net CONE in NYC w/ Optimistic CAF

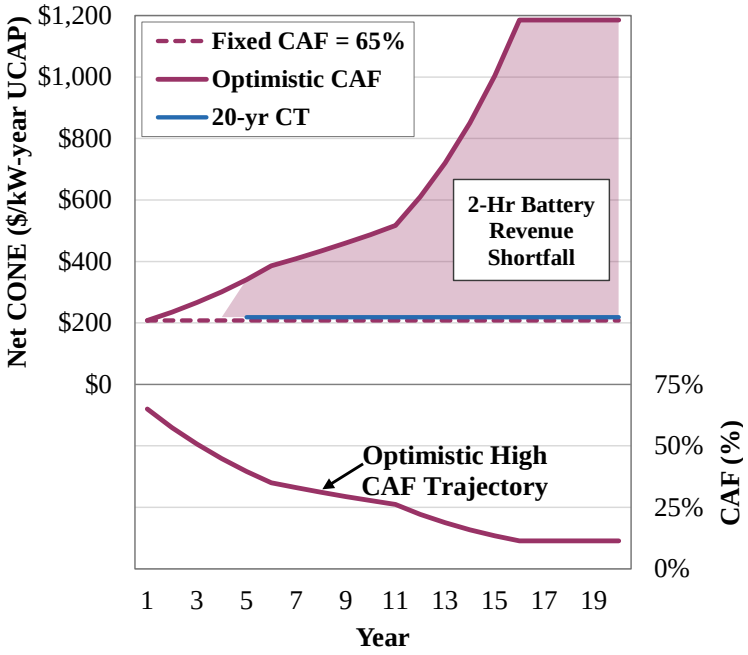


Figure 2 shows that if the CAF falls from 65 percent in Year 1 to 11 percent by year 20, the Net CONE of a 2-hour battery would rise nearly 500 percent to $1185 per kW-year (UCAP) by Year 20. As the CAF falls, the Net CONE of the 2-hour battery will quickly become much higher than the Net CONE of a CT. This would cause the CT to become the demand curve technology, causing a predictable revenue shortfall for the battery shown in the figure. This should cause developers to require more revenue in the near term.

Figure 3 illustrates how a New York City battery investor's annual capacity revenue needs (in ICAP terms) would vary over the 20-year period based on the "Realistic High" and "Realistic Low" CAF trajectories. The revenues fall after year 4 because:

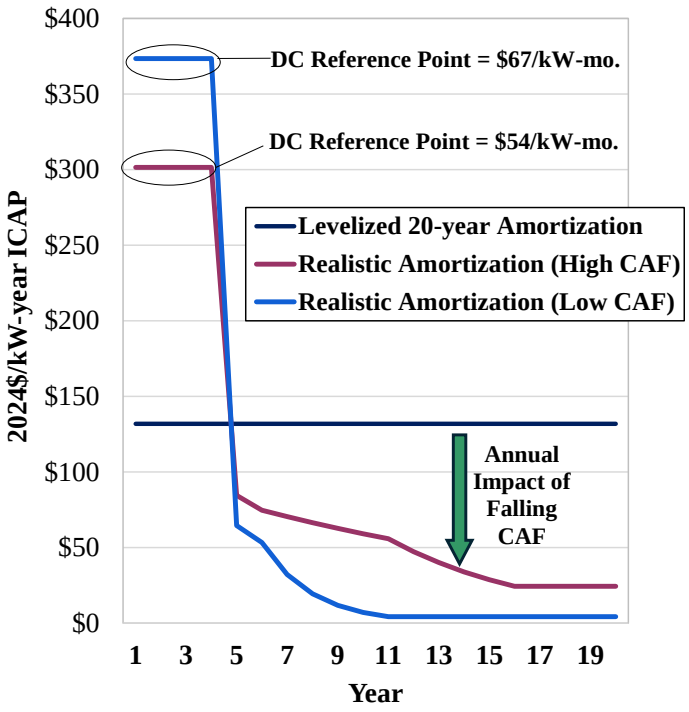
- Other lower-cost technologies will set the demand curves (such as a CT which is modeled in the figure); and

[17] The 20-year CT Net CONE of $218.62 per kW-year UCAP can be calculated using Analysis group's final demand curve model ("FINAL-Demand-Curve-Model-September-2024.xlsx". The parameters for the SCGT 7HA.03 Dual Fuel with SCR are selected for New York City. Then, the service life (cell E22) is changed to a value of 20 and the E&AS revenues in cells P108:V108 are changed to have the same value as earlier years. This produces an ICAP annual reference value of $209.66 per kW-year in cell B117, which we convert to UCAP terms using a 4.1 percent derating factor.

- Falling CAFs will reduce the capacity revenues for a 2-hour battery project because it is paid in UCAP terms.

The falling capacity revenues after year 4 must be offset by higher revenues in the first four years when the 2-hour battery sets the demand curve. These higher initial revenues would be needed to offset the falling revenues in future years to provide the same revenues as the 20-year levelized revenues shown in the figure. This demonstrates why it is unreasonable to assume the 2-hour battery can be amortized evenly over 20 years.

Figure 3: Capacity Revenue to 2-Hour Battery in NYC



AG's assessment of the 2-hour battery storage is incomplete because it does not reasonably consider capacity accreditation risks. A reasonable evaluation of these risks would reveal that the properly amortized 2-hour battery would be more expensive than a CT amortized over 20 years. A key implication is that from an investor's perspective, NYISO proposed demand curves are not sufficient to justify investment in a 2-hour battery storage facility.

3. MMU Responses to Specific Arguments Raised in NYISO's Filing Letter

NYISO offers various reasons why its recommendation adequately accounts for the impacts of CAF changes, which we address below:

First, NYISO notes that, since the Demand Curves will be converted to UCAP terms using the latest battery CAF during each year's Annual Update process, any change in CAFs of the

reference technology during the four-year reset period will be offset by a proportional change in capacity prices.[18]

> MMU Response: This does not account for the impact of falling CAFs on the economics of the 2-hour battery relative to other technologies over the 20-year amortization period. Capacity prices will not increase proportionally if another technology becomes less expensive after the four-year reset period. Furthermore, this revenue assurance to the investor during the four-year DCR period comes at a cost to consumers. If battery CAFs fall meaningfully during the four-year reset period – which must at least be acknowledged as a realistic possibility, given the State's plans for rapid large-scale storage deployment – consumers could experience large and unexpected price increases. For example, using the estimated 43 percent CAF from NYISO's '2024 IRM Sensitivity' case (which includes 5 GW of new solar and wind but only 200 MW of new storage) produces a UCAP Net CONE value for New York City of $314 per kW-year, roughly double the currently effective Net CONE. Using NYISO's lower bound CAF estimate of 25 percent by 2030 produces a UCAP Net CONE of $541 per kW-year, which is 3.4 times the current Net CONE. NYISO's tariff would require it to establish annual Demand Curve updates using these values if such an outcome occurred. Hence, while CAF values during the next four years are highly uncertain, there is a non-trivial possibility that capacity prices will rise dramatically if a two-hour battery is selected.

Second, NYISO contends the 2-hour battery may remain economic even if falling CAFs result in another technology being selected in future DCRs.[19]

> MMU Response: As discussed above in Section III.A.2, the selection of another technology in the future would imply that the capacity revenues of a 2-hour battery (considering the capacity price and CAF) had fallen below its ICAP Net CONE – otherwise, the 2-hour battery would continue to be selected. It is logical to assume that future DCRs will select longer-duration resources, since New York cannot replace all of its existing fossil capacity with very short duration batteries in order to meet its 2040 zero-emission mandate while maintaining reliability. Hence, a 2-hour battery built during the current reset period is very likely to earn revenues below its Net CONE in subsequent periods. An investor considering a battery project today would not ignore this and would therefore require higher revenues during the four-year DCR period than NYISO's evaluation suggests.

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[18] NYISO Filing Letter at p. 23.

[19] NYISO Filing Letter at p. 24-25.

Third, NYISO contends that the 50 basis point adder to the cost of equity and cost of debt accounts for the risk of CAF changes faced by a battery developer.[20]

> MMU Response: Analysis Group presents no analysis or evidence supporting why an adder of this size is appropriate considering the magnitude of expected CAF declines. The combined impact of the proposed 50 basis point adders on the Net CONE of the 2-hour battery in New York City is $8.66 per kW-year in UCAP terms, which is equivalent to the impact of a CAF decrease of just 1.9 percent. The estimates shown in Figure 1 demonstrate that the likely reduction in the two-hour CAF is much greater than this.

Fourth, NYISO claims that future changes in the Demand Curve Reset technology have always been possible and that this has not prevented selection of previous recommended technologies.[21]

> MMU Response: While the possibility of technological change has always been present, the range of variation of costs in prior resets was on a much smaller scale. Over the last 20 years, the inflation-adjusted Net CONE varied between negative 24 percent and positive 28 percent of the Net CONE from the 2004 demand curve study period. By contrast, as shown in Figure 3 for the optimistic CAF trajectory, the CT's net CONE would be 80 percent lower than the 2-hour battery's net CONE in UCAP terms, resulting in a large revenue shortfall for the 2-hour battery resource developer.

Fifth, NYISO contends that if the 2-hour battery's CAF falls in the future, it could operate at a lower output to achieve a longer duration.[22]

> MMU Response: This strategy does not avoid a major reduction in UCAP and revenues since the battery would be required to proportionately reduce the maximum capability it offers in order to earn the CAF of a longer duration resource.

For these reasons, NYISO and AG's evaluation of the 2-hour battery is fundamentally flawed because it does not adequately account for the high likelihood of much lower CAFs in the coming years. Hence, NYISO has not demonstrated that the 2-hour battery is the lowest cost

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[20] NYISO Filing Letter at p. 25.

[21] Id. at p. 24.

[22] Id. at p. 25.

peaking technology. In addition, potential variation in CAFs in the four-year Demand Curve Reset period poses a real risk of setting rates that are not just and reasonable.

B. NYISO Did Not Consider The Ability of 2-Hour Battery to Address Transmission Security Driven Needs

The problems with the selection of a two-hour battery are exacerbated when capacity requirements are derived from transmission security criteria. The Locational Capacity Requirements (LCRs) in NYISO's capacity market have been determined by NYISO's Transmission Security Limit (TSL) methodology for at least one zone in four out of the six years since the TSLs were introduced, including for all three downstate zones in the current capability year. The ICAP Demand Curves are designed to maintain supply in each zone at or above its LCR. Hence, the Net CONE established in this DCR will directly determine market incentives to satisfy transmission security requirements that are met through the capacity market. Evidence from NYISO studies suggests that the contribution of a 2-hour battery towards transmission security requirements is much lower than its current CAF levels. Consequently, if 2-hour batteries are built in areas where the LCRs are based on transmission security criteria, NYISO will have to increase the LCRs to account for differences between the 2-hour battery's CAF and its contribution to transmission security needs, leading to higher costs for consumers. It is unreasonable to select a technology that is not the most cost-effective for satisfying the locational capacity requirements that the ICAP Demand Curves are designed to maintain.

1. The Capacity Market Demand Curves are Used to Meet Transmission Security Requirements

In its Filing Letter, NYISO claims that the NYISO-administered capacity market is designed to address New York's resource adequacy needs and not transmission security.[23] This

[23] NYISO Filing Letter at p. 26.

is not correct. NYISO's capacity market is designed to satisfy both resource adequacy *and* transmission security criteria for several portions of NYISO's bulk power system.

The capacity market and the demand curves are designed to satisfy the system's capacity requirements, which are established using both resource adequacy and transmission security analyses. NYISO's Tariff states that "The ICAP Spot Market Auction will be conducted and solved simultaneously for Unforced Capacity that may be used by an LSE towards all components of its LSE Unforced Capacity Obligation for that Obligation Procurement Period using the applicable ICAP Demand Curves…"[24] The LSE Unforced Capacity Obligation is defined as "The Unforced Capacity equivalent of the Locational Minimum Installed Capacity Requirement [ICAP Requirement]". Importantly, this locational minimum requirement will reflect the higher of the locational need for capacity for resource adequacy or transmission security as explained below.

In NYISO's annual process to establish the ICAP requirements and demand curves, the New York State Reliability Council (NYSRC) first establishes a statewide Installed Reserve Margin (IRM) that satisfies the resource adequacy criterion of a loss of load expectation (LOLE) of no more than 1 day in 10 years. Subsequently, NYISO establishes Locational Capacity Requirements (LCRs) for the New York Control Area (NYCA) as a whole and three nested localities (New York City, Long Island and the G-J Zone). These LCRs are the anchor point used to determine the local demand curves for each zone.[25] These curves are then employed during the capacity action to procure capacity and set capacity prices.

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[24] NYISO MST, 5.14.1.1.

[25] The NYISO sets the demand curve price for each capacity zone at the Net CONE for that area when supply is equal to the zone's local ICAP Requirement plus a small surplus (the "level of excess").

To determine the LCR for each zone, NYISO uses its LCR Optimizer tool that uses a resource adequacy methodology to determine the resource adequacy requirement level for the zone, subject to minimum 'floor' values derived from NYISO's Transmission Security Limit (TSL) methodology. These floors have become increasingly binding in recent years.

The TSL methodology is designed to ensure that the LCRs satisfy NYSRC/NPCC transmission security criteria.[26] Transmission security is assessed by the NYISO using a deterministic calculation that differs from NYISO's probabilistic resource adequacy modeling in terms of methodology and assumptions. NYISO has taken steps to align its capacity market TSL methodology with the transmission security assessments it carries out in its system planning process.[27] Hence, when a locality's LCR is set at its TSL floor, the capacity market ICAP requirements for that locality are directly derived from transmission security analysis.

In recent years, the LCRs have frequently been set at TSL floors. In the 2024/25 capability year, the LCRs for New York City, Long Island, and the G-J Zone (comprising about 60 percent of NYISO's peak load), were set at the TSL floors. Preliminary LCR results for the 2025-26

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[26] See June 30, 2021 NYISO ICAPWG presentation "Transmission Security Assessments", available here. NYISO describes the significance of transmission security in the capacity market as follows: "The primary objectives of today's NYISO Capacity Market is to maintain sufficient capacity to satisfy both statewide resource adequacy and ICAP locality requirements respecting transmission security, by providing revenue adequacy for supply resources" (slide 7). NYISO goes on to state that "The Transmission Security Limit (TSL) was introduced into the optimizer as a floor to maintain sufficient resources in the ICAP localities to meet transmission security criteria" (slide 8).

[27] See October 7, 2024 NYISO ICAPWG presentation "Transmission Security Limit Floor for the Installed Capacity Market - Follow-up Discussion", available here. This presentation was recently provided by NYISO at the request of stakeholders to clarify how transmission security is incorporated in the capacity market. NYISO explains that "The transmission security assessment for the ICAP market, which is developed through the Bulk Power Transmission Limit study during the TSL floor calculation, and planning studies is [sic] conducted in a consistent manner" (slide 3). NYISO further states that "The technical considerations for transmission security, i.e., the power flow studies and the subsequent resource requirements, are consistent among the parameters used to establish ICAP market requirements and the planning studies" (slide 6). This presentation explicitly refers to "transmission security resource requirements" that are represented in the ICAP market through the use of the TSL floors (for example, see slide 5).

capability year indicate that the New York City and G-J Zone LCRs will continue to be set at their TSL-based floors.

2. A 2-Hour Battery is Less Capable of Satisfying Transmission Security-Based Requirements Than Resource Adequacy Requirements

Recent reliability studies performed by NYISO have identified Reliability Needs driven by transmission security with durations much longer than two hours, which is important because this reduces the capability of a 2-hour battery to satisfy these needs. In 2023, NYISO identified a transmission security need for 446 MW of capacity in New York City with a duration of nine hours.[28] In addition, NYISO's recently completed 2024 Reliability Needs Assessment found a transmission security need for 97 MW of capacity in New York City in 2034.[29] Although the duration of the identified need was only three hours, this was because: (a) NYISO assumed zero penetration of battery storage and (b) the duration of need tends to grow with the magnitude of the deficiency, which was still less than 100 MW. NYISO found that the duration of the need could be up to 11 hours in a case that assumed higher policy-driven load growth.

A 2-hour battery's contribution towards the transmission security-based capacity requirements will fall as the duration of underlying need rises and will be relatively small when the duration rises to ten hours or more. Hence, 2-hour batteries will likely be substantially less capable of satisfying transmission security needs in the future than resource adequacy needs.

3. An Accurate Assessment of Peaking Units' Cost Must Consider Their Transmission Security Contributions

The 2-hour battery's low transmission security value makes it less likely to be the lowest cost peaking unit to the power system. Contribution to transmission security needs is not

[28] See NYISO report "Short-Term Reliability Process Report: 2025 Near-Term Reliability Need Solution Selection", November 20, 2023.

[29] See NYISO 2024 Reliability Needs Assessment report, November 19, 2024.

currently considered in a resource's CAF, but it affects the net supply the resource effectively provides towards meeting the system's capacity requirements.

For resources that make limited contributions towards transmission security requirements, NYISO's practice is to increase the TSL floors (and therefore, the LCRs) to account for the resource's low contribution to transmission security. For example, demand response sells capacity through the Special Case Resource (SCR) program, but SCRs are assumed to provide no value in transmission security assessments. As a result, NYISO adds the anticipated MWs of capacity sold by SCRs to the TSL floors, so the *net* supply SCRs provide is 0 MW when the LCR is set at the TSL floor.[30] For other resources that have lower contributions in transmission security assessments than in resource adequacy assessments (e.g., offshore wind), the TSL floor is increased to account for the resource's limited availability. Hence, the accredited UCAP of such resources can be much greater than their actual contribution to the capacity requirements. If this is not considered in the demand curve reset, NYISO may not select the most cost-effective peaking technology for the system.

The Tariff requires NYISO to "…assess: (i) the current localized levelized embedded cost of a peaking plant in each NYCA Locality, the Rest of State, and any New Capacity Zone, to meet minimum capacity requirements…" In this assessment, NYISO quantifies cost per MW-year of UCAP sales, but if a 100 MW battery storage facility with a CAF of 66 percent sells 66 MW of UCAP and the transmission security value is only 22 percent (such as in the planning assessment with a nine-hour transmission security need), NYISO will increase the TSL to

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[30] See NYISO October 22, 2024 ICAPWG presentation "Transmission Security Limit (TSL) Floor Values Calculation: 2025-2026 Capability Year", at slide 8, available here. NYISO's calculation of the TSL floor value shows that a UCAP Requirement is first calculated using the load forecast and Bulk Power Transmission Limit respecting transmission security criteria. Then the quantity of SCRs assumed in the IRM Study is added to the ICAP equivalent of that requirement for purposes of calculating the ICAP Requirement.

account for this, causing the effective UCAP requirement to increase by 44 MW (equal to the 66 MW procured minus the 22 MW of the need satisfied). Hence, the cost per MW of net UCAP after accounting for this increase will be three times the cost per MW of UCAP (the ratio of 66% to 22%). Hence, even if the battery was the lowest cost unit per MW-year of UCAP that it sells based on its RA-based CAF, the battery will be much more costly per MW-year of the UCAP requirement that is actually satisfied when the LCRs are based on TSLs.

The analysis performed by NYISO and Analysis Group for the 2-hour battery does not account for its limitations in addressing transmission security-based capacity market requirements. As such, it is incomplete and does not serve as a reasonable basis to support NYISO's recommendation.

IV. A COMBUSTION TURBINE WITH 20-YEAR AMORTIZATION IS A VIABLE CHOICE FOR THE DCR TECHNOLOGY

In the stakeholder process, we recommended that NYISO adopt a combustion turbine with a 20-year amortization period ("20-year CT") as the DCR technology. A 20-year CT would not suffer from the weaknesses of the 2-hour battery described above and would likely have the lowest Net CONE among the remaining viable options. A 20-year CT is viable notwithstanding New York's requirement for a zero emissions power system by 2040 because any future requirement to retrofit dispatchable capacity to use a compliant fuel will result in a corresponding increase in the CT's revenues at that time. A 20-year CT is likely to be the lowest-cost peaking technology compared to a properly considered 2-hour battery, especially in New York City.

A. A 20-Year CT Is a Viable Choice for the DCR Peaking Unit

We address various arguments related to the viability of the 20-year CT below:

1. The State's Zero Emissions Mandate Does Not Preclude Selection of a 20-Year CT

In evaluating the CT technology, Analysis Group proposes a 13-year amortization period to account for the requirement in New York's Climate Leadership and Community Protection Act ("CLCPA") requires that the power system be zero emissions by 2040. The use of a 13-year amortization period effectively presumes that a CT built during the four-year DCR period will cease operating and earn zero revenues after 2040 in order to comply with the CLCPA.

It is unreasonable to assume that a CT built in the next four years will have zero economic value after 2040. Numerous studies of New York State's power system by 2040 and beyond have universally found a need for large quantities of dispatchable resources capable of operating for prolonged periods to meet resource adequacy needs when intermittent renewables and storage are insufficient. Most recently, NYISO's 2023 System & Resource Outlook found that 20 to 40 GW of dispatchable emissions free resources ("DEFRs") will be needed by 2040 to maintain reliability, while New York's Department of Public Service estimates a need for "at least 10 to 20 GW of clean firm generating capacity".[31] [32] Analysis performed to support New York State's Climate Action Council found that:

> On the inter-day timescale, firm resources are needed to serve load and maintain system reliability during multi-day periods of low renewable output – periods in which the contributions of short-duration battery storage are limited. Our analysis identified a need for firm, zero-carbon capacity – in addition to the state's existing hydro and nuclear facilities – of between 18–23 GW to maintain system reliability while achieving a 100% zero-emissions grid.[33]

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[31] See NYSDPS, "Department of Public Service Staff Proposed Definitions of Key Terms in PSL §66-p", November 4, 2024, NYPSC Case 15-E-0302, at pp. 32-33.

[32] The consensus around the need for large quantities of DEFRs also supports the argument in Section III.A.1 of these comments that the capacity value of short duration batteries is widely expected to fall precipitously in the future, as these studies would not identify the need for DEFRs if short duration batteries remained capable of addressing resource adequacy needs.

[33] See "Integration Analysis Technical Supplement", Appendix G to NYS Climate Action Council Scoping Plan (Dec 2022), prepared by Energy and Environmental Economics (E3) and Abt Associates, p. 47.

NYISO's 2023 System & Resource Outlook included a "State Scenario" which "serves as a postulated future based on inputs specified by the New York State Department of Public Service (NYDPS), New York State Energy Research and Development Authority (NYSERDA), and Joint Utilities." Its purpose is to support the Coordinated Grid Planning Process (CGPP) directed by the NYPSC. The State Scenario specifically includes both new and retrofit hydrogen combustion generators to meet the need for DEFRs in addition to renewables and storage. Its results included 17.9 GW of hydrogen combustion capacity statewide, of which 14.8 GW was from retrofits of existing generators.[34]

While New York has not yet ruled on which technologies will comply with the "zero emissions" requirement, it is extremely hard to imagine a solution to the need for tens of gigawatts of DEFRs that does not entail retrofitting or repowering existing generators to use a compliant clean fuel. This makes it extremely likely that a generator built in the next four years will have the option of retrofitting once a zero emission fuel becomes available and fossil fuels become prohibited by state regulations, instead of retiring after 13 years. In the next subsection we discuss why it is unnecessary to explicitly model the costs of such a retrofit in the Net CONE estimate of the 20-year CT in the current DCR.

2. Future Retrofit Costs Need Not Be Evaluated Explicitly in the Current DCR

NYISO argues that we neglected to consider the future retrofit costs a combustion turbine would require to comply with the CLCPA.[35] However, if all fossil fuel generators are required to retire or retrofit to use a zero emissions fuel by 2040, future demand curve resets will be set at higher levels that reflect the additional cost associated with equipment (such as fuel storage

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[34] See NYISO 2023-2042 System & Resource Outlook, Appendix H at p. 19.

[35] NYISO Filing Letter at p. 16.

facilities and combustion upgrades) needed to operate on the zero emission fuel. A CT facility built in the next four years will likely be among the most cost-effective units to retrofit.[36] Hence, it is reasonable to expect that future retrofit costs will be offset by proportionally higher future capacity revenues. As a result, it is much more reasonable to assume the CT will be retrofitted than to assume it will be retired.[37]

It is not necessary to determine at present what the specific future retrofit costs would be, since it can be assumed that whatever revenues eventually become available to motivate the conversion of the dispatchable fleet to zero emission fuel (through the capacity market or state incentives) will also be available to a CT built in the next four years. Hence, the high costs associated with hydrogen storage estimated by Analysis Group are not relevant to this argument. Likewise, any impact on the CT's net energy and ancillary services revenues caused by retrofitting to a clean fuel will be offset by changes to the Net CONE in future DCRs.

3. A 20-Year CT Could Be Permitted If Needed For Reliability

Recent permitting decisions by the New York State Department of Environment and Conservation (DEC) have raised doubts about whether a gas-fired CT can be permitted in New York. Specifically, the DEC issued air permit denials to the proposed Danskammer Energy Center and Astoria Gas Turbines repowering projects in 2021 on the grounds that they were inconsistent with the state's climate law. However, the DEC indicated in both cases that the

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[36] See Appendix F of NYISO's 2023 System & Resource Outlook at p. 7: "as fossil fuel burning combustion turbines and combined cycle units retire, their assets can be repurposed and retrofit to burn hydrogen as a fuel instead. This has the potential to be less expensive than building a brand new resource since many elements of the combustion turbine or combined cycle power plants can be reused with limited modification."

[37] Developers of recently proposed gas-fired generators in New York including the Astoria Gas Turbines and Danskammer Energy Center repowering projects indicated that their business plan included switching to burn hydrogen if and when such a fuel became required and/or available. See NRG Supplemental Enhanced Public Participation Plan Third Progress Report submitted to the NYSDEC on February 27, 2021 (available here), and Danskammer Energy, "Dnaksammer Upgrade Project" (August 2020), available here.

absence of any upcoming reliability need for the projects was a key factor in its determination.[38] Hence, it is likely that a generator could obtain a permit under the conditions modeled in the DCR when a capacity region has only a modest capacity surplus.

4. Previous Decisions of the 4th Circuit Court of Appeals Do Not Require a 13-year Amortization

NYISO states that "The United States Court of Appeals for the District of Columbia Circuit ["the Court"] and the Commission determined in the last reset that absent zero-emission resource eligibility rules, it was reasonable for the NYISO to reduce the amortization period for a fossil-only resource to align with the 2040 zero-emission electricity mandate imposed by the CLCPA".[39] NYISO argues that our proposal disregards precedent and any changes in circumstances from the previous DCR that would warrant a different outcome (namely, NYISO's use of a shortened amortization period).[40]

However, nothing in the Court's decisions would preclude use of a 20-year amortization period. In its decision rejecting FERC's rejection of NYISO's proposed 17-year amortization period, the Court clarified that "we express no view on whether the more detailed explanations FERC offered in its briefing could support the same result if adopted by the agency and supported by the record".[41] The Court's decision does not preclude a Commission order based on the valid arguments in these comments. The passage of four years and corresponding shortening of NYISO's proposed amortization period for the CT put the currently proposed 13-

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38 See the DEC's Notice of Denial of Title V Air Permit, DEC ID: 3-3346-00011/00017, Danskammer Energy Center, dated October 27, 2021, at page 13: "Danskammer has not offered a sufficient basis for the [DEC] to justify the Project…based upon publicly available studies and reports by the [NYISO],…at least through 2030, there is no demonstrated reliability need or justification for the Project."

39 NYISO Filing Letter at p. 14.

40 NYISO Filing Letter at p. 14.

41 See Indep. Power Producers of N.Y., Inc. v. FERC, No. 21-1166, 2022 WL 3210362, (D.C. Cir. Aug. 9, 2022) (per curiam). See New York Public Service Commission v. FERC, No. 23-1192, (D.C. Cir. Jun. 14, 2024).

year amortization far beyond the zone of reasonableness and justify a departure from the Commission's previous ruling accepting a 17-year amortization.

V. CONCLUSION

The MMU finds that the proposed selection of the 2-hour battery storage resource as the demand curve unit technology is not reasonable based on the analysis and evidence provided by NYISO. NYISO's assessment did not reasonably consider:

- The impact of potential CAF reductions over the proposed 20-year amortization period; or
- The reduced capacity value of the battery for satisfying transmission security-based capacity requirements.

If these issues were properly considered, we believe the the assessment would show that the 2-hour battery has a much higher Net CONE than a CT amortized over 20 years. Hence, NYISO's filing is deficient, and we respectfully recommend the Commission reject NYISO's proposed demand curves, and direct NYISO to address these deficiencies.

Respectfully submitted,

/s/ David B. Patton

David Patton
President
Potomac Economics, Ltd.

December 20, 2024

CERTIFICATE OF SERVICE

I hereby certify that I have this day e-served a copy of this document upon all parties listed on the official service list compiled by the Secretary in the above-captioned proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated this 20th day of December 2024 in Fairfax, VA.

/s/ David B. Patton