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OPTIMIZING BESS INTERCONNECTION IN CONSTRAINED DISTRIBUTION NETWORKS

Progressive planning and flexible operations to increase hosting capacity in New York City and the Metropolitan Area

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EXECUTIVE SUMMARY

Distributed battery energy storage system (BESS) deployment is accelerating rapidly in Consolidated Edison's (Con Edison) service territory, driven by state policy, improving economics, and growing reliability needs. At the same time, forecasted distribution hosting constraints, driven by limited BESS charging headroom under the existing planning methodology and assumptions, are increasingly triggering costly upgrades and long interconnection timelines.

This white paper:

1. **Examines** the current BESS hosting capacity method.
2. **Evaluates** the impact of several of its assumptions on study outcomes.
3. **Assesses** how operations-aligned planning assumptions can unlock additional capacity without lowering reliability standards.

To quantify the impact of the planning assumptions, the study compares six scenarios across representative constrained substations where BESS projects are being developed. The scenarios include 1) Con Edison's current base case assumptions (fixed-rate, 8-hour charging; with the substation limit defined as the greater of 70% of capability or the historic peak load), 2) expanded charging windows, 3) shaped/curved charging, 4) optimal charging profiles, 5) Con Edison's current base case assumptions with higher operational charge limits up to 100% of contingency capability, and 6) optimized charging profiles with higher operational charge limits. Across the substations evaluated, the study shows that extending the charging window (scenario 2) and modifying the charging shapes (scenario 3) increases hosting capacity on average by 6% and 28%, respectively. Optimal charging (scenario 4) and planning to the higher operational charge limits (full N-1/N-2 capability (scenario 5)) produce the largest gains–84% and 67% respectively (151% when combined (scenario 6)) by aligning modeled charging behavior with the flexibility of operational BESS installations.

The white paper then ties these planning concepts to practical, field-deployable operating controls. Con Edison's SCADA interconnection standard for energy storage systems (ESSs) includes a defined block-charge mechanism (hardwired signals and/or DNP3 communications) that can stop charging rapidly when needed. This supports a staged approach where planners can confidently use more of the contingency capability as operating procedures, commissioning practices, and automation maturity increase. This establishes a pragmatic pathway: near-term updates to charging windows/profiles in hosting capacity and CESIR screening, followed by wider use of higher charging limits where block-charge is available and proven. Longer-term, DERMS-enabled scheduling that approaches optimal charging scenarios (Scenarios 4 and 6) would foster even greater hosting capacity while providing greater situational awareness of BESS assets and the value they bring to system operation and the grid.

TAKEAWAYS AND KEY RECOMMENDATIONS

The study finds that progressive planning and operational approaches can materially increase BESS hosting capacity at the substations evaluated **without triggering upstream impacts or costs.** In particular, updated charging windows and charging profiles can increase hosting capacity by approximately **28% on average,** while planning closer to full **N-1/N-2 capability,** where block-charge controls are available, can increase hosting capacity on average by **67%.**

Based on these findings, the white paper recommends the following near-term actions:

1. **Update charging assumptions** in hosting capacity maps and CESIR studies to reflect longer charging windows and curved charging profiles.
2. **Allow charging up to full N-1/N-2 capability** where block-charge controls exist (already exists in most installations), and require compliance with Con Edison SCADA capabilities going forward.
3. **Improve interconnection queue transparency and milestone tracking** to better align available capacity with viable projects.
4. **Leverage DERMS to actively schedule BESS charging over time,** enabling more dynamic operations and further increases in hosting capacity.

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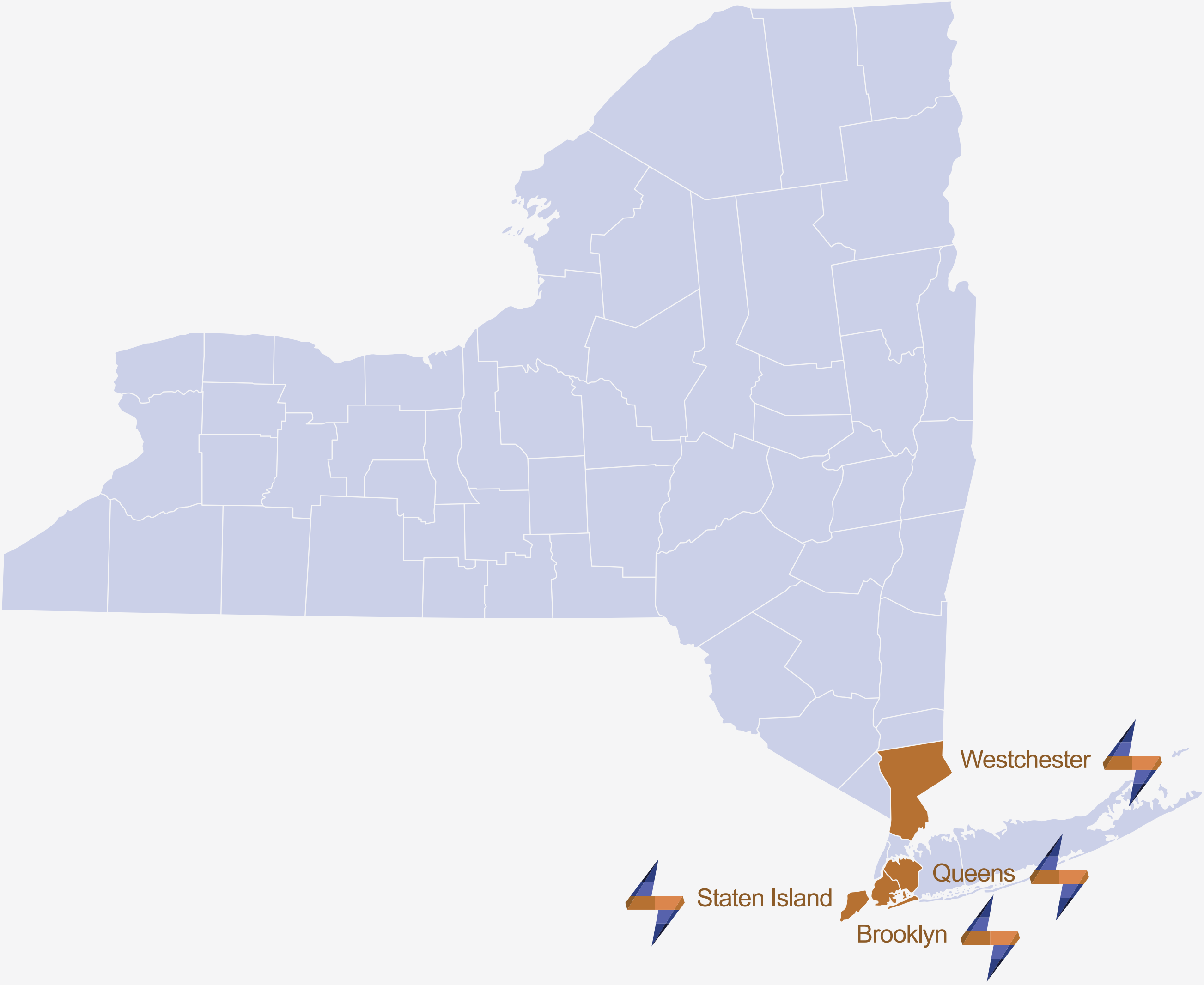
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INTRODUCTION

New York State's clean energy transition is accelerating the deployment of distributed energy resources (DERs), including Battery Energy Storage Systems (BESS). BESS enables utilities to defer or avoid costly infrastructure investments by optimizing use of existing grid assets, providing measurable ratepayer savings while supporting grid reliability during peak demand periods. The Climate Leadership and Community Protection Act (CLCPA) establishes statewide decarbonization targets, including a zero-emission electricity sector by 2040 and large-scale deployment of energy storage. The 2024 NYSERDA Energy Storage Roadmap (the Roadmap) recognized the critical role of energy storage in New York City in meeting decarbonization and reliability requirements:

> "As fossil fueled power plants, particularly in downstate New York, reach their end-of-life and move to retire, the NYISO and utilities will require dispatchable capacity to maintain reliability, both in terms of resource adequacy and transmission security. The ability of energy storage to provide these services makes this one of the highest-value deployment opportunities in New York and can help accelerate decarbonization in a reliable way."

In parallel, federal incentives such as those introduced through the Inflation Reduction Act (IRA) have further improved the economics of storage deployment. At the same time, global and domestic declines in battery technology costs have made BESS projects increasingly competitive and commercially viable. Together, these policy drivers and market trends are expected to result in rapid growth in distributed storage installations across the Con Edison service territory over the coming decade. For example, the 2024 NYSERDA roadmap estimated that approximately 4.6 GW of energy storage may be deployed in New York City (Zone J) by 2035, highlighting the scale of potential growth in the Con Edison service area.[1]

This growth is already visible in the Con Edison interconnection queue, where BESS project requests have increased dramatically. Over the past two years, the queue has grown by approximately fivefold, with more than 2.6 GW of BESS capacity seeking interconnection, including projects participating in the Retail Storage Incentive Program (RSIP). When including projects that have since been withdrawn or completed, the total volume of proposed distributed BESS projects in the queue exceeds 6 GW, indicating strong and sustained market interest in deploying storage in the Con Edison service territory.

According to the January 2026 Standardized Interconnection Requirements (SIR) Inventory, the cumulative capacity of BESS projects proposed through the SIR process, including completed and withdrawn projects, totals approximately 6.45 GW. However, some withdrawn projects have been removed from the inventory over time, suggesting the true cumulative market interest may be somewhat higher. Many of these projects are geographically clustered, reflecting local market opportunities and available development sites. In part due to an earlier network moratorium, early project development has been concentrated on non-network interconnections, where interconnection standards and procedures are more clearly defined. While EO-10215 established specific technical standards for DER interconnection on non-network systems,[2] EO-2022 provides network design specifications rather than DER-specific interconnection standards,[3] creating additional uncertainty for projects seeking to connect to networked portions of the distribution system.

Recent regulatory proceedings and planning studies have also highlighted the growing role that distributed storage will play in addressing future reliability needs in New York. Reports from the New York State Department of Public Service (DPS), the New York Independent System Operator (NYISO), and Con Edison identify emerging capacity needs in the coming years and cite storage as an important component of the solution. These findings reinforce the expectation that storage will play a critical role in supporting reliability, managing peak demand, and enabling the integration of renewable generation.

Table 1 summarizes several recent regulatory proceedings, planning documents, and system studies that reference distributed storage as part of the strategy for addressing future system needs. Collectively, these documents highlight both the growing reliance on storage resources and the importance of enabling timely deployment.

While these studies emphasize the importance of storage resources, they also highlight an emerging challenge: distribution system capacity limitations may constrain how much, where, and how quickly storage projects can be interconnected. Several areas within the Con Edison territory have already been identified as "saturated" or "constrained" for additional BESS interconnections, particularly at substations where existing load levels and contingency requirements limit the available headroom for additional charging load. In such cases, interconnection studies may identify the need for upstream system upgrades, which can significantly increase project costs and delay deployment.

Source	Date	Key Findings or Requirement	Relevance to Distributed Storage
DPS Case 25-E-0764 (NYC Reliability Contingency Plan Order)	December 2025	250–1,325 MW needed	Distribution storage is listed as one of the clean capacity resources.
Con Edison 2025 LTP	December 2025	Commits to update methodology to incorporate distribution storage	The document acknowledges the CESIR approach requires evolution.
NYISO 2025 Q3 STAR Report	October 2025	68–148 MW deficiency in 2029–2030	Storage is cited as an essential part of the solution.
Con Edison BESS Constraint Letter	August and September 2025	29 substations listed as constrained	The letters explore planning and operation innovations to relieve capacity constraints where possible.
Con Edison Bulk BESS RFP	July 2025 (Updated)	8 preferred locations overlap with cited constraints	Given eight of the preferred locations are constrained for storage, there is a need to address those constraints.
DPS Case 24-E-0621 (Con Edison Constraint Notice)	2024	Identifies areas with limited capacity for additional BESS interconnections	Highlights distribution constraints affecting storage deployment
DPS Case 18-E-0130 (Energy Storage Deployment Program)	2018	Establishes statewide storage deployment targets	Creates a policy framework supporting large-scale storage adoption
DPS Case 15-E-0751 (Value of DER/Value Stack)	2016–Present	Establishes a compensation structure for DER exports	Provides market revenue streams supporting storage economics

Table 1. Recent Regulatory Proceedings and Planning Documents Relevant to Distributed Energy Storage

Similar challenges have occurred previously. In the early 2000s, rapid growth in combined heat and power (CHP) installations led to interconnection constraints and the development of simplified planning limits such as maximum megawatt thresholds per feeder or substation.[2, 4] However, integrating battery storage introduces additional complexity because storage resources can both consume and supply power and can operate flexibly across different hours of the day.

In response to these challenges, Con Edison has made significant investments in advanced distribution planning and DER integration tools, including integrated system planning, publicly available hosting capacity maps, the development of Distributed Energy Resource Management Systems (DERMS), and new approaches to BESS dispatch and operational control. These efforts are intended to improve system visibility, enable more dynamic management of DERs, and support higher levels of DER penetration while maintaining system reliability.

At the policy level, the New York State DPS has emphasized the need to identify and deploy all available non-emitting resources that can help meet the reliability requirements and CLCPA targets in a cost-effective and timely manner. Distributed battery energy storage is widely viewed as one of the most promising options to support this goal, provided that interconnection and operational challenges are addressed efficiently.

Within this context, it is important to ensure that planning and interconnection methodologies accurately reflect the operational reality of storage resources. Conservative and static assumptions regarding charging behavior or operational limits can inadvertently constrain hosting capacity and limit the number of projects that can be accommodated without infrastructure upgrades, thereby limiting affordability benefits to ratepayers and progress toward state goals.

This white paper evaluates Con Edison’s current methodology for assessing BESS hosting capacity and identifies opportunities for refinement. The analysis compares alternative planning assumptions related to storage charging behavior, temporal modeling, and operational flexibility. In addition, the study benchmarks Con Edison’s approach against industry practices across multiple utilities and jurisdictions, identifying areas where evolving methodologies or emerging best practices may provide useful insights. The goal is to assess whether adjustments to planning assumptions—while still reflecting the operational realities and meeting Con Edison’s reliability requirement—can enable greater integration of distributed BESS resources within the existing distribution infrastructure.

INDUSTRY BENCHMARKING: ALTERNATIVE PLANNING APPROACHES

Area	Optimal Charging	Flexible Interconnection	Temporal Analysis Approach
Con Edison (2025)[5, 6]	Not considered	Not considered	24 hours around the peak day
Proposed Approach (2026)[7]	Limited optimization via constrained charging windows	Limited operational flexibility considered	Expanded temporal window around peak and off-peak hours
California IOUs[8]	Not considered in Integrated Capacity Analysis (ICA) studies; dynamic operating envelopes: under development for Rule-21 DER integration[11]	FlexConnect load program: flexible interconnection proposed under Rule 21[11]	Snapshot-based analysis (multiple representative cases)–576 hours
ComEd (Illinois)[9]	Dynamic operating envelopes: pilot programs under DERMS roadmap	Flexible interconnection strategies to manage grid capacity and integrate DERs	Snapshot-based feeder analysis
Texas	Not considered	Only for DER curtailment programs	Snapshot-based interconnection studies
Colorado[7]	Dynamic operating envelopes: evaluated through advanced DER management studies[12]	Regulatory mandate under public utility commission (PUC) guidance	Snapshot-based Hosting Capacity Analysis (HCA) with representative loading
National Grid (New York)[10]	Not considered	Limited/project-specific	576 hours used for DER hosting capacity

Table 2. Distribution Storage Interconnection Methodology Comparison

Table 2 summarizes key methodological assumptions used in BESS or DER hosting capacity analyses across several utilities and jurisdictions, including Con Edison (2025 and proposed 2026 approaches from this white paper), California investor-owned utilities (IOUs), Commonwealth Edison (Illinois), Texas utilities, Colorado utilities, and National Grid (NY). The comparison highlights how different utilities represent storage behavior, charging flexibility, and temporal modeling in their planning or hosting capacity methodologies.

Overall, the comparison illustrates that the proposed changes to Con Edison methodology move toward a more explicit representation of storage operational behavior, while many other jurisdictions still rely on simplified representations within hosting capacity studies. At the same time, several utilities are beginning to explore dynamic operational frameworks and flexible interconnection mechanisms, indicating a broader industry shift toward more operationally aware hosting capacity methodologies.

A key distinction across methodologies relates to how BESS charging duration and dispatch behavior are represented. The Con Edison 2025 approach assumes a fixed 8-hour charging window with a constant charging rate (a constant 'boxcar' charging profile), reflecting a simplified planning assumption. The proposed Con Edison 2026 methodology in this white paper introduces a 12-hour charging window with a curved charging profile, allowing charging to be distributed more flexibly across off-peak hours. This simple change enables improved operation within the defined window and better reflects realistic operational dispatch patterns.

Like Con Edison’s current approach, some utilities generally do not explicitly model storage charging profiles within hosting capacity analyses. Instead, BESS are generally represented as constant load or generation injections during snapshot simulations. For example, California IOUs, ComEd, Texas utilities, Colorado utilities, and National Grid (NY) typically treat storage in a simplified manner—either as a fixed load during charging or as a constant generation injection during discharging. This approach reduces modeling complexity but does not capture the potential operational flexibility of storage resources.

Another important difference relates to the treatment of optimal charging or operational flexibility. The proposed Con Edison 2026 methodology introduces limited optimization via constrained charging windows, whereas most other utilities do not currently optimize storage dispatch within hosting capacity calculations. However, several jurisdictions are actively exploring more advanced operational frameworks through dynamic operating envelopes and flexible interconnection programs. For instance, California is developing dynamic operating envelope capabilities under Rule 21, which is mandated by the CPUC. ComEd is piloting similar concepts under its DER management roadmap, and Colorado utilities are evaluating dynamic operational strategies through advanced DER management studies.

The comparison also highlights differences in interconnection flexibility mechanisms. Some jurisdictions, such as California (FlexConnect) and Colorado, have regulatory frameworks that enable flexible interconnection, allowing DERs to operate under conditional or dynamically managed limits. Others, including Texas utilities and National Grid (NY), primarily address flexibility through project-specific interconnection studies or limited operational programs.

Finally, utilities differ significantly in their temporal analysis approaches. Con Edison’s methodologies rely on time-series analysis centered around the system peak day, with the 2026 approach expanding the evaluation window to capture both peak and off-peak conditions. In contrast, many utilities—including ComEd, Texas utilities, and Colorado utilities—typically rely on snapshot-based analyses using representative hours or loading conditions, while some jurisdictions (e.g., California and National Grid [NY]) evaluate a larger set of representative hours, such as 576-hour datasets, to better capture seasonal and operational variability.

These operational approaches will invariably need to be accompanied by evolved planning approaches, such as those discussed in this white paper.

IMPACT OF PLANNING ASSUMPTIONS ON BESS HOSTING CAPACITY

Substation Name	Networks Served	Planned Upgrade/Load Transfer from 2025 Rate Case	12-Hour On-Peak Period from Rider Q	Local Contingency Standard
Corona No. 1 (Queens)	Flushing	• Load transfer to Hillside (2032) • 29 MW exceedance (2034) • CapEx: $872M + $860M	11 AM–11 PM	N–1[13]
Fox Hills (Staten Island)	Fox Hils	• Add fourth transformer and feeder (2030) • 17 MW exceedance • CapEx: $54M	11 AM–11 PM	N–2[14]
Millwood West (Westchester)	Millwood West	• Add third transformer and feeder plus load transfer (2031) • 31 MW exceedance (2034) • CapEx: $84M + $50M	11 AM–11 PM	Not available
Jamaica (Queens)	Jamaica	• Load transfer to Idlewild (2028) • 122 MW exceedance (2034) • CapEx: $379M + $264M	11 AM–11 PM	Not available
Greenwood (Brooklyn)	Bay Ridge	• Load transfer to Industry City (2034) • 65 MW exceedance (2034) • CapEx: $1,040M + $240M	11 AM–11 PM	N–1[15]
Water St. (Brooklyn)	Williamsburg and Prospect Park	• Load transfer to Nevins St. (2032) • 26 MW exceedance (2034) • CapEx: $1,465M + $269M	11 AM–11 PM	N–1[16]

Table 3. Substations Included in the Analysis and Their BESS Constraint Status

Scenario	Name	Duration	Shape	Charge Limit
1	Base case	8h (12 AM–8 AM)	Fixed-rate	Maximum of 70% of capability and peak load
2	Extended charging window	12h (11 PM–11 AM)	Fixed-rate	Maximum of 70% of capability and peak load
3	Curved charging	12h (11 PM–11 AM)	Triangular	Maximum of 70% of capability and peak load
4	Optimal charging	12h (11 PM–11 AM)	Optimal curve	Maximum of 70% of capability and peak load
5	Base case with higher limit	8h (12 AM–8 AM)	Fixed-rate	Maximum of 100% of capability and peak load
6	Optimal charging with higher limit	12h (11 PM–11 AM)	Optimal curve	Maximum of 100% of capability and peak load

Table 4. Planning Scenarios Considered in the Study

To evaluate how alternative BESS charging assumptions affect hosting capacity, a set of representative substations was selected for detailed analysis. These substations were chosen because they are currently constrained or nearly constrained for BESS interconnection under the existing planning methodology, making them suitable case studies for assessing how operational assumptions influence hosting capacity.

Table 3 summarizes the substations included in the analysis, the planned investments or work from the 2025 rate case, and the corresponding 12-hour on-peak period, as described in Rider Q. Where available, the local contingency standard has also been cited. The selected substations represent locations considered constrained for new interconnections. Developer interest has been high or very high for these systems, likely due to relative ease of siting and, at least until recently, interconnection.

Table 4 summarizes the planning scenarios evaluated in this study to assess the sensitivity of BESS hosting capacity to different charging assumptions. Each scenario varies a key planning parameter one at a time, including the charging window duration, charging profile shape, and the operational charging limit relative to the substation capability.[17] By modifying these assumptions, the analysis evaluates how modeling operational flexibility in BESS charging strategies influences the amount of storage that can be accommodated on the substations without violating their limits. The analysis uses 8,760-hour load data from the Hosting Capacity Map and does not incorporate queued BESS projects that were not completed at the time of simulation. Hence, all results illustrate the total hosting capacity available at each station, i.e., not the incremental amount relative what BESS is already installed or queued.

Scenario 1 (base case) reflects the current Con Edison planning methodology. In this approach, BESS charging is modeled as a fixed-rate profile over an 8-hour window (12 AM–8 AM).[18] The allowable charging headroom is defined as the difference between the substation load and 70% of the substation's capability (or current peak load, whichever is higher), which represents a conservative planning threshold designed to maintain an operational margin after a contingency.

Scenario 2 (extended charging window) evaluates the impact of expanding the charging duration to 12 hours (11 PM–11 AM)[19] while again maintaining a fixed, but lower, charging rate[20] and the same 70% capability limit. This scenario isolates the impact of a wider charging window and assesses whether spreading charging over a longer period increases the available hosting capacity.

Scenario 3 (curved charging) maintains the 12-hour charging window and replaces the fixed charging rate with a triangular charging profile,[21] where charging power gradually increases to a peak and then decreases. This curved profile better reflects potential operational dispatch patterns and evaluates whether non-uniform charging shapes can better use available system headroom.

Scenario 4 (optimal charging) increases operational flexibility by optimizing the charging profile across the same 12-hour window as in scenarios 2 and 3. In this case, the hourly charging levels are optimized to maximize hosting capacity while respecting system constraints, effectively allocating charging power during hours when system headroom is greatest.

Scenario 5 (base case with higher charge limit) returns to the 8-hour fixed-rate charging window used in Scenario 1 (base case) but extends the permissible charging limit from 70% (or the system peak) to 100% of the substation's capability. Scenario 5 evaluates the impact of relaxing the conservative planning margin while maintaining the existing charging profile. The block-charge functionality for each BESS, discussed in the following section, provides a solid planning and operational basis for this scenario.

Finally, **Scenario 6 (optimal charging with higher charge limit)** represents the most operationally flexible configuration evaluated in the study. It combines the optimized 12-hour charging profile from Scenario 4 with the 100% capability threshold, allowing charging to fully use available substation capacity while optimally distributing charging across the expanded time window.

To illustrate the operational implications of these assumptions, Figure 1 through Figure 6 present the resulting time-series profiles of BESS charging/discharging and the corresponding net substation load for each scenario during the peak day and the two days immediately before and after it, using a representative substation (Corona No. 1) as an example. These profiles highlight how different charging strategies reshape the substation load and affect the hosting capacity. In the cases of higher penetration, such as those characterized by Scenarios 4 through 6, the discharge power of the BESS exceeds that of the station load for some intervals, which may introduce reverse power flow and associated protection and voltage management considerations. At these levels, the overall charge and discharge profiles should be revisited to ensure the value of the BESS is optimally delivered to both the local and bulk system.

Figure 7 summarizes the resulting BESS hosting capacity for each scenario using a bar chart, enabling direct comparison of how different planning assumptions affect the amount of storage that can be accommodated at the substation level.

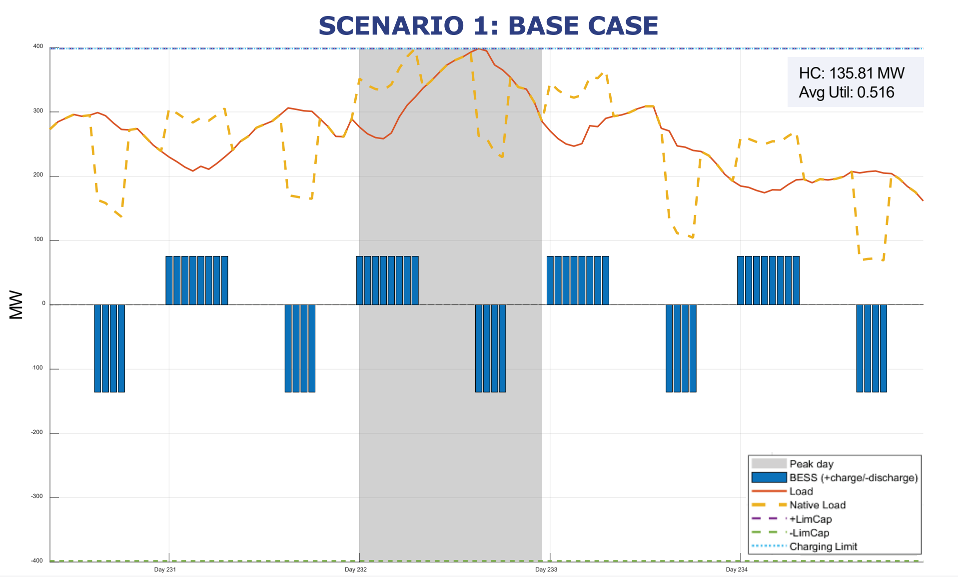

SCENARIO 1: BASE CASE

Figure 1. Base Case: Contrast Baseline Assumptions vs Alternate Planning Approaches - Corona No.1

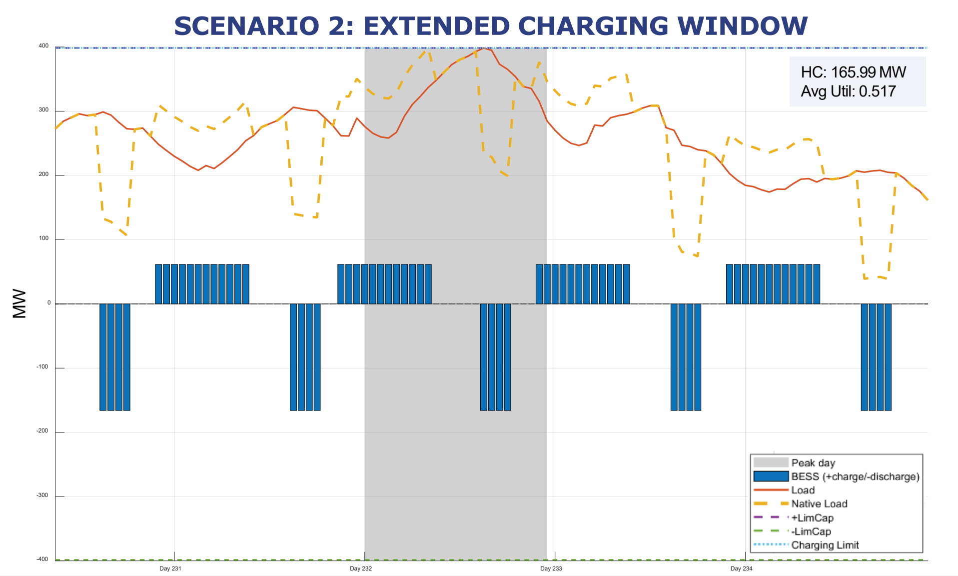

SCENARIO 2: EXTENDED CHARGING WINDOW

Figure 2. Extended Charging Window: Contrast Baseline Assumptions vs Alternate Planning Approaches - Corona No.1

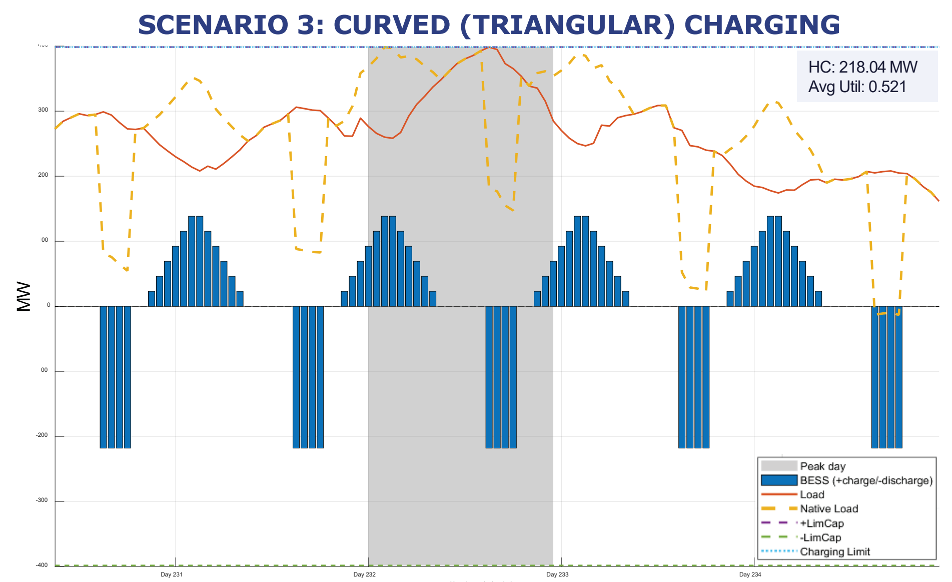

SCENARIO 3: CURVED (TRIANGULAR) CHARGING

Figure 3. Curved (Triangular) Charging: Contrast Baseline Assumptions vs Alternate Planning Approaches - Corona No.1

Figure 4. Optimal Charging: Contrast Baseline Assumptions vs Alternate Planning Approaches - Corona No.1

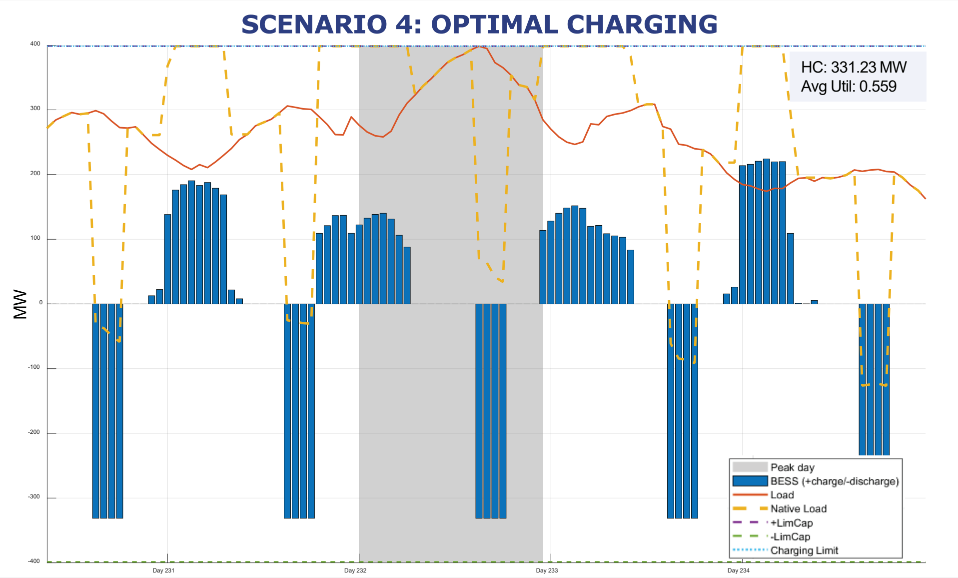


Figure 5. Base Case with Higher Limit: Contrast Baseline Assumptions vs Alternate Planning Approaches - Corona No.1

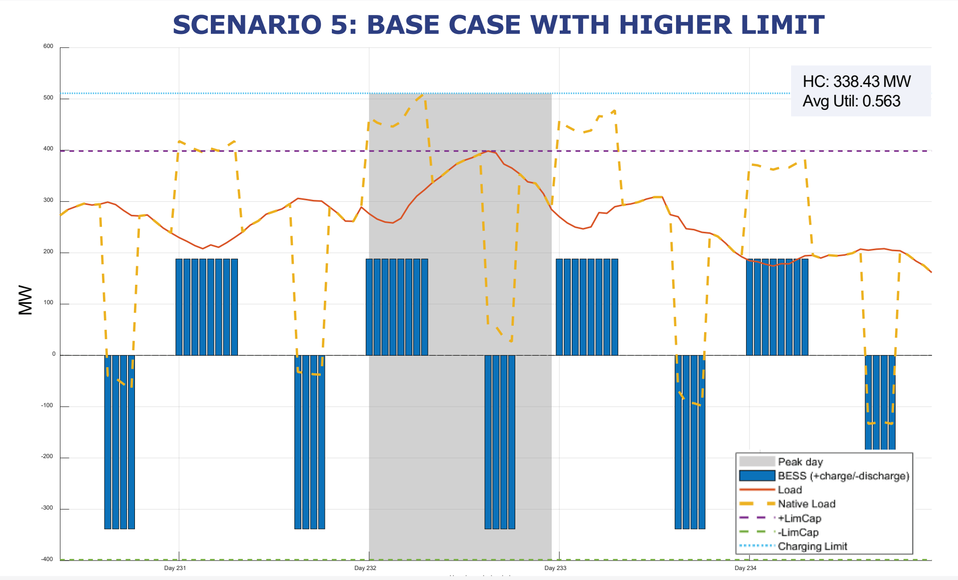
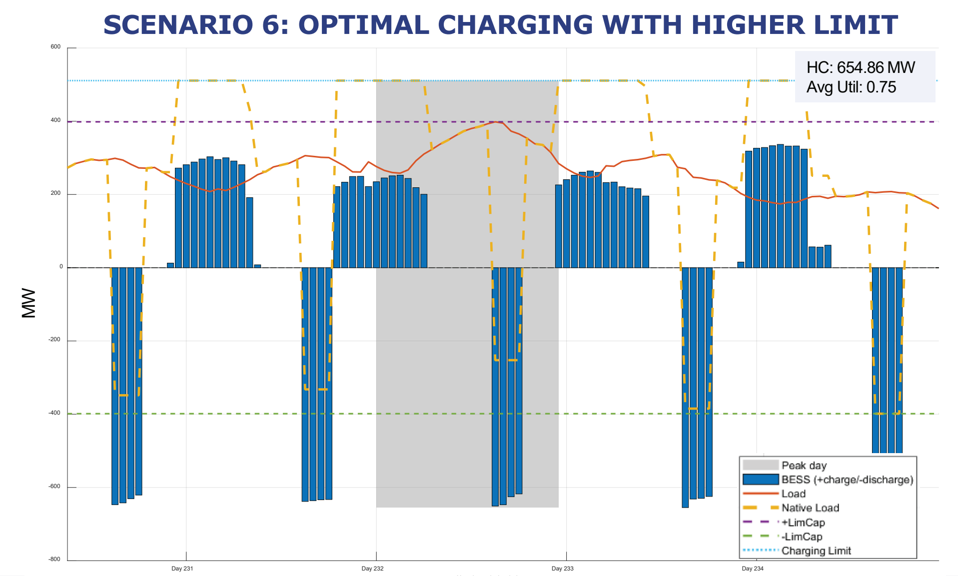


Figure 6. Optimal Charging with Higher Limit: Contrast Baseline Assumptions vs Alternate Planning Approaches - Corona No.1



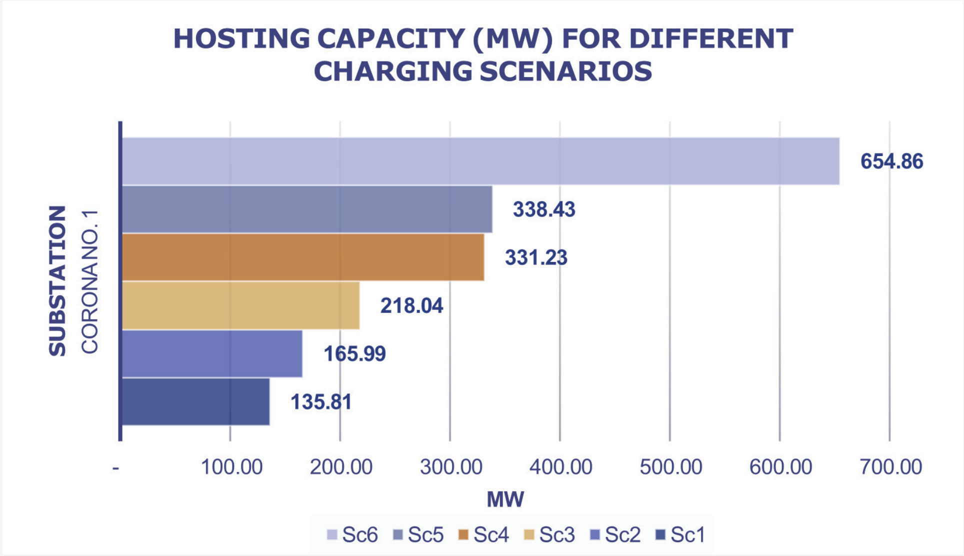


Figure 7. Hosting Capacity for Baseline vs. Alternate Planning Approaches - Corona No.1

To evaluate whether the trends observed in the illustrative example are consistent across different system conditions, the analysis was extended to multiple substations with varying load characteristics and thermal limits. Figure 8 presents the results for six sample substations—Water St., Corona No. 1, Greenwood, Jamaica, Millwood West, and Fox Hills—showing the absolute BESS hosting capacity (MW) under each planning scenario. The results indicate that the directional trend observed at Corona No. 1 is generally consistent across substations with different load profiles and thermal ratings. In most cases, each change to the planning assumptions leads to higher hosting capacity, although the magnitude of improvement varies by location depending on local load characteristics and available system headroom.

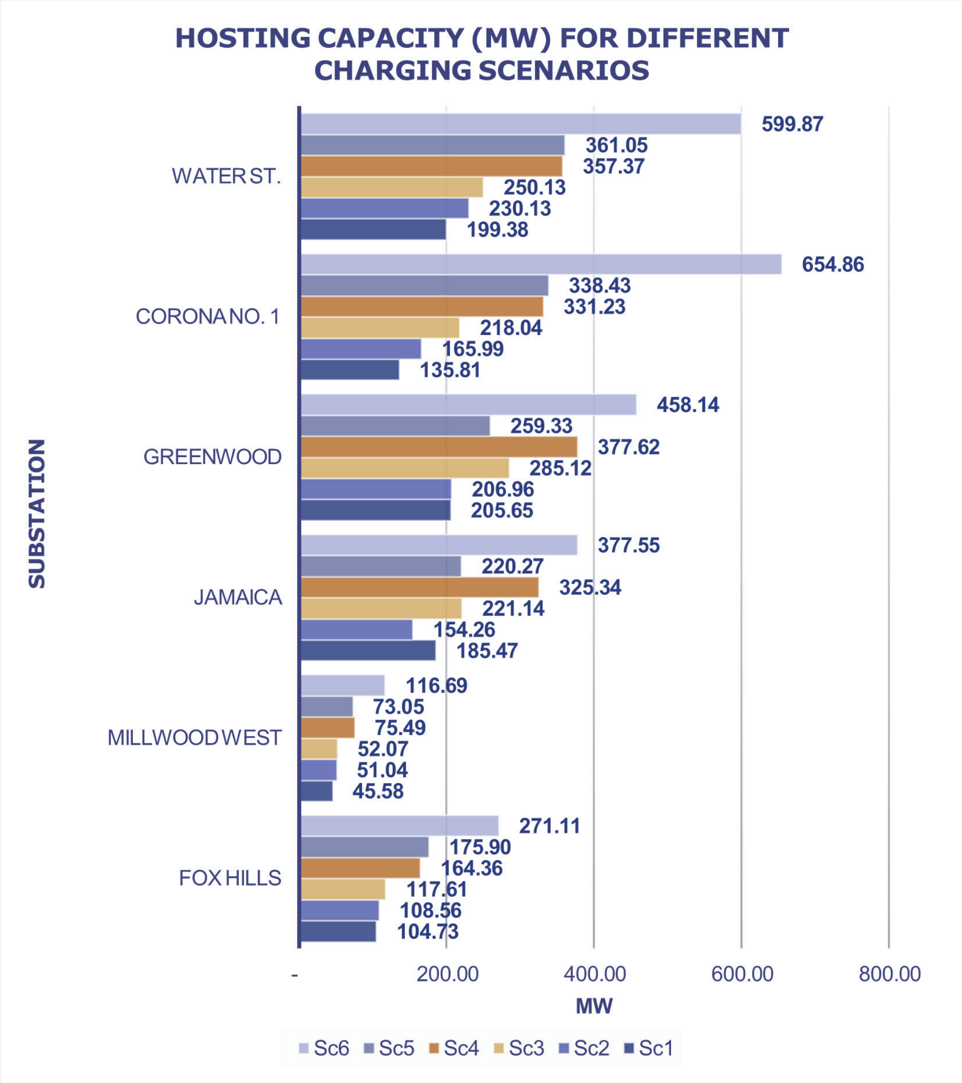


Figure 8. Impact of Planning Assumptions on BESS Hosting Capacity

Figure 9 illustrates the incremental increase in hosting capacity relative to Scenario 1 (Base Case) for each alternative planning approach across the same six substations. Expressing the results as a percentage improvement provides a normalized view of the benefits of each scenario and highlights the relative impact of extending the charging window, modifying the charging profile, and relaxing the charging limit.

Figure 10 summarizes the overall impact of the evaluated planning approaches on BESS hosting capacity, highlighting the comparative performance of the different scenarios across the studied substations.

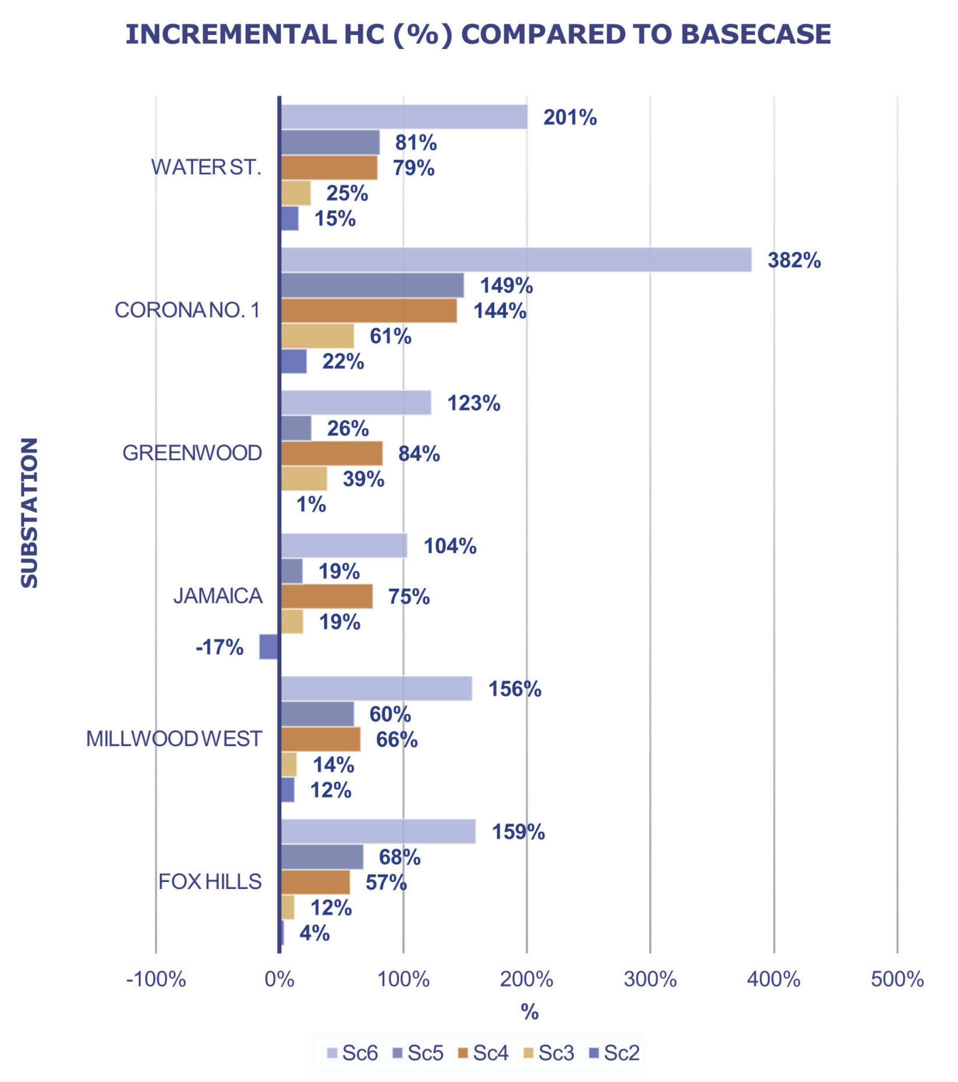


Figure 9. Incremental BESS Hosting Capacity for Alternate Planning Approaches

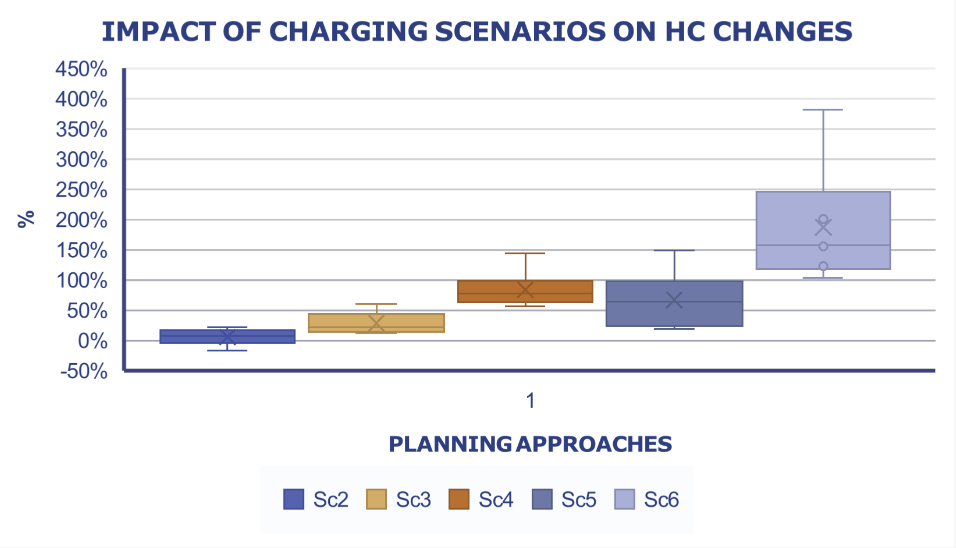


Figure 10. Impact of Alternate Planning Approaches on the BESS Hosting Capacity

OPERATIONAL CONSIDERATIONS

Operational planning assumptions only become actionable if they align with how Con Edison area substations are actually configured and operated in the field. The scenarios evaluated in this white paper (Scenarios 1–6) translate different degrees of operational flexibility into hosting capacity outcomes; however, the practical question is what level of flexibility can be reliably enforced under both contingency and normal operating conditions.

Figure 11 provides a generic illustration of a substation N-2 capability to anchor this discussion. In practice, some systems are planned to N-1, but the concept is the same: the usable capacity depends on the number of transformers assumed to be in service versus out of service, and on how confidently operators can manage load (including storage charging) when equipment is lost. This is the core link to Scenarios 5 and 6, which test the impact of planning on the full contingency capability (i.e., N-1/N-2) rather than limiting charging to the greater of 70% of capability or the substation peak load (Scenario 1 and related cases).

A key operational enabler for planning to 100% of station capability is Con Edison's interconnection SCADA standard for new DER customers, which includes explicit mechanisms to block charging (and, separately, block export) when needed. Figure 12a (block charge logic) illustrates the flexibility of operations during contingency events.

Con Edison SCADA enclosure and RTU architecture can issue control actions to customer equipment through two pathways: 1) a direct, hardwired interface using dry contacts to customer-owned protective relays/circuit breakers/inverter controls and 2) a DNP3 command from the Con Edison RTU to the customer-owned RTU over an RS-485 serial communication link. The block-charge function is described as a backup to customer logic, intended to enforce maximum import/export limits and charge time window restrictions; it also specifies that the customer-owned RTU should block charging within five seconds of receiving the signal.

Turning back to Figure 11, the operator, upon detection of the loss of two substation transformers, could monitor the loading on the remaining 35 MVA transformer and, if needed, could use the functionality to block charging of any or all of the downstream BESS. Even when planned to 100% of station capability, action would rarely be needed, but the backstop protection is in place if needed. Upon relief of the constraint, BESS units are unblocked and return to normal operation.

This fast, enforceable control capability is what makes it plausible, under appropriate operating procedures and confidence in communications and commissioning, to plan to full contingency capability (the philosophy of Scenarios 5 and 6). In this context, operators retain a direct lever to prevent BESS charging from worsening a post-contingency overload, consistent with best practices for managing emergency power system operating states.

Figure 12 b) also supports a second forward-looking point: the pathway from today's relatively static planning assumptions toward an actively managed dispatch state (the optimal charging of Scenarios 4 and 6). The single-line diagram shows the BESS integrated with Con Edison's SCADA interface and, in turn, with the DERMS layer, which can monitor BESS and coordinate fleet behavior. This represents an intended future state in which charging schedules can be dynamically adjusted based on measured system headroom, forecasted loading, and contingency conditions. In other words, the same monitoring and control architecture used for compliance and contingency response (Figure 12 a)) also serves as the foundation for a managed-operational approach (Figure 12b)). This architecture would enable the higher hosting capacity outcomes observed in the optimal charging scenarios.

These operational considerations suggest a staged evolution rather than a single step change. Planning to the full N-1/N-2 capability requires not only a defensible engineering rationale (as demonstrated by the results of Scenarios 5 and 6) but also operational confidence that charging can be blocked quickly and predictably at the site level should conditions warrant it. The SCADA standard defines the core control mechanisms and expected response time, which provides a concrete basis for an operating procedure that can be tied back to planning to enable Scenario 5. As confidence increases, the same framework can expand to incorporate more of the N-0 capability into planning and hence enable even greater hosting of BESS across the Con Edison system.

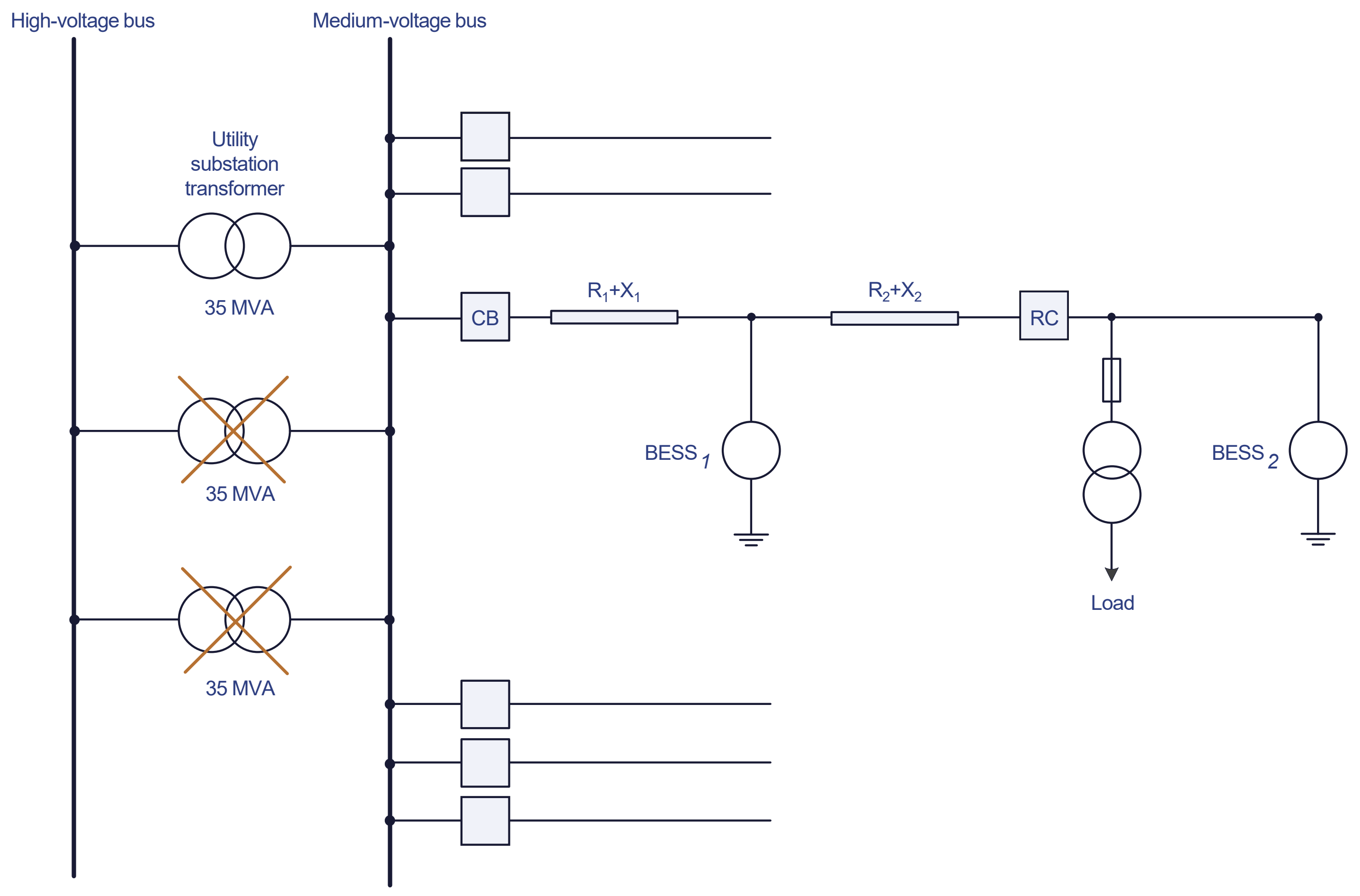


Figure 11. Generic Illustration of N-2 Capability for a Substation

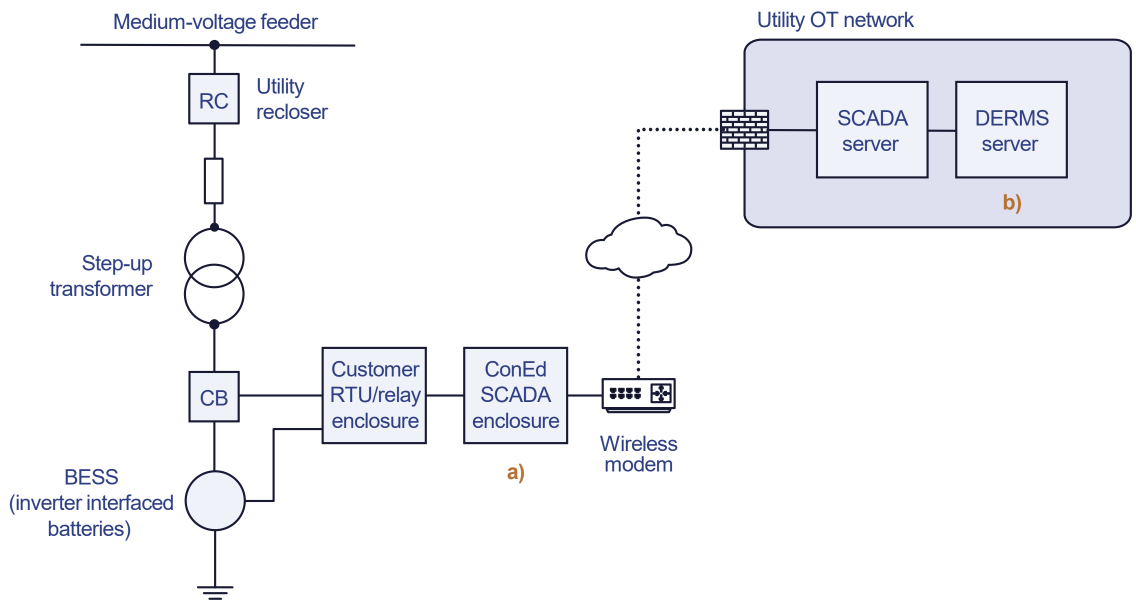


Figure 12. Operational Technology to Facilitate Greater BESS Integration: a) BESS Block Charge Logic and b) DERMS Enabled Optimal Dispatch

RECOMMENDATIONS AND PATH FORWARD

This white paper has reviewed the landscape for BESS integration in the New York City area and conducted studies to identify easily implementable approaches to accommodate additional BESS within the existing system. This section summarizes the main outcomes and presents actionable recommendations for the hosting capacity process, the CESIR study process, and various operational approaches to extend the ability to integrate BESS into Con Edison's distribution system while maintaining the reliability of the electrical infrastructure.

Taken together, these recommendations are actionable, near-term enhancements to Con Edison's approach to BESS integration. Due to NYS leadership under the REV proceedings, Con Edison already stands among the more progressive utilities in North America on this issue; adopting these measures would further strengthen that position and establish a leading example for industry peers.

1: Apply updated charging profiles to hosting capacity maps and CESIR study process (Q2 2026).

Using extended 12-hour charging windows and modified charging profiles (triangle or otherwise) better adapted to the local area station load can increase hosting capacity by 6% and 28%, respectively.[23] These modifications represent easy-to-implement solutions on both the distribution planning and implementation sides that can meaningfully extend the hosting capacity.

Modifying unbuilt BESS installations and retrofitting existing BESS installations with these new charging profiles could be implemented on a voluntary basis, whereby developers opt in. Any modification should be considered non-material as it supports the goals of the state to integrate BESS and have it improve the use of the existing electrical infrastructure.

We should note that these approaches to charging are partly captured in—and are inspired by—the Rider Q and Con Edison distribution engineering bulletin for B-380 interconnections.

2: Extend the limit to 100% of capability where BESS block charging exists, and require compliance with the Con Edison SCADA going forward (Q3 2026).

The ability to rapidly block charging of a BESS subsequent to a contingency condition provides sufficient operational safeguards to manage N-1/N-2 capacity after a contingency condition. Operators could safely and reliably limit or manage all BESS at the area station in question. Most known BESS installations already possess this functionality, but developing appropriate operating procedures would allow planners to confidently plan the system to its full N-1/N-2 capability. This should be done in tandem with recommendation 1, which would extend the incremental hosting capacity from 28% to 86%.[24]

The full N-1/N-2 capability represents a reasonable stepping stone that would result in an 86%[23] increase in hosting capacity for the stations reviewed. As operational confidence increases, planning for the N-0 capability with a reliability margin should be the eventual goal, enabling contingency capacity to be effectively managed by the real-time control mechanisms already in place.

3. Reform interconnection queue data management and transparency (Q3 2026).

Although not directly a focus of the study, the interconnection queue and the associated data were discussed throughout the development of this white paper. There is an opportunity to improve management of the BESS interconnection queue, project statuses, and overall transparency of the process. This would better inform project development and focus engineering time from all stakeholders on projects more likely to move forward. We recommend a more proactive approach to queue management by implementing and monitoring project milestones, both prior to CESIR and those with executed interconnection agreements, to avoid projects sitting stagnant for extended periods. Public tracking of these milestones within the SIR inventory would facilitate better use of the overall system capacity.

4: Leverage Con Edison DERMS investments to actively schedule BESS and enable operational flexibility (Q3 2027).

Over the longer term, operators should monitor and control BESS assets using the Con Edison DERMS to gain greater situational awareness of the BESS portfolio. Moreover, once integrated, these assets can be optimally scheduled as in the optimal scheduling cases (Scenarios 4 and 6), representing the next logical progression and a way to extract more value from the DERMS investments of Con Edison. Linking back to recommendation 1, planners could then further extend hosting capacity by planning to the optimal schedule, or to a realistic percentage thereof, rather than approximating the curve.

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14. Source: Case 25-E-00762, Exhibit_EIOP-7UPD, page 144
15. Source: Case 25-E-00762, Exhibit_EIOP-7UPD, page 91
16. Source: Case 25-E-00762, Exhibit_EIOP-7UPD, page 201
17. The capability represents either the N-1 or N-2 capacity of the station, depending on the network.
18. Example: Under this assumption, a 5 MW/20 MWh BESS with 90% round-trip efficiency would charge at a constant rate of approximately 2.78 MW over the 8-hour charging window in order to deliver the full 20 MWh discharge capability. In this simplified representation, all BESS units are assumed to follow the same static charging profile, regardless of system loading conditions or operational flexibility
19. https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={3025A192-0000-C917-8F5D-13D54E210BE6}&DocTitle=Updated%20Rider%20Q%20Full%20Package
20. Example: For the same 5 MW/20 MWh BESS, extending the charging window to 12 hours reduces the constant charging rate to approximately 1.85 MW, assuming the same 90% round-trip efficiency. The total energy requirement remains unchanged, but the longer charging window spreads the load across more hours, reducing the instantaneous charging demand on the substation.
21. The triangular charging profile represents a simplified curved charging shape in which charging power gradually ramps up from zero to a peak value at the midpoint of the charging window and then symmetrically ramps down to zero by the end of the window. For example, for a 5 MW/20 MWh BESS charging over a 12-hour window, the triangular profile would reach a peak charging level of approximately 3.7 MW at the midpoint of the window and ramp linearly up and down at approximately 0.62 MW per hour. This simplified representation is consistent with the type of curved charging behavior described in the Con Edison B380 specification, which allows storage charging profiles to vary over time rather than remaining fixed.
22. Forecasted 2025 hourly (8,760-hour) load data obtained from the Con Edison Hosting Capacity Map portal. Results reflect the total hosting capacity, i.e. does not consider installed BESS or those in the queue.
23. Mean value from the results for the representative substations considered in this white paper.
24. Using the full 100% capability increased hosting capacity by 67% on average. Use of a 12-hour triangle charging pattern accounts for an additional 28%, hence a total increase of 86% relative to the base case.

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