POTOMAC ECONOMICS

Memorandum

TO: NYISO

FROM: David B. Patton, Pallas LeeVanSchaick, and Joe Coscia

DATE: August 23, 2024

RE: Technology Choice for the 2025-2029 Demand Curve Reset ("DCR")

NYISO's capacity demand curve is intended to facilitate efficient investment and retirement decisions that will satisfy NYISO's planning needs. This is accomplished by setting the demand curve level based on the net cost of new entry ("Net CONE") for the lowest-cost peaking resource, although other types of resources may actually enter. Identifying a suitable technology given New York's zero-emission mandate by 2040 is a unique challenge in this DCR process. This memo provides our comments on the recommended selection of the 2-hour battery as the demand curve technology by the Analysis Group ("AG"), as well as our recommendation that NYISO select a combustion turbine ("CT") amortized over 20 years.

A. Executive Summary

1. The 2-Hour Battery Recommendation

In its July 30 Interim Final Report, AG recommended the 2-hour battery amortized over 20 years for the demand curve unit technology. We do not find this advisable for the following reasons:

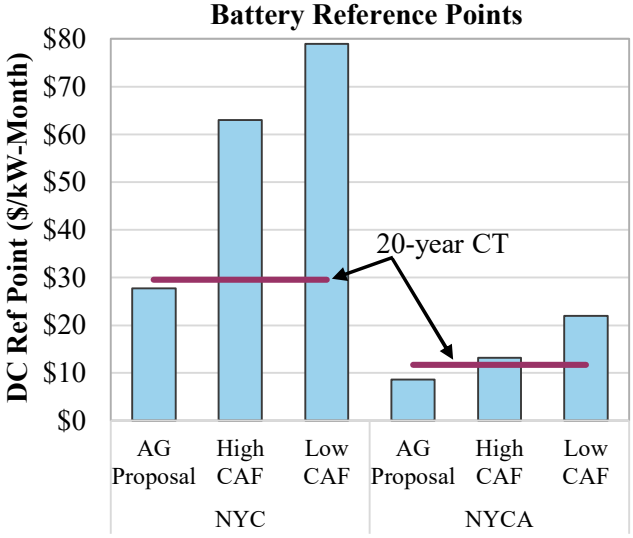
- AG underestimates the Net CONE of the battery because it does not properly consider the impact of falling Capacity Accreditation Factors ("CAF") over the 20-year amortization period. A more reasonable analysis, shown in Figure 1, would indicate that the demand curves under the 2-hour battery would exceed those of a combustion turbine.
- Even accepting AG's recommendations, the CAFs for the 2-hour battery will likely fall during the demand curve reset period, raising the demand curve levels through the annual adjustment process higher than for a CT amortized over 20 years.
- 2-hour batteries are limited in their ability to meet the future reliability needs of the system. Studies show that long-duration dispatchable resources are needed to satisfy NYISO's needs as the State transitions to a zero-emission fleet by 2040. For example:
  - NYSERDA's Integration Analysis to support the Climate Action Council Scoping Plan similarly found that large quantities of dispatchable resources (e.g., hydrogen-burning units or 100-hour batteries) will be needed for reliability in prolonged periods of low renewable output when short-duration batteries will be inadequate.[1]

[1] 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, pages 47-51.

- NYISO's recent 2023-2042 System & Resource Outlook study finds that at least 20 GW of dispatchable emissions-free resources capable of multi-day operation (such as hydrogen-fired CTs) are needed to replace existing fossil capacity by 2040.[2]

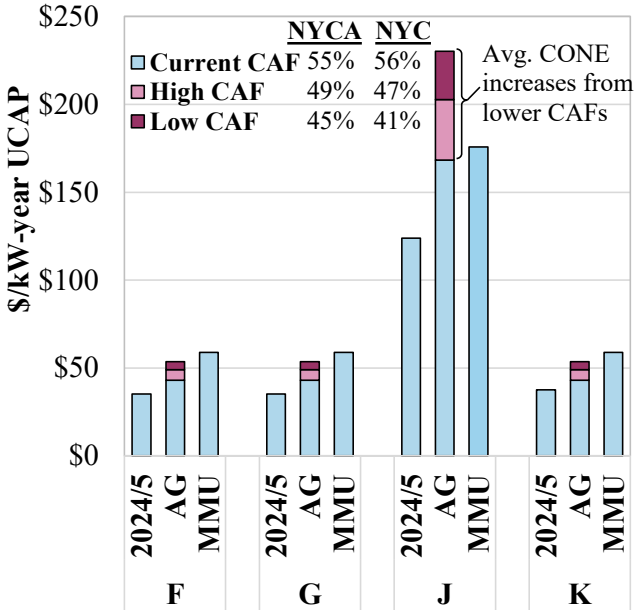
Regarding the first concern, a falling CAF over the life of a 2-hour battery will likely cause it to lose revenue in future years, thereby *raising its initial Net CONE*. Based on forecasted trajectories for the CAFs, it is unlikely to remain the demand curve reset unit after this cycle. If one assumes the demand curve is set based on a CT in the next cycle, the *current* Net CONE for the 2-hour battery and the corresponding demand curve reference points would rise sharply as shown in Figure 1. Even if one adopts an optimistic assumption that that CAF will fall less (i.e., the "high CAF" scenario), the reference point and resulting capacity prices would be higher than for a 20-year CT in all areas.

Figure 1: CAF Effects on 2-Hour Battery Reference Points



However, even if one accepts the Net CONE estimated by AG for the 2-hour battery, it will still likely produce higher prices in New York City over the 4-year demand curve reset period than a 20-year CT (the second concern listed above). Figure 2 compares forecasted clearing prices over the next four years under the current (2024-25) demand curves and the AG and MMU-recommended demand curves given the current capacity surplus. For the AG-recommended demand curves, the figure shows: (i) prices in the first year based on the current CAF level; (ii) the average increase in prices in the last 3 years with CAFs at the high end of our estimates in these years; and (iii) the additional increase in prices in the last 3 years assuming CAFs at the low end of our estimates of realistic CAFs in these years.

Figure 2: Forecasted Prices in Reset Period



This analysis shows that the AG proposal is likely to produce much higher prices in New York City after year 1 of the demand curve period than the MMU-recommended curves. Prices after year 1 in the rest of the state area may be comparable under the AG and MMU-recommended curves in the "Low" CAF case, with the MMU-recommended curves producing only slightly higher prices in the optimistic "high" CAF case.[3]

[2] See NYISO 2023-2042 System & Resource Outlook (July 2024), pages 8-9.

[3] Due to the current levels of surplus capacity in the G-J Locality and Long Island, the clearing prices in those areas are set on the NYCA demand curve. Additional detail is provided in Section B.

Hence, we find that a 2-hour battery is not advisable for NYISO to select as the Demand Curve Technology, both because: a) it cannot effectively satisfy the reliability needs of the system in the future; and b) it is not the lowest cost technology if future changes in CAFs are properly considered in the calculation of Net CONE.

2. Combustion Turbine Amortized over 20 Years

We recommend selecting a CT amortized over 20 years as the demand curve unit technology. The primary argument against selecting a CT is that it is challenging to permit it in New York State. However, the Department of Environmental Conservation ("DEC") has acknowledged that it could permit a fossil fuel generator identified to be needed for reliability by NYISO.[4] In addition, we find a number of compelling factors that demonstrate that a CT amortized over 20 years is the most reasonable choice for the demand curve technology:

- The clean energy transition will likely require the retrofit of much of the existing gas-fired capacity to burn clean fuel and a new CT will be among the most cost-effective units to retrofit. It is also reasonable to expect that Net CONE will rise to reflect new emission-free dispatchable resources. Hence, a new CT is well-positioned to operate profitably for more than 20 years.
- Properly accounting for the revenue effects of falling CAFs over the next 20 years for the 2-hour battery reveals that its true Net CONE currently is much higher than the Net CONE for a CT amortized over 20 years (See Section B of this memo).
- Even if one accepts AG's estimate of a battery's current CONE, a CT amortized over 20 years would avoid price increases from falling CAFs in the next four years.

The remaining sections in this memo address the following areas:

- Section B identifies flaws in AG's evaluation of the 2-hour battery and estimates the Net CONE that would result from addressing the flaws.
- Section C shows that the AG-recommended curves create substantial price risk over the 4-year demand curve reset period associated with near-term reductions in CAFs.
- Section D explains why it would be reasonable for NYISO to select a CT amortized over 20 years as the demand curve unit technology.
- Section E provides our conclusions and recommendations.

B. Evaluation of the 2-Hour Battery Storage System Net CONE

In its July 30 Interim Final Report, AG recommended the 2-hour battery amortized over 20 years for the demand curve unit technology. Table 1 shows its results for four key locations. The Net CONE of the 2-hour battery is initially calculated per kW-year of installed capacity ("ICAP"). The 2-hour battery's Net CONE in ICAP (shown in the first row) is divided by CAF (in the

[4] 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."

second row) to determine the Net CONE per kW-year of UCAP (in the third row). This is converted to a monthly value (kW-month of UCAP) to set the demand curves (in the fourth row).

Table 1: Analysis Group Interim Final Report Recommendations

Parameter		F – Capital	G – Dutchess	J - NYC	K – Long Is.
Net CONE per kW-year (ICAP)	(1)	$47.20	$49.50	$126.96	$27.73
Capacity Accreditation Factor	(2)	55.42%	56.16%	55.93%	52.76%
Net CONE per kW-year (UCAP)	= (1)/(2)	$85.17	$88.14	$227.00	$52.56
Summer Reference Point in $ per kW-month (UCAP)	(3)	$9.84	$10.93	$28.64	$7.35

This section identifies flaws in AG's evaluation of the 2-hour battery and estimates the Net CONE that would result from addressing the flaws, which would lead to selecting a CT as the demand curve technology. This section is divided into the following parts:

- Part 1 summarizes the available studies of future CAF values for the 2-hour battery and shows future high and low CAF scenarios that we use in this memo.
- Part 2 considers how future CAF values after the initial four-year demand curve period would affect the decision to invest in a 2-hour battery.
- Part 3 addresses AG's argument that the CAF degradation risk to a 2-hour battery investor is comparable to risks faced by other technologies.
- Part 4 demonstrates why the costs of a 2-hour battery exceed those of a CT even if the CT is fully amortized before 2040.
- Part 5 explains that the net energy and ancillary services revenues of the 2-hour battery would also decrease significantly over the 20-year amortization period and how this would further support the selection of a CT as the demand curve technology.
- Part 6 provides a summary of our conclusions.

1. Recent capacity accreditation studies and development of future CAF scenarios

AG makes the flawed assumption that the falling CAF will not prevent the battery from being amortized evenly over a 20-year period. The 2-hour battery CAF is widely expected to drop over the coming years as the penetration of batteries increases and the Northeast US region shifts from a summer peaking system to a system with primarily winter reliability risk. The following five studies estimated the marginal capacity value of 2-hour storage in various scenarios:

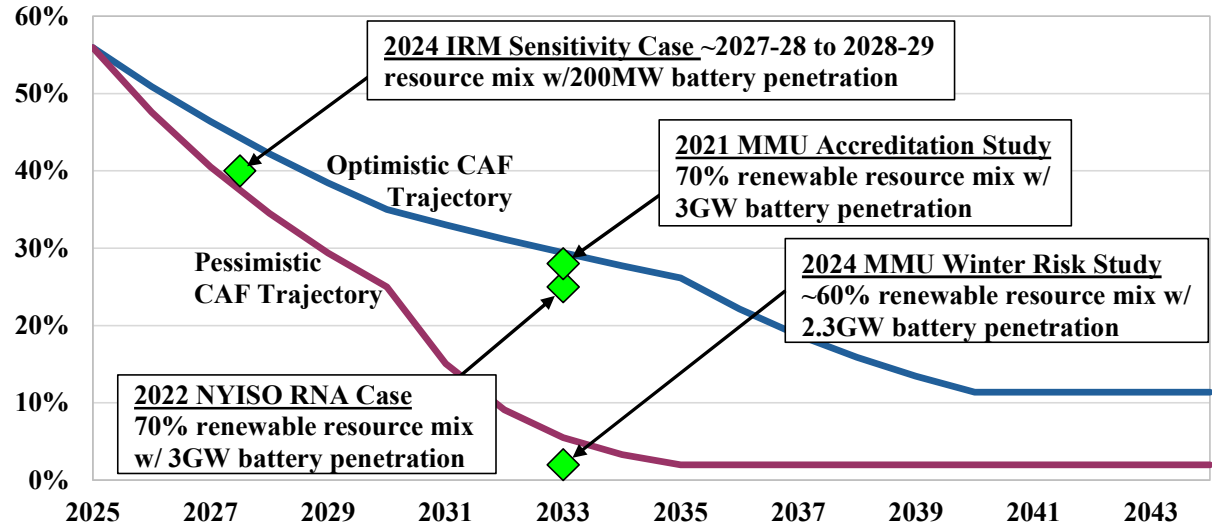
- NYISO (2022): **25 percent** (assumes 3 GW of 4-hour storage in NYC from the Capacity Accreditation consumer impact study of 70 percent renewables by 2030).[5]

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

- NYISO (2024): **40 percent** (assumes 200 MW of 4-hour storage in NYC from this demand curve reset study with CHPE and 5.2 GW of additional renewables viewed as potentially likely in the 2027-2028 and 2028-2029 Capability Years).[6]
- Potomac Economics (2021): **28 percent** (assumes 3 GW of 4-hour storage and 70 percent renewables by 2030 from our 2021 study of marginal capacity accreditation).[7]
- Potomac Economics (2024): **2 percent** 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), which result in the lower estimate.[8]
- 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.[9]

All of these studies indicate that we should expect the 2-hour battery's CAF to decline rapidly in the near future, although there is a wide range in the specific projections. Importantly, *none of these studies assume the State achieves its 2030 goal of 6 GW of battery storage installations.* Higher penetration of battery storage will tend to reduce their future CAF levels. Figure 3 shows the results of these studies for NYC (displaying the two studies of 70 percent renewables in 2033 given current progress) and includes realistic optimistic (i.e., high CAF) and pessimistic (i.e., low CAF) future CAF trajectories that we use to analyze 2-hour battery investments.

Figure 3: Future Expected CAF Changes in NYC for the 2-Hour Battery



This figure shows that even in the optimistic case, CAF levels for a 2-hour battery in New York City will drop from the current 56 percent to slightly over 11 percent by 2040. The optimistic

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

7 See MMU 11/2/2021 ICAPWG presentation, slide 43.

8 See our 2023 State of the NYISO Markets report, page 100.

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

estimates were generated from our resource adequacy model ("PE-RAM") assuming partial completion of the 2030 goals in 2030 and full completion of 2035 and 2040 goals. These CAFs are relatively high because they do not consider distinctions between firm and non-firm fuel resources. The pessimistic CAF trajectory shows the CAF for a 2-hour battery dropping from 56 percent in 2025 to 2.0 percent by 2035. In 2030, this CAF is based on the 2022 NYISO RNA Case. In 2035 and 2040, these CAFs are low because they consider firm versus non-firm fuel resource distinctions, which become significant as winter reliability risks increase. The figure shows that recently published estimates by NYISO fall between these two CAF trajectories.[10]

2. AG does not reasonably consider the effects of falling CAFs

These anticipated CAF reductions will be considered by battery storage developers. The battery storage advocacy group, NY BEST, recently stated: "the decline in [CAFs] is presently one of the most significant considerations of developers and financers, into their analysis."[11] 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.

AG has dismissed this concern arguing that if the CAF falls during the 20-year amortization period, the Net CONE per kW-year of UCAP will increase to offset the CAF degradation. In other words, if the CAF drops by 50 percent, the Net CONE will double. However, this is only true 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.

To illustrate how the CAF affects the incentives to invest in a 2-hour battery resource, Figure 4 shows the Net CONE of a battery in New York City over 20 years as the CAF falls in an optimistic case. It compares this to the Net CONE of the resource if the CAF were to remain fixed at the current level and to a CT amortized over 20 years.

Figure 4: Battery Net CONE in NYC with Optimistic CAF

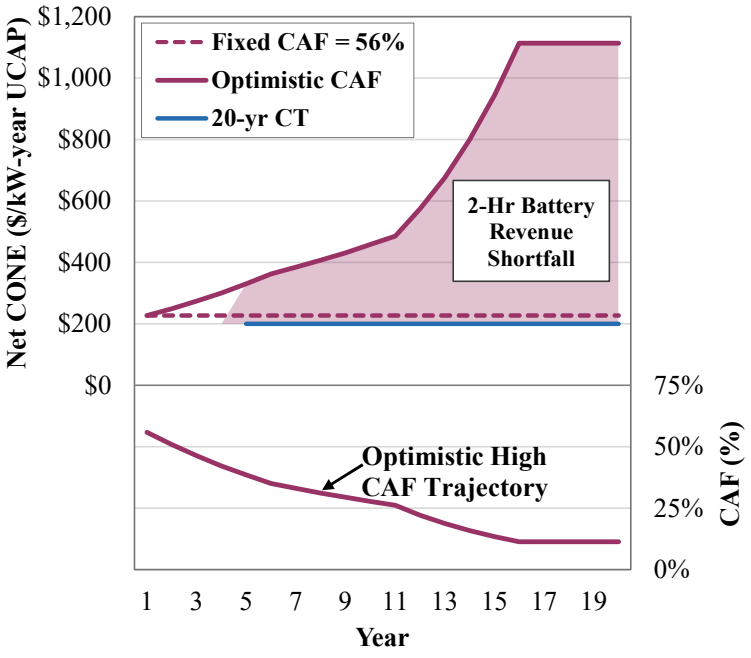


Figure 4 shows that if the CAF falls from 56 percent in Year 1 to 11 percent by year 20, the Net CONE of a 2-hour battery would rise by almost 400 percent to $1113 per kW-year (UCAP). As the CAF falls, its costs will quickly become much higher than the Net CONE of a CT. This should cause the CT to become the demand curve technology, causing a predictable

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

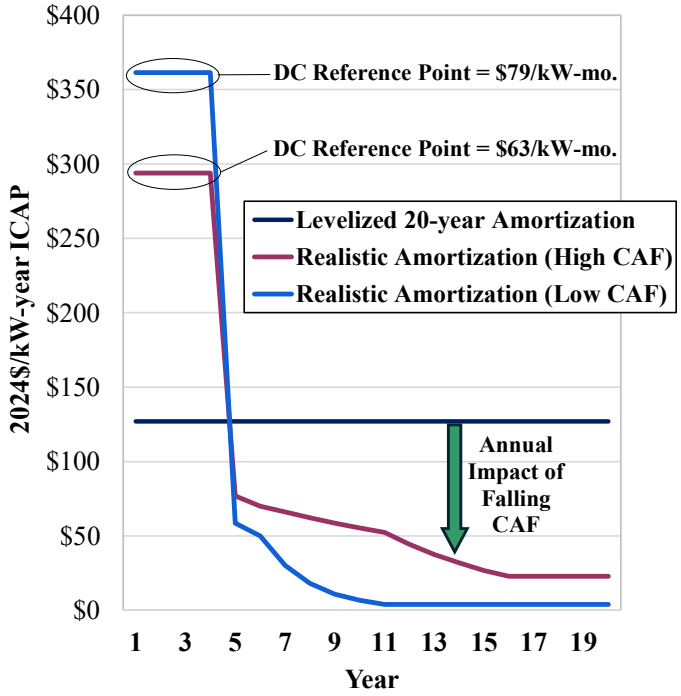
[11] New York Battery and Energy Storage Technology Consortium ("NY BEST") DCR comments, June 28, 2024, at page 2.

revenue shortfall for the battery shown in the figure. This should cause developers to require more revenue in the near term.

Figure 5 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; and
- Falling CAFs will reduce the capacity revenues for 2-hour batteries because it is paid in UCAP terms.

Figure 5: Capacity Revenue to 2-Hour Battery in NYC



The falling capacity revenues after year 4 must be offset by higher revenues in the first four years when the battery would set the demand curve. These higher initial revenues would offset the falling revenues in future years to provide the same revenues as the 20-year levelized revenues shown in the figure. This indicates that it is unreasonable to assume the 2-hour battery can be amortized evenly over 20 years. 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 2-hour battery is more expensive than a CT amortized over 20 years. The analyses shown in Figures 4 and 5 are shown for other zones in New York in the Appendix to this memo.

3. Reply to AG's contention that CAF degradation is like any technological change

In the Interim Final Draft Report, AG asserts that the risk of CAF degradation is no different from the risk to a CT developer that its technology may be superseded by a newer superior technology that reduces capacity prices and revenues. This ignores the profound difference in the magnitude of risk of falling returns to a 2-hour battery developer versus a CT developer:

- The risk is almost entirely one-sided for the 2-hour battery – Figure 4 and 5 shows that that the revenue even under the most optimistic CAF trajectory may fall more than 80 percent resulting in a shortfall amounting to the vast majority of the revenue needed by the 2-hour battery resource developer to break even on its investment.
- In contrast, CT developers may see increases or decreases in revenues. Future technological improvements lead to downside risk for a developer, while the developer would benefit from possible increases in future entry costs. Over the last 20 years, the inflation-adjusted Net CONE varied between a minimum of 76 percent and a maximum of 128 percent of the Net CONE from the 2004 demand curve study period.

- CT developers also face potential upside given that virtually all CTs built more than 20 years ago remained in operation well beyond 20 years, which delivers revenues exceeding those assumed under the 20-year amortization.

4. Proper Amortization Raises Net CONE of 2-Hr Battery above that of 13-year CT

Although we do not consider it reasonable to fully amortize the CT before 2040, even a CT fully amortized before 2040 would be more economic than a properly amortized 2-hour battery. AG assumes that if a CT is selected, the amortization period would fall in each of the upcoming demand curve resets, from 13 years in the current reset to 5 years in the 2032 reset. Ironically, this would *reduce* the Net CONE of a resource entering by 2027:

- Such a resource would expect the rising Net CONEs in each of the upcoming demand curve resets;
- This would *lower* the Net CONE of the CT in the current period from $127 per kW-year in ICAP terms to roughly $100 per kW-year – substantially lower than the Net CONE of the 2-hour battery.

This analysis is presented in the Appendix to this memo.

5. Degradation of Net Revenue from Operating Reserves

The 2-hour battery is assumed to earn high revenues from the sale of 10-minute spinning reserves in the day-ahead market. This accounts for 72 percent of energy and ancillary services net revenue based on the assumption that the battery storage unit would sell reserves in the DAM in 89 percent of hours. Stakeholders have pointed out that:

- Battery storage ICAP will reach ~5 GW by ~2033; but
- The requirement for 10-minute spin is only 655 MW and the total contingency reserve requirement is only 2620 MW.

Thus, it is inevitable that the revenues from 10-minute spinning reserves will fall as the penetration of batteries increases. While we do not estimate the impact in this memo, it would have an effect similar to the falling CAF evaluated above and further reduces the reasonableness of the 2-hour battery as the demand curve technology.

6. Conclusion Regarding 2-Hour Battery Net CONE

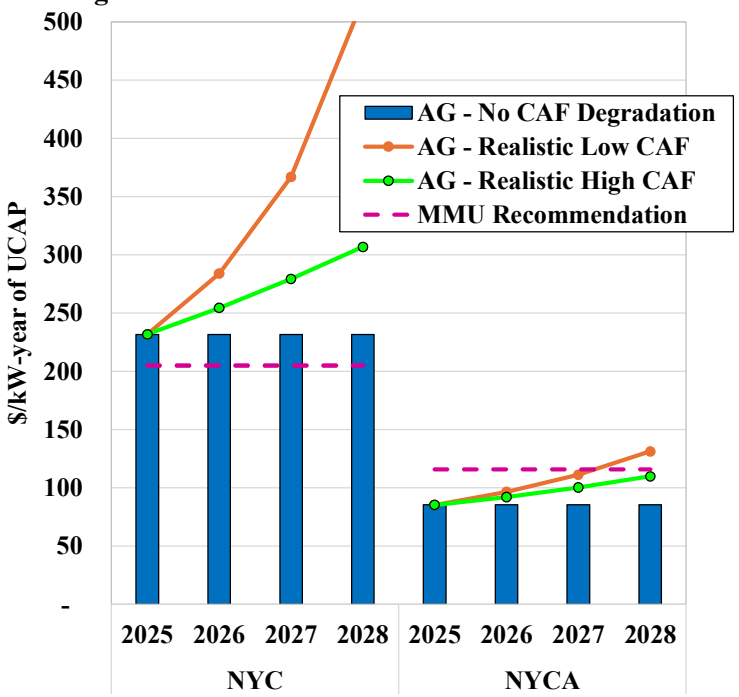
Our analysis demonstrates that the anticipated reduction in CAFs for 2-hour batteries will likely lead to another technology becoming more economic, thereby reducing revenues after the initial few years of investment. AG has largely ignored this risk and it has led AG to substantially under-estimate of Net CONE for the 2-hour battery. This conclusion is not sensitive to the specific characteristics of the competing technology because it is driven by the unique limitations of the 2-hour battery. We also find that the net revenues assumed from operating reserves has been over-estimated and will decrease as the penetration of battery resources increases.

Hence, a rational investor would require much larger returns in the initial years after the investment to make up for the anticipated CAF degradation. We find that if this risk was properly evaluated, the net CONE of the 2-hour battery rise significantly, making it too costly to be selected as the demand curve technology.

C. Risk to Consumers from a Falling CAF

Based on the CAF levels in the 2024-25 Capability Year, AG finds the 2-hour battery to be the most economic unit. However, the cost of the battery will increase substantially over next four years in UCAP terms if the CAF falls. To illustrate the sensitivity of the demand curves to the 2-hour battery CAF updates, Figure 6 compares the Net CONE values for the 2-hour battery the 20-year CT for New York City and NYCA. Since the values for the 2-hour battery are sensitive to its CAF, the figure shows a fixed CAF, high CAF and low CAF scenarios.

Figure 6: Net CONE Values in DC Reset Period



Because the 2-hour battery is smaller than the MMU-recommended CT, the Annual Reference Values (that determine the demand curves) are lower for the 2-hour battery all else equal. However, we find that the Annual Reference Value for the 2-hour battery will exceed the value for the 20-year CT if the CAF falls below:

- 53 percent in NYC; and
- 41 percent in NYCA.

The NYISO's IRM Sensitivity Case, which roughly corresponds to years 3 and 4 of the demand curve reset period, estimated CAFs for the 2-hour battery of 40 and 43 percent for New York City and NYCA, respectively. This indicates that the 2-hour battery is likely to be much more costly in NYC than a CT and comparable to a CT in NYCA.

This case also included only 200 MW of utility scale battery storage. Given the new NYSERDA program to subsidize energy storage resources and the sensitivity of the demand curves to small changes in the CAFs, it seems likely that the CAFs will fall more rapidly over the next four years, causing the AG recommendation to produce higher demand curves than a 20-year CT.

D. Assessment of a Combustion Turbine

Given the shortcomings of the 2-hour battery, we recommend selecting a CT amortized over 20 years. Part 1 of this section discusses our rationale for the recommended 20-year amortization period. Part 2 discusses several objections that have been made to selecting a CT.

1. Recommendation to Amortize the Combustion Turbine over 20 Years

While AG's evaluation of the CT was generally reasonable, we recommend amortizing the investment over 20 years rather than over 13 years as recommended by AG. The 13-year recommendation is based on the simple assumption that a CT built today would have to retire by 2040 because of the mandates of the CLCPA. We do not believe this is a reasonable assumption given recent studies, which indicate that reliability will require a substantial quantity of dispatchable resources, which will likely be comprised of:

- Existing gas-fired resources retrofitted to burn clean fuel; and
- New dispatchable emission-free resources ("DEFRs")

A new CT entering now will likely be among the most cost-effective units to retrofit. In future years, the Net CONE of the new DEFR technology will likely set the demand curves at levels much higher than the levelized Net CONE of the new CT. Additionally, the characteristics of a new CT will likely make it among the most flexible and efficient existing units, increasing its energy and ancillary services ("E&AS") net revenues after 2040.

Therefore, a new CT is well-positioned to operate profitably for more than 20 years, so it is much more reasonable to assume the CT will be retrofitted than to assume it will be retired. As a result, it is reasonable to assume that a CT built in the next few years would be amortized evenly over 20 years.

Based on these changes, we estimate a levelized Net CONE of $200/kW-year (UCAP) for the CT amortized over 20 years. Given our assessment in Section B, we estimate this would be more economic than the 2-hour battery with its CAF risks reasonably evaluated.

2. Potential Objections to the Combustion Turbine Amortized over 20 Years

In discussions related to the demand curve technology, various objections to the combustion turbine have been raised. The following discussion addresses each objection.

A CT may not be capable of complying with the CLCPA 2040 mandate.

Some cite the lack of CTs currently burning 100 percent clean fuel as evidence that it is not technically or financially feasible. However, it is technically feasible for a CT to become compliant with retrofits and a source of clean fuel. While these are not in operation today because they would not be financially viable, it is reasonable to assume they will become viable in the future if the State is committed to achieving its 2040 goals and less expensive technologies are prohibited by State regulations.

A CT will be difficult to permit and site…unless amortized over 13 years.

This concern is partly driven by the denial of a permit to the proposed Danskammer Energy Center by the NY DEC in 2021. In this denial, however, the DEC clearly stated that the project

could have been sited if there was any evidence of a reliability need for the project.[12] Hence, it is likely that a generator could obtain a permit under the conditions modeled in the DCR when a capacity region has a minimal capacity surplus.

Importantly, any difficulty in permitting a new fossil fuel peaking unit would not be addressed by fully amortizing the unit before 2040. The DEC explicitly indicated that a willingness to retire in 2040 did not provide a basis for granting it a permit. Hence, the challenges of siting a new CT do not support the use of a shorter amortization period than 20 years.

Previous decisions of the 4th Circuit Court of Appeals may require a 13-year amortization.

The US Circuit of Appeals for the DC Circuit ("the Court") remanded FERC's initial decision to reject NYISO's proposal to use a 17-year amortization period in the previous DCR. FERC subsequently approved the 17-year proposal, which was later upheld by the Court. Some assert that this implies that NYISO must limit a CT to having a 13-year amortization period in this DCR.[13] However, this is a misinterpretation of the Court's decisions—nothing in the Court's decisions would prevent NYISO from proposing a 20-year amortization period if it is properly explained.

The Court's first decision stated that FERC did not provide adequate reasoning for its rejection of NYISO's FPA Section 205 proposal to use a 17-year amortization period and its requirement for NYISO to use a 20-year amortization period.[14] The Court rejected the justifications provided by FERC for its rejection of the 17-year amortization period:

- FERC reasoned that the New York Public Service Commission ("PSC") might exercise its discretion to allow fossil-fueled generators to remain in service after 2039. The Court noted that such speculation about future regulations was "inconsistent with [FERC's] precedents" and that such changes must be adequately reasoned.
- FERC agreed with commenters stating that "NYISO's proposed 17-year amortization period fails to consider that the [Climate Act] does not require that power generators retire in order to satisfy the 2040 zero-emission requirement." The Court stated that "FERC failed to explain why it found [these] comments compelling, or why it believed that fossil-fueled plants might continue to operate after 2040."
- Importantly, 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."

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12 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 notwithstanding its inconsistency with the Statewide GHG emission limits…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."

13 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).

14 At pages 3-4.

Hence, FERC had the option of seeking to expand the record and improving the reasoning underlying the decision in favor of the 20-year amortization period for the CT. However, rather than defend its original decision, FERC responded to the first Court decision by approving NYISO's proposal to amortize the CT over 17 years. The PSC filed a petition for review to challenge this FERC decision.

The Court's second decision denied the PSC's petition for review of FERC's order on remand following the Court's first decision. The Court found the 17-year amortization to be within the zone of reasonableness, but *did not find 20 years to be unreasonable*, stating:

> To the extent that any approach to setting rates here would have required some degree of guesswork, Section 205 of the Federal Power Act (and our prior judgment) required FERC to resolve the matter in favor of [NYISO]'s reasonable prediction.[15]

This demonstrates that there is no Court precedent that would favor a 13-year amortization period over a 20-year amortization period. Further, NYISO has the option of building a record that would support FERC's approval of a 20-year combustion turbine, which would include the valid arguments in the prior subsection of this memo.

NYC property tax abatement for a new CT will expire in 2025.

There is some risk that the 15-year property tax abatement will not be renewed past April 2025 because this would increase the Net CONE of a new CT. This concern is not sufficient to disqualify the CT because:

- There is a long history of tax abatement renewals and if the CT is the demand curve technology, the State would have greater incentives to renew the abatement; and
- Even if the abatement is not renewed, the increase in net CONE for the 20-year CT will not be sufficient to make it more expensive than a properly evaluated 2-hour battery.

No CTs are currently in the interconnection queue.

This should not deter NYISO from selecting a CT as the demand curve technology for several reasons. First, the State currently has programs to subsidize renewable generation, hydro imports from Quebec, and battery storage, which is currently shifting investment incentives away from CT projects. However, since direct State subsidies to battery storage resources cannot be reflected in the Net CONE of the demand curve technology, the CT is still the technology with the lowest Net CONE even if none are currently in the interconnection queue.

Second, New York City is the only area of the State where the capacity surplus is relatively close to the "level of excess" at which the capacity demand curve is designed to motivate entry of new supply. However, materials related to NYISO's 2024 Reliability Needs Assessment indicate that it expects the 1,250 MW CHPE HVDC project and the 816 MW Empire Wind 1 offshore wind project to come online by the end of 2026, which is expected to generate a substantial capacity

[15] At page 12.

surplus in New York City through 2030.[16] These expectations are likely limiting current CT development, but it may emerge in the future as capacity surpluses fall in specific areas due to load growth and/or retirements of existing generation.

E. Conclusions and Recommendations

Based on our analysis of alternative demand curve technologies, the MMU does not support the selection of the 2-hour battery for two primary reasons:

- AG's analysis supporting the 2-hour battery recommendation does not reasonably consider the impact of potential CAF reductions over the proposed 20-year amortization period. If the CAF risks to a battery developer were fully considered, we believe the evaluation would show that the 2-hour battery has a higher Net CONE than a CT amortized over 20 years.
- AG's recommendation is at odds with studies of the resource mix needed to achieve a reliable zero-emission power grid, which suggest 2-hour batteries will not play a significant role.

We recommend selecting a CT amortized over 20 years. The recommended 20-year amortization of the CT is supported by the following arguments in this memo:

- The transition to a zero-emission power system will likely require much of the existing fossil fuel capacity to be retrofitted to burn clean fuel and a new CT would be among the most cost-effective units to retrofit.
- The need for new dispatchable emission-free resources in the future will also likely raise the demand curves in the future as 2040 approaches.
- Hence, a new CT is well-positioned to operate profitably in a zero-emissions power system well beyond 2040.

Finally, our recommendation to select a 20-year CT would eliminate the substantial risks to consumers of cost increases associated with CAF volatility over the next four years. We find that selecting a 20-year CT would likely result in much lower clearing prices in New York City and only slightly higher prices in other areas over the four-year demand curve period of May 2025 to April 2029.

Hence, we recommend the NYISO consider modifying its DCR technology recommendation to be a CT amortized over 20 years.

[16] See *2024 RNA Preliminary Results*, presented to the ESPWG/TPAS, July 25, 2024. Slide 17 indicates resource adequacy margins are not anticipated become tight until 2033, while slide 32 indicates that transmission security margins are anticipated to be substantial until the summer of 2031.

APPENDIX

1. *Analysis of a CT with Decreasing Amortization*

Figure 7 illustrates how a CT investment might be amortized over the 13 years before 2040 if it expected CTs entering in 2031 and 2035 would need to be fully amortized before 2040. The figure shows that this would actually reduce the CT net cost of entry in 2027 and 3031 compared to a 20-year levelized amortization schedule.

Figure 7: Capacity Revenues to 2-Hour Battery if CTs Fully Amortized by 2040

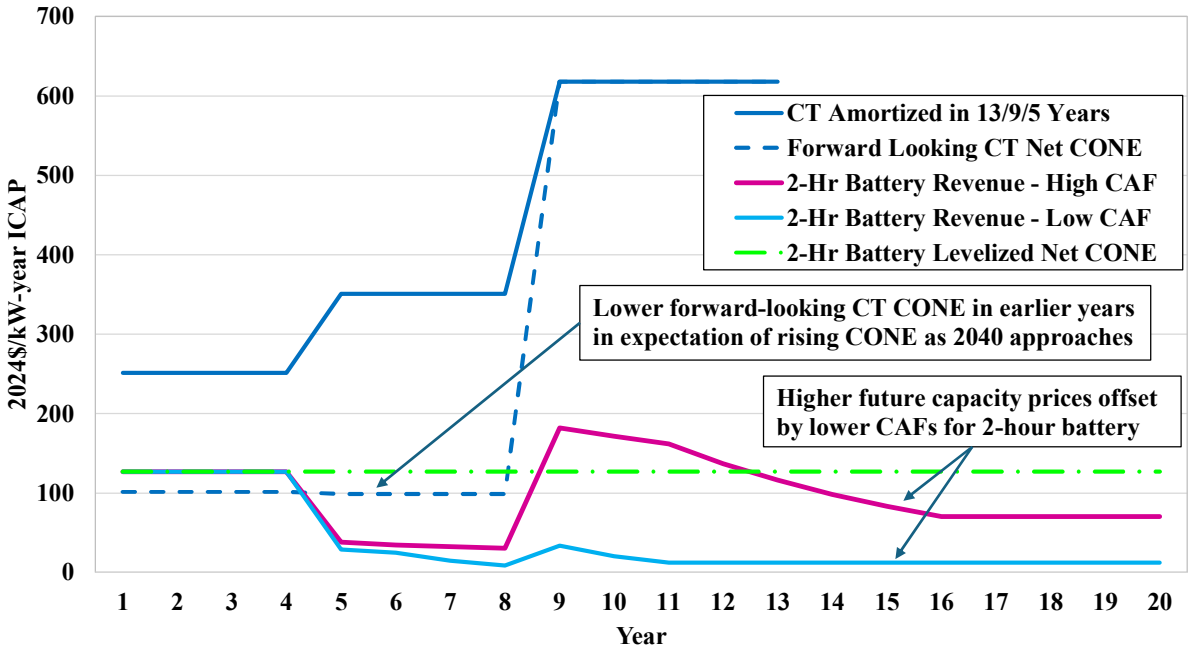

Figure 7 shows the annual capacity revenue that would be recovered by a 2-hour battery in each year of the investment assuming it receives: (a) the 20-year levelized amortized revenue requirement in Years 1 to 4, (b) capacity revenue based on the Net CONE of a CT entering in 2031 and fully amortized before 2040, and (c) capacity revenue based on the Net CONE of a CT entering in 2035 with a 5-year levelized amortization and continuing at this level through the remainder of the 20 years of the 2-hour battery investment. These are shown for our realistic high and low CAF scenarios.

In the high CAF scenario, the 2-hour battery developer earns 17 percent less capacity revenue (on a net present value basis) than needed to make the investment profitable. In the low CAF scenario, the 2-hour battery developer earns 54 percent less capacity revenue than needed to make the investment profitable. The figure shows that if capacity prices rose in the last five years before 2040 and continued through 2046, it would tend to increase revenues to a 2-hour battery investment, but not enough to make the investment profitable because of the significant CAF degradation. Hence, even if a CT had to be fully amortized before 2040, it would not support the selection of a 2-hour battery as the demand curve unit technology.

2. Analysis of CAF Effects on Net CONE in Other New York Areas

The following figures present the results of Figures 4 and 5 in this memo, calculated for localities other than New York City.

Figure 8A: 2-Hour Battery Net CONE in NYCA w/ Optimistic CAF

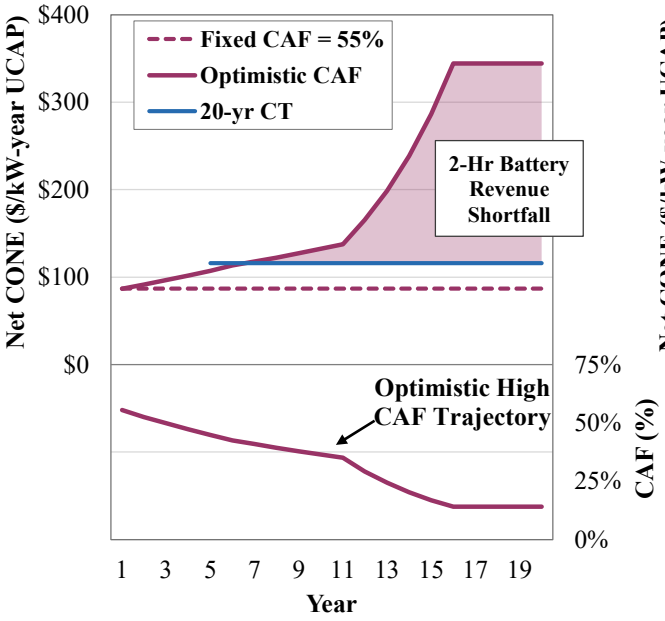

Figure 8B: 2-Hour Battery Net CONE in G-J w/ Optimistic CAF

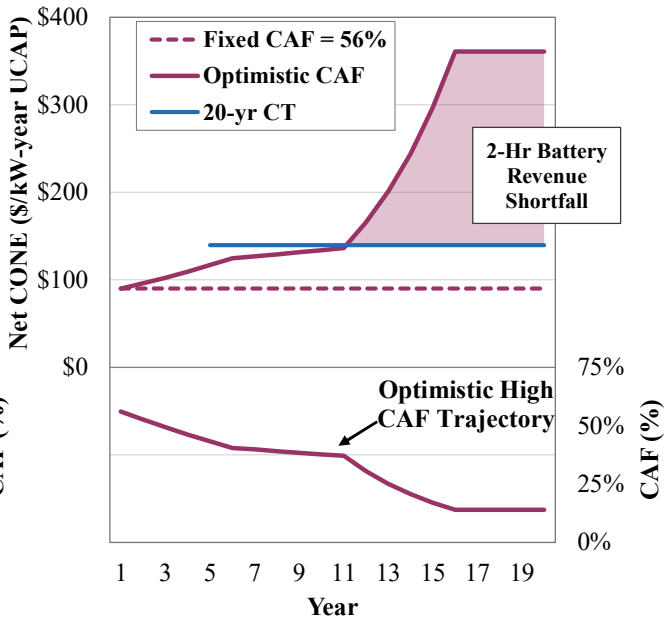

Figure 8C: 2-Hour Battery Net CONE in Long Island with Optimistic CAF

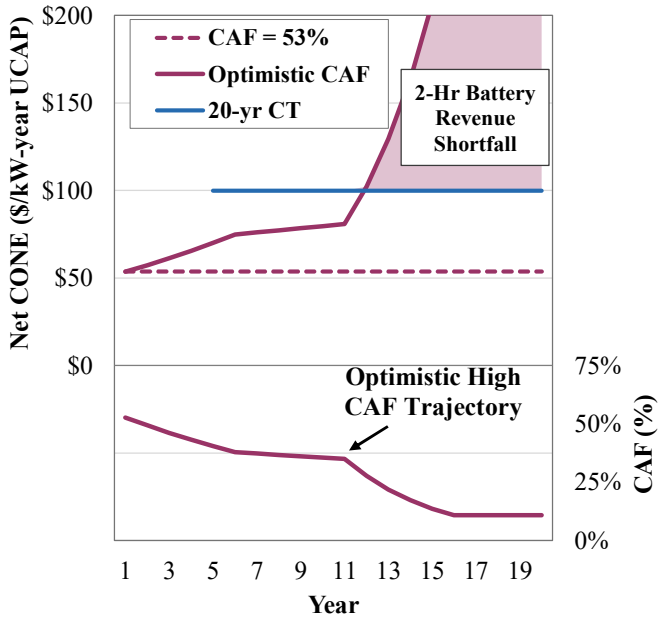

Figure 9A: Annual Capacity Revenue to 2-Hour Battery in Long Island

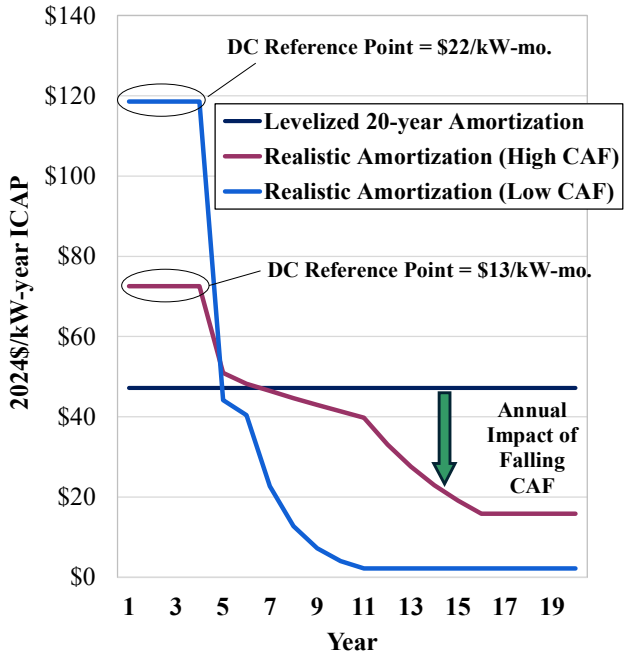

Figure 9B: Annual Capacity Revenue to 2-Hour Battery in Long Island

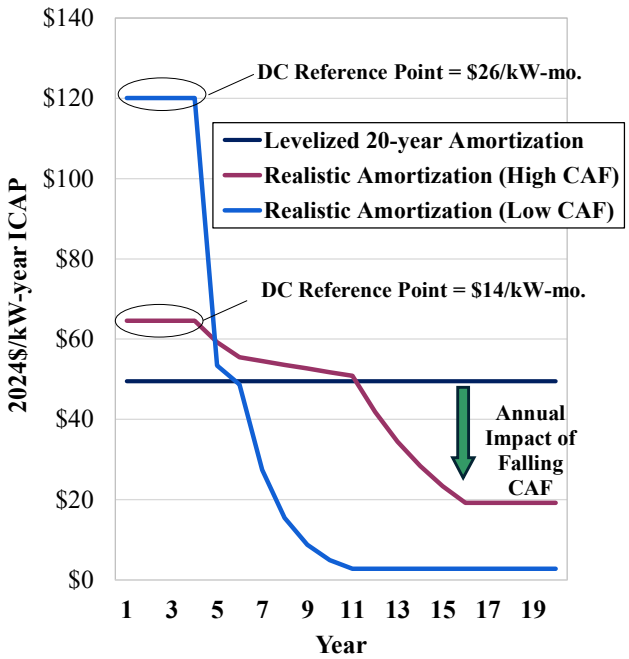

Figure 9C: Annual Capacity Revenue to 2-Hour Battery in Long Island